CRANE

VALVES · FITTINGS
PIPE AND
FABRICATED PIPING

Founded by R. T. Crane . 1855

CRANE CO.

836 S. Michigan Avenue - Chicago, Illinois

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CRANE CO.
56 GRANDVILLE AVE., S. W.
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JOS. H. SHUKER

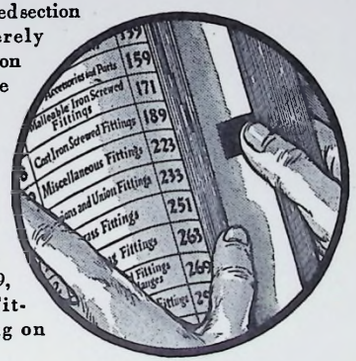
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USE OF THE MAJOR INDEX CLASSIFICATIONS



THE index at the right shows the number of the first page in each section dealing with a separate subject. Each of these pages is marked by a heavy black square printed on the margin of the page, directly opposite the listing of that section in this index. The sketch above illustrates how these black squares can be exposed more clearly, by bending the leaves of the book backward.

TO find any desired section immediately, merely place the thumb on the black square directly opposite the index listing of that section and open the book at that point. In the sketch the user is finding Section 9, Miscellaneous Fittings, beginning on page 223.



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VALVES · FITTINGS
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FABRICATED PIPING

No. 52

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CRANE CO.

836 S. Michigan Avenue • Chicago, Illinois

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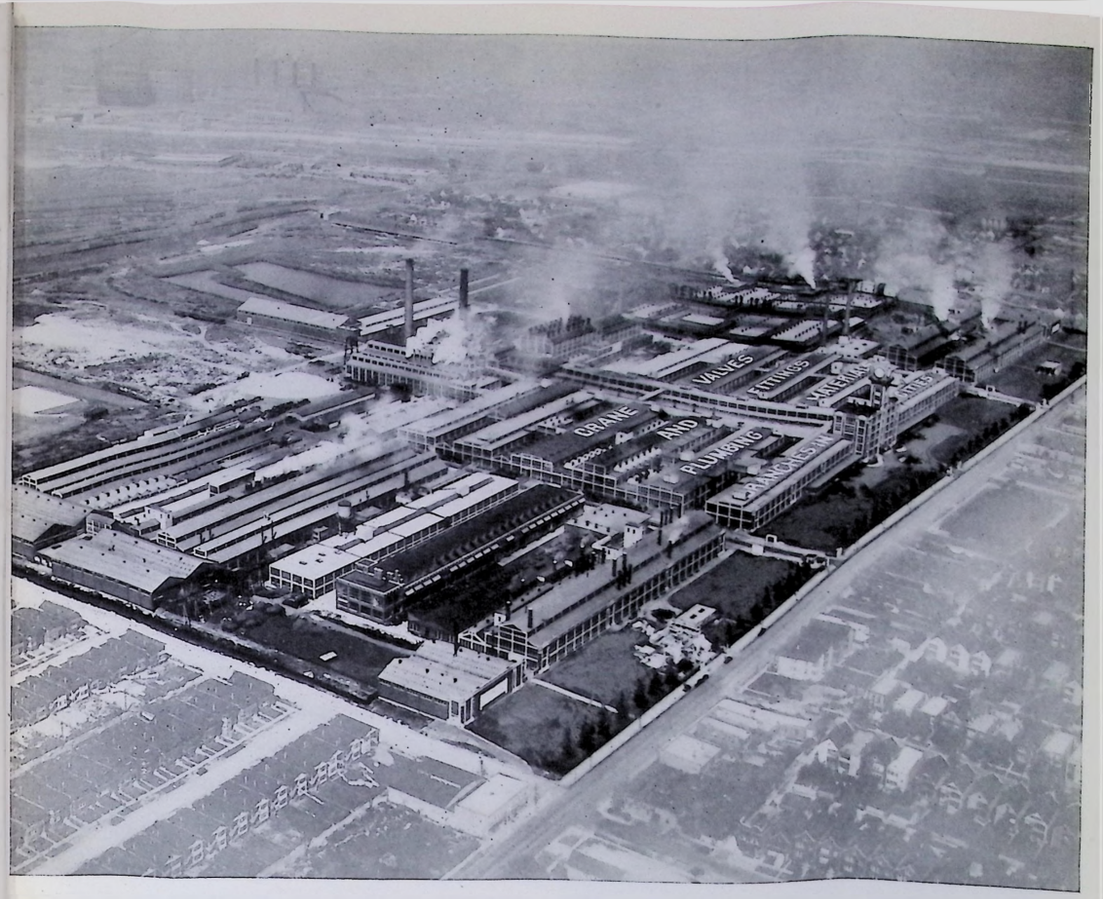
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CRANE CO. CHICAGO WORKS

Principal Source of Products Shown in This Catalog

The Crane Co. Chicago Works covers 160 acres of ground and includes 47 buildings with 72 acres of floor space. Seven miles of switch track connect directly with five different railroads and indirectly with lines reaching every section of the country. At this plant are manufactured valves, fittings and fabricated piping for every industrial use and for all types of construction. These products are described or listed in this catalog.

A complete range of designs, metals and sizes is presented. While extensive engineering data is included, additional information on any item may be had upon request, and without obligation.

You will find exactly the valve, fitting or other product you are looking for, either by reference to the proper section of the book or by consulting the alphabetical index on page I, or the numerical index on page XIX.

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DESIGNING AND ENGINEERING CRANE PRODUCTS



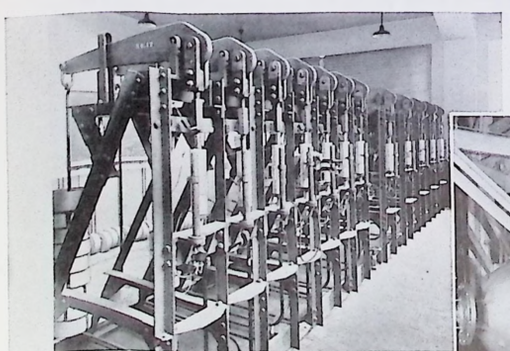
• A partial view of the Product Engineering Department where the technical excellence of Crane products originates.

Every Crane product is the result of careful preliminary work—research, design, testing. The departments devoted to this work are expertly manned and fully equipped. The Research and Development Division makes engineering studies and a wide variety of laboratory tests to determine the desirability and practicability of new products or of any suggested change in existing lines, also to maintain adequate control of the quality in all finished products.

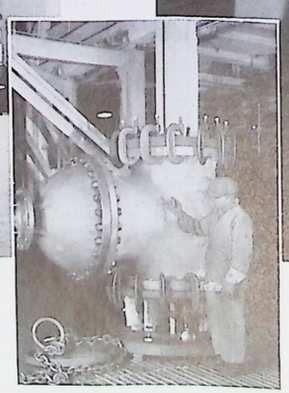
In the Product Engineering Department improvements and refinements in design of staple lines are always in progress, and the special problems of customers receive careful and competent attention. These facilities as well as the experience of the Sales Department are at the service of every customer in working out the best solution of his own problems.



• One of the laboratories where raw materials and metals undergo chemical analysis before going into Crane products.



• Battery of high temperature tensile or "creep" testing machines.



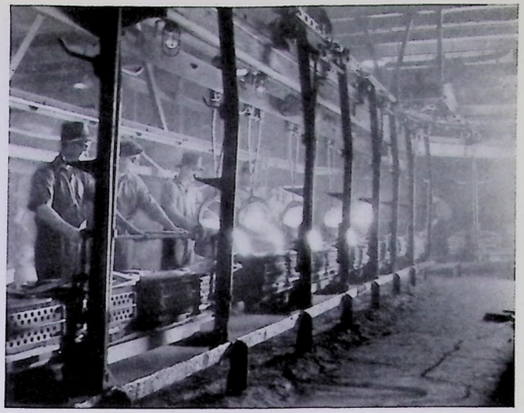
• (At right) Testing a Crane steel valve under high pressure.



• A specimen in the photoelastic apparatus, being studied for hidden strains in the research laboratory.



• Cores in the making. Made of specially selected sands blended by accurate process, automatically conveyed to ovens, finished to exact measurements.



• Continuous molding operation in cast-iron and malleable foundries—molds automatically dumped, sand automatically conditioned and returned for use, castings mechanically conveyed to cleaning departments.

CRANE MANUFACTURING FACILITIES

The vast number of items in the Crane line and the great variety of service for which they are offered necessitate a plant of unusual completeness and one that is fully equipped for all processes involved in manufacturing—from raw material to finished product.

For all cast products, the foundries are of course the first step in the progress from raw material storage to shipping platform. The vast cast iron foundry is typical of equipment and procedure. Cores made in multiple core boxes are placed on continuous conveyors on which they move through the core ovens. After this baking, they are carefully trimmed and gauged for accuracy before using. Crane designed molding machines, continuous mold conveyors, continuous melting cupolas, and an overhead sand tempering and distributing system are features of this foundry which make for uniformity and quality of small parts.

Malleable parts are cast in a separate foundry having long batteries of annealing ovens in addition to continuous equipment like that described above. In another foundry provision is made for heavier iron castings, with floor molding and



• One of the larger electric furnaces used in the steel foundry.



• In the brass foundry, molds are made on specially designed machines supplied with sand through overhead ducts or chutes.

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overhead crane handling. Then there is the brass foundry where non-ferrous metals are cast and the steel foundry with large electric ovens and accurately controlled heat treating furnaces.

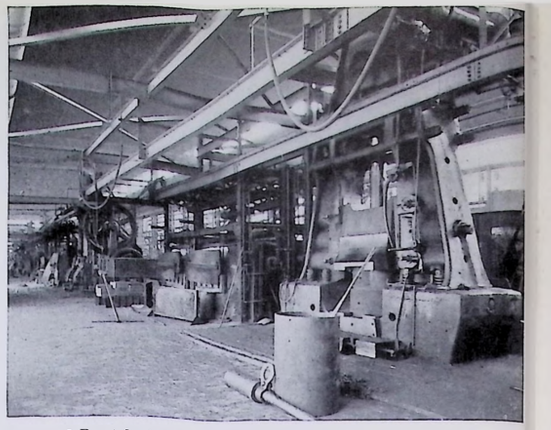
Rough castings pass through various finishing processes—cleaning, machining, polishing, plating, etc.—and are either shipped as fittings or go into assembly with other parts to form complete valves or specialties.

Machining of parts is accomplished by every variety of automatic and semi-automatic machine for facing, grinding, boring, threading, tapping, drilling, and lapping. Many of these machines are of Crane design. Every modern method of conveying parts quickly and automatically through various processes and to storage bins and shipping floors is in use.

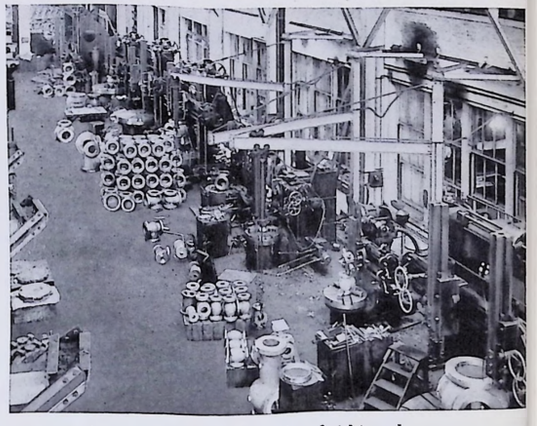
Steel forgings are formed by a range of steam hammers—from the smallest to the largest made. The largest is capable of striking a blow of more than 8 million foot pounds. Brass and other alloys are forged in a separate shop.

Pipe fabrication is accomplished on special bending floors and with special machinery, including facilities for threading, flanging, and Cranelapping bends of small and large diameter. In this department are the huge presses for forming seamless steel welding fittings. The shops are equipped for every type of welding and staffed with certified welders.

All products are rigidly inspected after each operation to insure the maintenance of exact standards of material and workmanship. Inspection and testing departments are provided with every known instrument and device for this purpose. Testing facilities include air pressures up to 1,500 lbs., steam up to 1,500 lbs. at 1000 deg. superheat, and water from city pressure up to the highest that is practicable to measure.



• Partial view of forge shop where valves and fittings for high pressures and high temperatures are made.



• A section of the large valve finishing shop.



• Bending pipe in the fabricating department. Pipe of large diameter is formed with amazing accuracy on this special floor.

STOCK AND DELIVERY SERVICE

A distinguishing feature of Crane policy has always been to maintain widely distributed and adequate stocks of all staple lines for the convenience of customers. Even through fluctuating economic conditions, a very enviable record for filling orders promptly has been maintained. While every possible effort is made to anticipate the needs of industry, customers will greatly facilitate this important service by giving us complete information regarding their requirements as soon as possible.

Our branches and distributors carry a well assorted stock of Crane valves and fittings to meet the demand in their particular locality. Their stocks are regularly supplied from the large factory stock, the extent of which is indicated by the illustration below.

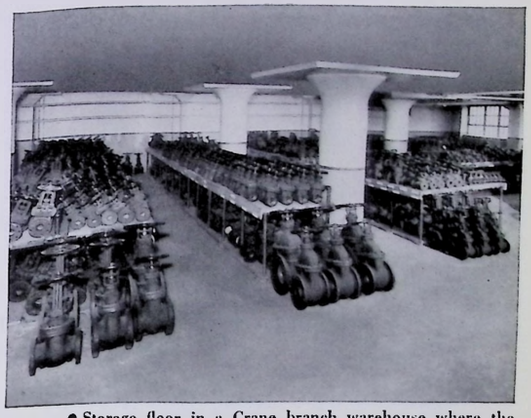
The size and location of stocks make the Crane line always readily available in every major industrial center. This assurance of a stable supply is an important plus-value which attaches to Crane products.



• This single view of one bay in the stock department of the Chicago works suggests the amount of stock required to supply the demand for even a single line of valves.



• Adequate pipe stocks are carried by all Crane branches and distributors. The service is facilitated by modern methods and modern equipment throughout.



• Storage floor in a Crane branch warehouse where the larger valves and fittings are stocked.



• This view of the small parts stock in a Crane branch indicates clearly the extensive provision for prompt and accurate supply of staple requirements.

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TERMS

This catalogue supersedes all previous issues.

Credit Terms: Thirty days net.

Remittances should be made to the office from which our invoice is issued, in funds free of exchange or collection charges.

Prices and Designs: Subject to change without notice.

Contracts: Subject to strikes, accidents, or other causes beyond our control.

No claims allowed unless made within ten days of receipt of goods.

We guarantee Crane goods to the extent that we will replace those having manufacturing defects when used in the service for which we recommend them. No charges for labor or expense required to repair defective goods, or occasioned by them, will be allowed. If the goods are defective, the measure of the damage is the price of the defective goods only.

Goods must not be returned to us unless our consent has first been obtained.

Orders covering special goods are not subject to cancellation, except upon agreement to make payment for the special work which has been performed.

All special goods made to specification, where the buyer is to inspect them, must be inspected and accepted before shipment is made. After shipment is made, our responsibility ceases.

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341½ E	113
342	146
342 E	113
342½ E	113
343	146
343 E	113
343½ E	113
344	146
345	146
346 P	141
346½	150
347 D	225
347 P	141
350	144
350¼	144
350½ C	140
351	144
351¼	144
352	144
352 E	338
352¼	144
352½ C	140
353	144
353 E	338
353¼	144
354	142
354 E	338
355 E	339
356	142
357 E	338
358	145
358½	145
359	145
359 E	339
359½	145
360	142
360 E	339
360½	145
361 X	306
361½	145
362	144
362 E	22
363	144
363 X	306
364 E	22
366	151
366 E	36
366½	150
366½ C	150
367	151
367½	150
367½ C	150
368	151
369 E	36
371 X	308
372	153
372 P	26
372½	153
373	153
373 P	26
373 X	308
373½	153
374 P	26
374¼	153
374½	156
375	156
375 P	26
375½	156
376	400
376 X	323
377 X	323
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382	383
382 P	24
383 P	24
383 X	310
384	386
384 P	24
385	386
385 P	24
385 X	310
386 A	387
386 H	387
389 X	312
390	382
390 H	245
391	382
391 XR	348
391½ H	245
392 H	245
393	382
393 H	245
393½	382
394	154
394 H	245
394½	154
395	154
395½	154
396 H	245
396 X	323
397	155
397 X	323
398	437
398 H	245
398½ H	245
399 H	245
399½ H	245

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401 D	305
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403 D	305
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407 D	305
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412	435
412 D	305
413 D	305
415 D	305
415 H	386
415 V	386
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417	388
417 D	305
417½	388
419 D	305
421 D	305
423 D	305
423½ D	305
425½ D	305
427 D	305
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429 D	305
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453 E	338
454 E	338
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458 E	338
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496 E	340
497 E	340

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525 D	303
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527	274
527 D	303
528	274
529	276
530	276
531	276
531 D	303
532	276
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536	276
537	278
537 D	303
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539 D	303
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555	290	625 D	307	757	111	853 E	342					1253 D	311
556	332	639	531	757½	111	854	59					1254 D	311
556½	332	640	443	760	181	854 D	309					1268 E	626
557	291	642	527	760 D	330	854 E	341					1269 E	631
558	290	644	527	762	181	855 E	341					1278 E	628
558½	332	651 E	334	762 D	330	855 H	294					1290	235
559	290	656 E	341	764	181	856	59					1292	235
561½	626	657 E	334	764 D	330	856 E	335					1294	235
567	271	658 E	334	766	181	857 E	335					1296	235
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571	271	665 E	631	775	247	860	59						
572	340	666 E	340	776	107	861 E	631						
573	271	670 E	628	777	107	862 E	340						
574	340	673	216	778	107	869 E	628						
575	271	674	216	779	107	874 E	340						
577	271	675	216	780	107	890 E	241						
578	271	677	216	781	107	891	105						
579	271	679	216	791	105	891½ E	241						
580	271	679 E	216	793½	105	892 E	241						
581	271	681	216	798	105	893	105						
582	271	681 E	216			893 E	241						
585	179	690	238			894 E	241						
586	179	691	238			895 E	241						
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587	179	693	238			897 E	241						
587½	179	693 E	342			898	105						
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589½	179	696	238										
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804½ H	84
805 H	84
805½ H	84
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817 E	240
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819½ E	240
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821 H	158
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919½ E	242
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981½	424
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983 D	424
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986	432

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1058	200

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1116 A	399
1117	397
1117 A	399
1118	412
1118½	412
1120	397
1121	397
1121 A	399
1122	401
1123	410
1124	410
1124 A	413
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1128½	408
1130	408
1131	402
A 1131	402
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1164	394
1165	394
1166	394
1168	394

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1471	78	1553 D	313			2581	393	2773	560				
1472	78	1555	515			2590	393	2777	561				
1473	78	1557	515			2591	393	2778	561				
1474	78	1559	516					2779	561				
1475	78	1559 E	626					2780	561				
1476	78	1560 E	631					2785	562				
1477	78	1561	516					2787	562				
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1491	109	1569 E	628					2797	563				
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		1574½	519										
		1575	519										
		1575½	519										
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		1585	514										
		1586	514										
		1586¼	514										
		1586½	513										
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		1591½	248										
		1594½	513										
		1595	513										

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1509½	512
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1826 P	25
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1953	545

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2855	572
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2858	572
2861	573
2863	573

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3033 D	349
3034 D	349
3035 D	349
3036 D	349
3041 H	413
3042 E	349
3043 H	348

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3935	459

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4063	499
4064 E	501
4065 E	501
4068 E	505
4069 E	505

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4197	493
4198	493
4199	493

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4202	365
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4214 P	494
4234 E	501
4235 E	501
4270	51

4300

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4362 E	495
4364 E	495
4377	507

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4437	502
4448	503
4449	503

4700

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4752 L	506
4753	506
4753 L	506

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18803	421
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18820	421
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18840	421
18841	421
18859	421
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18863	420
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18891	420

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Crane Materials

During the eighty years of Crane progress, numerous metals have been developed to meet specific requirements and new needs of industry. Many of these have demonstrated their usefulness to industry by standing up in service for years and have become standardized as the materials most suitable for certain conditions. Not only does Crane Co. furnish the most suitable of standardized piping materials, but with changing conditions and increasing severity of service, higher pressures and temperatures in steam power plants, in oil refineries, and in industrial chemical manufacture, Crane metallurgists and engineers have been constantly at work developing new alloys and adapting the most useful commercial alloys to meet specific needs.

In design also, besides well established standard equipment, improvements are constantly sought to meet particular as well as general uses. Not only is the integrity and serviceability of each material guaranteed by analyses and physical tests made throughout manufacture, but the serviceability of the product as a whole is thoroughly tested out under conditions similar to but more severe than met in actual use.

The temperature to which equipment will be subjected in service is of great importance in the selection of materials, because the strength and permanence of most metals are affected by temperature. Obviously, these effects must be considered in design calculations and choice of materials. Crane Co. has pioneered in the study of the effect of temperature on the properties of metals, and such tests have become a regular part of the procedure of examination and development of new materials. Crane Co. maintains a well equipped Laboratory for making tests at normal, sub-normal, and high temperatures, the latter over both short and long periods of testing.

In the property of corrosion resistance there is no one metal that has universal application. Some metals have high resistance to some corrosive substances while offering comparatively little resistance to others. Conditions such as temperature and degree of dilution are other factors that may affect choice of a corrosion resistant metal. Considerations of economy enter into the question. In some cases the problem is not a question of life of equipment, but one of contamination (even to a slight degree) of product in process of manufacture. All these factors are taken into account by Crane chemists and engineers in advising the best materials to meet your individual problem.

Crane Co. regularly manufacture a complete line of non-ferrous goods. The Crane regular line of brasses, bronzes, and nickel alloys has become well known, and they have demonstrated their serviceability through many years of use. Crane Steam Brass, Special Brass, Hard Metal, Bronze Stem Metal, and Nickel Alloys are among those manufactured regularly to successfully meet varied and exacting requirements.

In the iron and steel line, great advances have been made in the past few years to keep pace with and to allow desirable increases in pressure and temperature, dictated by economic considerations. Crane Co. has been keeping up with and anticipating the advancing requirements and demands of industry.

Characteristic properties of a number of metals regularly used in Crane products are given on this and the following pages.

Crane Steam Brass

Crane Steam Brass is an alloy of copper-tin-lead and zinc, of the class known as Red Brass. It conforms to the requirements of A.S.T.M. Specification B62 (Composition Brass, 85-5-5-5, sometimes referred to as "ounce" metal).

The average physical properties of Crane Steam Brass given below are higher than usually required by specifications for this class of material:

	Average
Tensile Strength, pounds per square inch	34,000
Yield Point, pounds per square inch	16,000
Elongation in 2 inches, per cent	22

Crane Special Brass

This alloy, commercially termed bronze, is a high grade brass conforming to the requirements of A.S.T.M. Specification B61 for steam or valve bronze.

The average physical properties are given below:

	Average
Tensile Strength, pounds per square inch	36,000
Yield Point, pounds per square inch	17,000
Elongation in 2 inches, per cent	25

Crane Hard Metal (Bronze)

This is a pure copper-tin bronze of high strength and hardness which years of satisfactory service have proved thoroughly reliable for valves and fittings for use with high pressures under extremely severe conditions. Its hardness and average tensile strength of 40,000 pounds per square inch make it an exceptionally desirable material for valve bodies, seats, and discs to withstand severe service.

This material conforms to the requirements of A.S.T.M. Specification B60.

Sand Blasting Brass Castings at the Chicago Works



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Crane No. 44 Nickel Alloy

Crane No. 44 Metal is a nickel alloy of 50,000 pounds per square inch tensile strength, and hardness superior to that of ordinary bronze. It has given excellent service in valves, valve trim, and fitting castings under such conditions as process work, where material more corrosion and wear resistant than brass or bronze is required.

Crane No. 49 Nickel Alloy

Crane No. 49 Nickel Alloy is a nickel-copper-tin alloy having a Brinell hardness of approximately 225 and a minimum tensile strength of 60,000 pounds per square inch. It is particularly suitable for the seating surfaces of gate valves, where good bearing properties and resistance to galling are important. It also has excellent resistance to the cutting action of steam. These properties made it well suited for globe valve discs, especially when the valves are used for throttling service.

Crane Cast Manganese Bronze for Stems

To procure a metal to withstand the great torsional and tensile strains to which valve stems are subjected, Crane Co. has developed "Crane Cast Manganese Bronze", which is now used where "Cast Bronze" stems are called for. This material has a minimum tensile strength of 65,000 pounds per square inch and conforms to the requirements of A.S.T.M. Specification B54.

Crane Cast Aluminum (Alcoa No. 43 Alloy)

Crane Co. is in a position to furnish valves and fittings cast in aluminum and has standardized on the Aluminum Co. of America Alloy No. 43 for such articles when required for corrosive service conditions.

This is an aluminum alloy containing approximately 4.5 to 6.0% silicon, with physical properties as shown below:

	Minimum
Tensile Strength, pounds per square inch	17,000
Elongation in 2 inches, per cent	3

Crane Cast Irons

Crane Cast Iron is regularly produced in three grades in order to obtain uniform density, soundness, and close-grain in all thicknesses of sections employed in the various lines of valves and fittings made in cast iron.

Cast iron conforms to the requirements of A.S.T.M. Specification A126 for Class A Castings, and is used for small valves and fittings having light sections.

Ferrosteel conforms to the requirements of A.S.T.M. Specification A126 for Class B higher strength Gray Iron Castings, and is used for sections of medium thickness.

High Tensile Iron, used for heavier sections, has an average tensile strength of 50,000 pounds per square inch.

Cast iron and Ferrosteel exceed the minimum requirements of A.S.T.M. Specification A126, as can be seen from the comparison in the following table:

	Crane Cast Iron	ASTM A126	Crane Ferrosteel	ASTM A126	Crane High Tensile Iron
	Average	Class A	Average	Class B	Average
Tensile Strength, pounds per square inch	26,000	21,000	35,000	30,000	50,000
Transverse Test, Load at Center, pounds	3,000	2,500	3,600	3,300	4,200
Transverse Test, Deflection at Center, inches	0.12	0.10	0.14	0.12	0.14

Crane Ni-Resist Cast Iron

Ni-Resist Cast Iron (sometimes called Monel Cast Iron) is used as material where the physical properties of cast iron are suitable but where greater resistance to corrosion is required. At high temperatures it is far more resistant to growth and scaling than ordinary cast iron.

Ni-Resist is an alloy cast iron containing approximately 14% nickel, 6% copper, 2½% chromium, and has a tensile strength of approximately 25,000 pounds per square inch.



A Foundry Floor, Chicago Works

Crane Malleable Iron

Crane Malleable Iron is particularly well adapted to the manufacture of screwed pipe fittings, valves, and flanges. It is characterized by pressure tightness, stiffness, and toughness, the latter property being an especially valuable one for pipe line materials, particularly for service involving expansion and contraction stresses and shock.

This iron has a tensile strength of from 40,000 to 50,000 pounds per square inch. By the application of improved methods in furnace practice, casting, and annealing, a superior line of malleable iron goods is assured.

Crane Malleable Iron conforms to the requirements of M.S.S. Specification No. SP22, adopted by the Manufacturers' Standardization Society, which is specified for use in valves and fittings in the American Standard Code for Pressure Piping, A.S.A. B31.

The value of malleable iron to resist shock or impact as well as bending stresses caused by weight of piping, expansion, etc., is shown in the following table, which gives a comparison of malleable iron with cast iron and cast steel. Note that the malleable iron and cast steel bars had to be reversed after each blow due to bending.

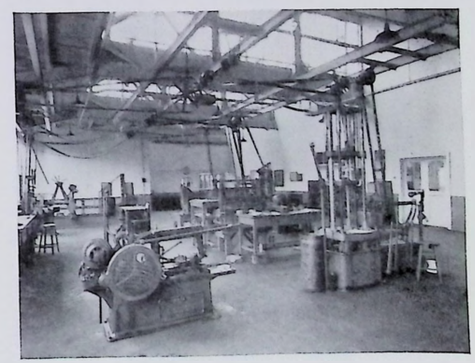
Material	Tensile Strength in Pounds per Square Inch	Blows of a 25-pound Drop Hammer to Break	Shock Test Foot Pounds	Size of Bars
Cast Iron	23,400	7	102	1 x 1 x 13
Ferrosteel	35,060	11	206	1 x 1 x 13
*Malleable Iron	41,200	22	1,580	1 x 1 x 13
*Cast Steel	80,120	92	10,112	1 x 1 x 13

*These bars had to be reversed after each blow on account of bending.



Malleable Iron Torsional Test Bar

As a part of our regular routine control in the production of malleable iron and the annealing of articles made from it, a torsional test bar is illustrated, one of which is made half-hourly during each day's run.



Views in the Laboratories, Chicago Works

Exelloy

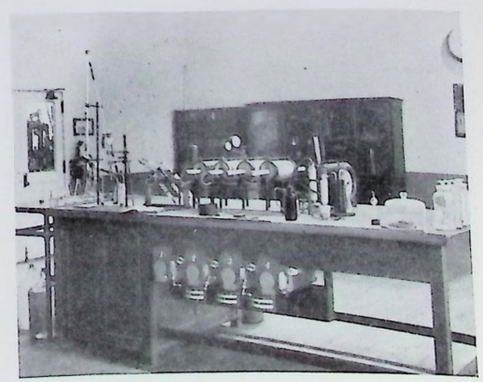
Exelloy is a chromium iron of the stainless group, containing about 12 per cent chromium and 0.10 per cent carbon. When used for valve stems, it is heat treated to give the following physical properties:

Tensile Strength, pounds per square inch	100,000
Yield Point, pounds per square inch	80,000
Elongation in 2 inches, per cent	20
Reduction of Area, per cent	60
Brinell Hardness, Approximate	225

When used for body seat rings of valves, it is heat treated to higher physical properties, as follows:

Tensile Strength, pounds per square inch	145,000
Yield Point, pounds per square inch	125,000
Elongation in 2 inches, per cent	18
Reduction of Area, per cent	50
Brinell Hardness, Approximate	300

Valve discs when made of Exelloy are given a supplementary heat treatment to obtain a minimum Brinell hardness of 350.



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Crane Carbon and Alloy Cast Steels

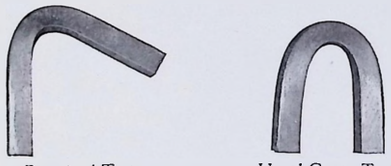
To meet the numerous service requirements to which valves and fittings are subjected, Crane Co. regularly produces a variety of cast steels, each of which fulfills the qualifications for a particular service condition.

All Crane Cast Steels are made by the basic electric furnace process and are thoroughly and uniformly heat treated to refine the grain, relieve cooling strains, and give the required physical properties.

Crane Carbon Cast Steel

Crane Carbon Cast Steel conforms to the requirements of A.S.T.M. Specification A95 for valves, flanges, and fittings for high temperature service. The physical properties are higher than required by usual specifications, as shown below:

	Usual Requirements	Crane Carbon Cast Steel Average
Tensile Strength pounds per square inch	70,000	80,000
Yield Point pounds per square inch	36,000	42,500
Elongation in 2 inches per cent	22	24
Reduction of Area, per cent	30	40
Cold Bend, degrees	120	120 to 180



Required Test — Usual Crane Test Carbon Steel



Crane Tensile Test Bar Before and After Test

Crane Nickel Cast Steel

Crane 2¼% Nickel Cast Steel has been developed to meet the demand for a cast steel having good resistance to shock or impact at sub-zero temperatures, such as encountered in lubricating oil dewaxing service.

This steel has the following physical properties:

	Minimum
Tensile Strength, pounds per square inch	67,500
Yield Point, pounds per square inch	40,000
Elongation in 2 inches, per cent	25
Reduction of Area, per cent	45
Charpy Impact at minus 75°F., foot pounds	10

Crane Nickel-Chrome Alloy Cast Steel

For high pressure hydraulic work and oil and gas well drilling service, Crane Co. has developed a moderately alloyed cast steel which, due to its high strength and fine grain structure as well as better resistance to erosion and corrosion, has been used for high pressure valves and fittings for a number of years.

This steel has also been used to a considerable extent for oil cracking service where pressures and temperatures were beyond the useful range of plain carbon steel. The addition of approximately one-quarter of one per cent molybdenum to this alloy steel has proven definitely to prevent embrittlement when exposed to temperatures encountered in cracking service.

This steel conforms to the requirements of A.S.T.M. Specification A157, Grade C11, and has the following physical properties:

	Minimum
Tensile Strength, pounds per square inch	110,000
Yield Point, pounds per square inch	75,000
Elongation in 2 inches, per cent	18
Reduction of Area, per cent	30

Crane Carbon-Molybdenum Cast Steel

This steel has excellent strength retention at high temperatures, but unlike most alloy steels, heat treatment is not imperative after welding, as it air hardens only to a negligible degree. These properties make it well suited for valves and fittings to be field welded.

The addition of ½ per cent of molybdenum to carbon steel increases its resistance to "creep" or "flow" at temperatures from 800° to 1000°F. Therefore, valves and fittings designed for nominal pressures at 750°F., when made in carbon-molybdenum steel, may be safely recommended for the same pressures at temperatures 150° to 200°F. higher than when made in plain carbon steel.

This steel conforms to the requirements of A.S.T.M. Specification A157, Grade C1, and has the following physical properties:

	Minimum
Tensile Strength, pounds per square inch	80,000
Yield Point, pounds per square inch	50,000
Elongation in 2 inches, per cent	22
Reduction of Area, per cent	45

Crane 5% Chrome-Molybdenum Cast Steel

This steel fills the need for an economical corrosion resisting steel for use in valves and fittings for cracking service in the handling of sulphur bearing oils. Chrome-molybdenum steel conforms to the requirements of A.S.T.M. Specification A157, Grade C5, and has the following physical properties:

	Minimum
Tensile Strength, pounds per square inch	110,000
Yield Point, pounds per square inch	80,000
Elongation in 2 inches, per cent	18
Reduction of Area, per cent	30

Crane 18-8 Chrome-Nickel Alloy Cast Steel

Valves and fittings made of this material may be recommended for use in all lines handling food products. It also has excellent resistance to oil or oil vapors containing hydrogen sulphide.

This material conforms to the requirements of A.S.T.M. Specification A157, Grade C9, and is properly heat treated to obtain maximum corrosion resistance and physical properties as given below:

	Requirements of A157, Grade C9	Crane 18-8 Steel, Average
Tensile Strength pounds per square inch	70,000	78,000
Yield Point pounds per square inch	30,000	38,000
Elongation in 2 inches, per cent	35	50
Reduction of Area, per cent	40	55

This metal is licensed by the Chemical Foundation, Inc., under U. S. Patents No. 1,316,817 and No. 1,339,378.

Crane Carbon Forged Steel

Crane Forged Steel used for carbon steel flanges, valves, and fittings conforms to the requirements of A.S.T.M. Specification A105, Class II.

This steel, having a maximum carbon content of 0.35%, is also suitable for fusion welding, in accordance with A.S.T.M. Specification A151. The physical properties are as follows:

	Minimum
Tensile Strength, pounds per square inch	70,000
Yield Point, pounds per square inch	36,000
Elongation in 2 inches, per cent	22
Reduction of Area, per cent	30

Crane Carbon-Molybdenum Forged Steel

Forged flanges, valves, and fittings required for pressures and temperatures beyond the range of plain carbon steel are forged from carbon-molybdenum steel conforming to the requirements of A.S.T.M. Specification A182, Grade F1.

Because of its strength retention properties at elevated temperatures and due to the fact that it hardens only to a negligible degree after welding, it is an excellent material for high temperature service and where valves or flanges are joined by fusion welding.

The physical properties are as follows:

	Minimum
Tensile Strength, pounds per square inch	70,000
Yield Point, pounds per square inch	45,000
Elongation in 2 inches, per cent	25
Reduction of Area, per cent	35

Crane Bolting Materials

In the manufacture of Crane Flanged Valves and Fittings, three classes of bolting materials are regularly used. These materials are as follows:

Bolts and studs for temperatures up to 500°F. are made from open hearth steel complying with A.S.T.M. Specification A107, Open Hearth Screw-Steel grade, having the following physical properties:

	Minimum
Tensile Strength, pounds per square inch	60,000
Yield Point, pounds per square inch	35,000
Elongation in 2 inches, per cent	25
Reduction of Area, per cent	50

Studs and bolt-studs for temperatures up to 500°F., primarily for high pressure hydraulic service, are made from cold rolled steel complying with A.S.T.M. Specification A108, Open Hearth Screw-Steel grade, having the following physical properties:

	Minimum
Tensile Strength, pounds per square inch	70,000
Yield Point, pounds per square inch	60,000
Elongation in 2 inches, per cent	18
Reduction of Area, per cent	45

Studs and bolt-studs for high temperature service are made from Crane Triplex Steel, which complies with the requirements of A.S.T.M. Specification A96 for Class C Bolting, and the American Steel Flange Standards, B16e-1932.

	Minimum
Tensile Strength, pounds per square inch	130,000
Yield Point, pounds per square inch	110,000
Elongation in 2 inches, per cent	18
Reduction of Area, per cent	55



Forging Steel Pipe Flanges, Chicago Works

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Materials for Corrosive Fluids

The preceding pages give a brief description of the chemical and physical properties of the materials used in the manufacture of Crane Valves and Fittings, and many of the articles listed in this catalogue will find use in applications where corrosion is not apt to cause serious trouble. Typical service conditions for which regular materials are suitable are water and steam lines in plants which operate under close technical supervision; and, as a result of that supervision, corrosion can be eliminated completely, or minimized to the extent that satisfactory service life is attained.

Unfortunately for industry as a whole, however, corrosion by many of the almost unlimited number of fluids and combinations of fluids encountered in the chemical and process industries cannot be disposed of so easily. Some of these fluids cannot be handled in metallic equipment at all, in which case there is no corrosion problem for the metallurgist. The handling of others necessitates the use of extremely special materials, with the choice limited to one or, at the most, a very few metals or alloys. In fact, there are very few applications for which valves, pipe, and fittings are used where the choice among the multitude of metals and alloys available does not depend, at least in part, upon the corrosive tendencies of the fluid to be handled. This means that the manufacturer of metallurgical products must be prepared not only to produce equipment capable of withstanding the extreme pressures and temperatures which are encountered in present day processing, but must be prepared also to furnish materials which can be used in contact with corrosive fluids, and to advise which of the materials he has to offer is best suited for use in contact with the particular fluid or fluids under consideration.

The recommendation of materials for corrosive service requires an understanding of the variable conditions involved and the behavior of any metal or alloy towards any of the various corrosive media, as well as upon definite information regarding the conditions under which the article is to be used and the results which are expected from it. The principal "variables" referred to are the purity, concentration, and temperature of the substance being handled. Another which might also be considered is the possible difference between the results obtained from a given metal or alloy after rolling or forging and those obtained from the same materials in the form of a casting. Under the subject conditions of service and results desired, consideration must be given to such points as agitation, velocity, exposure to the atmosphere, intermittent and continuous operation, contamination of the product being handled, and effect on dissimilar metals in contact.

Crane Co. is in an excellent position to meet the needs of the present day industry, due to their complete laboratory facilities and continual contact with field conditions. It must be realized, however, that complete information regarding service conditions is necessary to avoid delays in making suitable recommendations.

It is also desirable to know something of the consumers' past experience with materials for valves, fittings, and pipe under the conditions of service in his particular plant, and whether the service life obtained from various materials has been considered satisfactory.

In order to simplify the preparation of data required, Crane Co. has prepared a "Questionnaire", copies of which are available at all Crane Branches. Upon receipt of this questionnaire, properly filled out, we will be glad to make definite recommendations covering valves and fittings which can be expected to give maximum service life under the conditions specified. All data and information received will be held strictly confidential.

Distinguishing Marks

All product is marked for identification with either the name "CRANE", the letter "C", or the letters "CC", depending on the size and type of the article as well as the method of manufacture. In addition, certain unions and union fittings have specific marking, such as "GEM", "RAILROAD", etc. Unions, fittings, and valves made in accordance with the specifications adopted by the American Association of Railroads are marked with either the letters "ARA" or "AAR".

Designation of Material

Cast iron product has no marking indicating the material.

Malleable iron product is marked with either the letters "MI" or "MALL", except for Standard Malleable Iron Screwed Fittings which can be distinguished from the Standard Cast Iron by the open crotch between the bands in place of joining bands, and unions or union fittings which are not made in cast iron and cannot be confused.

Brass product can be readily distinguished from cast iron by its color, and therefore has no material marking, except special bronze alloys which have special markings.

Steel product is all marked with the word "STEEL" which definitely distinguishes it from cast iron. In addition, alloy steels are marked with a symbol to identify the alloy. Steel castings of pressure containing parts have the heat number stamped on a raised pad.

Cast stainless steels and other corrosion resistant alloys have special markings.

Designation of Service Pressure Ratings

The recommended pressure ratings for each line of goods illustrated in this Catalogue are specified on the page where listed. Nearly all of the product, with the exception of Gas Stops, Low Pressure Brass Valves, and Standard Screwed Fittings, are marked with the recommended basic working pressure.

Where the numerals are not followed by any suffix symbols, they represent the basic steam service pressure rating at the maximum temperature which is given for the line on the corresponding page of this Catalogue, or, where the maximum temperature is not specified, at the temperature of saturated steam.

Ammonia Valves and Fittings are an exception to the foregoing in that they are marked "300" without any suffix symbol to indicate ammonia service pressure. Valves with leather or rubber faced discs are another exception in that they use bodies regularly marked with a basic steam rating, yet should only be used on the service that this type of disc face is recommended for.

Where the numerals are followed by the letters "WOG", they represent the water, oil, or gas service pressure rating at or near atmospheric temperature. Where two sets of numerals are shown, the steam service pressure is followed by the letter "S", and the water, oil, or gas service pressure, by the letters "WOG". Test pressure marking, where used, is followed by the word "TEST".

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Air Testing

The fact that many of our products are recommended for water, oil, and gas does not necessarily indicate that all of those products are air tested. It has been found commercially that our regular stock valves have proven quite generally satisfactory for gas service without an air test, and therefore when an air test is required, it must be definitely specified.

Any valves that are to be used for air, gas, or very volatile fluids and where absolute tightness is of essential importance, should be ordered air tested unless the catalogue definitely states that they are regularly air tested.

All valves which are air tested are provided with protectors placed over the openings.

Hydrostatic and Shock Working Pressures

All valves, fittings, and flanges in this catalogue are suitable for the liquid working pressures given, only when used in hydraulic installations in which shock is absent or negligible.

The sudden closure of a valve in a hydraulic system causes the body of liquid, which may be moving at a rate generally in excess of 1 foot per second, to stop instantaneously. As a liquid is relatively incompressible, the effect of the sudden cessation of flow is to raise the pressure considerably above the static working pressure. This increase in pressure is called "SHOCK" and may, in some cases, be sufficient to cause valves or piping to fail.

The increase in pressure due to shock is not dependent upon the working pressure of the system but upon the velocity with which the liquid is flowing. For example: An installation having a working pressure of 100 pounds per square inch with a velocity of 3 feet per second will be subject to the same increase in pressure due to *instantaneous closure* of a valve as one having a working pressure of 1000 pounds per square inch and the same velocity.

Shock is generally prevalent in lines which are equipped with check valves, quick closing valves, or in lines supplied by reciprocating pumps. However, shock may also be produced in any line to a lesser degree by the rapid closure of regular globe or gate valves, and it is therefore recommended that care must always be used in closing valves in lines transporting liquids.

It is recommended that, where shock is likely to occur, the maximum shock pressure be added to the working pressure of the line to determine the working pressure of the valves, fittings, or flanges which should be used.

It is also recommended that all hydraulic installations be equipped with air chambers or other types of shock absorbers to eliminate, as much as possible, the increase in pressure due to shock.

Increase in Pressure Due to Expansion of Liquids

If a vessel is completely filled with a liquid so that there is no space available for volumetric expansion, any rise in temperature of the liquid will cause an increase in internal pressure. This increase in pressure is due to the tendency of the liquid to change in volume, and as liquids are relatively incompressible, the pressure builds up rapidly with only a slight change in temperature. The rise in temperature may be due to the sun's rays or to an increase in atmospheric temperature.

Crane Co. has conducted tests which indicate that when vessels are completely filled with fuel oil of 33° A.P.I., a temperature rise of one degree Fahrenheit causes the internal pressure to increase approximately 75 pounds per square inch.

It is recommended, therefore, where valves are installed in lines carrying liquids (particularly oil), that some means be employed to prevent entrapping the liquid in the valve bonnet, to eliminate the possibility of pressure building up due to temperature rise.

Brass Valves

Names of parts . . . . . pages 10 to 11
Globe, Angle, and Cross Valves . . . . . pages 12 to 29
Check and Foot Valves . . . . . pages 30 to 37
Gate Valves . . . . . pages 38 to 44
Hose Valves . . . . . pages 45 to 47
Radiator Valves . . . . . pages 48 to 55

The user of brass valves will appreciate the unusual completeness of the Crane line. It offers a size, style, and weight for every commercial requirement, and in addition, includes, in most pressure classifications, a variety of designs that covers all service conditions.

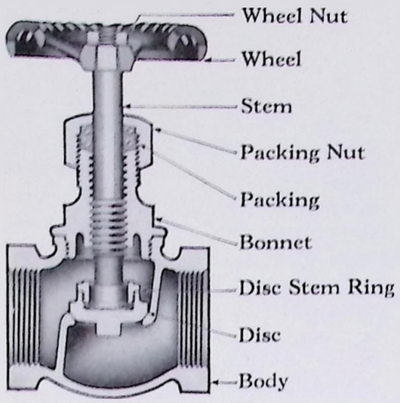
Crane Brass Valves, like other Crane products, are characterized by quality. Designs are carefully developed based on an accurate knowledge of valve use, and are practical and serviceable. Materials are selected for properties which especially fit them for each valve part. Workmanship is first class in every respect. And finally, the entire manufacturing process — from raw materials to the finished product — is safeguarded by an adequate system of checking, gauging, inspecting, and testing.

* * * * * * * * *

The list shown above does not include all Crane Brass Valves. Brass valves that perform a special duty or those made for special services, such as Butterfly Valves, Gasoline Check and Foot Valves, Pop Safety Valves, Quick-Opening Self-Closing Valves, Relief Valves, Solder-Joint Valves, Tank Float Valves, Throttle Valves, Valves for Marine Service, and Whistle Valves, are illustrated in other sections of this catalogue. See the index.

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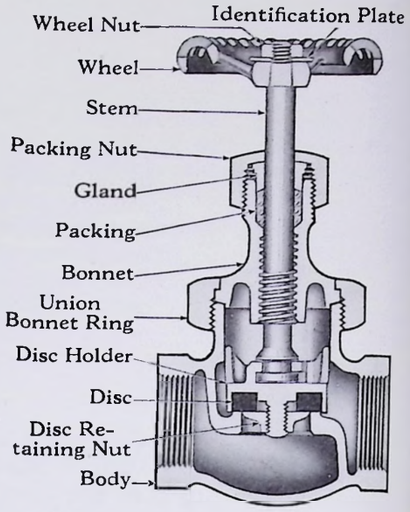
Brass Valves—Names of Parts



Left

Screwed Bonnet Globe Valve

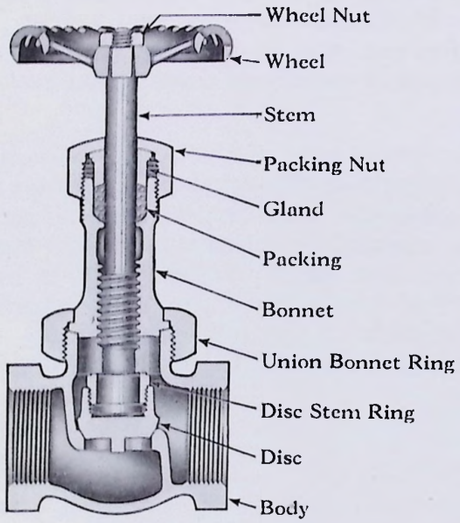
(No. 1)



Right

Union Bonnet Globe Valve with Composition Disc

(No. 7)



Left

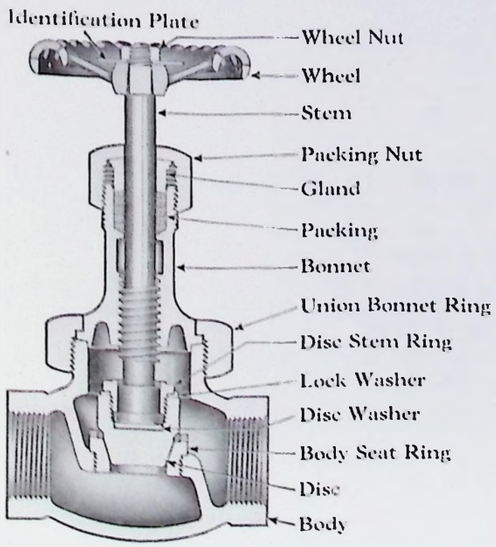
Union Bonnet Globe Valve with Metal Disc

(No. 362 E)

Below

Union Bonnet Globe Valve with Metal Disc and Renewable Seat

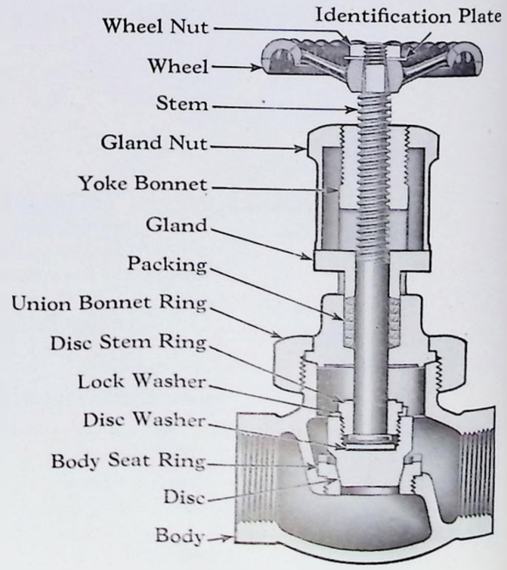
(No. 382 P)



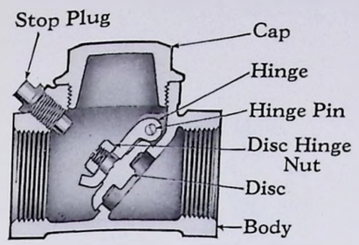
Below

Union Bonnet Outside Screw and Yoke Globe Valve with Metal Disc and Renewable Seat

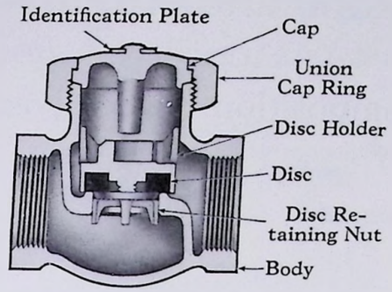
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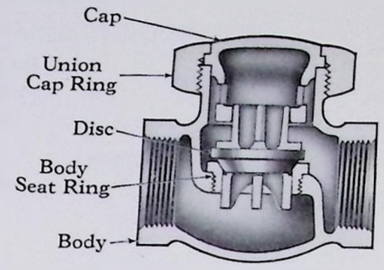
Brass Valves—Names of Parts



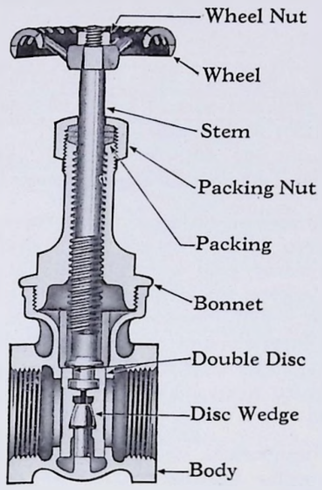
Swing Check Valve Regrinding Type (No. 35)



Horizontal Check Valve With Composition Disc (No. 27)



Horizontal Check Valve With Metal Disc and Renewable Seat (No. 218)



Left

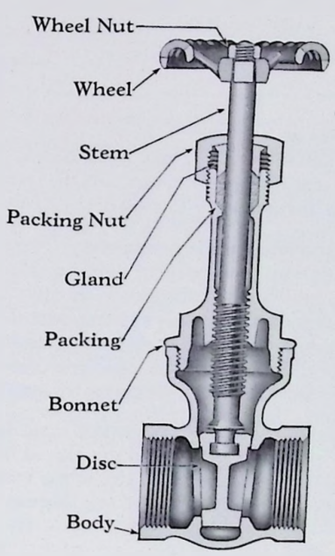
Rising Stem Double Disc Gate Valve

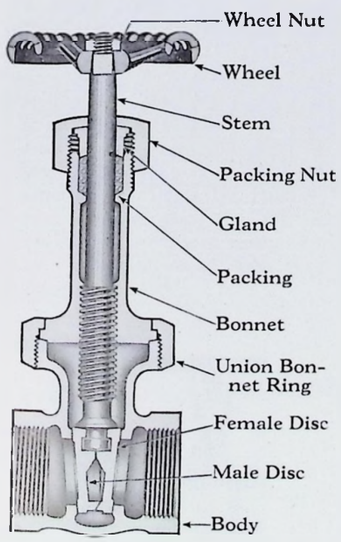
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Right

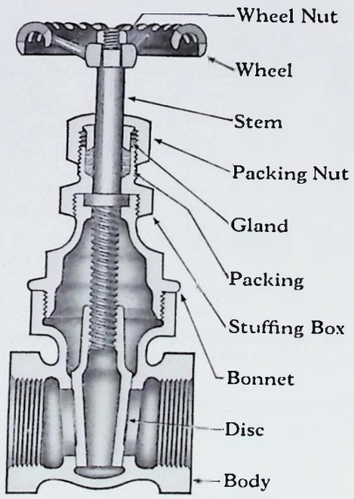
Rising Stem Wedge Disc Gate Valve

(No. 431)

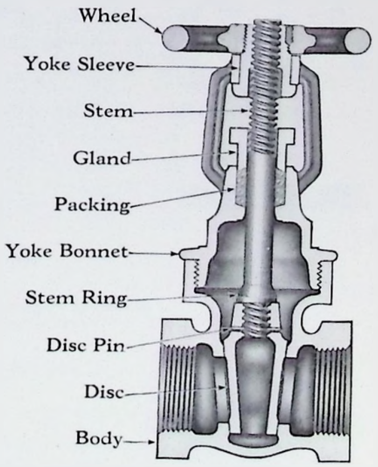




Rising Stem Union Bonnet Double Wedge Disc Gate Valve (No. 457)



Non-Rising Stem Wedge Disc Gate Valve (No. 458)

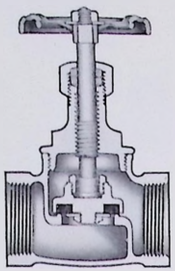


Outside Screw and Yoke Wedge Disc Gate Valve (No. 459)

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Low Pressure

Brass Globe and Angle Valves



Cross Section
No. 1204, Globe

Composition Disc Valves

100 pounds steam working pressure



No. 1204, Globe
Screwed



No. 1205, Angle
Screwed



No. 1210, Globe
with Lock Shield



No. 1211, Angle
with Lock Shield

List Prices

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 1204 or No. 1205	Each	1.10	1.10	1.25	1.60	2.20	2.80	4.00	5.50	8.75
No. 1210 or No. 1211, with Lock Shield	Each		1.40	1.60	2.00	2.65	3.35	4.75		
Extra disc holder, disc, nut, and disc stem ring, complete	Each	Spun on stem	.50	.60	.70	.85	1.10	1.50	2.00	

For list prices of Composition Discs, see page 168. For list prices of Keys for Lock Shield Valves, see page 167.

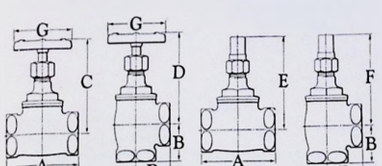
Service recommendations: These valves combine a wide range of utility with moderate cost. Being equipped with a composition disc, they are suitable for almost any low pressure installation. They are especially recommended for domestic hot or cold water lines, domestic gas lines, steam heating systems, and similar low pressure service.

Construction: The swivel disc holder, in sizes 1/8 and 1/4-inch, is spun onto the stem. In the larger sizes, it is attached to the stem with a threaded nut as shown in the illustration above.

Discs: Unless otherwise ordered, these valves are furnished with a No. 8 Low Pressure Hot Water Disc suitable for hot water, cold water, or domestic gas service. When ordered for steam, they will be furnished with a No. 7 Low Pressure Steam Disc. For description and dimensions of discs, see page 168.

No. 1204 and No. 1205 Valves have a metal plate, secured to the valve by the wheel nut, to identify the type of disc.

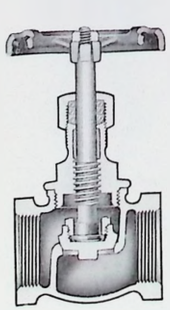
Repacking: These valves, when wide open, can be repacked while under pressure.



No. 1204 No. 1205 No. 1210 No. 1211

Dimensions, in Inches

Size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
A	1 13/16	1 13/16	2	2 3/8	2 3/4	3 5/16	3 3/4	4 1/4	4 7/8
B	13/16	13/16	15/16	1 1/16	1 5/16	1 1/2	1 13/16	2	2 7/16
C Open	2 7/8	2 7/8	3 1/8	3 5/8	4 1/8	4 5/8	5	5 5/8	6 1/8
D Open	2 1/2	2 1/2	2 7/8	3 3/8	3 3/4	4 3/8	4 3/4	5 1/2	6
E		2 1/2	2 5/8	3 1/4	3 5/8	4 1/8	4 5/8		
F		2 1/4	2 3/8	3	3 1/4	3 7/8	4 1/2		
G	1 1/2	1 1/2	1 1/2	2 1/4	2 5/8	3	3 3/8	3 3/4	4 1/4



Cross Section
No. 1 B, Globe

Brass Disc Valves

100 pounds steam working pressure

These valves are recommended for general low pressure service on lines carrying steam, water, oil, or gas.

List Prices and Dimensions

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 1 B or No. 2 B	Each	.77	1.00	1.26	1.80	2.52	3.50	5.30
End to end, Globe	In.	1 11/16	2	2 1/2	2 7/8	3 7/16	3 7/8	4 3/4
Center to end, Angle	In.	7/8	1	1 1/4	1 7/16	1 3/4	1 15/16	2 3/8
Center to top, open	In.	3 1/4	3 3/8	4 3/8	4 3/4	5 1/2	5 3/4	6 7/8
Diameter of wheel	In.	2 1/4	2 5/8	3	3 3/8	3 3/4	4 1/4	4 3/4



No. 1 B
Globe
Screwed



No. 2 B
Angle
Screwed

Low Pressure

Brass Globe and Angle Valves

For Coffee Urns, Sterilizers, and Similar Apparatus

100 pounds steam working pressure



No. 1206, Globe
Female Inlet and Outlet



No. 1207, Angle
Female Inlet and Outlet



No. 1208, Globe
Female Inlet, Female Union Outlet



No. 1209, Angle
Female Inlet, Female Union Outlet



No. 1214, Globe
Female Inlet, Male Union Outlet



No. 1215, Angle
Female Inlet, Male Union Outlet

When ordering, specify style of finish wanted.

List Prices

Size		Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 1206 or No. 1207	Rough body, plain	Each	1.40	1.60	2.00	2.75	3.50	5.00	6.75	10.25
	Rough body, nickel-plated all over	Each	1.65	1.85	2.30	3.15	4.00	5.75	7.75	11.50
	Polished all over	Each	3.00	3.25	3.85	4.75	5.75	7.50	9.75	13.75
	Polished and chromium-plated all over	Each	3.60	3.85	4.60	5.70	7.00	9.00	12.00	17.00
No. 1208, No. 1209, No. 1214, or No. 1215	Rough body, plain	Each	1.95	2.20	2.70	3.50				
	Rough body, nickel-plated all over	Each	2.25	2.50	3.10	4.00				
	Polished all over	Each	3.70	4.00	4.75	5.75				
	Polished and chromium-plated all over	Each	4.50	4.85	5.75	7.00				

For list prices of extra complete disc holders, see page 12. For list prices of Composition Discs, see page 168.

Construction: Except for wheel, finish, and union end, these valves are the same as the No. 1204 and No. 1205, shown on page 12. Each valve is fitted with a Crane Style L Black Moulded Composition Wheel.

Service recommendations: The valves are durably constructed, are compact and neat in appearance, and are supplied in a variety of finishes. They are made especially for service on coffee urns, restaurant steam tables, sterilizers, and similar apparatus; but they are suitable for almost any low pressure installation where valves with special finish or with union end are desired.

The composition disc provides a wide range of utility. Valves with the No. 8 Low Pressure Hot Water Disc are suitable for hot water, cold water, or domestic gas service; valves with the No. 7 Low Pressure Steam Disc are suitable for steam (see page 12 on No. 1204 and No. 1205 Valves).

Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
End to end, No. 1206	1 13/16	2	2 3/8	2 3/4	3 5/16	3 3/4	4 1/4	4 7/8
Center to female end, No. 1207, No. 1209, No. 1215	13/16	15/16	1 1/16	1 5/16	1 1/2	1 13/16	2	2 7/16
Center to female end, No. 1208, No. 1214	15/16	1	1 3/16	1 3/8				
Center to union end, No. 1208, No. 1209	1 13/16	2	2 1/8	2 1/4				
Center to union end, No. 1214, No. 1215	2 1/4	2 3/8	2 5/8	2 7/8				
Center to top of wheel, open, Globe	2 13/16	3 1/8	3 5/8	4 1/8	4 5/8	5 1/8	5 3/4	6 1/4
Center to top of wheel, open, Angle	2 1/2	2 7/8	3 3/8	3 3/4	4 1/4	4 7/8	5 1/2	6 1/8
Diameter of wheel	1 1/2	1 3/4	2	2	2 1/4	2 1/2	2 3/4	3



No. 1300, Globe

Brass Solder-Joint Globe and Angle Valves

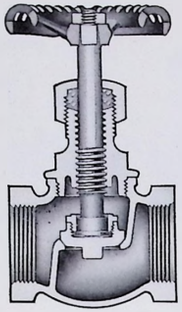
Licensed under Mueller Brass Co., STREAMLINE Division, Patents.

Crane Brass Solder-Joint Globe and Angle Valves have solder-joint end connections for use with copper tubing.

The complete Crane Solder-Joint line includes valves, fittings, bends, and accessories for domestic and industrial installations; see the section of this catalogue devoted to Solder-Joint Valves and Fittings.

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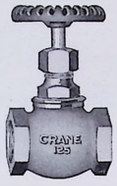
Standard
Brass Globe, Angle, and Cross Valves
Brass Disc



Cross Section
No. 1, Globe

125 pounds steam working pressure

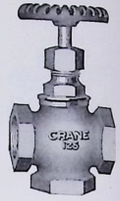
These valves are recommended for general service on steam, water, oil, or gas.



No. 1, Globe
Screwed



No. 2, Angle
Screwed



No. 18, Cross
Screwed

List Prices

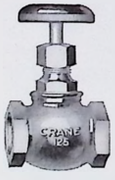
Size	Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 1, Globe or No. 2, Angle	Each	.72	.72	.77	1.00	1.26	1.80	2.52	3.50	5.30	10.00	14.40
No. 18, Cross	Each		1.25	1.25	1.50	2.00	2.50	3.50	5.00	8.00	16.00	24.00

Construction: These valves are heavier and more rugged than is usual with "Standard" valves. All parts are liberally proportioned, to assure a high factor of safety against pressure, operating strains, and expansion and contraction of the piping.

The disc, in sizes ⅛ to ½-inch, is integral with the stem. In the larger sizes, the disc swivels on the stem as shown in the illustration above.

Repacking: These valves, when wide open, can be repacked while under pressure.

Flanged Valves: For flanged valves, the No. 71 Globe or Angle Valves are recommended. See page 19.



No. 6, Globe
with Composition Wheel



No. 6, Angle
with Composition Wheel

Valves with Special Wheels and Special Finish

Except for the special wheels and the finish, No. 6 and No. 8 Globe and Angle Valves are the same as the No. 1 and No. 2 valves illustrated above.

No. 8 valves are made to order only.

When ordering, specify whether globe or angle valves are wanted, also the style of finish desired.



No. 8, Globe
with Brass Wheel



No. 8, Angle
with Brass Wheel

List Prices

Size		Inches	¼	⅜	½	¾	1	1¼	1½	2
*No. 6, Globe or Angle with Composition Wheel	Rough body, plain	Each	1.15	1.25	1.40	1.75	2.35	3.25	4.35	6.85
	Rough body, nickel-plated all over	Each	1.40	1.55	1.70	2.10	2.75	3.70	4.85	7.60
	Polished all over	Each	1.85	2.00	2.15	2.50	3.25	4.35	5.75	9.00
	Polished and nickel-plated all over	Each	2.15	2.30	2.45	2.85	3.65	4.80	6.25	9.75
*No. 8, Globe or Angle with Brass Wheel	Polished all over	Each	2.75	3.00	3.15	3.50	4.25	5.60	7.00	10.25
	Polished and nickel-plated all over	Each	3.25	3.50	3.70	4.10	4.90	6.30	7.75	11.25

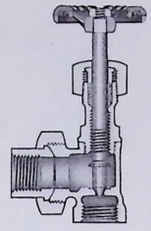
No. 6 and No. 8 Valves can be furnished polished and chromium-plated; see the Crane Discount Sheet for prices.

Dimensions, in Inches

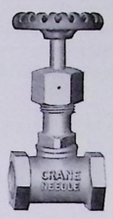
Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
End to end, Globe	1 7/16	1 5/8	1 7/8	2 3/16	2 11/16	3 3/16	3 11/16	4 3/16	5 1/8	6 1/16	7 1/16
Center to end, Angle or Cross	¾	13/16	15/16	1⅛	1⅜	1 5/8	1 13/16	2 1/16	2½	3 1/16	3 11/16
Center to top of wheel, open, Globe or Cross	2⅞	3⅛	3⅜	3⅞	4½	5⅓	5 5/8	6½	7½	8	9⅝
Center to top of wheel, open, Angle	2¾	3	3¼	3¾	4½	5	5⅝	6⅜	7½	8	9⅝
Diameter of wheel, No. 1, No. 2, No. 18	1½	1¾	2 1/16	2 9/16	2¾	3 1/16	3⅝	4 1/16	4¾	5⅜	6
Diameter of wheel, No. 6		2	2	2¼	2½	2¾	3	3	3		
Diameter of wheel, No. 8		1¾	2	2½	2½	3	3½	4	5		

Needle Point
Brass Globe and Angle Valves

WORKING PRESSURES
200 pounds steam
400 pounds cold water, oil, or gas, non-shock



Cross Section
No. 85, Angle, Screwed
With Female Union Outlet



No. 88, Globe
Screwed



No. 89, Angle
Screwed

List Prices

Size	Inches	⅛	¼	⅜	½	¾
No. 85, Angle, with Union	Each	2.00	2.00	2.20	3.00	4.00
No. 88, Globe, or No. 89, Angle	Each	1.20	1.40	1.50	2.00	2.50

Service recommendations: These valves are especially suitable where very close and delicate regulation of flow is desired. They are recommended for steam, water, oil, gas, for light liquid lines, for fuel oil, and for similar service.

Construction: The valves are compact and unusually rugged. They have a large stuffing box equipped with a gland, and when wide open, they can be repacked while under pressure.

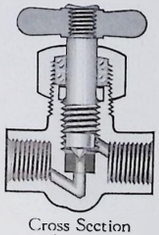
The stems are made of brass.

Seat opening: The diameter of the seat opening in these valves is given in the table shown below. Valves with other size seat opening are special and are made to order; prices on application.

Higher pressure valves: Needle point valves for higher pressures are made of steel or Exelloy; see page 320.

Dimensions, in Inches

Size	⅛	¼	⅜	½	¾
Diameter of seat opening	⅛	3/16	¼	5/16	7/16
End to end, No. 88 Globe	1 3/16	1 9/16	1 13/16	2 1/16	2 3/16
Center to female end, No. 85 or No. 89 Angle	⅝	13/16	⅞	1 1/16	1¼
Center to union end, No. 85 Angle	1 5/16	1 9/16	1¾	2	2 3/16
Center to top of wheel, open	3	3	3⅜	4	4⅜
Diameter of wheel	1½	1½	1¾	2 1/16	2 9/16



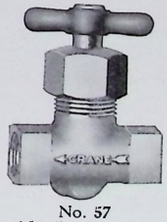
Cross Section
No. 57

Brass Needle Air Valve

WORKING PRESSURE
300 pounds cold water, oil, or gas, non-shock

List Prices and Dimensions

Size	Inches	⅜
Price	Each	2.50
Diameter of seat opening	Inches	⅛
End to end	Inches	2 5/16
Center to top of stem, open	Inches	2½



No. 57
Needle Air Valve

Service recommendations: The No. 57 Valve is ideal for service on water lines to air drills, on air or water lines in garages, filling stations, and industrial plants, and for similar service.

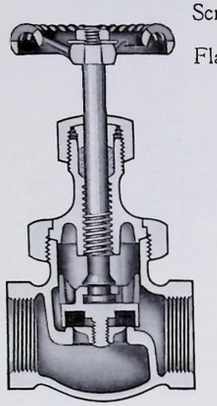
The valve should always be installed with the pressure above the seat.

Construction: This valve is heavy and rugged. The body, packing nut, and stem are brass. The tee handle is malleable iron; valves with malleable iron wheel are made to order at a special price.

The valve has an extra thick fibre seat that can be easily renewed should it become worn.

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150-Pound
Brass Globe and Angle Valves
Cranite Composition Disc



Cross Section
No. 7, Globe

WORKING PRESSURES

Screwed valves—150 pounds steam
300 pounds cold water, oil, or gas, non-shock
Flanged valves—150 pounds steam
225 pounds cold water, oil, or gas, non-shock

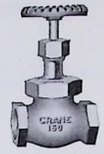
FEATURES

Union Bonnet
Cranite Disc
Slip-on Disc Holder

SERVICE RECOMMENDATIONS

These valves are recommended for a wide range of service. They will give excellent results on steam, hot water, cold water, oil, air, or gas lines. They are especially suited for use in installations where the discs must be renewed quickly.

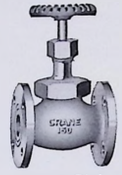
When ordering, specify whether globe or angle valves are wanted.



No. 7, Globe Screwed



No. 7, Angle Screwed



No. 9, Globe Flanged



No. 9, Angle Flanged

List Prices

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 7, Globe or Angle, Screwed	Each	1.10	1.10	1.25	1.60	2.20	2.80	4.00	5.50	8.75	15.75	22.00
No. 9, Globe or Angle, Flanged, F. & D.	Each					5.00	6.00	9.00	11.00	16.50	25.00	34.00
Extra disc holder, disc, and nut, complete — With No. 4 Cranite Disc	Each	.30	.30	.35	.40	.45	.55	.75	1.05	1.60	3.15	4.60
Extra disc holder, disc, and nut, complete — With No. 2 or No. 3 Disc	Each	.25	.25	.30	.35	.40	.45	.60	.85	1.35	2.70	3.85

For list prices of Composition Discs, see page 168.

Rugged construction: All parts are unusually rugged, to withstand severe operating strains.

Quick repairs: A leak can be easily and quickly repaired by replacing the slip-on disc holder with an extra complete holder and disc. A new disc can be placed in the original holder, at the convenience of the engineer. Users should keep on hand a supply of extra disc holders and discs for this purpose.

Union bonnet construction: The union bonnet ring reinforces the bonnet joint, and facilitates dismantling.

Discs: Unless otherwise ordered, these valves are furnished with a No. 4 Cranite Disc, suitable for high-pressure steam.

When ordered for hot water, gas, oil, or gasoline, they are furnished with a No. 2 Hot Water Disc.

When ordered for cold water or air, they are furnished with a No. 3 Cold Water Disc.

For description and dimensions of discs, see page 168.

Stuffing box: The stuffing box is fitted with a gland, and is filled with high grade packing.

Repacking: The valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2a-1930). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the MSS 150-Pound Standard; no deduction is made if valves are ordered "faced only".

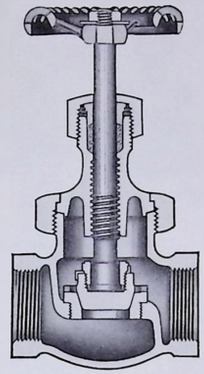
Full face gaskets should be used; see page 357.

Dimensions, in Inches

Size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
End to end, No. 7 Globe	2	2	2 5/16	2 11/16	3 3/16	3 3/4	4 1/4	4 3/4	5 3/4	6 3/4	8
Center to end, No. 7 Angle	1 5/16	1 5/16	1 1/16	1 1/4	1 7/16	1 11/16	2	2 3/16	2 11/16	3 1/4	3 13/16
Face to face, No. 9 Globe					3 3/4	4 3/8	4 13/16	5 1/2	6 1/2	7 1/2	8 7/8
Face to face, No. 9 Angle					2 7/16	2 9/16	2 7/8	3 3/16	3 3/4	4 5/16	4 5/8
Center to face, No. 9 Globe					5 5/8	6 3/8	7 1/8	7 7/8	9 1/8	10 5/8	11 7/8
Center to face, No. 9 Angle					5 1/2	6 1/4	7	7 5/8	8 7/8	10 3/8	11 3/4
Center to top of wheel, open, Globe	4	4	4 1/2	5	4 3/4	5	5 1/4	6	7	7	7 1/2
Center to top of wheel, open, Angle	3 7/8	3 7/8	4 3/8	4 7/8	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4		
Diameter of wheel	1 3/4	1 3/4	2 1/16	2 9/16	3 7/8	4 1/4	4 5/8	5	6	7	7 1/2
Diameter of flanges					1 1/32	3/8	1 13/32	7/16	1/2	9/16	5/8
Thickness of flanges											

Templates for drilling ... page 369

150-Pound
Brass Globe and Angle Valves
Plug Type Disc



Cross Section
No. 14 P, Globe

WORKING PRESSURES

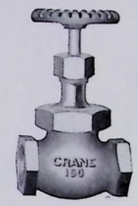
150 pounds steam
300 pounds cold water, oil, or gas, non-shock

FEATURES

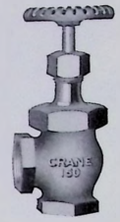
Plug Type Disc
Renewable Seat
Union Bonnet

SERVICE RECOMMENDATIONS

These valves are recommended for severe services under moderate working pressures, such as for throttling, and for soot blower, blow-off, boiler feed, drip, and drain lines.



No. 14 P, Globe Screwed



No. 16 P, Angle Screwed

List Prices

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 14 P or No. 16 P	Each	1.50	1.50	1.75	2.25	3.00	4.25	5.50	7.25	11.00	23.00	30.00

For wrenches for removing seat rings, see page 169.

Plug type disc valves for moderate pressures: The No. 14 P and No. 16 P introduce to the lower working pressure class, valves having the structural refinements found heretofore only in valves designed for high pressures. They provide, at moderate cost, the many advantages of the plug type disc and seat.

These valves are especially suitable for the severe services, such as for throttling, and for soot blower, blow-off, boiler feed, drip, and drain lines, where valves of conventional construction do not give satisfaction.

Sturdy construction: The valves are sturdily constructed; all parts are liberally proportioned to withstand severe operating strains.

Plug type disc and seat: The plug type disc and seat are ideal for hard service. The wide seating surface is unusually resistant to foreign matter and to wiredrawing.

The tapered disc permits easy regulation of flow when throttling.

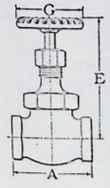
A metal plate, secured to the valve by the wheel nut, identifies the plug type disc.

Material: Bodies, discs, and body seat rings are made of good quality brass.

Union bonnet construction: The serviceable and practical union bonnet construction provides a strong, tight body-bonnet connection. The bonnet ring reinforces the joint and facilitates dismantling and reassembling, without danger of injuring the valve.

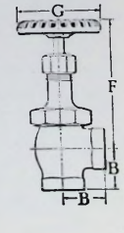
Stuffing box: The stuffing box is deep and is equipped with a gland. It is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.



Dimensions, in Inches

Size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
A	2	2	2 5/16	2 11/16	3 3/16	3 3/4	4 1/4	4 3/4	5 3/4	6 3/4	8
B	1 5/16	1 5/16	1 1/16	1 1/4	1 7/16	1 11/16	2	2 3/16	2 11/16	3 1/4	3 13/16
E—Open	4 1/8	4 1/8	4 5/8	5 1/4	6	6 7/8	7 1/4	8 1/4	9 1/2	11	12 1/4
F—Open	4	4	4 1/2	5 1/8	5 7/8	6 3/4	7 1/8	8	9 1/4	10 3/4	12
G	1 3/4	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	6	7



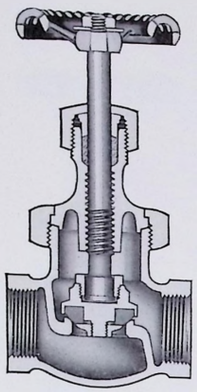
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Brass Globe and Angle Valves

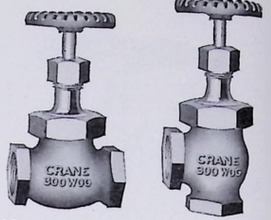
For Light Oils and Gases

300 pounds oil, air, or gas working pressure, 250° F.

Air Tested *Patent Pending*



Cross Section
No. 207, Globe



No. 207, Globe Screwed

No. 209, Angle Screwed

Tight, Easy Seating
No. 5 Cranoil Disc

SERVICE RECOMMENDATIONS

These are definitely superior to valves ordinarily used on light oils and gases. They seat perfectly tight, they close easily, and they withstand wear exceptionally well.

They are especially recommended for refined oils, such as transformer oil, for gases, and for solvents which, in many cases, attack rubber composition discs but do not corrode brass, and which are difficult to hold with metal to metal seat valves.

List Prices, Each

Size — Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 207, Globe, or No. 209, Angle	1.50	1.75	2.10	2.70	3.30	4.60	6.25	9.75	18.00	26.00
Extra disc holder, complete — Slip-on disc holder	.45	.50								
Extra disc holder, complete — With disc stem ring			.60	.70	.90	1.25	1.75	2.50	4.50	7.00

Construction: These are rugged union bonnet valves. Sizes ¼ and ⅜-inch have a slip-on disc holder; larger sizes have the disc and stem fastened with a disc stem ring as shown in the cross section.

Disc and seat: The No. 5 Cranoil Disc is a specially fabricated material that will not swell, harden, or otherwise break down. It is permanently cemented into the disc holder; there can be no seepage around it. For description of disc, see page 168.

The seat and disc form a line to line contact. The narrow bearing and the disc material are an ideal combination for light oils and gases, providing absolute tightness and easy seating.

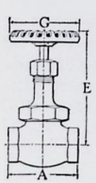
Stuffing box: Stuffing boxes are equipped with a gland and are filled with high grade packing.

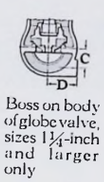
Boss on body of globe valve: Globe valve bodies sizes 1¼-inch and larger, have a boss cast on one side. When ordered tapped or when ordered equipped with a No. 211 Valve (shown below) for transformer oil service, the boss is drilled and tapped with a ¼-inch pipe thread, without extra charge.

Installation: Wherever possible, these valves should be installed with the pressure under the disc.

Tamper-proof valves: Valves with lock shield or with lock shield and slip cover are made to order; prices are furnished on application.

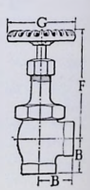
Dimensions, in Inches





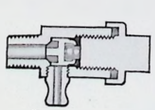
Boss on body of globe valve, sizes 1¼-inch and larger only

Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3
A	2	2 5/16	2 11/16	3 3/16	3¾	4¼	4¾	5¾	6¾	8
B	1 5/16	1 1/16	1¼	1 7/16	1 11/16	2	2 3/16	2 11/16	3¼	3 13/16
C						1 5/16	1⅛	1½	1 15/16	2⅜
D						1 7/16	1½	1¾	1⅞	2 1/16
E—Open	4	4½	5¼	6	6⅞	7¾	8⅝	9¾	11	12⅜
F—Open	3⅞	4⅜	5⅛	5⅞	6¾	7⅝	8⅜	9½	10¾	12¼
G	1¾	2 1/16	2 9/16	2¾	3 1/16	3⅝	4 1/16	4¾	6	7

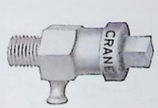


Brass Vent or Sampling Valves

For Transformer Oil Service



Cross Section
For 300 pounds transformer oil, 250° F.



No. 211
Air Tested
Patent Pending

List Prices

Size of male thread — Inches	¼	⅜	½	¾
No. 211 — Each	1.25	Made to order.		

Uses: This valve is used on transformer oil, as a Vent Valve or as a Sampling Valve in conjunction with the No. 207. When installed at the top of oil immersed electrical equipment, the valve is opened to vent air. When installed at a low point, the valve is opened to draw off samples of oil.

Construction: The No. 211 uses the same disc material and seat design as the No. 207.

Crane Navy

Brass Globe, Angle, and Cross Valves

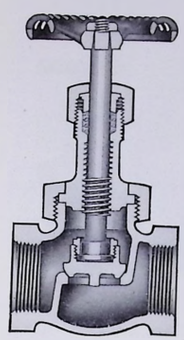
Regrinding

WORKING PRESSURES

Screwed valves — 200 pounds steam, 500° F.
400 pounds cold water, oil, or gas, non-shock
Flanged valves — 150 pounds steam, 500° F.
225 pounds cold water, oil, or gas, non-shock

TEST PRESSURES

Screwed valves — 600 pounds hydrostatic
Flanged valves — 450 pounds hydrostatic



Cross Section
No. 70, Globe



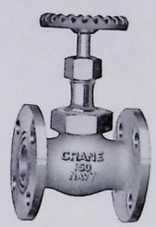
No. 70, Globe Screwed



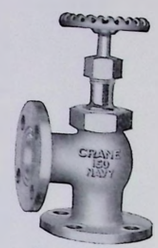
No. 70, Angle Screwed



No. 74, Cross Screwed



No. 71, Globe Flanged



No. 71, Angle Flanged

When ordering No. 70 or No. 71 Valves, specify whether globe or angle valves are wanted.

List Prices

Size — Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 70, Globe or Angle, Screwed — Each	1.30	1.30	1.50	1.90	2.50	3.50	5.00	7.00	11.00	20.00	29.00
No. 74, Cross, Screwed — Each				2.65	3.50	4.75	6.00	9.00	14.00		
No. 71, Globe or Angle, Flanged, F. & D. — Each					6.00	8.00	11.00	14.00	20.00	33.00	48.00

Service recommendations: These valves are recommended for severe service on steam, water, oil, or gas lines.

Material: The body is made of Crane Special Brass, a high grade steam metal.

Regrinding: These valves can be reground without removing the body from the line. Instructions for regrinding are furnished with each valve.

Union bonnet: The union bonnet ring reinforces the bonnet joint and facilitates dismantling and reassembling. When a valve is being reground, the ring centers and guides the valve trimmings.

Disc connection: The disc, in sizes ⅛ to ½-inch, is integral with the stem. In larger sizes, the disc swivels on the stem, as shown in the cross section.

Stuffing box: Stuffing boxes are deep, are equipped with a gland, and are filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2a-1930). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the MSS 150-Pound Standard; no deduction is made if valves are ordered "faced only".

Full face gaskets should be used; see page 357.

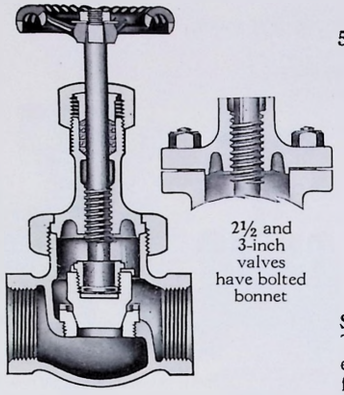
Dimensions, in Inches

Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
End to end, Globe, Screwed	1 11/16	1 11/16	1 15/16	2¼	2¾	3 5/16	3⅞	4½	5¼	6 5/16	7¼
Center to end, Angle or Cross, Screwed	1 3/16	1 3/16	1	1 3/16	1⅜	1 11/16	1 15/16	2¼	2⅝	3 3/16	3 13/16
Face to face, Globe, Flanged					3 11/16	4 3/16	4 9/16	5 5/16	6	6¾	7 15/16
Center to face, Angle, Flanged					2 7/16	2⅝	2⅞	3 3/16	3¾	4 5/16	4⅝
Center to top of wheel, open	3½	3½	3⅞	4⅜	5⅜	6	6⅞	7⅞	8⅝	9½	11⅜
Diameter of wheel	1¾	1¾	2 1/16	2 9/16	2¾	3 1/16	3⅝	4 1/16	4¾	6	7
Diameter of flanges					3⅞	4¼	4⅝	5	6	7	7½
Thickness of flanges					11/32	⅜	13/32	7/16	½	9/16	⅝

Templates for drilling page 369

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250-Pound
Brass Globe and Angle Valves
Plug Type Disc



Cross Section
No. 212 P, Globe

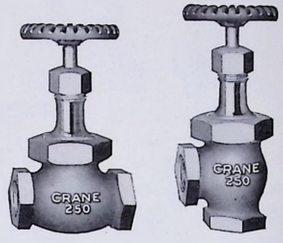
2½ and 3-inch valves have bolted bonnet

WORKING PRESSURES
250 pounds steam, 500° F.
500 pounds cold water, oil, or gas, non-shock

TEST PRESSURE
650 pounds hydrostatic

FEATURES
Exelloy Renewable Seat
Nickel Alloy Plug Type Disc
Union or Bolted Bonnet

SERVICE RECOMMENDATIONS
These valves are recommended for exceptionally severe service, such as for throttling, and for soot blower, blow-off, boiler feed, drip, and drain lines.



No. 212 P, Globe Screwed

No. 214 P, Angle Screwed

List Prices

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 212 P or No. 214 P	Each	2.70	3.10	4.15	5.35	7.25	10.00	14.00	20.00	38.00	60.00

For wrenches for removing seat rings, see page 169.

Body: The body is Crane Special Brass, a high grade steam metal.

Plug type disc and seat: The plug type disc and seat are ideal for severe service. The wide seating surface is unusually resistant to foreign matter and to wiredrawing. The tapered disc permits easy regulation of flow when throttling.

A metal plate, secured to the valve by the wheel nut, identifies the plug type disc.

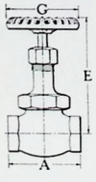
Seat metals: The disc is Crane Nickel Alloy. The seat ring is Exelloy, a specially heat-treated chromium iron. These metals offer excellent resistance to wear, temperature, galling, and scoring; they are harder, tougher, and stronger than metals ordinarily used in brass valves.

Bonnet construction: Sizes 2-inch and smaller have a union bonnet; 2½ and 3-inch sizes have a bolted bonnet, inside screw. Both types provide a strong, tight joint, yet they can be easily dismantled and reassembled without danger of injury to the valve.

Stem threads: The stem threads are accurately machined and are unusually long, assuring long life.

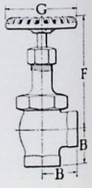
Stuffing box: The stuffing box is equipped with a gland and is unusually deep. It is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

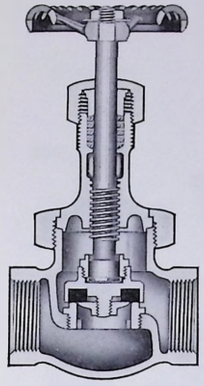


Dimensions, in Inches

Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3
A	2	2 5/16	2 11/16	3 3/16	3 3/4	4 1/4	4 3/4	5 3/4	7 1/4	8 1/4
B	15/16	1 1/16	1 1/4	1 7/16	1 11/16	2	2 3/16	2 11/16	3 5/8	4 1/8
E Open	4 1/8	4 3/4	5 3/8	6	6 3/4	7 5/8	8 5/8	10	11 1/4	12 3/4
F Open	4 1/8	4 5/8	5 1/4	5 7/8	6 5/8	7 1/2	8 1/2	9 3/4	10 1/4	11 3/4
G	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	5 3/8	6	7



250-Pound
Brass Globe and Angle Valves



Cross Section
No. 212 C or No. 213

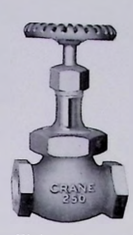
Cranite Composition Disc or Copper Disc Valves

WORKING PRESSURES
250 pounds steam, 500° F.
*500 pounds cold water, oil, or gas, non-shock

TEST PRESSURE
650 pounds hydrostatic

FEATURES
Nickel Alloy Renewable Seat
Union Bonnet

*When No. 212 C or No. 214 C Valves are used on gas, oil, or gasoline, they are recommended for only 400 pounds working pressure.



Globe, Screwed
No. 212 C, Cranite Disc
No. 213, Copper Disc



Angle, Screwed
No. 214 C, Cranite Disc
No. 215, Copper Disc

Except for the disc and seat, these valves are the same as the Nos. 212 P and 214 P, shown on page 20. A metal plate, secured to the valve by the wheel nut, identifies the type of disc.

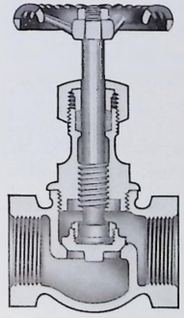
List Prices

Size		Inches	¼	⅜	½	¾	1	1¼	1½	2
No. 212 C, No. 214 C, No. 213, or No. 215		Each	2.70	3.10	4.15	5.35	7.25	10.00	14.00	20.00
Extra disc holder, disc, nut, and disc stem ring, complete, for No. 212 C or No. 214 C	With No. 4 Cranite Disc	Each	.50	.55	.60	.75	1.00	1.40	1.80	2.55
	With No. 2 or No. 3 Disc	Each	.45	.50	.55	.65	.85	1.25	1.55	2.20
Extra copper discs for No. 213 or No. 215		Each	.12	.15	.18	.21	.26	.35	.50	.75

For list prices of Composition Discs, see page 168. *For wrenches for removing seat rings, see page 169.*

Nos. 212 C and 214 C: The No. 212 C and No. 214 C Valves are recommended where discs must be frequently renewed. Unless otherwise ordered, they are furnished with a No. 4 Cranite Disc for high-pressure steam. When ordered for hot water, gas, oil, or gasoline, they are furnished with a No. 2 Hot Water Disc; and when ordered for cold water or air, with a No. 3 Cold Water Disc. For description and dimensions of discs, see page 168.

Nos. 213 and 215: The No. 213 and No. 215 Valves are recommended for services where discs must be frequently renewed and where a metallic disc is preferred. They are furnished with a Crane Renewable Copper Disc.



Cross Section
No. 4, Globe

Brass Disc Valves

WORKING PRESSURES
250 pounds steam
500 pounds cold water, oil, or gas, non-shock

TEST PRESSURE—650 pounds hydrostatic

No. 4 Valves have Crane Hard Metal body and disc. In sizes ½-inch and smaller, the disc is integral with the stem; in larger sizes, the disc swivels on the stem, as shown in the cross section. The stuffing box, on sizes ¾-inch and larger, has a gland. The valves, when wide open, can be repacked while under pressure.



No. 4, Globe Screwed



No. 4, Angle Screwed

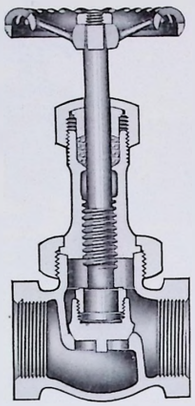
When ordering, specify whether globe or angle valves are wanted.

List Prices and Dimensions

Size	Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 4, Globe or Angle	Each	1.30	1.30	1.50	1.90	2.50	3.50	5.00	7.00	11.00	20.00	29.00
End to end, Globe	Inches	1 9/16	1 9/16	1 7/8	2 3/16	2 11/16	3 1/4	3 7/8	4 5/16	5 1/4	6 1/16	7 1/4
Center to end, Angle	Inches	13/16	13/16	15/16	1 1/8	1 3/8	1 9/16	1 15/16	2	2 5/8	3 1/4	3 11/16
Center to top of wheel, open, Globe	Inches	3 1/8	3 1/8	3 3/8	3 7/8	4 5/8	5 3/8	6 1/4	7	7 7/8	8 3/4	11
Center to top of wheel, open, Angle	Inches	3 1/8	3 1/8	3 3/8	4	4 1/2	5 3/8	6 1/2	7 1/4	8 1/8	9 1/4	11 1/8
Diameter of wheel	Inches	1 3/4	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	6	7

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300-Pound Brass Globe and Angle Valves Regrinding



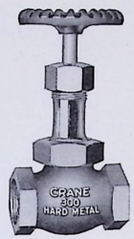
Cross Section
No. 362 E, Globe

WORKING PRESSURES
300 pounds steam, 550° F.
600 pounds cold water, oil, or gas, non-shock

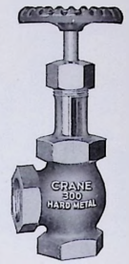
TEST PRESSURE
800 pounds hydrostatic

FEATURES
Hard Metal Body and Disc
Union Bonnet

SERVICE RECOMMENDATIONS
These valves are recommended for severe operating conditions at high pressures. They combine serviceability with moderate cost.



No. 362 E, Globe Screwed



No. 364 E, Angle Screwed

List Prices

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 362 E or No. 364 E	Each	2.70	3.10	4.15	5.35	7.25	10.00	14.00	20.00	38.00	60.00

Body and disc: These parts are made of Crane Hard Metal, a strong, hard, copper-tin bronze that resists cutting and wiredrawing exceptionally well.

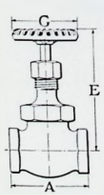
Bonnet: The bonnet is made of a new special bronze. Its unusually good wear-resisting properties combined with the long and accurately machined stem threads materially lengthens the life of both the stem and bonnet.

Regrinding: These valves can be reground without removing the body from the line. Instructions for regrinding are furnished with each valve.

Union bonnet construction: The union bonnet construction, in addition to making a sturdy, tight joint, facilitates dismantling and reassembling the valve. The union ring reinforces the bonnet joint; and when the valve is being reground, it centers and guides the valve trimmings.

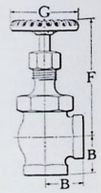
Stuffing box: The stuffing box is unusually deep and is filled with high grade packing. It is equipped with a gland.

Repacking: These valves, when wide open, can be repacked while under pressure.

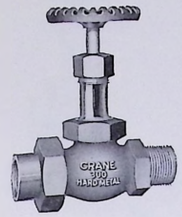


Dimensions, in Inches

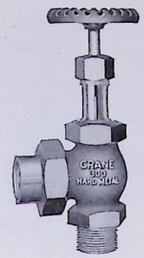
Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
A	2	2 5/16	2 11/16	2 15/16	3 1/2	4 1/16	4 5/8	5 3/4	6 7/8	8
B	1 5/16	1 1/16	1 1/4	1 1/2	1 3/4	2 1/16	2 5/16	2 7/8	3 7/16	4
E Open	4 1/8	4 5/8	5 1/4	6 3/8	6 7/8	7 7/8	8 3/4	10 3/8	12 1/8	13 1/4
F Open	4	4 1/2	5 1/8	6 1/4	7	7 7/8	9	10 1/2	12	13 1/4
G	1 3/4	2 1/16	2 9/16	3 1/16	3 5/8	4 1/16	4 3/4	6	7	8



300-Pound Brass Globe and Angle Valves Regrinding



No. 1834, Globe



No. 1835, Angle

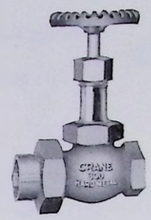
Male Inlet
Female Union Outlet

Male end is one pipe size larger than female union end.

WORKING PRESSURES
300 pounds steam, 550° F.
600 pounds cold water, oil, or gas, non-shock

TEST PRESSURE
800 pounds hydrostatic

INTERCHANGEABILITY
All parts of these valves except the bodies are interchangeable with the corresponding parts of the No. 362 E Globe and No. 364 E Angle Valves shown on the preceding page.



No. 1836, Globe



No. 1837, Angle

Female Inlet
Female Union Outlet

Both ends are same size.

List Prices

Size	Inches	3/8 x 1/4	1/2 x 3/8	3/4 x 1/2	1 x 3/4	1 1/4 x 1	1 1/2 x 1 1/4	2 x 1 1/2	2 1/2 x 2	3 x 2 1/2
No. 1834 or No. 1835	Each	5.25	5.70	7.85	10.75	16.00	21.00	28.50	45.00	83.00

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 1836 or No. 1837	Each	4.90	5.20	6.55	8.75	12.50	17.00	23.00	37.00

Cab Hose Valves

Female Inlet — Hose End Outlet



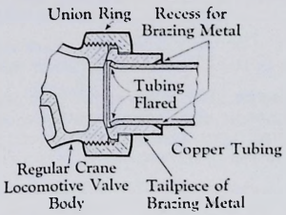
No. 1833

The No. 1833 Valves except for their hose end bodies are made like the No. 362 E Valves shown on the preceding page.

List Prices

Size	Inches	3/8 female 1/2 hose	1/2 female 1/2 hose	1/2 female 3/4 hose
No. 1833	Each	3.60	3.80	5.50

Union End Valves for use with Copper Tubing



Union end valves can be made to order with brazing tail-pieces for use with copper tubing. Prices on application.

Dimensions, in Inches

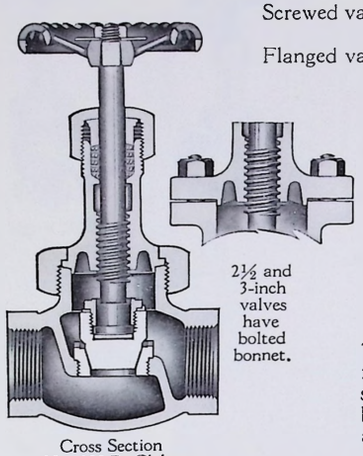
Size				3/8 x 1/4	1/2 x 3/8	3/4 x 1/2	1 x 3/4	1 1/4 x 1	1 1/2 x 1 1/4	2 x 1 1/2	2 1/2 x 2	3 x 2 1/2
Size, No. 1834, No. 1835												
Size, No. 1836, No. 1837				1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	
Size, No. 1833	3/8 x 1/2	1/2 x 1/2	1/2 x 3/4									
End to end, No. 1834				3 11/16	4 1/4	4 13/16	5 1/2	6 1/8	6 7/8	7 13/16	9 1/16	10 3/8
Center to male end, No. 1835				1 3/4	2 1/16	2 3/8	2 3/4	3	3 5/16	3 13/16	4 3/8	4 15/16
Center to union end, No. 1835				1 15/16	2 3/16	2 7/16	2 3/4	3 1/8	3 9/16	4	4 11/16	5 7/16
End to end, No. 1836				2 15/16	3 3/8	3 13/16	4 1/4	4 7/8	5 5/8	6 5/16	7 9/16	
Center to female end, No. 1837				1	1 3/16	1 3/8	1 1/2	1 3/4	2 1/16	2 5/16	2 7/8	
Center to union end, No. 1837				1 15/16	2 3/16	2 7/16	2 3/4	3 1/8	3 9/16	4	4 11/16	
End to end, No. 1833	3 3/8	3 1/2	3 15/16									
Center to top, open, Globe	4 5/8	4 5/8	5 1/4	4 1/8	4 5/8	5 1/4	6 3/8	6 7/8	7 7/8	8 3/4	10 3/8	12 1/8
Center to top, open, Angle				4	4 1/2	5 1/8	6 1/4	7	7 7/8	9	10 1/2	12
Diameter of wheel	2 1/16	2 1/16	2 9/16	1 3/4	2 1/16	2 9/16	3 1/16	3 5/8	4 1/16	4 3/4	6	7

All valves shown on this page are made to order only.

Description....page 22

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300-Pound
Brass Globe and Angle Valves
Plug Type Disc



Cross Section
No. 382 P, Globe

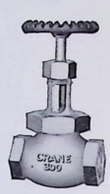
2½ and 3-inch valves have bolted bonnet.

WORKING PRESSURES
300 pounds steam, 550° F.
Screwed valves — 600 pounds cold water, oil, or gas, non-shock
Flanged valves — 500 pounds cold water, oil, or gas, non-shock

TEST PRESSURE
800 pounds hydrostatic

FEATURES
Exelloy Renewable Seat
Nickel Alloy Plug Type Disc
Union or Bolted Bonnet

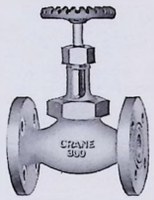
SERVICE RECOMMENDATIONS
These valves are recommended for exceptionally severe service, such as for throttling, and for soot blower, blow-off, boiler feed, drip, and drain lines.



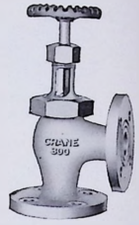
No. 382 P, Globe Screwed



No. 384 P, Angle Screwed



No. 383 P, Globe Flanged



No. 385 P, Angle Flanged

List Prices

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 382 P or No. 384 P, Screwed	Each	2.70	3.10	4.15	5.35	7.25	10.00	14.00	20.00	38.00	60.00
No. 383 P or No. 385 P, Flanged, F. & D.	Each				13.00	17.00	22.00	28.00	36.50	63.00	100.00

For wrenches for removing seat rings, see page 169.

Body: The body is strong and durable; it is made of Crane Special Brass, a high grade steam metal.

Plug type disc and seat: The wide seat resists wiredrawing and foreign matter exceptionally well. The disc taper assists in maintaining tightness and permits easy flow regulation when throttling.

Seat metals: The disc is Crane Nickel Alloy; the seat ring is Exelloy. These metals are an ideal combination, offering unusual resistance to wear, temperature, and galling; they are harder, tougher, and stronger than metals ordinarily used in brass valves.

Bonnet construction: Sizes 2-inch and smaller have a union bonnet; 2½ and 3-inch sizes have a bolted bonnet, inside screw. Both types provide a strong, tight joint, yet they can be easily dismantled and reassembled without injuring the valve.

Stuffing box: The stuffing box is unusually deep; it has a gland and is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges conform to the Crane 300-Pound Brass Flange Standard. They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the Crane 300-Pound Standard; no deduction is made if valves are ordered "faced only".

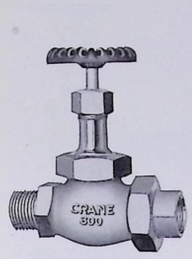
Full face gaskets should be used; see page 357.

Dimensions, in Inches

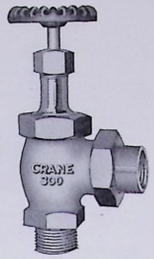
Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3
End to end, No. 382 P	2¼	2½	2 15/16	3½	4⅛	4¾	5¼	6⅜	7½	8½
Center to end, No. 384 P	1⅛	1¼	1½	1¾	2 1/16	2⅜	2⅝	3 3/16	3¾	4¼
Face to face, No. 383 P				4¾	5⅜	6¼	7¼	8	9	10 5/16
Center to face, No. 385 P				3	3¼	3½	4	4 5/16	4¾	5 7/16
Center to top of wheel, open, Globe	4⅜	5⅛	5⅝	6⅝	7¼	8¼	9⅜	10⅝	12	13⅜
Center to top of wheel, open, Angle	4¼	4⅞	5⅜	6⅜	7	8	9	10¼	11	12⅜
Diameter of wheel	2 1/16	2 9/16	2¾	3 1/16	3⅝	4 1/16	4¾	6	7	8
Diameter of flanges				4⅝	4⅞	5¼	6⅛	6½	7½	8¼
Thickness of flanges				17/32	19/32	5/8	11/16	¾	13/16	29/32

Templates for drilling . . . . page 369

300-Pound
Brass Globe and Angle Valves
Plug Type Disc



No. 1824 P, Globe



No. 1825 P, Angle

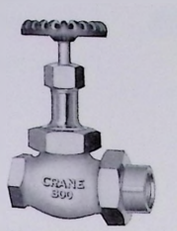
Male Inlet
Female Union Outlet

Male end is one pipe size larger than female union end.

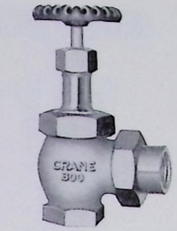
WORKING PRESSURES
300 pounds steam, 550° F.
600 pounds cold water, oil, or gas, non-shock

TEST PRESSURE
800 pounds hydrostatic

INTERCHANGEABILITY
All parts of these valves except the bodies are interchangeable with the corresponding parts of the No. 382 P Globe and No. 384 P Angle Valves shown on the preceding page.



No. 1826 P, Globe



No. 1827 P, Angle

Female Inlet
Female Union Outlet

Both ends are same size.

List Prices

Size	Inches	½ x ⅜	¾ x ½	1 x ¾	1¼ x 1	1½ x 1¼	2 x 1½	2½ x 2
No. 1824 P or No. 1825 P	Each	5.70	7.85	10.75	16.00	21.00	28.50	45.00

Size	Inches	½	¾	1	1¼	1½	2
No. 1826 P or No. 1827 P	Each	6.55	8.75	12.50	17.00	23.00	37.00

Cab Hose Valves

Female Inlet — Hose End Outlet



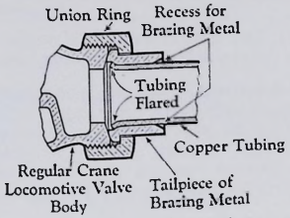
No. 1823 P

The No. 1823 P Valves except for their hose end bodies are made like the No. 382 P Valves shown on the preceding page.

List Prices

Size	Inches	⅜ female ½ hose	½ female ½ hose
No. 1823 P	Each	3.60	3.80

Union End Valves for use with Copper Tubing



Union end valves can be made to order with brazing tail-pieces for use with copper tubing. Prices on application.

Dimensions, in Inches

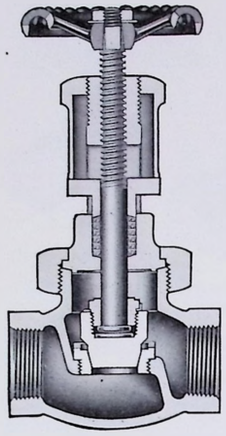
Size			½ x ⅜	¾ x ½	1 x ¾	1¼ x 1	1½ x 1¼	2 x 1½	2½ x 2
Size, No. 1824 P, No. 1825 P									
Size, No. 1826 P, No. 1827 P				½	¾	1	1¼	1½	2
Size, No. 1823 P	⅜ x ½	½ x ½							
End to end, No. 1824 P			4 5/16	5	5⅞	6⅝	7 7/16	8 5/16	9 11/16
Center to male end, No. 1825 P			2⅛	2½	3	3 5/16	3⅝	4⅛	4 11/16
Center to union end, No. 1825 P			2 3/16	2½	2⅞	3 5/16	3 13/16	4 3/16	5
End to end, No. 1826 P				4	4⅝	5⅜	6 3/16	6 13/16	8 3/16
Center to female end, No. 1827 P				1½	1¾	2 1/16	2⅜	2⅝	3 3/16
Center to union end, No. 1827 P				2½	2⅞	3 5/16	3 13/16	4 3/16	5
End to end, No. 1823 P	3½	3⅝							
Center to top, open, Globe	5⅛	5⅛	5⅛	5⅝	6⅝	7¼	8¼	9 3/8	10⅝
Center to top, open, Angle			4⅞	5 3/8	6 3/8	7	8	9¼	10¼
Diameter of wheel	2 9/16	2 9/16	2 9/16	2¾	3 1/16	3⅝	4 1/16	4¾	6

All valves shown on this page are made to order only.

Description . . . . page 24

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300-Pound
Brass Globe and Angle Valves
Outside Screw and Yoke



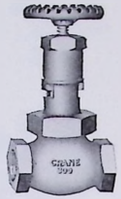
Cross Section
No. 372 P, Globe

WORKING PRESSURES
300 pounds steam, 550° F.
Screwed valves — 600 pounds cold water, oil, or gas, non-shock
Flanged valves — 500 pounds cold water, oil, or gas, non-shock

TEST PRESSURE
800 pounds hydrostatic

FEATURES
Exelloy Renewable Seat
Nickel Alloy Plug Type Disc
Union Bonnet

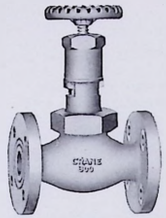
SERVICE RECOMMENDATIONS
These valves are recommended for exceptionally severe service, such as for throttling, and for soot blower, blow-off, boiler feed, drip, and drain lines. They are especially suitable for superheated steam or for service where valves are operated frequently.



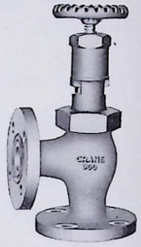
No. 372 P, Globe Screwed



No. 374 P, Angle Screwed



No. 373 P, Globe Flanged



No. 375 P, Angle Flanged

List Prices

Size	Inches	½	¾	1	1¼	1½	2
No. 372 P or No. 374 P, Screwed	Each	6.25	7.75	10.00	13.00	18.00	25.00
No. 373 P or No. 375 P, Flanged, F. & D.	Each		15.00	19.00	24.00	31.00	40.00

For wrenches for removing seat rings, see page 169.

Body: The body is strong and rugged. It is made of Crane Special Brass, a high grade steam composition.

Yoke-bonnet: The yoke is compact without sacrificing accessibility for repacking. Full threads at the yoke top for the packing nut prevent crossing or stripping of threads. The serviceable and practical union bonnet holds a tight joint and makes dismantling for cleaning or repairing easy.

Plug type disc and seat: The plug type disc and seat are unusually resistant to wiredrawing and foreign matter. The tapered disc permits easy flow regulation when throttling.

Seat metals: The seat ring is Exelloy; the disc, Crane Nickel Alloy. These metals have excellent resistance to wear, temperature, galling, and scoring.

Stem: The stem is Exelloy, assuring liberal strength and long life.

Stuffing box: The stuffing box is exceptionally deep and is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges conform to the Crane 300-Pound Brass Flange Standard. They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the Crane 300-Pound Standard; no deduction is made if valves are ordered "faced only".

Full face gaskets should be used; see page 357.

Dimensions, in Inches

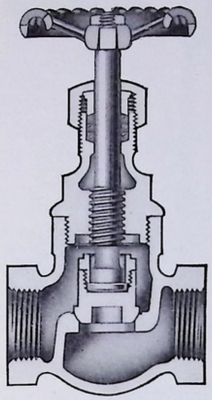
Size	½	¾	1	1¼	1½	2
End to end, No. 372 P	$2\frac{15}{16}$	$3\frac{1}{2}$	$4\frac{1}{8}$	$4\frac{3}{4}$	$5\frac{1}{4}$	$6\frac{3}{8}$
Center to end, No. 374 P	$1\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{1}{16}$	$2\frac{3}{8}$	$2\frac{5}{8}$	$3\frac{3}{16}$
Face to face, No. 373 P		$4\frac{3}{4}$	$5\frac{3}{8}$	$6\frac{1}{4}$	$7\frac{1}{4}$	8
Center to face, No. 375 P		3	$3\frac{1}{4}$	$3\frac{1}{2}$	4	$4\frac{5}{16}$
Center to top of wheel, open, Globe	$5\frac{3}{4}$	$6\frac{1}{8}$	$7\frac{5}{8}$	$8\frac{5}{8}$	$10\frac{1}{8}$	$12\frac{1}{8}$
Center to top of wheel, open, Angle	$5\frac{5}{8}$	$5\frac{7}{8}$	$7\frac{3}{8}$	$8\frac{3}{8}$	$9\frac{3}{4}$	$11\frac{7}{8}$
Diameter of wheel	$2\frac{3}{4}$	$3\frac{1}{16}$	$3\frac{5}{8}$	$4\frac{1}{16}$	$4\frac{3}{4}$	6
Diameter of flanges		$4\frac{5}{8}$	$4\frac{7}{8}$	$5\frac{1}{4}$	$6\frac{1}{8}$	$6\frac{1}{2}$
Thickness of flanges		$\frac{17}{32}$	$\frac{19}{32}$	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{3}{4}$

Templates for drilling . . page 369

1000-Pound Hydraulic
Brass Globe and Angle Valves

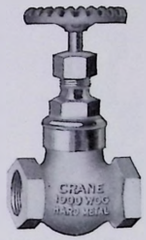
WORKING PRESSURE
1000 pounds cold water, oil, or gas, non-shock

TEST PRESSURE
1200 pounds hydrostatic



Cross Section
No. 257 H, Globe

FEATURES
Hard Metal Body and Disc
Exelloy Stem



No. 257 H, Globe Screwed



No. 258 H, Angle Screwed

List Prices

Size	Inches	½	¾	1	1¼	1½	2
No. 257 H, Globe, or No. 258 H, Angle	Each	4.15	5.35	7.25	10.00	14.00	20.00

Service recommendations: The No. 257 H Globe and No. 258 H Angle Valves are well proportioned and are sturdily constructed. They are recommended for general stop valve service on water and oil lines not subjected to shock and on high-pressure gas lines.

Construction: The valves have a ball to flat seat, providing a line bearing. Seats are integral with the body.

Stuffing boxes are of ample depth, are equipped with a gland, and are filled with high quality packing.

Materials: Bodies and discs are made of Crane Hard Metal, a strong, hard, copper-tin bronze having unusual resistance to wear. Stems are made of Exelloy, assuring liberal strength and long life.

Seat opening: The diameter of the seat opening in the valves is the same as the nominal size of the valve.

Repacking: These valves, when wide open, can be repacked while under pressure.

Dimensions, in Inches

Size		½	¾	1	1¼	1½	2
End to end, No. 257 H Globe		3	$3\frac{7}{16}$	$3\frac{15}{16}$	$4\frac{7}{16}$	$5\frac{5}{16}$	$6\frac{5}{16}$
Center to end, No. 258 H Angle		$1\frac{3}{8}$	$1\frac{5}{8}$	$1\frac{15}{16}$	$2\frac{3}{16}$	$2\frac{9}{16}$	$3\frac{1}{16}$
Center to top of wheel, open	No. 257 H Globe	5	$5\frac{7}{8}$	$6\frac{7}{8}$	$7\frac{7}{8}$	$9\frac{1}{8}$	$10\frac{3}{4}$
	No. 258 H Angle	$4\frac{3}{4}$	$5\frac{5}{8}$	7	$7\frac{3}{4}$	$9\frac{3}{8}$	$10\frac{3}{4}$
Diameter of wheel		$2\frac{3}{4}$	$3\frac{1}{16}$	$3\frac{5}{8}$	$4\frac{1}{16}$	$4\frac{3}{4}$	$5\frac{3}{8}$

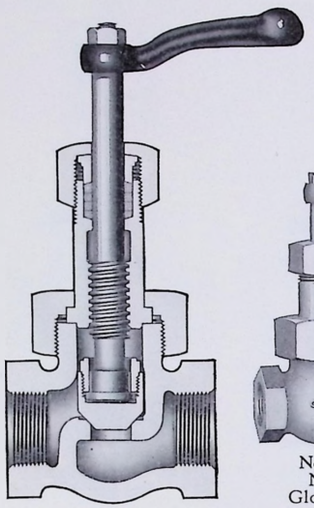
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2000-Pound Hydraulic
Brass Globe and Angle Valves
Union Bonnet

WORKING PRESSURE
2000 pounds cold water, oil, or gas, non-shock

TEST PRESSURE
2200 pounds hydrostatic

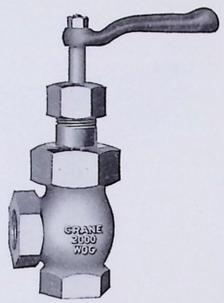
FEATURES
Union Bonnet
Hard Metal Body and Disc



Cross Section
No. 232 H, Globe
45° Seat

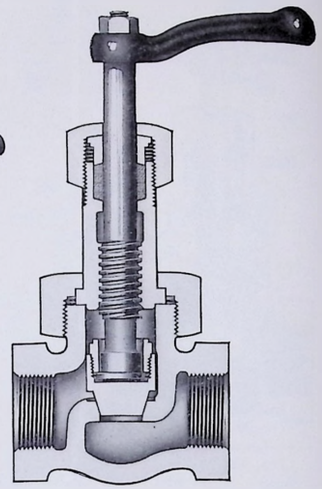


No. 232 H or
No. 233 H
Globe, Screwed



No. 232 H or
No. 233 H
Angle, Screwed

When ordering, specify whether globe or angle valves are wanted.



Cross Section
No. 233 H, Globe
Plug Type Disc

List Prices and Dimensions

Size		Inches	3/8	1/2	3/4	1	1 1/4
No. 232 H or No. 233 H, Globe or Angle		Each	6.00	6.00	7.00	9.00	13.00
End to end, Globe		Inches	2 13/16	2 13/16	3 7/16	4	4 11/16
Center to end, Angle		Inches	1 3/8	1 3/8	1 3/4	2 1/16	2 3/8
Center to top of lever handle, Open	No. 232 H, Globe	Inches	6 1/8	6 1/8	6 3/4	8 1/8	9 7/8
	No. 232 H, Angle	Inches	5 3/4	5 3/4	6 3/8	7 1/2	9 1/8
	No. 233 H, Globe	Inches	6 3/8	6 3/8	7	8 3/8	9 1/2
	No. 233 H, Angle	Inches	6 1/8	6 1/8	6 1/2	7 3/4	8 3/4
Center to end of lever handle		Inches	3 7/8	3 7/8	4 1/4	4 5/8	5

No. 232 H Valves, 45° seat: The No. 232 H Globe and Angle Valves are made with a 45° seat. They are suitable for general stop valve service on hydraulic lines not subjected to shock and on high-pressure gas lines.

All sizes of the No. 232 H Valves have the disc stem ring construction shown in the cross section at the left.

No. 233 H Valves, plug type disc: The No. 233 H Globe and Angle Valves have a plug type disc and seat. They are especially recommended for severe service, such as throttling. The seating surfaces have excellent resistance to wiredrawing and foreign matter, and the tapered disc permits easy flow regulation.

The 1¼-inch size valves have the disc stem ring construction shown in the cross section at the right; smaller sizes have the disc cast integral with the stem.

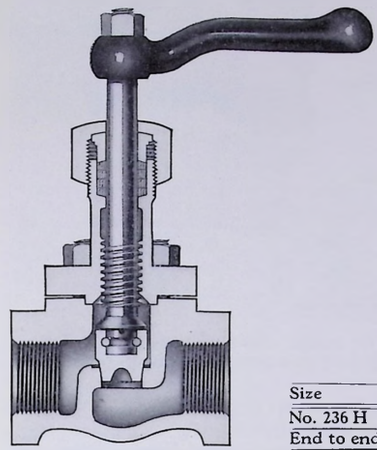
Rugged construction: Both types of valves are well proportioned throughout and are unusually heavy. Bodies and discs are cast of Crane Hard Metal, a copper-tin bronze of high strength and hardness. The union bonnet joint is strong and serviceable; it holds a tight joint readily, and it facilitates regrinding.

Seat opening: The diameter of the seat opening in the valves is slightly larger than the inside diameter of Double Extra Strong Pipe.

Repacking: These valves, when wide open, can be repacked while under pressure.

Renewable seat valves made to order: Renewable seat valves with either 45° seat or plug type disc can be made on special order; prices on application.

2500-Pound Hydraulic
Brass Globe Valves
Bolted Bonnet



Cross Section

WORKING PRESSURE
2500 pounds cold water, oil, or gas, non-shock

TEST PRESSURE
3000 pounds hydrostatic

FEATURES
Bolted Bonnet
Hard Metal Body
Hard Metal Plug Type Disc

SERVICE RECOMMENDATIONS
Recommended for severe and extremely high pressure hydraulic service on lines not subject to shock, and on high-pressure gas lines.



No. 236 H, Globe
Plug Type Disc, Screwed

List Prices and Dimensions

Size	Inches	1	1 1/4	1 1/2	2	2 1/2
No. 236 H	Each	22.50	27.50	35.00	47.50	90.00
End to end	Inches	4 1/2	4 15/16	5 1/2	6 3/8	7 7/8
Center to top, open	Inches	8 1/8	9	10 1/8	11 1/2	12 5/8
Center to end of handle, or wheel diameter	Inches	5	5 3/4	8	9	10

Exceptionally rugged construction: No. 236 H Valves have very heavy metal sections; their bolted bonnet provides a sturdy, rugged construction. Crane Hard Metal, used for the bodies and discs, has great strength and hardness, and offers excellent resistance to wear.

Plug type disc and seat: The plug type disc and seat are unusually resistant to wiredrawing and foreign matter. The wide tapered seating surface permits easy flow regulation when throttling.

Disc-stem connection: The 1-inch No. 236 H Valves have the disc and stem cast integral (not illustrated); 1¼ and 1½-inch sizes have the disc and stem cast separately and fastened together with two disc pins as shown in the cross section; 2 and 2½-inch sizes have the two parts cast separately and fastened together with a disc stem ring (not illustrated).

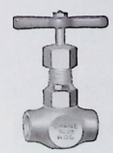
Handle or wheel: 1 and 1¼-inch valves have lever handles as illustrated; larger sizes have wheels.

Seat opening: The diameter of the seat opening in these valves is slightly larger than the inside diameter of Double Extra Strong Pipe.

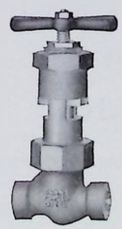
Repacking: These valves, when wide open, can be repacked while under pressure.

Renewable seat valves: Renewable seat No. 236 H Valves are made on special order; prices on application.

For Higher Pressures Use Crane Steel Valves



3000-Pound
No. 222 X, Globe
Exelloy
See page 320



3000-Pound
No. 216 P, Globe
Forged Steel
See page 321

When globe and angle valves are required for hydraulic pressures higher than 2500 pounds, use Crane Steel Valves.



3000-Pound
No. 176 P, Globe
Forged Steel
See pages 322 and 323

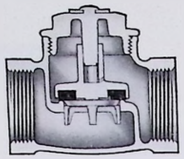


6000-Pound
No. 225 H, Globe
Forged Steel
See page 324

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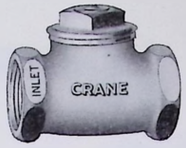
Low Pressure
Brass Check Valves

Composition Disc Valves



Cross Section
No. 1212, Horizontal

100 pounds steam working pressure



No. 1212, Horizontal
Screwed

List Prices and Dimensions

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 1212, Horizontal	Each	1.10	1.10	1.20	1.30	1.90	2.60	3.60	5.00	7.50
Extra disc holder, disc, and nut, complete	Each	.40	.40	.55	.80	1.10	1.40	1.75	2.25	3.00
End to end	Inches	1 13/16	1 13/16	2	2 3/8	2 3/4	3 5/16	3 3/4	4 1/4	4 7/8
Center to top	Inches	1 1/8	1 1/8	1 1/4	1 3/8	1 5/8	1 3/4	2	2 1/4	2 1/2

For list prices of Composition Discs, see page 168.

Service recommendations: These valves combine a wide range of utility with moderate cost. Being equipped with a composition disc, they are suitable for almost any low pressure installation.

They are especially recommended for domestic hot or cold water lines, domestic gas lines, and similar low pressure service.

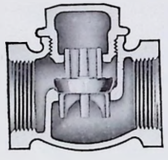
Discs: Unless otherwise ordered, these valves are furnished with a No. 8 Low Pressure Hot Water Disc, suitable for hot water, cold water, or domestic gas service.

When ordered for steam, they will be furnished with a No. 7 Low Pressure Steam Disc.

For description and dimensions of discs, see page 168.

A metal plate, secured to the cap, identifies the type of disc.

Brass Disc Valves

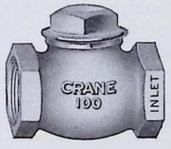


Cross Section
No. 20 B, Horizontal

100 pounds steam working pressure

The 3/8-inch size is made with a ball disc.

These valves are recommended for general low pressure service on lines carrying steam, water, oil, or gas.



No. 20 B, Horizontal
Screwed

List Prices and Dimensions

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 20 B, Horizontal	Each	.70	.90	1.15	1.60	2.25	3.15	4.75
End to end	Inches	1 11/16	2	2 1/2	2 7/8	3 7/16	3 7/8	4 3/4
Center to top	Inches	1 1/8	1 1/4	1 1/2	1 11/16	2	2 1/4	2 5/8

Brass Solder-Joint Check Valves



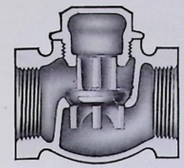
No. 1304, Horizontal

Licensed under Mueller Brass Co., STREAMLINE Division, Patents

No. 1304 Brass Solder-Joint Horizontal Check Valves have solder-joint end connections for use with copper tubing.

The complete Crane Solder-Joint line includes valves, fittings, bends, and accessories for domestic and industrial installations; see the section of this catalogue devoted to Solder-Joint Valves and Fittings.

Standard
Brass Check Valves
Brass Disc



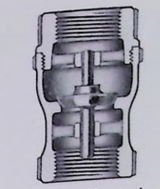
No. 20, Horizontal
Screwed



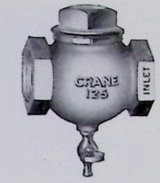
No. 26, Angle
Screwed

125 pounds steam working pressure

Sizes 3/8-inch and smaller have a ball disc.



No. 24, Vertical
Screwed



No. 28, Horizontal
Screwed
with Drip Cock

List Prices

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 20, Horizontal	Each	.65	.65	.70	.90	1.15	1.60	2.25	3.15	4.75	9.00	13.00
No. 24, Vertical	Each	.72	.72	.77	1.00	1.26	1.80	2.52	3.50	5.30	10.00	14.40
No. 26, Angle	Each	.72	.72	.77	1.00	1.26	1.80	2.52	3.50	5.30	10.00	14.40
No. 28, Horizontal, with Drip Cock	Each				2.15	2.55	3.15	4.05				

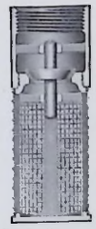
Service recommendations: These valves are recommended for general service on steam, water, oil, or gas lines.

Construction: The valves are heavier and more rugged than is usual with "Standard" valves. All parts are liberally proportioned, to withstand operating strains and expansion and contraction of the pipe.

Installation: The No. 24 Vertical Check Valves should be used on vertical lines with upward flow, and always should be installed with the inlet end down.

Dimensions, in Inches

Size		1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 20	End to end	1 7/16	1 5/8	1 7/8	2 1/4	2 11/16	3 3/16	3 11/16	4 1/4	5 1/8	6 1/16	7 1/16
	Center to top	1 5/16	1 1/16	1 3/16	1 3/8	1 5/8	1 7/8	2 3/16	2 3/8	2 13/16	3 5/16	3 3/4
No. 26	Center to end	3/4	1 3/16	1 5/16	1 1/8	1 3/8	1 5/8	1 13/16	2 1/16	2 1/2	3 1/16	3 5/8
	Center to top	1 5/16	1	1 3/16	1 5/16	1 9/16	1 13/16	2 1/16	2 5/16	2 3/4	3 1/4	3 3/4
No. 24	End to end	1 13/16	1 13/16	1 3/4	2 5/16	2 3/4	3 7/16	3 13/16	4 1/8	4 11/16	5 3/4	6 5/16
	Largest diameter	1 1/8	1 1/8	1 3/8	1 1/2	1 3/4	2 1/8	2 9/16	2 7/8	3 5/8	4 7/16	5 1/4
No. 28	End to end				2 5/8	3 1/8	3 9/16	3 7/8				
	Center to top				1 11/16	2	2 1/16	2 1/4				



Cross Section
No. 33½

Standard
Brass Foot Valves
with Strainer

200 pounds cold water working pressure



No. 33½
Screwed

List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 33½, Screwed	Each	1.40	1.55	1.90	2.50	3.50	5.00	10.00	15.00
End to end	Inches	2 1/16	2 5/8	3 15/16	5	6 1/4	7 1/16	9	10 11/16
Size of pipe that valve will pass through	Inches	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4

Service recommendations: These valves are recommended for use on water suction lines.

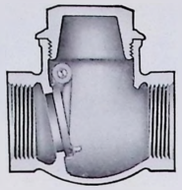
Construction: The valves are designed to slip through standard wrought pipe, two pipe sizes larger than the nominal valve size.

The strainer is made of brass wire screen.

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Standard
Brass Swing Check Valves

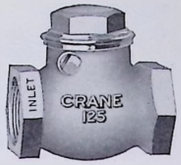
Brass Disc Valves



Cross Section
No. 34, Brass Disc

125 pounds steam working pressure

These valves may be used either in a horizontal position, or in a vertical position for upward flow.



No. 34, Brass Disc
Screwed

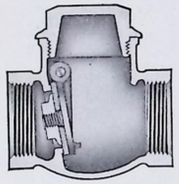
List Prices and Dimensions

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 34, Brass Disc	Each	1.80	2.00	2.25	2.80	3.65	4.75	6.75	15.00	24.00
End to end	Inches	1 7/8	2 7/32	2 11/16	3 3/16	3 11/16	4 7/32	5 1/8	6 1/16	7 3/8
Center to top	Inches	1 3/8	1 9/16	1 13/16	2 3/16	2 9/16	2 13/16	3 1/4	3 7/8	4 1/8

Service recommendations: These valves are recommended for service on steam and water lines.

Construction: The valves are heavier and more rugged than is usual with "Standard" valves. All parts are liberally proportioned to withstand normal operating strains. The disc, in sizes 3/8 to 2-inch, is integral with the hinge as shown in the illustration above. In the larger sizes, the disc swivels on the hinge. All sizes have a disc stop, preventing the disc from sticking in the open position.

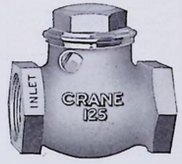
Leather Disc Valves



Cross Section
No. 34 1/2, Leather Disc

200 pounds cold water working pressure

These valves may be used either in a horizontal position, or in a vertical position for upward flow.



No. 34 1/2, Leather Disc
Screwed

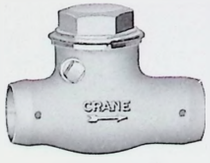
List Prices and Dimensions

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 34 1/2, Leather Disc	Each	2.40	2.65	2.90	3.60	4.65	6.00	8.25
End to end	Inches	1 7/8	2 7/32	2 11/16	3 3/16	3 11/16	4 7/32	5 1/8
Center to top	Inches	1 3/8	1 9/16	1 13/16	2 3/16	2 9/16	2 13/16	3 1/4

Service recommendations: These valves are especially recommended for service on cold water lines.

Construction: Except for the leather disc construction, the valves are identical with the No. 34 Brass Disc Valves shown above.

Brass Solder-Joint Swing Check Valves



No. 1303, Swing Check

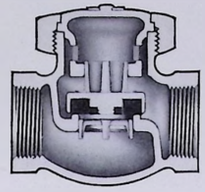
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No. 1303 Brass Solder-Joint Swing Check Valves have solder-joint end connections for use with copper tubing.

The complete Crane Solder-Joint line includes valves, fittings, bends, and accessories for domestic and industrial installations; see the section of this catalogue devoted to Solder-Joint Valves and Fittings.

150-Pound
Brass Check Valves

Composition Disc Valves



Cross Section
No. 27, Horizontal

WORKING PRESSURES
150 pounds steam
300 pounds cold water, oil, or gas, non-shock

FEATURES
Union Cap
Composition Disc

When ordering, specify whether horizontal or angle valves are wanted.



No. 27, Horizontal
Screwed



No. 27, Angle
Screwed

List Prices

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 27, Horizontal or Angle	Each	1.10	1.20	1.30	1.90	2.60	3.60	5.00	7.50	13.50	20.50
Extra disc holder, disc, and nut, complete	Each	.25	.30	.45	.60	.70	.85	1.15	1.70	3.30	5.25

For list prices of Composition Discs, see page 168.

Service recommendations: These valves are recommended for a wide range of service, such as for steam, hot water, cold water, oil, air, or gas. They are especially suited for use where discs must be renewed easily and quickly.

Rugged construction: All parts are strong and rugged, assuring a high factor of safety.

Union cap: The union cap construction facilitates dismantling for cleaning and repairing.

Discs: Unless otherwise ordered, these valves are furnished with a No. 1 Steam Disc, suitable for steam.

When ordered for hot water, oil, or gas, they are furnished with a No. 2 Hot Water Disc.

When ordered for cold water or air, they are furnished with a No. 3 Cold Water disc.

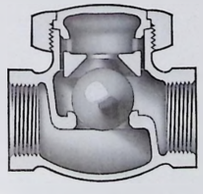
For description and dimensions of discs, see page 168.

A metal plate, secured to the cap, identifies the type of disc.

Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
End to end, Horizontal	2	2 5/16	2 11/16	3 3/16	3 3/4	4 1/4	4 3/4	5 3/4	6 3/4	8
Center to end, Angle	1 5/16	1 1/16	1 1/4	1 7/16	1 11/16	2	2 3/16	2 11/16	3 1/4	3 13/16
Center to top, Horizontal	1 3/8	1 1/2	1 3/4	2	2 1/4	2 5/8	3	3 1/2	4	4 5/8
Center to top, Angle	1 1/4	1 3/8	1 5/8	1 7/8	2 1/8	2 1/2	2 3/4	3 1/4	3 3/4	4 3/8

Metal Ball Disc Valves



Cross Section
No. 31, Horizontal

WORKING PRESSURES
150 pounds steam
300 pounds cold water, oil, or gas, non-shock

List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4
No. 31, Horizontal	Each	1.60	2.40	3.60	5.60
End to end	Inches	2 11/16	3 3/16	3 3/4	4 1/4
Center to top	Inches	1 11/16	1 15/16	2 1/4	2 9/16



No. 31, Horizontal
Screwed

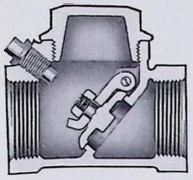
Service recommendations: These valves are recommended for steam, water, oil, or gas lines.

Smaller sizes: When sizes smaller than 1/2-inch are required, the No. 20 Horizontal Check Valves shown on page 31 are recommended.

Valves with drip cock: These valves can be furnished with a drip cock, similar to the No. 28 Check Valves shown on page 31, at an extra price.

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 35 of 402
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asbestosclaims.law/library/21275/35

200-Pound
Brass Check Valves
Regrinding



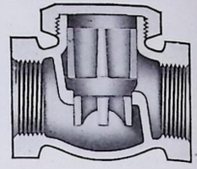
Cross Section
No. 35, Swing

WORKING PRESSURES

Screwed valves—**200** pounds steam, **500°** F.
400 pounds cold water, oil, or gas, non-shock
Flanged valves—**150** pounds steam, **500°** F.
225 pounds cold water, oil, or gas, non-shock

TEST PRESSURES

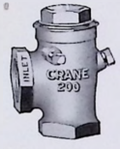
Screwed valves—**600** pounds hydrostatic
Flanged valves—**450** pounds hydrostatic



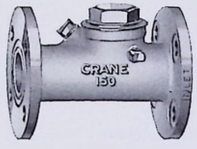
Cross Section
No. 72, Navy
Horizontal



No. 35, Swing
Screwed



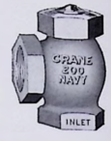
No. 37, Swing
Angle, Screwed



No. 35½, Swing
Flanged



No. 72, Navy
Horizontal, Screwed



No. 72, Navy
Angle, Screwed

Horizontal Swing Check Valves may also be used in a vertical position for upward flow.

When ordering, specify whether horizontal or angle valves are wanted.

List Prices

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 35, Swing, Screwed	Each	2.50	2.50	2.75	3.10	4.00	5.50	7.00	10.00	19.00	27.00
No. 35½, Swing, Flanged, F. & D.	Each				10.00	12.50	17.00	21.00	35.00	50.00	65.00
No. 37, Swing, Angle, Screwed	Each			2.75	3.10	4.00	5.50	7.00	10.00		
No. 72, Horizontal or Angle, Screwed	Each	1.15	1.35	1.70	2.25	3.15	4.50	6.30	9.90	18.00	26.00

Service recommendations: These valves are recommended for severe service on steam, water, oil, or gas lines.

Material: The bodies are made of Crane Special Brass, a high grade steam metal.

Regrinding: All check valves shown on this page may be reground without removing the bodies from the line. By removing the stop plug on the swing check valves, a screw driver can be engaged with the slot in the disc spud, making it easy to rotate the disc when regrinding.

Flanged valves: End flanges conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2a-1930). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the MSS 150-Pound Standard; no deduction is made if valves are ordered "faced only".

Full face gaskets should be used; see page 357.

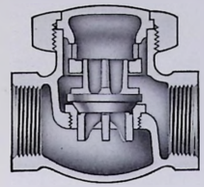
Dimensions, in Inches

Size		¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 35, Swing	End to end	2 3/16	2 3/16	2½	2¾	3¼	3 13/16	4¼	5 5/16	6	7
	Center to top	1 5/16	1 5/16	1 7/16	1 11/16	2	2 3/8	2 11/16	3 3/16	3¾	4 5/16
No. 35½, Swing	Face to face				4 3/8	5	5 5/8	6 1/8	7 3/8	8½	9 1/8
	Center to top				1 11/16	2	2 3/8	2 11/16	3 3/16	3¾	4 5/16
No. 37, Angle, Swing	Center to end			1⅛	1⅜	1 5/8	1⅞	2⅛	2 5/8	3	3 5/16
	Center to top			1 9/16	1 13/16	2 3/16	2½	2 7/8	3 7/16	4 1/16	4 9/16
No. 72, Horizontal or Angle	End to end, Horizontal	1 11/16	1 15/16	2¼	2¾	3 5/16	3⅞	4½	5¼	6 5/16	7¼
	Center to end, Angle	1 3/16	1	1 3/16	1⅜	1 11/16	1 15/16	2¼	2 5/8	3 3/16	3 13/16
	Center to top, Horizontal	1 5/16	1⅛	1 3/16	1 7/16	1¾	2	2¼	3 5/16	3¾	4 5/16
	Center to top, Angle	1 5/16	1⅛	1 3/16	1 7/16	2⅛	2 7/16	2¾	3 5/16	3¾	4⅜
Flange dimensions	Diameter of flanges				3 7/8	4¼	4 5/8	5	6	7	7½
	Thickness of flanges				11/32	3/8	13/32	7/16	½	9/16	5/8

Templates for drilling . . . page 369

250-Pound
Brass Check Valves

Crane Nickel Alloy Disc Valves



Cross Section
No. 218, Horizontal

WORKING PRESSURES

250 pounds steam, **500°** F.
500 pounds cold water, oil, or gas, non-shock

TEST PRESSURE — **650** pounds hydrostatic

FEATURES

Crane Nickel Alloy Disc and Seat
Union Cap



No. 218
Horizontal
Screwed



No. 219
Angle
Screwed

List Prices and Dimensions

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2
No. 218, Horizontal, or No. 219, Angle	Each	2.40	2.80	3.70	4.80	6.50	9.00	12.60	18.50
End to end, Horizontal	Inches	2	2 5/16	2 11/16	3 3/16	3¾	4¼	4¾	5¾
Center to end, Angle	Inches	1 5/16	1 1/16	1¼	1 7/16	1 11/16	2	2 3/16	2 11/16
Center to top, Horizontal or Angle	Inches	1⅜	1½	1¾	2	2¼	2⅝	3	3½

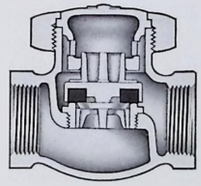
Service recommendations: No. 218 and No. 219 Valves are recommended where operating conditions require a high quality metal disc and seat. They are suitable for severe service on steam, water, oil, or gas lines.

Rugged construction: All parts are unusually strong and rugged. The valves are liberally proportioned to withstand severe operating strains.

Material: The body is made of Crane Special Brass, a high grade steam composition. The disc and seat are Crane Nickel Alloy, a seating material that resists wear exceptionally well.

Union cap: The valves have a union cap and can be easily dismantled for cleaning and repairing.

Cranite Composition Disc Valves



Cross Section
No. 218 C, Horizontal

WORKING PRESSURES

250 pounds steam, **500°** F.
500 pounds cold water, non-shock
400 pounds cold oil or gas, non-shock

TEST PRESSURE — **650** pounds hydrostatic

FEATURES

Cranite Disc — Crane Nickel Alloy Seat
Union Cap



No. 218 C
Horizontal
Screwed



No. 219 C
Angle
Screwed

List Prices

Size		Inches	¼	⅜	½	¾	1	1¼	1½	2
No. 218 C, Horizontal, or No. 219 C, Angle		Each	2.40	2.80	3.70	4.80	6.50	9.00	12.60	18.50
Extra disc holder, disc, and nut, complete	With No. 4 Cranite Disc	Each	.30	.35	.50	.65	.80	1.00	1.35	1.95
	With No. 2 or No. 3 Disc	Each	.25	.30	.45	.60	.70	.85	1.15	1.70

For list prices of Composition Discs, see page 168.

Service recommendations: These valves are recommended for services where discs must be frequently renewed.

Construction and dimensions: Except for the disc and seat, the valves are the same as the Nos. 218 and 219 shown above. End to end, center to end, and center to top dimensions are the same.

Discs: Unless otherwise ordered, No. 218 C and No. 219 C Valves are furnished with a No. 4 Cranite Disc, suitable for high-pressure steam.

When ordered for hot water, oil, or gas, they are furnished with a No. 2 Hot Water Disc.

When ordered for cold water or air, they are furnished with a No. 3 Cold Water Disc.

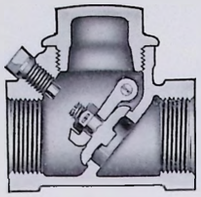
For description and dimensions of discs, see page 168.

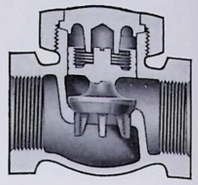
Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 36 of 402
Published by AsbestosClaims.Law
asbestosclaims.law/library/21275/36

300-Pound
Brass Check Valves
Regrinding

WORKING PRESSURES
300 pounds steam, 550° F.
Screwed valves — 600 pounds cold water, oil, or gas, non-shock
Flanged valves — 500 pounds cold water, oil, or gas, non-shock

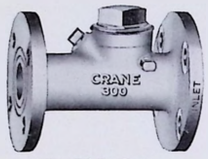
TEST PRESSURES
No. 74 E and No. 75 E — 800 pounds hydrostatic
No. 366 E and No. 369 E — Air Tested


Cross Section
No. 74 E, Swing


Cross Section
No. 366 E, Horizontal



No. 74 E, Swing
Screwed

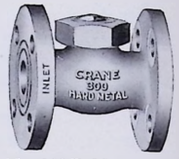


No. 75 E, Swing
Flanged

The No. 74 E and the No. 75 E Swing Check Valves may also be used in a vertical position for upward flow.



No. 366 E, Horizontal
Screwed



No. 369 E, Horizontal
Flanged

List Prices

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 74 E, Screwed	Each		2.70	2.70	3.25	4.25	6.00	7.50	12.00		
No. 75 E, Flanged, F. & D.	Each				10.00	13.00	18.00	22.00	37.50		
No. 366 E, Screwed	Each	2.40	2.80	3.70	4.80	6.50	9.00	12.60	18.50	34.00	54.00
No. 369 E, Flanged, F. & D.	Each				12.00	16.00	21.00	26.50	35.00	60.00	95.00

No. 74 E and No. 75 E: The No. 74 E and No. 75 E are heavy, ruggedly constructed swing check valves, recommended for severe service on steam, water, oil, or gas lines. Bodies and discs are Crane Special Brass, a high grade steam metal.

These valves may be reground without removing the body from the line. By removing the stop plug, a screw driver can be engaged with the disc-spud slot, making it easy to rotate the disc when regrinding.

No. 366 E and No. 369 E: These are horizontal check valves, recommended for steam, water, oil, air, or gas, and especially for service where pulsations in the line are apt to cause an ordinary check valve to hammer. The dashpot formed above the piston type disc effectively cushions the disc.

Bodies and discs are Crane Hard Metal, a copper-tin bronze that resists wear exceptionally well.

These valves can be reground without removing the body from the line.

When so ordered, the valves can be equipped with a spring above the disc to keep the valve normally closed when used on air or gas; prices on application.

Flanged valves: End flanges conform to the Crane 300-Pound Brass Flange Standard. They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the Crane 300-Pound Standard; no deduction is made if valves are ordered "faced only".

Full face gaskets should be used; see page 357.

Dimensions, in Inches

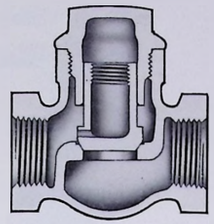
Size		¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 74 E or No. 75 E	End to end, No. 74 E		2¾	2¾	3 1/16	3 5/8	4 1/8	4 13/16	5 13/16		
	Face to face, No. 75 E				5¼	5 13/16	6 7/16	7 7/16	8 3/8		
	Center to top		1 13/16	1 13/16	2 1/8	2 7/16	2 13/16	3 5/16	3 13/16		
No. 366 E or No. 369 E	End to end, No. 366 E	1 13/16	2	2½	2 15/16	3½	4 1/16	4 5/8	5¾	6⅞	8
	Face to face, No. 369 E				3 15/16	4 9/16	5	5¾	6¾	7⅞	8 11/16
	Center to top	1	1⅛	1⅜	1⅞	2	2⅜	2⅝	3¼	3⅞	4½
Flange dimensions	Diameter of flanges				4⅝	4⅞	5¼	6⅛	6½	7½	8¼
	Thickness of flanges				17/32	19/32	5/8	11/16	¾	13/16	29/32

Templates for drilling . . page 369

Hydraulic
Brass Check Valves

1000 - Pound

WORKING PRESSURE
1000 pounds cold water, oil, or gas, non-shock
TEST PRESSURE — 1200 pounds hydrostatic


Cross Section

List Prices and Dimensions

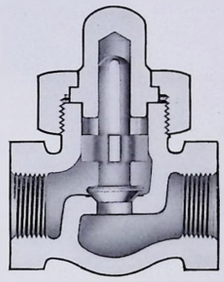
Size	Inches	½	¾	1	1¼	1½	2
No. 259 H	Each	3.70	4.80	6.50	9.00	12.60	18.50
End to end	Inches	3	3 7/16	3 15/16	4 7/16	5 5/16	6 5/16
Center to top	Inches	2¼	2½	3	3½	3¾	4½



No. 259 H
Horizontal
Screwed
1000-Pound

2000 - Pound

WORKING PRESSURE
2000 pounds cold water, oil, or gas, non-shock
TEST PRESSURE — 2200 pounds hydrostatic


Cross Section

List Prices and Dimensions

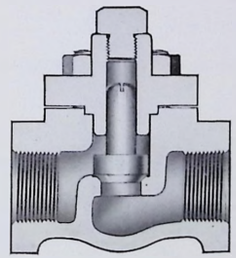
Size	Inches	⅜	½	¾	1	1¼
No. 234 H	Each	5.00	5.00	6.00	8.00	11.00
End to end	Inches	2 13/16	2 13/16	3 7/16	4	4 11/16
Center to top	Inches	2⅝	2⅝	3¼	3⅞	4 7/16



No. 234 H
Horizontal
Screwed
2000-Pound

2500 - Pound

WORKING PRESSURE
2500 pounds cold water, oil, or gas, non-shock
TEST PRESSURE — 3000 pounds hydrostatic


Cross Section

List Prices and Dimensions

Size	Inches	1	1¼	1½	2
No. 238 H	Each	18.00	22.50	27.50	40.00
End to end	Inches	4½	4 15/16	5½	6⅜
Center to top	Inches	3 9/16	4 1/16	4⅝	5 5/16



No. 238 H
Horizontal
Screwed
2500-Pound

Service recommendations: Crane Hydraulic Brass Check Valves are recommended for severe high-pressure hydraulic service on lines not subjected to shock, and for high-pressure gas lines.

Construction: The valves are exceptionally heavy and rugged. The top of the disc fits snugly in the valve cap, guiding the disc accurately and forming a dashpot that effectively cushions the action of the valve while in service.

The No. 259 H Valves have a screwed cap, the No. 234 H Valves have a union cap, and the No. 238 H have a bolted cap.

Materials: The bodies and discs of these valves are made of Crane Hard Metal, a strong, hard, copper-tin alloy having excellent resistance to wear.

Seat opening: The diameter of the seat opening in the No. 259 H Valves is the same as the nominal size of the valve. In both the No. 234 H and the No. 238 H Valves, it is slightly larger than the inside diameter of Double Extra Strong Pipe.

Steel valves: When check valves are wanted for higher pressures, for higher temperatures, or for unusually severe services, Crane Steel Valves are recommended. See pages 320 and 327.

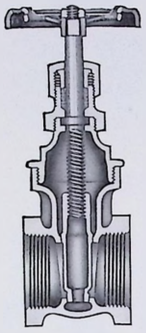
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Brass Gate Valves

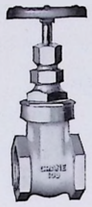
Wedge Disc—Non-Rising Stem

Low Pressure Gate Valves

100 pounds steam working pressure



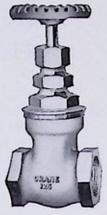
Cross Section
No. 449½



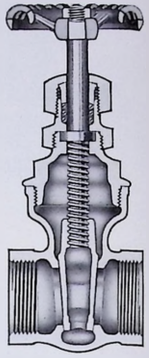
No. 449½
Low Pressure
Screwed

Standard Gate Valves

125 pounds steam working pressure



No. 438
Standard
Screwed



Cross Section
No. 438

List Prices

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 449½	Each	1.45	1.45	1.65	2.05	2.80	3.70	5.00	7.30		
No. 438	Each	1.45	1.45	1.65	2.05	2.80	3.70	5.00	7.30	13.00	19.00

No. 449½ Low Pressure Gate Valves: Although these valves are lighter than the No. 438 Standard Valves, they are of good proportions and are well constructed.

They will give good service where working conditions are not severe and are recommended for general shut-off valve service on low pressure steam and water lines. They are well suited for heating systems, city water, low pressure condensation return lines, and similar low pressure service.

These valves, when wide open, can be repacked while under pressure. The stuffing box is equipped with a gland.

No. 438 Standard Gate Valves: These valves are heavier and more rugged than is usual with "Standard" valves. All parts are liberally proportioned, to assure a high factor of safety against pressure, operating strains, and expansion and contraction of piping.

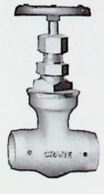
They are recommended for general service on steam, water, oil, or gas lines.

The stuffing box is equipped with a gland.

These valves, when wide open, can be repacked while under pressure.

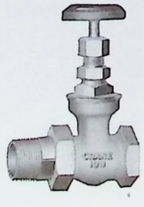
Dimensions, in Inches

Size		¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 449½ Low Pressure	End to end	1¾	1 13/16	1 13/16	2	2 3/16	2 7/16	2 5/8	3		
	Center to top of wheel	3¾	3¾	3¾	4½	5¼	5¾	6½	7⅝		
	Diameter of wheel	2¼	2¼	2¼	2⅝	3	3⅜	3¾	4¼		
No. 438 Standard	End to end	1¾	1 13/16	2	2¼	2 11/16	3	3¼	3 11/16	4¼	4 11/16
	Center to top of wheel	3¾	3¾	4 1/16	4¾	5⅝	6½	7¼	8⅝	10	11⅛
	Diameter of wheel	1¾	1¾	2 1/16	2 9/16	2¾	3 1/16	3⅝	4 1/16	4¾	5⅜



Brass
Solder-Joint
Gate Valves

See the section on Solder-Joint Valves and Fittings



Brass
Radiator
Gate Valves

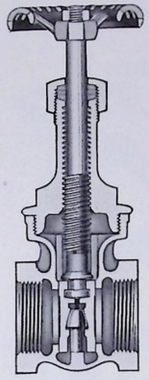
See page 50



Brass
Hose
Gate Valves

See page 46

Standard
Brass Gate Valves
Double Disc—Rising Stem



Cross Section
No. 440

125 pounds steam working pressure

SERVICE RECOMMENDATIONS
These valves are recommended for general service on steam, water, oil, or gas lines.

No. 440 Valves are heavier and more rugged than is usual with "Standard" valves. All parts are liberally proportioned, to assure a high factor of safety against pressure, operating strains, and expansion and contraction of the piping.



No. 440
Screwed

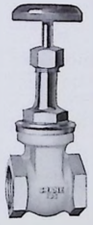
List Prices

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 440, Screwed	Each	1.45	1.45	1.65	2.05	2.80	3.70	5.00	7.30	13.00	19.00

Construction: These valves have a rising stem, a double disc, and parallel seats. The double disc is guided in the body. When closing, the last turn of the handwheel forces the discs against the seats; when opening, the first turn of the handwheel releases the discs from the seats.

Repacking: These valves, when wide open, can be repacked while under pressure.

Flanged valves: For flanged valves, see page 41.



No. 444, Screwed
with Composition Wheel

Valves with Special Wheels and Special Finish

Except for the special wheels and the style of finish, No. 444 and No. 448 Gate Valves are the same as the No. 440 Gate Valves illustrated above.

When ordering No. 444 or No. 448 Valves, specify style of finish wanted.



No. 448, Screwed
with Brass Wheel

List Prices

Size		Inches	½	¾	1	1¼	1½	2	2½	3
*No. 444	Rough body, plain	Each	2.00	2.55	3.40	4.50	6.00	8.90		
	Rough body, nickel-plated all over	Each	2.40	3.00	3.85	5.00	6.60	9.65		
	Polished all over	Each	3.30	4.00	5.10	6.75	9.00	13.90		
	Polished and nickel-plated all over	Each	3.70	4.50	5.60	7.35	9.70	14.80		
*No. 448	Rough body, plain	Each	2.90	3.30	4.65	5.85	7.60	10.60	16.70	24.30
	Rough body, nickel-plated all over	Each	3.35	3.80	5.25	6.55	8.40	11.50	17.90	26.00
	Polished all over	Each	4.15	4.80	6.35	8.10	10.60	15.60	24.00	35.00
	Polished and nickel-plated all over	Each	4.60	5.30	6.95	8.80	11.40	16.50	25.25	36.75

**Nos. 444 and 448 Valves can be furnished polished and chromium-plated; see the Crane Discount Sheet for prices.*

Dimensions, in Inches

Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3
End to end	1⅝	1¾	1⅞	2⅛	2½	2¾	3	3½	4 1/16	4 9/16
Center to top of wheel, open	4¼	4¼	4¾	5⅞	7	8⅜	9½	11⅞	14¼	16½
Diameter of wheel, No. 440	1¾	1¾	2 1/16	2 9/16	2¾	3 1/16	3⅝	4 1/16	4¾	5⅜
Diameter of wheel, No. 444			2¼	2¼	2½	2¾	3	3		
Diameter of wheel, No. 448			2	2½	2½	3	3½	4	5	5

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Standard
Brass Gate Valves
Quick Opening

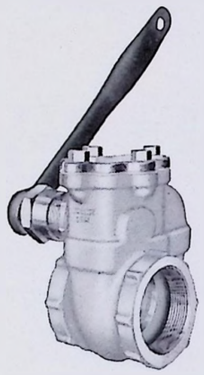
Cam Action Valves

Patented

WORKING PRESSURES
½ to 2-inch — 125 pounds steam
200 pounds cold water, oil, or gas, non-shock

2½ and 3-inch — 100 pounds steam
100 pounds cold water, oil, or gas, non-shock

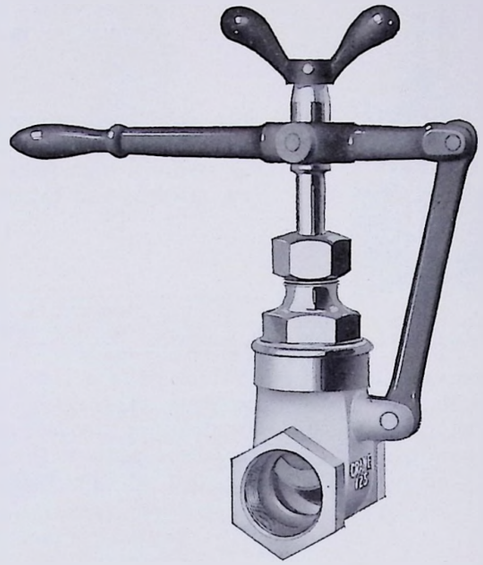
Air Tested



No. 432, Screwed

Sliding Stem Valves

WORKING PRESSURES
125 pounds steam
200 pounds cold water, oil, or gas, non-shock



No. 442, Screwed

List Prices

Size	Inches	½	¾	1	1¼	1½	2	2½	3
No. 432, Cam Action Valves	Each	6.50	7.50	10.00	13.00	17.00	26.00	45.00	65.00
No. 442, Sliding Stem Valves	Each		3.60	4.80	6.20	8.50	11.80	20.25	30.00

No. 432 Cam Action Valves: This superior line of quick opening wedge gate valves is recommended for service on steam, water, oil, or air lines.

The solid wedge disc is operated with a quick opening lever through a specially designed cam arrangement, assuring fast and positive valve action.

Sizes 1-inch and smaller have a screwed cap; the larger sizes have a bolted cap as shown in the illustration.

To insure proper seating, when closing the valves, a snappy action with plenty of force should be applied to the lever. The disc will not jam, and there is no danger of injuring parts because the valve has been designed to withstand such action.

No. 432 Gate Valves are listed by the Underwriters' Laboratories of Chicago as approved for hazardous liquid service at pressures not exceeding 50 pounds; this is the maximum pressure prescribed by the Underwriters' Laboratories for hazardous liquid equipment.

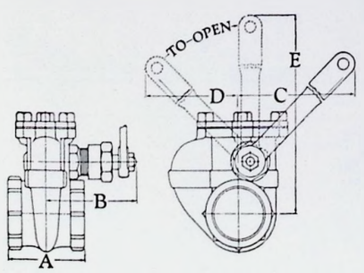
No. 442 Sliding Stem Valves: No. 442 Quick Opening Gate Valves are of the parallel seat construction. They have a sliding stem and a double disc.

They are of ample proportions, sturdily constructed, and only a short movement of the lever is required to operate the valve.

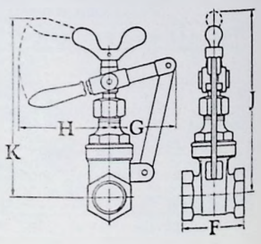
The wing nut at the top of the stem permits forcing the discs to the seats after the valve has been closed, and releasing the discs before opening.

Shock: When these valves are used on liquid lines, closing a valve quickly might cause "water hammer". When severe, water hammer should be eliminated by installing a suitable cushioning device in the piping. Otherwise, the shocks might damage the valves or the piping.

Dimensions, in Inches

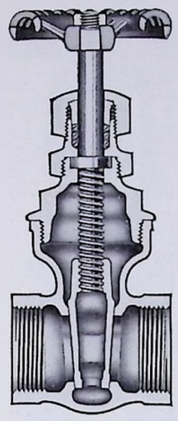


Size	½	¾	1	1¼	1½	2	2½	3
A	1 7/8	2 1/8	2 1/2	2 3/4	2 7/8	3 3/8	4	4 1/4
B	2 11/16	2 7/8	3 1/8	3 1/2	3 7/8	4 1/4	4 7/8	5 3/8
C	2 1/8	3 1/8	4	5 1/2	6 3/8	7 5/8	8 3/4	10
D	3	3 1/4	3 1/2	4 5/8	5 3/8	6 3/8	7 1/2	8 1/8
E	5 9/16	6 1/4	6 3/4	8 5/8	9 13/16	12	13 7/8	15 5/16
F		2 5/8	2 13/16	3 1/4	3 7/8	4 1/8	4 5/8	5 3/8
G		2 5/8	3	3 1/2	4	4 3/8	4 5/8	5 1/4
H		4 7/8	5 3/4	7	7 3/8	8 3/8	9 1/2	10 5/8
J		7 1/8	8 5/8	10 1/8	11	13 1/4	15	16 7/8
K		7 1/2	8 1/4	9 7/8	10 3/4	13 3/8	16 1/2	17

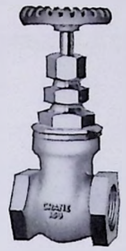


150-Pound
Brass Gate Valves
Wedge Disc

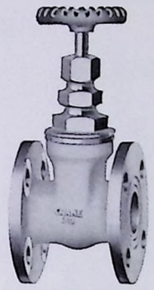
WORKING PRESSURES
Screwed valves — 150 pounds steam
300 pounds cold water, oil, or gas, non-shock
Flanged valves — 150 pounds steam
225 pounds cold water, oil, or gas, non-shock



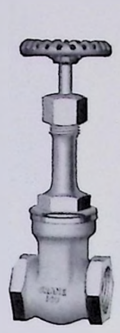
Cross Section Non-Rising Stem No. 437



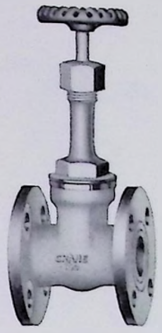
Non-Rising Stem No. 437 Screwed



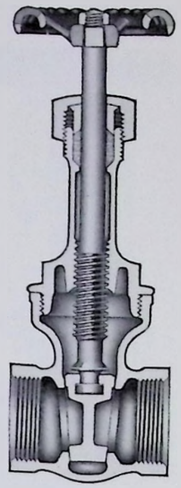
Non-Rising Stem No. 437½ Flanged



Rising Stem No. 431 Screwed



Rising Stem No. 429 Flanged



Cross Section Rising Stem No. 431

List Prices

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 437, Screwed	Each	1.45	1.45	1.65	2.05	2.80	3.70	5.00	7.30	13.00	19.00
No. 437½, Flanged, F. & D.	Each				9.00	10.25	12.00	15.00	25.00	33.00	39.00
No. 431, Screwed	Each	1.45	1.45	1.65	2.05	2.80	3.70	5.00	7.30	13.00	19.00
No. 429, Flanged, F. & D.	Each				9.00	10.25	12.00	15.00	25.00	33.00	39.00

Service recommendations: These valves are recommended for steam, water, oil, or gas where the service requires a heavier construction than found in Standard valves.

No. 437 and No. 437½ Gate Valves: The No. 437 and No. 437½ are non-rising stem valves. They are more massive and are heavier in construction than the No. 438 Standard Wedge Disc Gate Valves, shown on page 38.

They have a gland in the stuffing box, and when wide open can be repacked while under pressure.

No. 431 and No. 429 Gate Valves: The No. 431 and No. 429 are rising stem valves. Their solid wedge disc slips onto the stem, and is accurately guided in the body.

The valves have a gland in the stuffing box, and when wide open can be repacked while under pressure.

Flanged valves: End flanges conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2a-1930). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the MSS 150-Pound Standard; no deduction is made if valves are ordered "faced only".

Full face gaskets should be used; see page 357.

Dimensions, in Inches

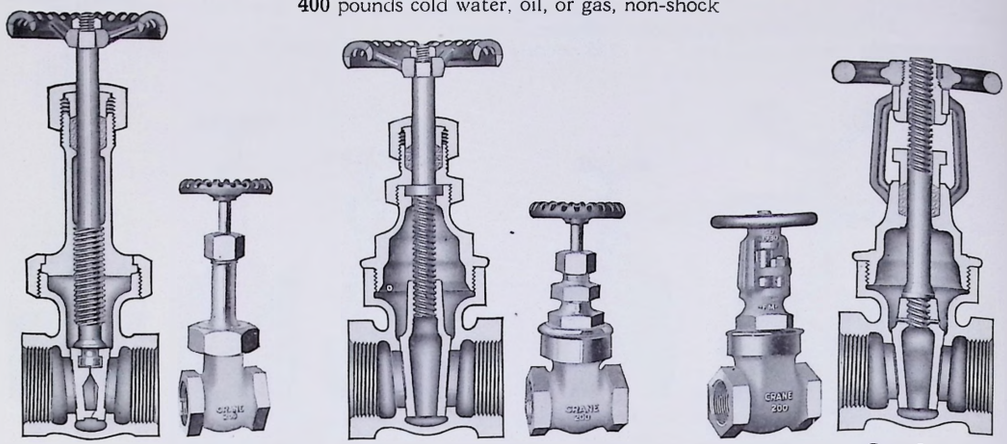
Size		¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 437 and No. 437½	End to end, No. 437	1 7/8	1 15/16	2 1/8	2 3/8	2 7/8	3 3/16	3 7/16	3 7/8	4 1/2	4 15/16
	Face to face, No. 437½				3	3 3/8	3 7/8	4 3/8	5 1/2	6 1/2	7 1/2
	Center to top of wheel	3 3/4	3 3/4	4 1/16	4 3/4	5 5/8	6 1/2	7 1/4	8 5/8	10	11 1/8
	Diameter of wheel	1 3/4	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8
No. 431 and No. 429	End to end, No. 431	1 7/8	1 15/16	2 1/8	2 3/8	2 7/8	3 3/16	3 7/16	3 7/8	4 1/2	4 15/16
	Face to face, No. 429				3	3 3/8	3 7/8	4 3/8	5 1/2	6 1/2	7 1/2
	Center to top of wheel, open	5 1/8	5 1/8	5 1/2	6 5/8	7 7/8	9 1/2	10 7/8	13 1/8	15 3/8	17 7/8
	Diameter of wheel	1 3/4	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8
Flange dimensions	Diameter of flanges				3 7/8	4 1/4	4 5/8	5	6	7	7 1/2
	Thickness of flanges				11/32	3/8	13/32	7/16	1/2	9/16	5/8

Templates for drilling . . . page 369

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200-Pound
Brass Gate Valves
Wedge Disc

WORKING PRESSURES
200 pounds steam, 500° F.
400 pounds cold water, oil, or gas, non-shock



Cross Section Rising Stem No. 457 — Air Tested
Rising Stem No. 457 Screwed
Cross Section Non-Rising Stem No. 458
Non-Rising Stem No. 458 Screwed
Outside Screw and Yoke No. 459 Screwed
Cross Section Outside Screw and Yoke No. 459

List Prices

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 457, Rising Stem	Each	2.35	2.35	2.75	3.25	4.50	6.00	8.00	13.00	20.00	32.50
No. 458, Non-Rising Stem	Each	2.35	2.35	2.75	3.25	4.50	6.00	8.00	13.00	20.00	32.50
No. 459, Outside Screw and Yoke	Each			8.75	8.75	10.25	12.00	15.00	22.00	32.00	50.00

Service recommendations: These valves are ruggedly constructed. They are recommended for severe service on steam, water, oil, or gas lines.

Material: The body and bonnet are made of Crane Special Brass, a high grade steam composition.

Stuffing box: The stuffing box is equipped with a gland, and is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

No. 457 Rising Stem Gate Valves: The No. 457 Gate Valves have a union bonnet, which strengthens the bonnet joint and facilitates dismantling for cleaning and repairing.

Sizes ¾-inch and smaller have a solid wedge disc; the larger sizes have a double wedge disc.

No. 459 Outside Screw and Yoke Gate Valves: The No. 459 Gate Valves, in sizes ½ to 2-inch inclusive, conform to the Underwriters' Specification known as "The National Standard". They are listed as approved and inspected by the Associated Factory Mutual Fire Insurance Companies of Boston, and the Underwriters' Laboratories of Chicago.

No. 459 Gate Valves with flanged ends can be made to order; prices and dimensions will be furnished on application.

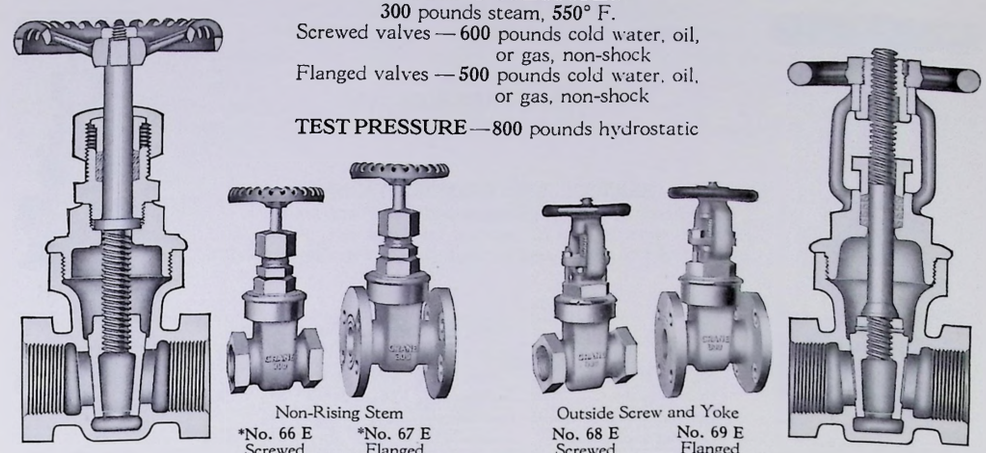
Dimensions, in Inches

Size		¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 457	End to end	1 15/16	1 15/16	2 3/16	2 7/16	2 3/4	3 1/8	3 7/16	4	4 5/8	5 7/16
	Center to top of wheel, open	5 1/4	5 1/4	6	7	8 1/2	9 3/4	11 1/4	13 3/4	16 1/2	19
	Diameter of wheel	2 1/16	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	6	7
No. 458	End to end	2	2	2 3/8	2 5/8	3	3 1/2	4	4 3/4	5 3/8	6
	Center to top of wheel	4 1/8	4 1/8	4 7/8	5 1/2	6 1/4	7 1/4	8 1/8	9 5/8	11 1/4	12 3/4
	Diameter of wheel	2 1/16	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	6	7
No. 459	End to end			2 5/8	2 5/8	3	3 1/2	4	4 3/4	5 3/8	6
	Center to top of stem, open			6 3/8	6 3/8	7 3/8	8 3/4	9 3/4	11 5/8	13 7/8	16 1/8
	Diameter of wheel			3 5/16	3 5/16	3 5/8	3 7/8	4 3/8	4 13/16	5 3/4	6 11/16

300-Pound
Brass Gate Valves
Wedge Disc

WORKING PRESSURES
300 pounds steam, 550° F.
Screwed valves — 600 pounds cold water, oil, or gas, non-shock
Flanged valves — 500 pounds cold water, oil, or gas, non-shock

TEST PRESSURE — 800 pounds hydrostatic



Cross Section Non-Rising Stem *No. 66 E
Non-Rising Stem *No. 66 E Screwed *No. 67 E Flanged
*2½ and 3-inch sizes have bolted bonnet.
Outside Screw and Yoke No. 68 E Screwed No. 69 E Flanged
Cross Section Outside Screw and Yoke No. 68 E

List Prices

Size		Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Non-Rising Stem	No. 66 E, Screwed	Each	4.00	4.00	5.00	6.00	8.00	11.25	16.50	23.00	40.00	65.00
	No. 67 E, Flanged, F. & D.	Each				13.00	16.00	21.50	30.00	41.00	65.00	100.00
Outside Screw and Yoke	No. 68 E, Screwed	Each			8.00	10.00	13.00	17.00	23.00	35.00		
	No. 69 E, Flanged, F. & D.	Each				16.00	21.00	27.00	39.00	55.00		

Nos. 66 E and 67 E: These are non-rising stem wedge disc valves. They are recommended for severe service on high-pressure steam, water, oil, or gas lines.

Sizes 2-inch and smaller have a screwed bonnet, as illustrated; 2½ and 3-inch sizes have a bolted bonnet (not illustrated).

Nos. 68 E and 69 E: These are outside screw and yoke wedge disc valves. They are recommended for high-pressure steam, water, oil, or gas lines. They are especially suitable on services where the action of the fluid might affect inside stem threads.

Construction and materials: Both the Non-Rising Stem and the Outside Screw and Yoke Valves have unusually heavy metal sections and are ruggedly constructed. Bodies and discs are made of Crane Special Brass, a high grade steam composition.

Stuffing boxes are deep, are equipped with a gland, and are filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges conform to the Crane 300-Pound Brass Flange Standard. They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the Crane 300-Pound Standard; no deduction is made if valves are ordered "faced only".

Full face gaskets should be used; see page 357.

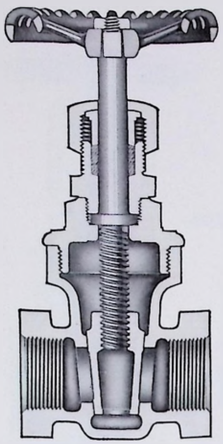
Dimensions, in Inches

Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3
End to end, Screwed	2 3/16	2 3/16	2 13/16	3 1/4	3 3/4	4 1/4	4 11/16	5 9/16	6 7/16	7 13/16
Face to face, Flanged				3 15/16	4 1/2	4 3/4	5 9/16	6 7/16	7	7 13/16
Center to top of wheel, Nos. 66 E or 67 E	4 1/2	4 1/2	5 1/2	6 1/4	7	8	9	10 3/4	11 7/8	13 1/4
Center to top of stem, open, Nos. 68 E or 69 E			6 1/2	7	8 1/8	9 1/4	10 1/4	13		
Diameter of wheel, Nos. 66 E or 67 E	2 9/16	2 9/16	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8	6	7	8
Diameter of wheel, Nos. 68 E or 69 E			3 5/16	3 9/16	3 7/8	4 3/8	4 7/8	5 3/4		
Diameter of flanges				4 5/8	4 7/8	5 1/4	6 1/8	6 1/2	7 1/2	8 1/4
Thickness of flanges				17/32	19/32	5/8	11/16	3/4	13/16	29/32

Templates for drilling . . page 369

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1000-Pound Hydraulic
Brass Gate Valves
Wedge Disc — Non-Rising Stem

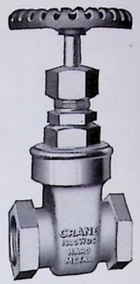


Cross Section

WORKING PRESSURE
1000 pounds cold water, oil, or gas, non-shock

TEST PRESSURE
1200 pounds hydrostatic

SERVICE RECOMMENDATIONS
These valves are recommended for severe high-pressure hydraulic service on lines not subjected to shock and for high-pressure gas lines.



No. 230 H
Screwed

List Prices and Dimensions

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2
No. 230 H	Each	6.00	6.00	7.50	9.00	12.00	15.50	22.50	34.50
End to end	Inches	2 3/16	2 3/16	2 13/16	3 1/4	3 3/4	4 1/4	4 11/16	5 9/16
Center to top of wheel	Inches	4 1/2	4 1/2	5 1/2	6 1/4	7	8	9	10 3/4
Diameter of wheel	Inches	2 9/16	2 9/16	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8	6

Construction: The No. 230 H Gate Valves are exceptionally massive, rugged, and heavy. They are well proportioned and will easily withstand strains resulting from installation and operation on high-pressure service.

They have non-rising stems and solid wedge discs.

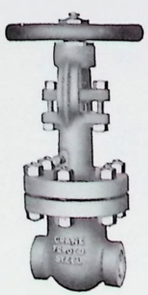
Materials: The bodies and discs of these valves are made of Crane Hard Metal, an unusually hard, strong, copper-tin bronze which resists wear exceptionally well. It is ideal for severe hydraulic service.

Stuffing box: The stuffing box is deep and is equipped with a gland. It is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

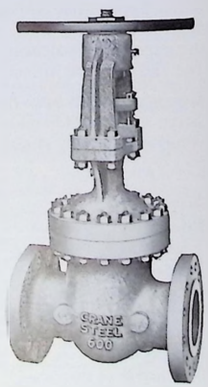
Crane Steel Gate Valves

For High Pressures and Temperatures



Forged Steel Gate Valve

When gate valves are required for higher pressures, high temperatures, or for unusually severe services, Crane Steel Gate Valves are recommended.



Cast Steel Gate Valve

Hose Threads

Hose threads: The basic (fundamental) dimensions of hose threads used on Crane Hose Valves are given in the table shown below.

Standard Crane practice: Unless otherwise ordered, the hose valves shown on pages 46 and 47 are furnished with the Chicago Hose Thread on sizes 2-inch and smaller and on the 3-inch size, and with the Chicago Fire Department Hose Thread on the 2½-inch size.

When so ordered, the valves shown on pages 46 and 47 can be supplied with the Iron Pipe Hose Thread on all sizes; with the California Hose Thread on sizes 2½-inch and smaller; and with the National (American) Standard Fire Hose Thread on the 2½ and 3-inch sizes. These are furnished without extra charge.

Special hose threads: When any other hose thread is required, orders should be accompanied by a sample, preferably the male end of a hose coupling.

Form of thread: The basic form of all Crane hose threads is the American National Standard, formerly known as the "U. S. Standard Form".

Dimensions of Hose Threads

Name of Hose Thread	Nominal Size of Hose, Inches	Number of Threads per Inch	Maximum Major Diameter (O.D.) of Nipple, Inches
Chicago Hose Thread	½	11½	1.0625
	¾		1.2951
	1	11½	1.688
	1¼		1.927
	1½	8	2.513
	2	7	3.637
	3	7½	3.017
Chicago Fire Department Hose Thread	2½	14	.8248
Iron Pipe Hose Thread	½		1.0353
	¾	11½	1.2951
	1		1.6399
	1¼		1.8788
	1½		2.3528
	2	8	2.843
	2½		3.470
	3	11	1.050
California Hose Thread	½		1.314
	¾		1.856
	1		2.090
	1¼		2.556
	1½	10	3.017
	2	7½	3.0686
	2½	6	3.6239
National (American) Standard Fire Hose Thread	2½	7½	
	3		

Hose and Hose Goods

In addition to the Hose Valves shown on pages 46 and 47, Crane Co. supplies a complete line of Hose and Hose Goods, including Hose, Hose Nozzles and Pipes, Hose Fittings, Hose Strainers, Hose Caps, Hose Spanners, Sensible Swivel Caps, Siamese Connections, and Hose Clamps. These are shown in another section of this catalogue. See the index.

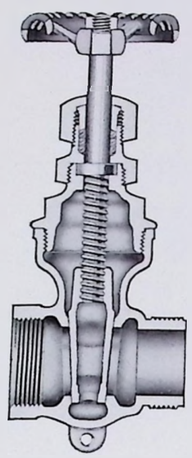
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asbestosclaims.law/library/21275/41

Brass Hose Gate Valves

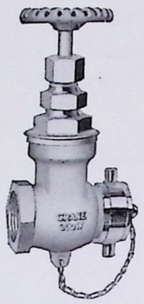
Wedge Disc—Non-Rising Stem

Standard

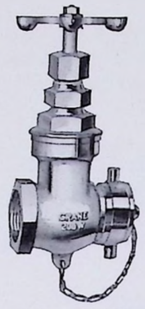
200 pounds cold water working pressure



Cross Section
No. 451



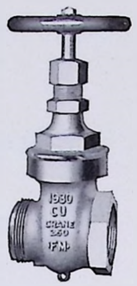
No. 451
Screwed



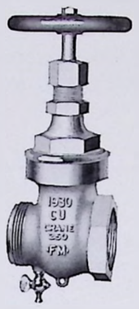
No. 451½
Screwed
with Brass Wheel

Underwriters' Pattern

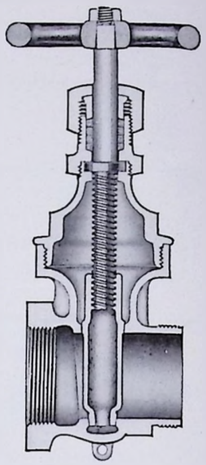
250 pounds cold water working pressure



No. 453
Screwed



No. 453
Screwed
with Drain Cock



Cross Section
No. 453

When ordering, specify whether wanted with or without cap and chain. In addition, when ordering No. 451½ Valves, specify style of finish.

Unless otherwise ordered, No. 453 Valves are furnished without drain cock.

List Prices

Size			Inches	1	1¼	1½	2	2½	3
No. 451	Rough body, plain	With brass cap and chain	Each	5.10	6.70	8.85	12.60	20.00	29.50
		Without brass cap and chain	Each	3.35	4.70	6.25	9.00	15.00	22.00
*No. 451½	Polished all over	With brass cap and chain	Each	8.65	11.10	14.45	20.90	31.00	45.50
		Without brass cap and chain	Each	6.90	9.10	11.85	17.30	26.00	38.00
	Polished and nickel-plated all over	With brass cap and chain	Each	9.25	11.80	15.25	21.90	32.25	47.25
		Without brass cap and chain	Each	7.50	9.80	12.65	18.30	27.25	39.75
No. 453	Rough body, plain, Without drain cock	With brass cap and chain	Each			11.25		23.25	
		Without brass cap and chain	Each			9.00		19.00	
	Rough body, plain, With drain cock	With brass cap and chain	Each			12.25		24.25	
		Without brass cap and chain	Each			10.00		20.00	

No. 451½ Valves can be furnished polished and chromium-plated; see the Crane Discount Sheet for prices.

Hose threads: Unless otherwise ordered, sizes 2-inch and smaller and the 3-inch size are furnished with Chicago Hose Threads; the 2½-inch size is furnished with the Chicago Fire Department Hose Thread.

When so ordered, all sizes can be supplied with Iron Pipe Hose Threads; sizes 2½-inch and smaller, with California Hose Threads; sizes 2½ and 3-inch, with National (American) Standard Fire Hose Threads. These are furnished at regular prices.

When any other hose thread is required, orders should be accompanied by a sample, preferably the male end of a hose coupling.

Underwriters' Specifications: No. 453 Hose Gate Valves conform to the Underwriters' Specification known as "The National Standard". They are listed as approved and inspected by the Associated Factory Mutual Fire Insurance Companies, Boston, and the Underwriters' Laboratories, Chicago, for water working pressures up to 250 pounds.

Dimensions, in Inches

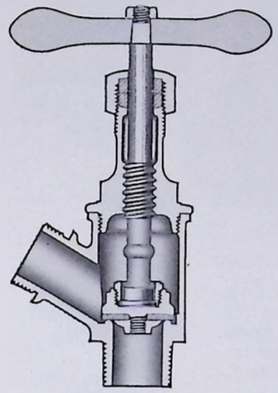
Size		1	1¼	1½	2	2½	3
No. 451 and No. 451½	Center to female end	1⅜	1½	1⅝	1⅞	2⅛	2⅜
	Center to hose end	1⅝	1⅞	2 1/16	2¼	2⅝	2 13/16
	Center to top of wheel	5⅝	6½	7¼	8⅝	10	11⅛
	Diameter of wheel, No. 451	2¾	3 1/16	3⅝	4 1/16	4¾	5⅜
	Diameter of wheel, No. 451½	2½	3	3½	4	5	5
No. 453	Center to female end			1⅝		2 5/16	
	Center to hose end			2¼		2½	
	Center to top of wheel			7½		11	
	Diameter of wheel			4⅛		6	

Brass Hose Valves

Chicago Hose Valves

Leather Disc

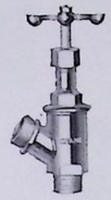
200 pounds cold water working pressure



Cross Section
No. 50



No. 50
Screwed
Tee Handle

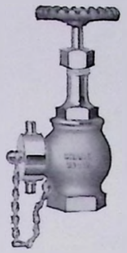


No. 52
Screwed
Brass Wheel

Angle Hose Valves

Crane Composition Disc

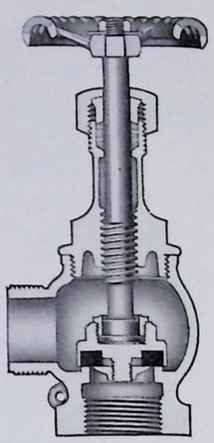
250 pounds cold water working pressure



No. 117
Screwed



No. 119
Screwed
Brass Wheel



Cross Section
No. 117

When ordering Nos. 50, 52, or 119 Valves, specify the finish wanted. In addition, when ordering Nos. 117 or 119 Valves, specify whether wanted with or without cap and chain.

List Prices

Size			Inches	½	¾	1	1¼	1½	2	2½	3
No. 50	Rough body, plain		Each			3.15	3.70	4.75	7.00	8.50	
	Rough body, nickel-plated all over		Each			3.65	4.30	5.50	8.00	9.75	
*No. 52	Polished all over		Each					9.00	11.50	14.50	
	Polished and nickel-plated all over		Each					10.00	12.75	16.00	
No. 117	Rough body, plain	With brass cap and chain	Each	5.50	6.50	7.75	9.50	11.50	16.00	33.00	45.00
		Without brass cap and chain	Each	4.50	5.25	6.00	7.50	9.00	12.50	28.00	37.50
*No. 119	Polished all over	With brass cap and chain	Each	7.50	8.75	10.50	13.00	16.00	21.50	40.00	57.50
		Without brass cap and chain	Each	6.50	7.50	8.75	11.00	13.50	18.00	35.00	50.00
	Polished and nickel-plated all over	With brass cap and chain	Each	8.25	9.50	11.50	14.25	17.50	23.50	43.00	62.00
		Without brass cap and chain	Each	7.00	8.00	9.50	11.75	14.50	19.50	37.00	53.00

For list prices of Composition Discs for No. 117 and No. 119 Hose Valves, see page 168.

Nos. 52 and 119 Valves can be furnished polished and chromium-plated; see the Crane Discount Sheet for prices.

No. 50 and No. 52 Hose Valves: These valves are especially suitable for use on outside standpipes.

No. 117 and No. 119 Hose Valves: These valves are furnished with a Crane No. 3 Cold Water Disc. They are recommended for standpipes, hose racks, and similar service where rugged, dependable hose valves are required.

For description and dimensions of discs, see page 168.

Hose threads: These valves are furnished with the same hose threads as the Hose Gate Valves shown on page 46.

Dimensions, in Inches

Size		½	¾	1	1¼	1½	2	2½	3
No. 50 and No. 52	Center to hose end			2½	3	3	3½	4 1/16	
	Bottom of inlet to top of tee handle or wheel, open			8⅛	9⅝	10⅜	11⅞	13⅞	
	Length of tee handle, No. 50			5⅛	5¾	6½	8¼	8¼	
	Diameter of wheel, No. 52					4	5	5	
No. 117 and No. 119	Center to hose end	1½	1 9/16	1¾	2¼	2⅜	2¾	3¼	3 13/16
	Bottom of inlet to top of wheel, open	6⅛	7 3/16	7 13/16	9⅛	9⅞	12 3/16	14 3/16	16 7/16
	Diameter of wheel, No. 117	2 9/16	2¾	3 1/16	3⅝	4½	5½	6	7
	Diameter of wheel, No. 119	2½	2½	3	3½	4	5	6	6



No. 56
Screwed

Garden Hose Valves

Leather Disc



No. 58
Screwed

List Prices

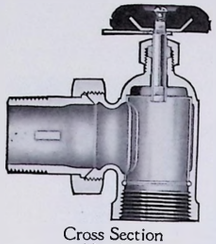
Size	Inches	½	¾	1	1¼	1½	2	2½
No. 56 or No. 58, Rough body, plain	Each	1.65	1.65	2.20	3.40	4.75	7.00	15.00

These valves have the same hose threads as the Hose Gate Valves shown on page 46.

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Brass Radiator Valves and Union Elbows

Hot Water Valves



Cross Section No. 174



No. 174 Angle

Radiator Union Elbows

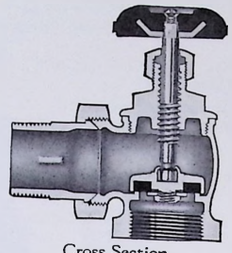


No. 192 Union Elbow

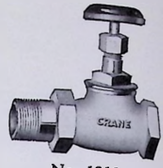
Composition Disc Steam Valves



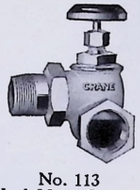
No. 112 Angle



Cross Section No. 112



No. 1213 Globe



No. 113 Left Hand Corner

When ordering corner valves, specify whether right hand or left hand corner valves are wanted.



No. 113 Right Hand Corner

List Prices

Size		Inches	½	¾	1	1¼	1½	2
No. 174, Angle Valves, rough body, nickel-plated all over, for hot water		Each	3.25	3.70	4.50	5.75	7.30	12.00
No. 112, Angle Valves, rough body, nickel-plated all over, for steam		Each	3.70	4.30	5.10	6.40	8.40	13.60
No. 1213, Globe Valves, rough body, nickel-plated all over, for steam		Each	3.70	4.30	5.10	6.40	8.40	
No. 113, Corner Valves, rough body, nickel-plated all over, for steam		Each	4.10	4.75	5.60	7.05	9.25	15.00
No. 192, Union Elbows, rough body, nickel-plated all over		Each	1.75	2.00	2.50	3.30	4.25	7.20

For list prices of Composition Discs, see page 168.

Hot Water Valves: The No. 174 Valves are recommended for gravity hot water heating installations. They are neat in appearance, compact in design, and are well constructed.

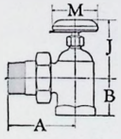
They open or close in one-quarter turn; a pointer below the wheel shows the position of the opening in the disc. The disc, made from brass tubing, has a 1/16-inch hole to provide for circulation when the valve is closed.

Steam Valves: The No. 112, No. 1213, and No. 113 Valves are recommended for steam and vapor heating installations. They present a neat appearance, are compact in design, and are substantially constructed.

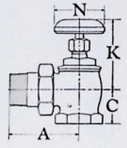
They are equipped with a No. 8 Low Pressure Composition Disc, secured in the disc holder by a brass nut and washer. For description and dimensions of discs, see page 168.

The disc holder swivels on the stem.

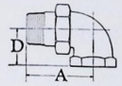
Lock Shield: Valves shown on this page can be furnished with lock shield at the same price. See page 52.



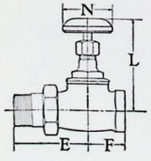
No. 174



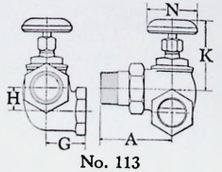
No. 112



No. 192



No. 1213



No. 113

Dimensions, in Inches

Size	½	¾	1	1¼	1½	2
A (*)	2¼	2¾	3	3½	3¾	4¼
B	1⅛	1¼	1½	1 13/16	2 1/16	2⅜
C	1	1 3/16	1 7/16	1 11/16	1 13/16	2⅛
D	1⅛	1 5/16	1 9/16	1 13/16	2 1/16	2½
E	2½	2⅞	3¼	3¾	4	
F	1 3/16	1⅜	1⅝	1⅞	2⅛	
G	1 3/16	1⅜	1 11/16	2	2¼	2¾
H	⅝	¾	15/16	1 3/16	1 5/16	1 11/16
J	2⅛	2⅜	2¾	3	3⅜	4
K—Open	3⅛	3⅞	4⅝	5⅛	6⅛	7½
L—Open	3⅝	4⅛	4⅝	5⅛	5¾	
M	2	2	2	2¼	2½	2¾
N	2	2	2¼	2½	2¾	3

(*) Dimension A conforms to the Standard adopted by the Heating and Piping Contractors' National Association in co-operation with the Manufacturers Standardization Society of the Valve and Fittings Industry.

Brass Radiator Valves

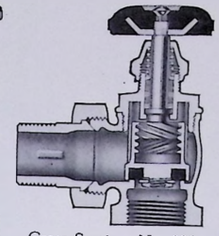
With Self-Adjusting Packing and Composition Disc

Angle and Corner Valves

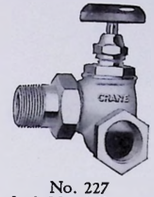
For Steam, Vacuum, Vapor, or Hot Water



No. 226 Angle

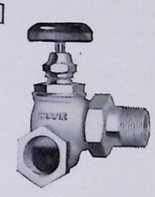


Cross Section, No. 226



No. 227 Left Hand Corner

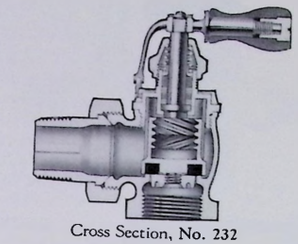
When ordering corner valves, specify whether right hand or left hand corner valves are wanted.



No. 227 Right Hand Corner

Angle Modulating Valve

For Steam, Vacuum, or Vapor



Cross Section, No. 232



No. 232, Angle Modulating

List Prices

Size	Inches	½	¾	1	1¼	1½
No. 226, Angle, rough body, nickel-plated all over	Each	3.70	4.30	5.10	6.40	8.40
No. 227, Corner, rough body, nickel-plated all over	Each	4.10	4.75	5.60	7.05	9.25
No. 232, Modulating, rough body, nickel-plated all over	Each	3.70	4.30	5.10	6.40	

For list prices of Composition Discs, see page 168.

Service recommendations: These valves are recommended for steam, vacuum, or vapor heating systems. In addition, the No. 226 and No. 227 are ideal for hot water systems (forced feed or gravity flow). When wanted for gravity flow hot water, orders should so specify, and the valves will be furnished with a small hole drilled through the seat to provide slow circulation when the valve is closed.

Construction: The valves are strong, compact, and neat appearing. They have a non-rising stem and open or close in three-quarter turn.

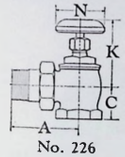
The stuffing box is packed with a combination of Cranite and braided asbestos packing. The bronze spring in the stuffing box not only holds the packing tight but also prevents leakage at the valve seat caused by contraction of the internal parts after the valve is closed and has cooled.

The valves are equipped with a No. 8 Low Pressure Composition Disc. For description and dimensions of discs, see page 168.

No. 232 Modulating Valves: Except for the lever handle, indicating plate, adjustable stop, and throttling nut, the No. 232 are the same as the No. 226 Valves. They are designed for installations where it is desired to control, or modulate, the flow of steam passing into the radiator.

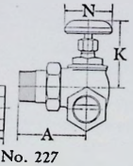
The indicating plate is graduated to show closed, ¼ open, ½ open, ¾ open, and open positions. The stop for the open position is adjustable, making it possible to limit the maximum amount of steam which will pass through the valve when wide open.

Lock Shield Valves: The No. 226 and No. 227 Valves, when so ordered, can be furnished with a lock shield without extra charge; see page 52.

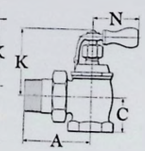


No. 226





No. 227



No. 232

Dimensions, in Inches

Size	No. 226 or No. 227					No. 232			
	½	¾	1	1¼	1½	½	¾	1	1¼
A(*)	2¼	2¾	3	3½	3¾	2¾	2¾	3	3½
C	1	1 3/16	1 7/16	1 11/16	1 13/16	1	1 3/16	1 7/16	1 11/16
G	1 3/16	1⅜	1 11/16	2	2¼				
H	⅝	¾	15/16	1 3/16	1 5/16				
K	3	3	3¼	3½	4	3	3	3¼	3½
N	2	2	2¼	2½	2¾	2⅜	2⅜	2⅜	2⅜

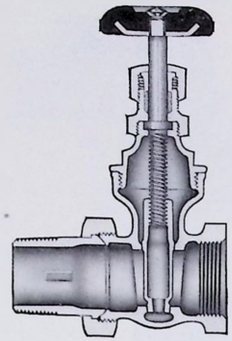
(*) Dimension A conforms to the Standard adopted by the Heating and Piping Contractors' National Association in co-operation with the Manufacturers Standardization Society of the Valve and Fittings Industry.

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Brass Radiator Gate Valves

Wedge Disc—Non-Rising Stem

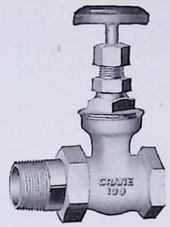
100 pounds steam working pressure



Cross Section

Crane No. 455 Brass Gate Valves are recommended for radiator valve service on hot water installations (either forced feed or gravity flow type) and on steam or vapor heating systems. They are especially suitable for use with unit heaters. In addition, the valves are ideal for general shut-off valve service at other points throughout heating systems, as on boilers and hot water heaters.

When ordering, specify style of finish desired.



No. 455
With Male Union Outlet

List Prices and Dimensions

Size		Inches	½	¾	1	1¼	1½
No. 455	Rough body, plain	Each	3.20	3.75	4.65	6.00	8.25
	Rough body, nickel-plated all over	Each	3.65	4.25	5.20	6.60	9.00
Center to female end		Inches	1	1⅛	1 5/16	1½	1 9/16
Center to union end		Inches	2¼	2 11/16	2 13/16	3 3/16	3 5/16
Center to top of wheel		Inches	3¾	4½	5¼	5¾	6½
Diameter of wheel		Inches	1¾	2	2¼	2½	2¾

Hot water service: When No. 455 Valves are wanted for gravity flow hot water heating systems, orders should so specify. Such valves are furnished with a small hole drilled through the disc to provide slow circulation when the valve is closed.

Construction: No. 455 Valves are neat in appearance, are attractively finished, and are well proportioned and sturdily constructed. They have a non-rising stem and a wedge disc.

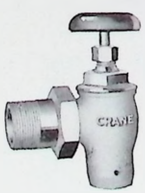
Stuffing box: The stuffing box is filled with high grade packing and is equipped with a gland.

Repacking: The valves, when wide open, can be repacked while under pressure.

Lock Shield Valves: These valves can be furnished with a lock shield without extra charge; see page 52.

Brass Solder-Joint Radiator Valves and Union Elbows

Licensed under Mueller Brass Co., STREAMLINE Division, Patents



Radiator Valve
With Solder-Joint Inlet

Crane Brass Radiator Valves and Crane Brass Radiator Union Elbows having solder-joint inlet for use with copper tubing are made to order; prices are furnished on application.

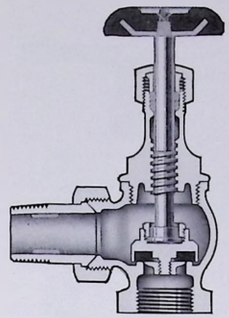
The complete Crane Solder-Joint line includes valves, fittings, bends, and accessories for domestic and industrial installations; see the section of this catalogue devoted to Solder-Joint Valves and Fittings.



Radiator Union Elbow
With Solder-Joint Inlet

Heavy Brass Radiator Valves

Government Pattern—with Composition Disc



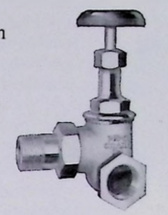
Cross Section
No. 67 G

WORKING PRESSURE—150 pounds steam

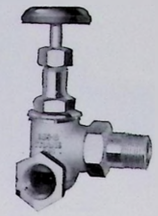
These valves are recommended for steam and hot water heating systems. When wanted for gravity flow hot water, orders should so specify; such valves are drilled with a small hole through the seat to provide slow circulation when the valve is closed.



No. 67 G
Angle



No. 145 G
Left Hand Corner



No. 145 G
Right Hand Corner

When ordering corner valves, specify whether right hand or left hand corner valves are wanted.

List Prices and Dimensions

Size		Inches	½	¾	1	1¼	1½	2
No. 67 G, Angle, rough body, nickel-plated all over		Each	3.70	4.30	5.10	6.40	8.40	13.60
No. 145 G, Corner, rough body, nickel-plated all over		Each	4.10	4.75	5.60	7.05	9.25	15.00
	A	Inches	2⅜	3¼	3½	3⅞	4⅜	5¼
	B	Inches	1 3/16	1⅝	1¾	2	2¼	2 13/16
	C	Inches	2⅝	3	3¾	4	4⅜	5
	D	Inches	1¼	1½	1⅞	2	2¼	2⅝
	E	Inches	½	11/16	15/16	1	1 5/16	1⅝
	F-Open	Inches	4½	5¼	6	7⅛	7½	8⅜
	G	Inches	2¼	2½	2¾	3	3	3

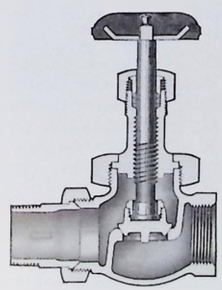
For list prices of Composition Discs, see page 168.

Construction: These valves are heavy and are unusually sturdy. They have a rising stem and a gland in the stuffing box. The valves can be repacked when wide open and under pressure.

Discs: Unless otherwise ordered, the valves are furnished with a No. 1 Steam Disc, suitable for steam service. When ordered for hot water service, they are furnished with a No. 2 Hot Water Disc. For description and dimensions of discs, see page 168.

Government and Navy Specifications: The valves comply with Government Specifications issued by the General Supervising Architect's Office and the Quartermaster General's Office, and also with Navy Department Specification No. 66-P-1, dated February 1, 1932, on Power Plant Apparatus and Piping for Shore Use.

Union Bonnet—with Brass Disc



Cross Section
No. 4270, Globe

WORKING PRESSURE — 200 pounds steam

When ordering, specify whether globe or angle valves are wanted.

The No. 4270 Valves are recommended for high pressure steam and hot water systems.



No. 4270
Angle

List Prices and Dimensions

Size	Inches	⅜	½	¾	1	1¼
No. 4270, rough body	Each	2.60	3.25	4.50	6.00	8.00
Center to female end	Inches	1	1 3/16	1⅜	1 11/16	1 15/16
Center to union end	Inches	2 3/16	2 7/16	3	3¼	3¾
Center to top, open	Inches	3¾	4¼	5⅛	6	6¾
Diameter of wheel	Inches	2	2¼	2½	2¾	3

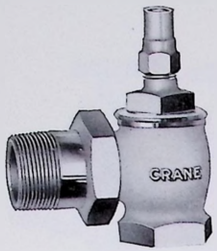
These valves have Crane Special Brass body and disc, and are heavy and ruggedly constructed. They have a union bonnet and can be reground without removing the body from the line. The stuffing box is equipped with a gland. The valves, when wide open, can be repacked while under pressure. Sizes ½-inch and smaller have a one-piece disc and stem.

¼, 1½, and 2-inch No. 4270 Valves can be made to order; prices on application.

The valves shown on this page can be furnished with lock shield at the same price; see page 52.

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Lock Shields for Radiator Valves



Radiator Valve with Lock Shield

All Crane Radiator Valves except the No. 232 Valves can be furnished with a Lock Shield without additional charge.

Crane Lock Shields are of sufficient length to completely enclose the stem when the valve is wide open. When furnished on nickel-plated valves, the Lock Shield is nickel plated. When furnished on rough body plain valves, it is finished but not plated.

When ordering a radiator valve equipped with a Lock Shield, the order should specify the size of the valve, its catalogue number, and should state "with Lock Shield".

When ordering Lock Shields only, the order should specify the size and catalogue number of the valve for which the Lock Shield is wanted.



Key for Operating Valve with Lock Shield

For list prices, see page 167.

Extra Length Tail-Pieces

For Radiator Valves and Radiator Union Elbows



½-inch Extra Length



1-inch Extra Length



1½-inch Extra Length



2-inch Extra Length

List Prices

Catalogue Number of Radiator Valve or Union Elbow		Nos. 112, 113, 174, 192, 226, 227, 232, 455, 1213, and 4270, except the ½-inch No. 232.					½-inch No. 232
Size of valve or elbow	Inches	½	¾	1	1¼	1½	½
½-inch Extra Length Tail-Piece	Each	2.00	2.25	2.75	3.25	3.75	2.25
1-inch Extra Length Tail-Piece	Each	2.25	2.50	3.00	3.50	4.00	2.50
1½-inch Extra Length Tail-Piece	Each	2.50	2.75	3.25	3.75	4.25	2.75
2-inch Extra Length Tail-Piece	Each	2.75	3.00	3.50	4.00	4.50	3.00

Extra Length Tail-Pieces provide a convenient and economical means of correcting rough-in dimensions. When, after the installation of supply and return lines, it is found that the regular tail-piece is not long enough to reach the radiator, one of these can be easily substituted to make proper connections.

They are furnished in four different lengths, making it possible to increase the regular center to union end dimension of radiator valves and radiator union elbows ½-inch, 1-inch, 1½-inches, or 2-inches, depending upon the extra length used.

When ordering Extra Length Tail-Pieces for the ½-inch No. 232 Modulating Radiator Valve, orders must specify the size and catalogue number of the valve. All other tail-pieces are interchangeable on corresponding size valves and union elbows, and orders need only state the size of valve or elbow. All orders should specify the extra length wanted.

Hot Water Radiator Air Valves



No. 206

List Prices

Size	Inches	⅛
No. 206, Wood Wheel, nickel-plated	Each	.70
No. 210, Lock Shield, nickel-plated	Each	.57
Keys for No. 210, extra	Each	.18



No. 210

These needle valve air vents, furnished both in wheel handle and loose key types, are used primarily to eliminate air from hot water radiation and supply lines.

Hoffman Venting Valves

For Gravity, Steam, or Vacuum Heating Systems

Advantages of Hoffman Vacuum Systems

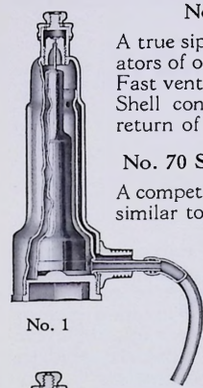
Every venting requirement of one pipe steam and vacuum systems is covered by the line of Hoffman Siphon Air and Vacuum Valves. These valves are noted for their leak-proof qualities and for their correct venting speed. Vacuum Valves have the patented Double Air Locks which assure maximum vacuums.

The performance and economy of a two-pipe vapor system can be closely approached by installing No. 2 or No. 77 Hoffman Vacuum Valves on the radiators and Hoffman Quick Vent Float Air and Vacuum Valves on the mains of a simple one-pipe gravity steam job. The savings made in fuel quickly pay for the slight extra cost of installing these valves and a great improvement in heating comfort is assured. The system becomes more adaptable to weather changes and maintains comfort over long periods without attention to the fire.

Radiator Vent Valves

No. 1 Siphon Air Valve

A true siphonic-action air valve for radiators of one-pipe gravity steam systems. Fast venting and with leak-proof Double Shell construction. Does not prevent return of air to the system.



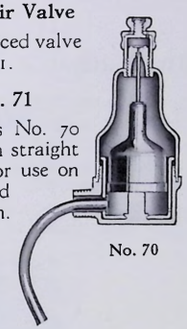
No. 1

No. 70 Siphon Air Valve

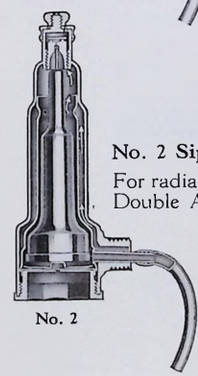
A competitively priced valve similar to the No. 1.

No. 71

Same as No. 70 but with straight shank for use on concealed radiation.



No. 70



No. 2

No. 2 Siphon Air and Vacuum Valve

For radiators of one pipe vacuum systems. Double Air Locks prevent the return of air after the radiator is completely vented. Double Shell construction eliminates water leakage.



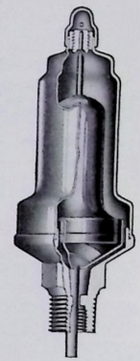
No. 3 Air Line Valve

A compact all-metal valve for venting radiators of air line or Paul Systems.

Main Vent Valves

No. 5 Quick Vent Float Air Valve

For venting mains of gravity steam systems which end less than 18" above boiler water line or for other conditions where water may be encountered. Leak-proof Double Shell construction. Closes against water but does not prevent the return of air to the system.



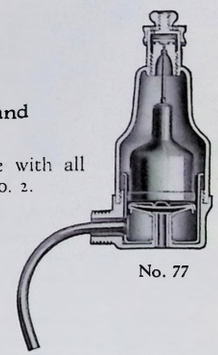
No. 5

No. 6 Quick Vent Float Air and Vacuum Valve

For venting steam mains of one-pipe vacuum systems which end less than 18" above boiler water line. Valve closes against water and Double Air Locks prevent return of air to the system.

No. 77 Siphon Air and Vacuum Valve

A moderately priced valve with all the major features of the No. 2.



No. 77

No. 78 Siphon Air and Vacuum Valve

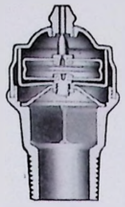
Same construction as No. 77 but with straight shank for use on concealed radiation.

List Prices and Sizes

No.	Pattern	Size Conn.	Max. Op. Press., Pounds	Each	No.	Pattern	Size Conn.	Max. Op. Press., Pounds	Each
1	Angle	⅛"	10	3.10	5	Straight shank	⅜" female ¾" male	10	12.30
70	Angle	⅛"	10	1.90					
71	Straight shank	⅛"	10	2.40					
2	Angle	⅛"	10	6.10	6	Straight shank	⅜" female ¾" male	10	18.70
77	Angle	⅛"	10	4.30					
78	Straight shank	⅛"	10	5.10	3	Angle		10	4.60

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Hoffman Venting Valves and Radiator Traps



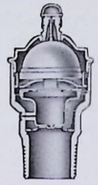
No. 4

No. 4 Quick Vent Valve

For venting mains of one and two-pipe gravity steam systems which end at least 18″ above boiler water line. No. 4 Valve will not close against water and will not prevent air from returning to the system.

No. 76 Vacuum Vent Valve

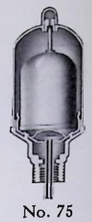
A quick-venting float air and vacuum valve for venting steam mains, similar in operation to the No. 6 valve. Double thread connection, ¾″ male and ⅜″ female.



No. 16

No. 75 Float Air Valve

A moderately priced, fast venting valve for mains, coils and unit heaters of one pipe gravity steam systems. Operation is similar to that of the No. 5 Valve.



No. 75

No. 16 Quick Vent Float Air and Vacuum Valve

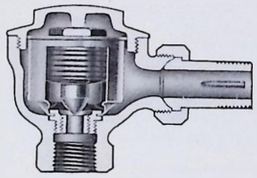
For venting steam mains of one-pipe vacuum systems which end 18″ or more above boiler water line. This valve closes against water but where large amounts are encountered, use No. 6 Valve. Double Air Locks prevent return of air to the system.

List Prices and Sizes

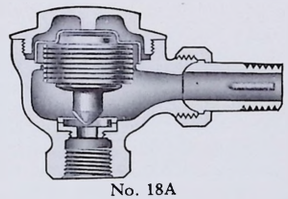
No.	Pattern	Size Conn.	Max. Op. Press., Pounds	Each	No.	Pattern	Size Conn.	Max. Op. Press., Pounds	Each
4	Straight shank	¼″-¾″	10	3.80	16	Straight shank	¾″	10	6.50
76	Straight way	1″ female	10	10.50	75	Straight shank	⅜″ female ¾″ male	10	6.50

Hoffman Thermostatic Radiator Traps

Hoffman Thermostatic Traps are used to keep radiators and risers of two-pipe systems operating at maximum heating efficiency. A thermostatic element opens the trap outlet to permit the escape of condensate and air, but closes it tightly against steam loss. The thermostat is of the bellows type, formed under 500 pounds internal pressure by a special hydraulic process which automatically rejects imperfect units. This process assures bellows folds of uniform metal thickness and freedom from tool marks—two factors essential to accurate performance and long life. Hoffman Traps operate on narrow temperature differentials, providing rapid and thorough removal of air and condensate.



No. 8A



No. 18A

No. 8A and No. 9A

No. 8A and 9A have Bellows Thermostat, Valve Pin and Seat combined in a single unit, which is replaceable without adjustment. Nickel-silver Valve Pin and Seat. The No. 8A, with 400 sq. ft. capacity, is used on radiators, while the larger No. 9A, with 700 sq. ft. capacity, is used to drip risers and heating units with larger condensing capacities.

No. 18A

No. 18A is similar to No. 8A except that trap seat is not combined with the thermal member. Cage-mounted Bellows Thermostat is interchangeable without adjustment in all 18A bodies. Bronze renewable seats.

Special Thermal Member in 8A and 9A Trap

The combined Bellows Thermostat, Valve Pin and Seat simplifies clean-out and inspection jobs, as the unit can be easily removed and replaced without adjustment. Should renewal be necessary, the installation of a new unit restores the trap to full efficiency.

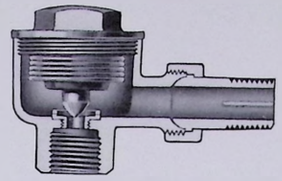
List Prices and Sizes

No.	Angle Pattern ½ x ½	Angle Pattern ½ x ¾	Angle Pattern ¾ x ¾	Swivel ½ x ½	Max.* Oper. Press.	Capacity EDR	No.	Angle Pattern ¾ x ¾	Max. Oper. Press.	Capacity EDR
8A	8.00	8.00	8.80	8.00	25	400	9A—with union	11.00	25	700
18A	7.60	7.60	8.40	7.60	25	400	9A—no union	10.20	25	700

*8A-18A-9A can be furnished for pressures up to 50 lbs. without additional cost.

Hoffman Thermostatic Radiator Traps and Drip Traps

No. 17A



A low priced trap. Operates same as No. 18A but has smaller capacity. Bellows Thermostat is attached to the cap and is interchangeable without adjustment. Bronze renewable seat.

No. 17V

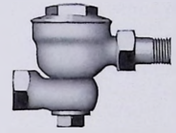


A vertical trap especially designed for concealed type radiators having a bottom outlet.

List Prices and Sizes

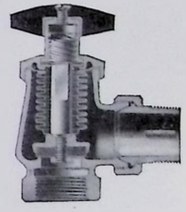
No.	Angle Pattern ½ x ½	Angle Pattern ½ x ¾	Angle Pattern ¾ x ¾	Swivel ½ x ½	Max.* Oper. Press.	Capacity EDR
17A	6.40	6.40	6.80	6.40	15	200
17V	6.40				15	200

Swivel Connections



Swivel connections can be furnished without extra cost on ½″ sizes of No. 8A, 17A and 18A, giving straightway, right or left hand patterns or intermediate angles.

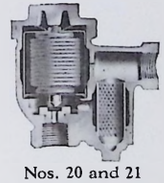
No. 37 Radiator Bellows-Type Packless Supply Valve



A quick opening, bellows, packless valve for one and two-pipe steam or vacuum systems. Leak-proof bellows permits high valve lift and hence ample clearance to allow counter flow of steam and condensate without interference when used on one-pipe systems. Bellows prevents air leakage.

List Prices and Sizes

No.	Pattern	½″	¾″	1″	1¼″	1½″
37	Angle	5.60	6.40	8.00	9.60	12.00
	Swivel	6.10	6.90			
	Offset			8.50	10.40	

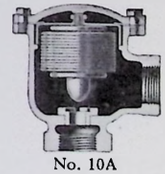


Nos. 20 and 21

High and Low Pressure Drip Traps

For draining heating units or steam processing equipment operating under high pressure. Trap body is of rugged all-bronze construction. Hydraulically formed Thermal Member is solidly filled with thermostatic fluid, preventing break-down due to water hammer. Dirt and scale which might make the trap inoperative are excluded by the built-in dirt strainer.

A low pressure trap with cast-iron body and Thermal Member of construction similar to Nos. 8A and 9A. Seat is renewable. Used for dripping supply mains, risers, unit heaters, hot blast radiation where it is practical to cool the condensate by installing a cooling leg at least 5 feet long ahead of the trap.



No. 10A

List Prices and Capacities

No.	Pattern	Size Conn.	Capacities in lbs. water per hour*	Max. Press.	Each
10A	Angle	1-inch Female	1140 lbs.—3° drop, 1600 lbs.—4° drop, 2140 lbs.—5° drop	25 lbs.	17.60
20	Angle	⅜-inch Female	275 lbs.—20° drop, 450 lbs.—25° drop, 660 lbs.—30° drop	100 lbs.	12.00
20	Angle	½-inch Female	275 lbs.—20° drop, 450 lbs.—25° drop, 660 lbs.—30° drop	100 lbs.	15.00
21	Angle	¾-inch Female	375 lbs.—20° drop, 610 lbs.—25° drop, 800 lbs.—30° drop	100 lbs.	21.00
21	Angle	1-inch Female	375 lbs.—20° drop, 610 lbs.—25° drop, 800 lbs.—30° drop	100 lbs.	27.00

*No. 10A capacities based on 2-lb. pressure differential. Nos. 20 and 21 capacities based on 10 lbs. pressure differential. See Hoffman Catalog for other capacities at various pressures.

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Other Brass Valves

The preceding pages, numbers 10 to 55, while grouped under the heading of "Brass Valves", do not include all Crane Brass Valves. Those that are designed to perform a special duty or those that are made for special services, such as Butterfly Valves, Gasoline Check and Foot Valves, Pop Safety Valves, Quick-Opening Self-Closing Valves, Relief Valves, Solder-Joint Valves, Tank Float Valves, Throttle Valves, Valves for Marine Service, and Whistle Valves, are shown in other sections of this catalogue. See the index.

Iron and Steel Valves

Many users classify valves not so much by materials as by services. Iron Body Valves, and in some cases, even Steel Valves, are considered as alternates for Brass Valves. This is especially true of the smaller sizes, while in the larger sizes, the Iron or Steel Valve is the logical continuation of the small sizes of Brass Valves. The selection of any type—brass, iron, or steel—depends upon the user's preference, established by considerations of service and economy.

Iron and Steel Valves are shown in other sections of this catalogue; see the index.

Brass Stops, Brass Cocks, and Iron Cocks

The Crane line of Brass Stops, Brass Cocks, and Iron Cocks, illustrated on pages 58 to 66, is unusually complete and affords the user a varied selection for a wide range of service conditions. It includes the following:

Brass Rough Stops . . . . page 58
Brass Ground Key Stops . . . . page 58
Brass Brine Cocks . . . . page 58
Brass Ground Key Faucets . . . . page 58
Brass Corporation Stops . . . . page 59
Brass Hydrant Stops . . . . page 59
Brass Gas Service Stops . . . . page 60
Brass Gas Meter Stops . . . . page 60
Brass Gas Stove Stops . . . . page 60
Brass Pet Cocks . . . . page 60
Brass Cylinder Cocks . . . . page 60
Brass Gauge Cocks . . . . page 60
Standard Brass Steam Cocks . . . . page 61
250-Pound Hard Metal Steam Cocks . . . . page 61
Standard Iron Cocks . . . . page 62
Iron Gas Line Cocks . . . . page 63
Heavy Duty Iron Cocks . . . . page 63
Iron Lock Cocks, Essex Pattern . . . . page 63
Brass and Iron Spring Loaded Cocks . . . . page 64
Iron Asbestos Packed Cocks . . . . page 65

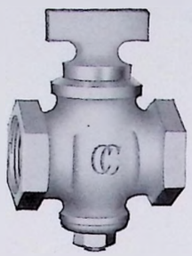
In addition, various accessories are included:

Hydrant Clamps . . . . page 59
Wood Rod Couplings . . . . page 59
Street Washer Keys . . . . page 59
Hydrant Handles . . . . page 59
Wrenches for Cocks . . . . page 66

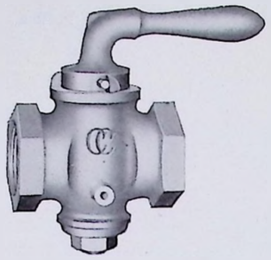
The uniformly high quality that characterizes all Crane products are maintained in these lines.

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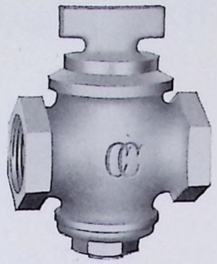
Brass Rough Stops



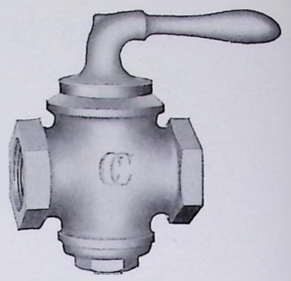
Flat-Way, Tee Head
No. 804
Without Drain
No. 806
With Check and Drain
(Not illustrated)



Flat-Way, Lever Handle
No. 804½
Without Drain
(Not illustrated)
No. 806½
With Check and Drain



Round-Way
No. 812, Tee Head



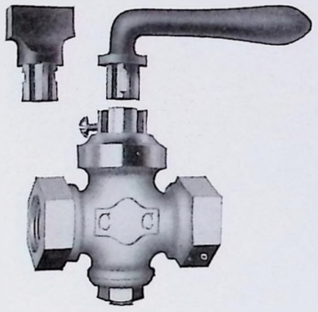
Round-Way
No. 812½, Lever Handle

List Prices

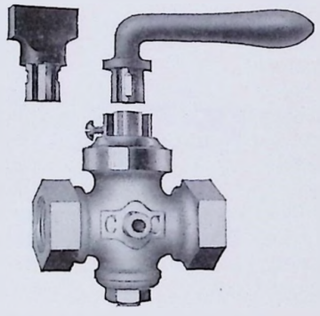
Size	Inches	⅜	½	⅝	¾	1	1¼	1½	2
No. 804 or No. 804½	Per Dozen	20.40	21.00	29.40	36.00	52.80	89.40	149.40	258.00
No. 806 or No. 806½	Per Dozen	21.00	21.60	30.00	36.60	54.00	91.20	152.40	264.00
No. 812 or No. 812½	Per Dozen		26.40	36.00	46.20	73.80			

Drain Tubes Extra

Brass Ground Key Stops



With Reversible Check
No. 820, Removable Lever Handle
No. 823, Removable Tee Head



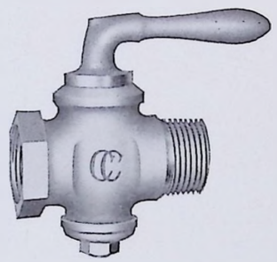
With Reversible Check and Drain
No. 821, Removable Lever Handle
No. 824, Removable Tee Head

List Prices

Size	Inches	½	⅝	¾	1
No. 820 or No. 823	Per Dozen	21.00	29.40	36.00	52.80
No. 821 or No. 824	Per Dozen	21.60	30.00	36.60	54.00

Drain Tubes Extra

Brass Brine Cocks

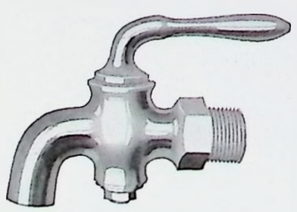


No. 814, Lever Handle

List Prices

Size	Inches	⅜	½	¾	1	1¼
No. 814	Each	1.25	1.35	2.00	3.00	4.50

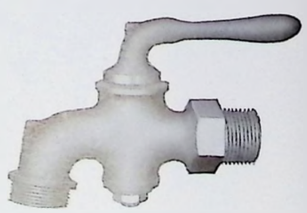
Brass Ground Key Faucets



No. 800, Plain

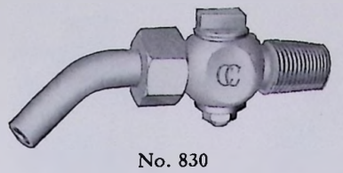
List Prices

Size		Inches	⅜	½	¾	1
No. 800	Rough	Per Dozen	20.40	21.00	29.40	52.80
	Polished	Per Dozen	25.20	25.80	35.40	64.80
No. 801	Rough	Per Dozen		24.00	32.40	60.00
	Polished	Per Dozen		28.80	38.40	72.00

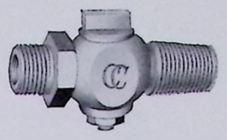


No. 801, For Hose

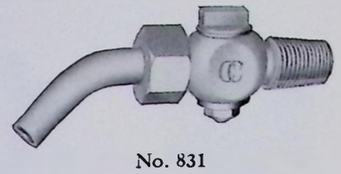
Brass Corporation Stops



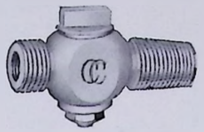
No. 830



No. 834

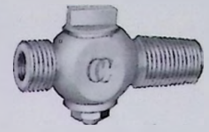


No. 831



No. 833

Size	Inches	½	⅝	¾	1
No. 830	Per Dozen	19.20	27.00	34.20	54.00
No. 831	Per Dozen	19.20	27.00	34.20	54.00
No. 833	Per Dozen	17.40	23.40	30.00	48.00
No. 834	Per Dozen	17.40	23.40	30.00	48.00
No. 837	Per Dozen	17.40	23.40	30.00	48.00



No. 837

No. 830 and No. 831 Stops have a long male thread on the inlet end, to fit Mueller, Payne, and Lennox taps. They have an inside thread in the outlet end, to fit Mueller, Payne, and Lennox tapping machine screw plugs.

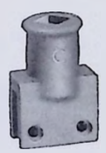
On No. 830 Stops, the outlet male thread engaging the union nut is one size larger iron pipe size (⅝-inch Stops have ¾-inch threads). On No. 831 Stops, the outlet male thread is Mueller Standard.

No. 833 Stops are the No. 830 with the union coupling omitted. No. 837 are the No. 831 with the union coupling omitted.

No. 834 Stops have male iron pipe threads on both ends. The ⅝-inch size has ¾-inch threads.

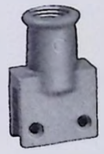
No. 830 and No. 831 Stops can be furnished with a straight tail-piece, when so ordered.

Hydrant Clamps



No. 850
With Square Hole
Malleable Iron

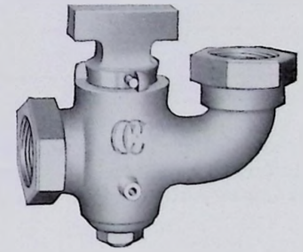
Orders should specify whether with square hole or tapped for pipe.



No. 850
Tapped for Pipe
Malleable Iron

			Square Hole			Pipe Tap	
Size of rod or pipe		Inches	⅜	7/16	½	⅜	½
Width of slot		Inches	7/16	½	½	½	½
No. 850	Black	Each	.06	.08	.10	.09	.13
	Galv.	Each				.12	.17

Brass Hydrant Stops



No. 816, Tee Head, With Check and Drain

Size	Inches	½	¾	1	1¼
No. 816	Per Dozen	25.80	45.00	64.80	103.80

Wood Rod Couplings



No. 854, Malleable Iron

No. 854	Black Per Set	.40
	Galv. Per Set	.50

These couplings have a ⅜-inch pipe thread, and may be used with 1 or 1⅛-inch square rod.

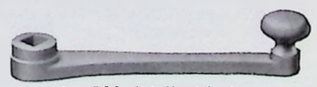
Street Washer Keys



No. 856, Malleable Iron
Length, 8¾ Inches

No. 856	To fit ⅜-inch square rod	Each	.21
	To fit ½-inch square rod	Each	.23

Hydrant Handles

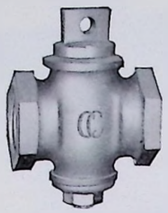


No. 860, Malleable Iron
To fit ⅜-inch Square Rod

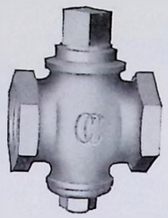
No. 860	Each	.10

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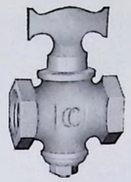
Brass Gas Service Stops



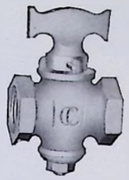
No. 270, Flat Head



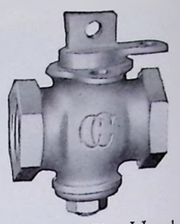
No. 272, Square Head



No. 276, Tee Head

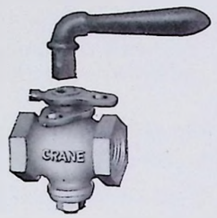


No. 278, Tee Head With Check



No. 284, Flat Head With Lockup

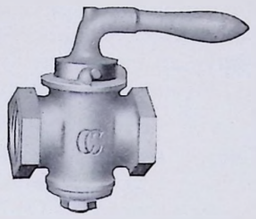
Brass Gas Meter Stops



For Apartment Houses

No. 289, Removable Lever Handle, With Lockup

Brass Gas Stove Stops



No. 298, Lever Handle, With Check

List Prices

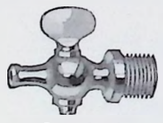
Size	Inches	¼	⅜	½	¾	1	1¼	1½	2
No. 270 or No. 272	Each	.90	1.00	1.10	1.30	2.10	3.25	4.60	8.00
No. 276	Each	.90	1.00	1.10	1.30				
No. 278	Each	1.00	1.15	1.30	1.55				
No. 284	Each			1.40	1.60	2.50	3.85	5.35	9.00
No. 289	Each			1.50					
No. 298	Each	1.15	1.25	1.35	2.15	3.25			

No. 289 Apartment House Gas Meter Stops are recommended for use where a single gas stove or other appliance is connected to several meters, such as in the laundry room of an apartment building. Each tenant can lock his own stop.

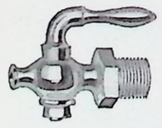
The prices of No. 284 and No. 289 Stops do not include lock.

Wrenches . . . . page 66

Brass Pet Cocks

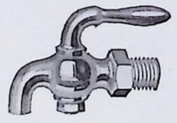


Standard
No. 700, Tee Head
No. 702, Lever Handle
(Not illustrated)



Heavy
No. 704, Tee Head
(Not illustrated)
No. 706, Lever Handle

Brass Cylinder Cocks

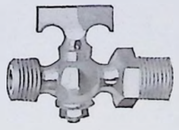


No. 724, Lever Handle

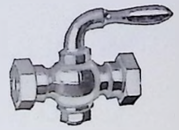
List Prices

Size	Inches	⅛	¼	⅜	½
No. 700	Each	.40	.45	.50	.60
No. 702	Each	.55	.60	.65	.75
No. 704	Each		.80	.85	.90
No. 706	Each		.95	1.00	1.05
No. 708	Each	.55	.65	.75	
No. 710	Each	.70	.80	.90	
No. 712	Each	.75	.85	.95	
No. 714	Each	.90	1.00	1.10	
No. 724	Each	.85	1.15	1.30	1.85
No. 742	Each		1.75		
No. 744	Each		.75		

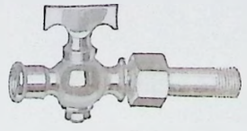
Brass Gauge Cocks



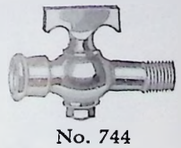
Male
No. 708, Tee Head
No. 710, Lever Handle
(Not illustrated)



Female
No. 712, Tee Head
(Not illustrated)
No. 714, Lever Handle



No. 742
With Union
Male and Female
Tee Head

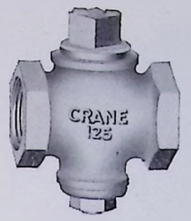


No. 744
Male and Female
Tee Head

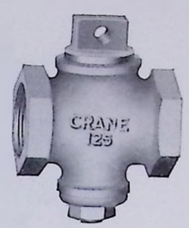
Standard Brass Steam Cocks

WORKING PRESSURES
125 pounds steam
125 pounds cold water, oil, air, or gas, non-shock

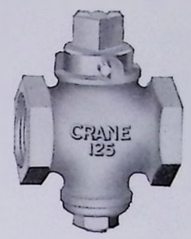
Air Tested



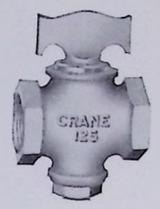
No. 250
Square Head



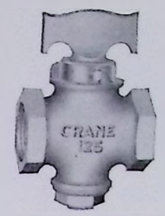
No. 252
Flat Head



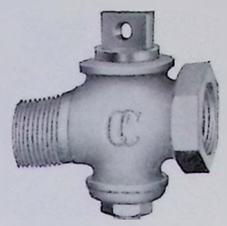
No. 254
Square Head
With Check



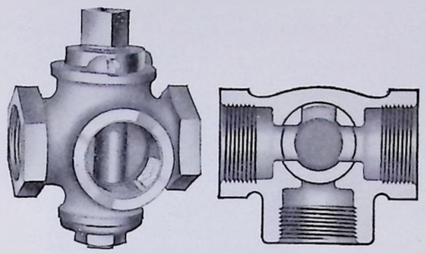
No. 256
Tee Head



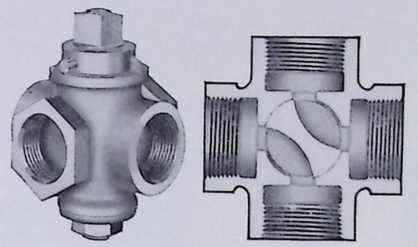
No. 258
Tee Head
With Check



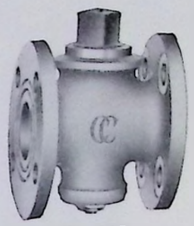
No. 266
Male and Female
Flat Head



No. 268, Three-Way
Square Head
With Check



No. 269, Four-Way
Square Head, With Check
Made to order only



No. 265
Flanged
Square Head

List Prices and Dimensions

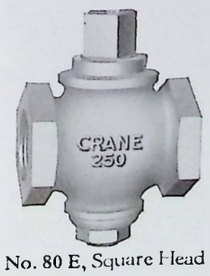
Size	Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	4
No. 250 or No. 252	Each		.85	1.00	1.25	1.70	2.35	3.70	4.85	7.30	14.50	22.50	
No. 254	Each				1.40	1.90	2.55	3.95	5.15	7.65			
No. 256	Each	.85	.85	1.00	1.25	1.70	2.35						
No. 258	Each	1.00	1.00	1.15	1.40	1.90	2.55						
No. 266	Each		1.35	1.45	2.00	2.50	3.00	5.35					
No. 268	Each		1.80	2.10	2.50	3.00	3.75	5.75	7.15	11.00			
No. 269	Each				6.00	8.50	11.00	14.50	17.50	25.00			
No. 265, Flanged, F. & D.	Each					5.50	7.30	9.70	11.75	18.00	27.50	43.00	84.00
Dimensions, in Inches, No. 265	Face to face					$2\frac{11}{16}$	$3\frac{1}{8}$	$3\frac{3}{4}$	$4\frac{3}{8}$	5	6	$7\frac{1}{4}$	$9\frac{3}{8}$
	Diameter of flanges					$3\frac{7}{8}$	$4\frac{1}{4}$	$4\frac{5}{8}$	5	6	7	$7\frac{1}{2}$	9
	Thickness of flanges					$\frac{11}{32}$	$\frac{3}{8}$	$\frac{13}{32}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{11}{16}$

Templates for drilling . . . . page 369 *Wrenches . . . . page 66*

Flanged cocks: The end flanges on No. 265 Cocks conform to the MSS 150-Pound Bronze Flange Standard (No. SP-2a-1930). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the MSS 150-Pound Standard; no deduction is made if cocks are ordered "faced only".

Full face gaskets should be used; see page 357.

250-Pound Hard Metal Steam Cocks



No. 80 E, Square Head

WORKING PRESSURES
250 pounds steam
250 pounds cold water, oil, or gas, non-shock

List Prices

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 80 E	Each	1.40	1.75	1.75	2.40	3.60	6.00	7.75	11.50	23.00	35.00

The body and plug are made of Crane Hard Metal, a copper-tin bronze of unusual strength and hardness.

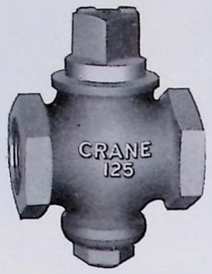
Wrenches . . . . page 66

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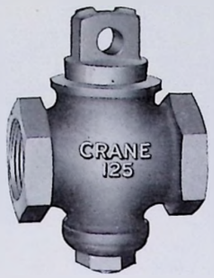
Standard Iron Cocks

WORKING PRESSURE
125 pounds cold water, oil, air, or gas, non-shock

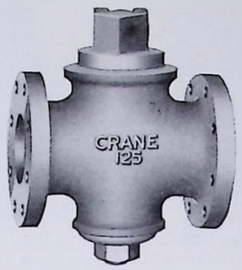
Air Tested



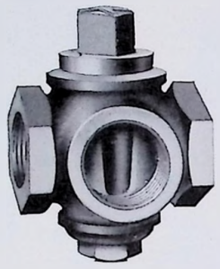
Square Head
No. 320, All-Iron
No. 322, With Brass Washer
No. 324, With Brass Plug and Washer



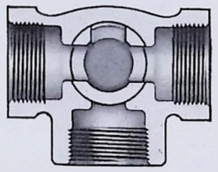
Flat Head
No. 320½, All-Iron
No. 322½, With Brass Washer
No. 324½, With Brass Plug and Washer



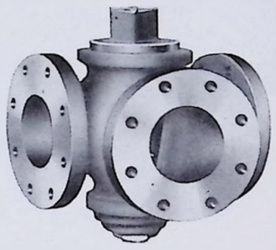
Flanged, Square Head
No. 325, All-Iron
No. 329, With Brass Plug and Washer



Three-Way
Square Head
No. 326, All-Iron
No. 330, With Brass Plug and Washer



Three-Way
Cross Section



Three-Way, Flanged
Square Head
No. 331, All-Iron
No. 335, With Brass Plug and Washer

List Prices

Size		Inches	½	¾	1	1¼	1½	2	2½	3	4	6
No. 320	Black	Each	.90	1.05	1.30	1.60	1.95	2.70	4.40	6.75	15.50	45.00
	Galv.	Each	1.35	1.60	1.95	2.40	2.95	4.05	6.60	10.15	23.25	67.50
No. 320½	Black	Each	.90	1.05	1.30	1.60	1.95	2.70	4.40	6.75	15.50	
	Galv.	Each	1.35	1.60	1.95	2.40	2.95	4.05	6.60	10.15	23.25	
No. 322 or No. 322½	Black	Each	1.00	1.20	1.55	1.95	2.35	3.20	5.15	7.75	19.00	
No. 324 or No. 324½	Black	Each	1.40	1.75	2.15	3.00	4.15	5.75	9.50	14.00	40.00	
	Galv.	Each	1.75	2.15	2.60	3.55	4.85	6.70	11.00	16.30	45.25	
No. 325, Flanged, F. & D.	Black	Each						4.25	6.25	9.50	19.00	50.00
No. 329, Flanged, F. & D.	Black	Each						7.50	11.25	16.75	43.50	108.00
No. 326	Black	Each		1.65	1.80	2.05	2.65	3.65	5.35	7.50	19.00	
	Galv	Each		2.50	2.70	3.10	4.00	5.50	8.00	11.25	28.50	
No. 330	Black	Each		2.35	2.65	3.45	4.90	6.75	10.50	14.75	43.50	
	Galv.	Each		3.00	3.35	4.25	5.95	8.20	12.45	17.40	50.50	
No. 331, Flanged, F. & D.	Black	Each						7.00	9.00	12.75	26.00	60.00
No. 335, Flanged, F. & D.	Black	Each						10.00	14.00	20.00	50.50	116.00

When so ordered, these Cocks can be furnished with a check, at an additional price.

Flanged cocks: The end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). Prices include drilling to the 125-Pound Standard. No deduction is made if cocks are ordered "faced only".

Dimensions of Flanged Cocks, in Inches

Size		2	2½	3	4	6
Face to face	No. 325 or No. 329	6⅜	8⅝	9⅝	12⅛	14
	No. 331 or No. 335	6⅜	8⅝	9⅝	12⅛	14
Center to face of side opening	No. 331 or No. 335	4⅛	4⅝	4¾	6 1/16	7
Diameter of flanges		6	7	7½	9	11
Thickness of flanges		5/8	11/16	¾	15/16	1
Diameter of bolt circle		4¾	5½	6	7½	9½
Number of bolts		4	4	4	8	8
Diameter of bolts		5/8	5/8	5/8	5/8	¾

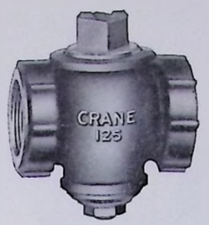
Wrenches ... *page 66*

Templates for drilling ... *page 370*

Iron Gas Line Cocks

WORKING PRESSURE
125 pounds cold water, oil, air, or gas, non-shock

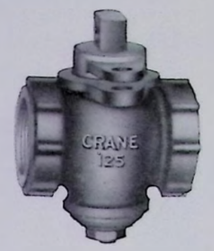
Air Tested



Square Head
No. 1228, With Brass Plug and Washer



Flat Head
No. 1232, With Brass Plug and Washer



Flat Head, with Lockup
No. 1234, With Brass Plug and Washer

List Prices

Size	Inches	½	¾	1	1¼	1½	2	2½	3
No. 1228 or No. 1232, Galv.	Each	1.65	1.95	2.55	3.45	5.20	7.60	15.50	22.20
No. 1234, Galv.	Each	1.95	2.25	2.95	4.05	5.95	8.60		

When so ordered, these Cocks can be furnished with a check, at an additional price.

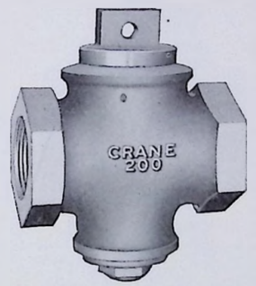
These cocks are compact but sturdy, and are especially suited for use in gas lines. They have a brass plug, brass washer, galvanized cast iron body, and galvanized steel or malleable iron nut.

Wrenches ... *page 66*

Heavy Duty Iron Cocks

WORKING PRESSURE
200 pounds cold water, oil, air, or gas, non-shock

Air Tested



Flat Head
No. 334, All-Iron
No. 336, With Brass Washer
No. 337, With Brass Plug and Washer

List Prices

Size		Inches	½	¾	1	1¼	1½	2
No. 334	Black	Each	1.15	1.25	1.75	2.10	2.80	3.65
	Galv.	Each	1.75	1.90	2.65	3.15	4.20	5.50
No. 336	Black	Each	1.25	1.40	2.00	2.45	3.20	4.15
No. 337	Black	Each	1.80	2.40	3.05	4.20	6.00	7.50
	Galv.	Each	2.25	2.90	3.65	4.90	6.95	8.75

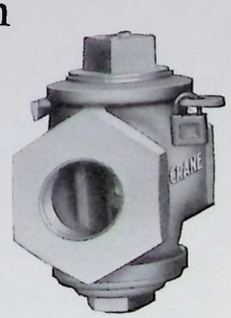
1 and 2-inch No. 336 Cocks are also known as "Oil Country Pattern".

Wrenches ... *page 66*

Iron Lock Cocks, Essex Pattern

WORKING PRESSURES
Standard — 175 pounds cold water, oil, air, or gas, non-shock
Extra Heavy — 350 pounds cold water, oil, air, or gas, non-shock

Air Tested



Square Head
With Brass Washer
No. 321, Standard
No. 323, Extra Heavy

List Prices

Size	Inches	No. 321, Standard 2	No. 321, Standard 3	No. 321, Standard 4	No. 323, Extra Heavy 2	No. 323, Extra Heavy 3	No. 323, Extra Heavy 4
Price	Each	4.00	8.00	14.00	5.00	10.00	17.50

Prices do not include lock.
Wrenches ... *page 66*

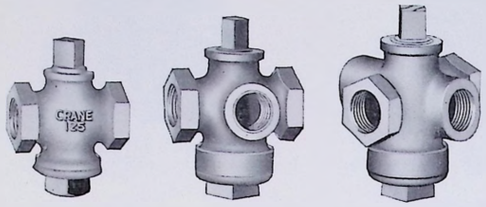
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Spring-Loaded Cocks

Brass Cocks

WORKING PRESSURES
125 pounds air
175 pounds cold water, non-shock

Air Tested



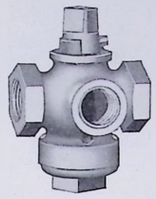
No. 305 Square Head — No. 306, Three-Way Square Head — No. 307, Four-Way Square Head

Brass Three-Way Cocks

For Air Hoists

125 pounds air working pressure

Air Tested



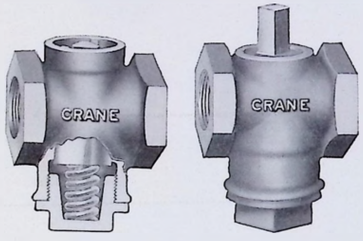
No. 308, Three-Way Square Head With Check

Mine Cocks

Iron

WORKING PRESSURES
125 pounds air
175 pounds cold water, non-shock

Air Tested

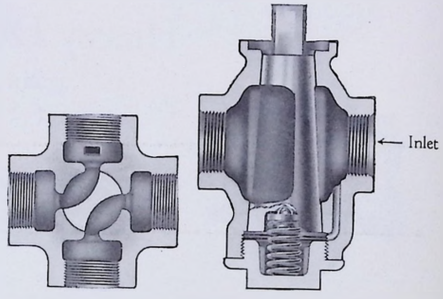


No. 318 Triangular Head With Lock Shield — No. 319 Square Head

Iron Four-Way Cocks

WORKING PRESSURES
250 pounds air
350 pounds cold water, non-shock

Air Tested



No. 339, Four-Way Square Head

List Prices

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	3	4
No. 305	Each	3.00	3.25	4.50							
No. 306	Each	3.50	4.25	5.25							
No. 307	Each	5.00	5.00	6.75							
No. 308	Each		5.50	7.50							
No. 318 or No. 319	Each			2.25	2.40	2.40	2.65	4.00	6.65	13.00	40.00
No. 339	Each			8.00	11.50	15.00	23.00	30.00	42.00		

All the cocks shown on this page are equipped with a steel spring between the plug and the cap. The spring compensates for wear, assures a tight joint between the body and the plug, and permits easy operation.

No. 308 Cocks: No. 308 Cocks are designed for operating air hoists. When the load is lifted, pressure is admitted below the piston of the hoist, and the air above the piston escapes through a hole in the body of the cock. When the load is lowered, the air below the piston passes through the cock into the upper portion of the hoist cylinder.

Mine Cocks: No. 318 and No. 319 Cocks have a brass plug. All-iron cocks can be made to order; prices on application.

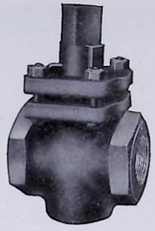
No. 318 Cocks can be operated only with a triangular wrench. The lock shield prevents tampering.

Sizes 3 and 4-inch have a bolted cap.

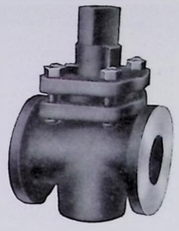
Iron Four-Way Cocks: No. 339 Cocks have a brass plug. They are especially suited for operating hydraulic or air cylinders, hydraulic presses, etc.

Wrenches . . . . page 66

Iron Asbestos Packed Cocks



No. 310, Screwed



No. 311, Flanged

List prices of flanged cocks include facing and drilling to the 125-Pound American Cast Iron Flange Standard. No deduction is made if cocks are ordered "faced only".

List Prices and Dimensions

Size		Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6
No. 310	U-Packed,	Each	1.60	1.60	1.60	1.60	2.10	2.50	3.50	4.75	7.00	12.00	18.00	27.00	30.00	45.00	60.00
	Bushing Packed,	Each				1.75	2.30	2.75	3.85	5.25	7.75	13.25	20.00	30.00	35.00		
No. 311 F. & D.	U-Packed,	Each						2.50	3.50	4.75	7.00	12.00	18.00	27.00	30.00	45.00	60.00
	Bushing Packed,	Each						2.75	3.85	5.25	7.75	13.25	20.00	30.00	35.00		
End to end, Screwed		Inches	2⅞	2⅞	3¼	3¼	3 5/16	4¼	4⅝	5 3/16	6	7⅛	8 1/16	8 1/16	10 1/16	14 5/16	16⅜
Face to face, Flanged		Inches						5½	5¾	6	7½	8¾	9¾	9¾	11⅝	13½	16⅛
Diameter of flanges		Inches						4¼	4⅝	5	6	7	7½	8½	9	10	11
Thickness of flanges		Inches						7/16	½	9/16	⅝	11/16	¾	13/16	15/16	15/16	1
Diameter of bolt circle		Inches						3⅛	3½	3⅞	4¾	5½	6	7	7½	8½	9½
Number of bolts								4	4	4	4	4	4	8	8	8	8
Diameter of bolts		Inches						½	½	½	⅝	⅝	⅝	⅝	⅝	¾	¾

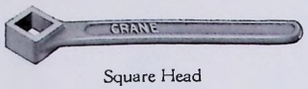
U-packed cocks are also known as "Channel" packed. They are suitable for 150 pounds working pressure.

Iron Asbestos Packed Cocks can also be furnished in Extra Heavy, Angle, Three-Way, or Ammonia patterns, and Brass Asbestos Packed Cocks can be furnished in Standard, Extra Heavy, Angle, or Three-Way patterns. Prices on application.

Templates for drilling . . . page 370

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Malleable Iron Wrenches
For Brass and Iron Cocks



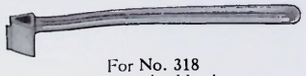
Square Head



Flat Head

List Prices

Square Head											Flat Head			
		Sizes suitable for											Sizes suitable for	
		Brass Cocks					Iron Cocks						Brass Cocks	Iron Cocks
Wrench Number	Price Each	No. 80 E	Nos. 250 254 265 268 269 272	Nos. 305 306	No. 307	No. 308	Nos. 320 322 324 325 329 1228	Nos. 326 330 331 335	No. 321	No. 323	Wrench Number	Price Each	Nos. 252 266 270 284	Nos. 320½ 322½ 324½ 1232 1234	Nos. 334 336 337
1-S	.05	¼	¼								1-F	.05	¼		
2-S	.06	⅜	⅜	¼, ⅜, ½	¼, ⅜	⅜					2-F	.06	⅜		
3-S	.07		½		½	½	½				3-F	.07	½	½	
4-S	.11	½	¾				¾	¾			4-F	.11	¾	¾	½
5-S	.15	¾	1				1	1			5-F	.15	1	1	¾
6-S	.20	1	1¼				1¼	1¼			6-F	.20	1¼	1¼	1
7-S	.29	1¼	1½				1½	1½			7-F	.29	1½	1½	1¼
8-S	.48	1½	2				2	2	2		8-F	.48	2	2	1½
9-S	.82	2	2½				2½	2½			9-F	.82	2½	2½	2
10-S	1.20	2½	3				3	3	3	2	10-F	1.20	3	3	
11-S	1.60	3	4						4	3	11-F	1.60			
12-S	4.50						4	4		4	12-F	4.50		4	
13-S	5.50						6	6							


For No. 318
Triangular Head


For Nos. 319 and 339
Square Head

List Prices

Size of Cock	Inches	½	¾	1	1¼	1½	2	3	4
For No. 318	Each	.20	.20	.20	.25	.40	.65	1.00	5.00
For No. 319	Each	.20	.20	.20	.25	.40	.65	1.00	5.00
For No. 339	Each	.20	.20	.50	.65	.65	1.00		

Iron Body Wedge Gate Valves

Clamp Valves.....pages 68 to 69
Low Pressure Valves.....page 73
Standard Valves.....pages 74 to 78
Malleable Iron Valves.....page 79
175-Pound Valves.....pages 80 to 81
250-Pound Valves.....pages 82 to 83
800-Pound Hydraulic Valves.....page 84
By-passes, Clean-outs, and Indicators.....page 85
Gearing, Grease Cases, and Gear Covers.....page 86
Dimensions.....pages 87 to 97

Crane Co. offers the user an unusually complete line of Iron Body Wedge Gate Valves. The line includes valves for steam pressures up to 250 pounds and for water, oil, or gas pressures up to 800 pounds. It includes brass trimmed valves in all pressure classes, all-iron valves in all pressure classes except the 800-Pound Hydraulic, Standard valves with "Exelloy" or "18-8" trimmings, and malleable iron valves.

The Crane high standard of quality in design, materials, and workmanship is maintained in these valves, assuring the user satisfactory and long-time service.

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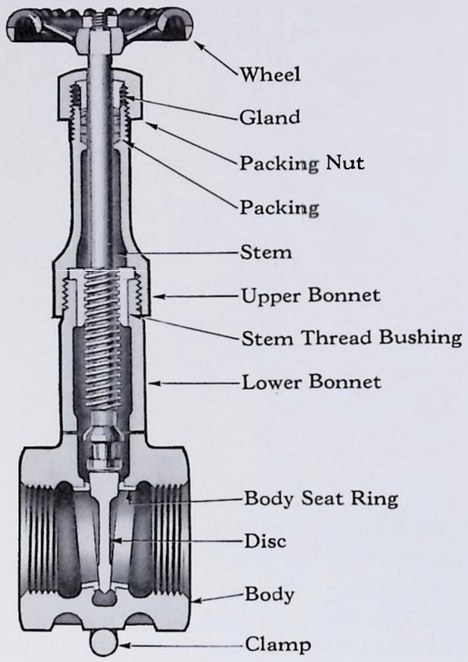
Clamp Gate Valves

Wedge Disc—All-Iron or Brass Trimmed

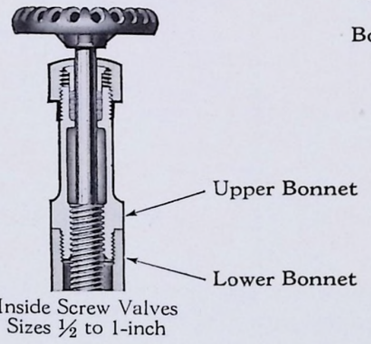
WORKING PRESSURES

Size	Saturated steam	Cold water, oil, or gas, non-shock
Screwed		
¼ to 2-inch	150 pounds	225 pounds
2½ to 4-inch	125 pounds	175 pounds
Flanged		
1 to 2-inch	125 pounds	200 pounds
2½ to 4-inch	125 pounds	175 pounds

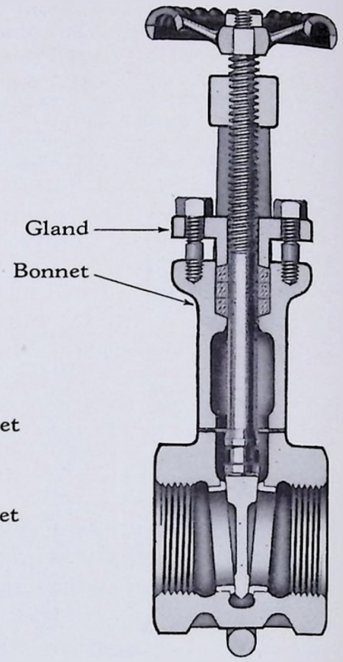
Air tested



Inside Screw Valves
Sizes 1¼ to 4-inch



Inside Screw Valves
Sizes ½ to 1-inch



Outside Screw and
Yoke Valves

Service recommendations: Crane Clamp Gate Valves are suited for a wide variety of service, on steam, water, oil, gas, or gasoline lines, in process industries, in oil field or oil refinery installations, and wherever compact, sturdy valves are needed.

Construction: The clamp construction enables dismantling the valve quickly for inspection, cleaning, or repairs. In addition, it maintains a snug and accurately aligned bonnet joint.

All-iron valves: The seats in all-iron valves are cast integral with the body. In sizes ½ to 4-inch, the disc is forged steel. The stem is steel, nickel-plated.

The bonnet construction of all-iron inside screw valves ½-inch and larger is similar to that of brass trimmed valves, except that the top portion of the bonnet in sizes ½ to 1-inch and the stem thread bushing in sizes 1¼-inch and larger are made of malleable iron.

Brass trimmed valves: Brass trimmed valves have brass body seat rings, disc, gland, and stem.

In inside screw valves ¼ to 1-inch, the upper portion of the bonnet engages the stem threads; it is made of brass and is renewable. Sizes 1¼-inch and larger have a brass renewable stem thread bushing in the bonnet. This construction provides a full stem thread engagement, brass-to-brass, and assures long life of the stem threads.

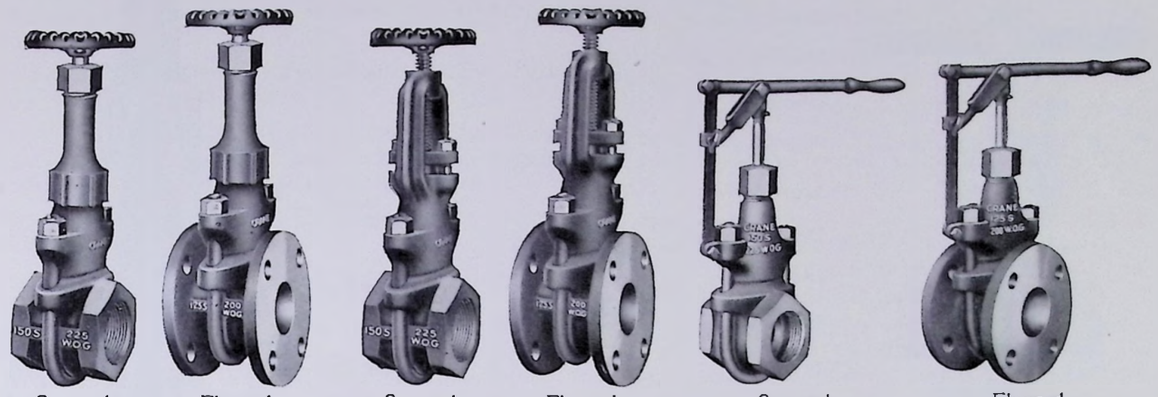
Outside screw and yoke valves have a cast iron bolted gland.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). The flanges are plain faced, with a smooth finish.

Clamp Gate Valves

Wedge Disc — All-Iron or Brass Trimmed

Inside Screw, Rising Stem — Outside Screw and Yoke — Quick Opening



Screwed	Flanged	Screwed	Flanged	Screwed	Flanged
No. 488 All-Iron	No. 488½ All-Iron	No. 484½ All-Iron	No. 485½ All-Iron	No. 492 All-Iron	No. 492½ All-Iron
No. 490 Iron Body Brass Trimmed	No. 490½ Iron Body Brass Trimmed	No. 486½ Iron Body Brass Trimmed	No. 487½ Iron Body Brass Trimmed	No. 494 Iron Body Brass Trimmed	No. 494½ Iron Body Brass Trimmed

List Prices

Size Inches	Inside Screw, Rising Stem				Outside Screw and Yoke			
	Screwed		Flanged, F. & D.		Screwed		Flanged, F. & D.	
	No. 488 All-Iron Each	No. 490 Brass Trimmed Each	No. 488½ All-Iron Each	No. 490½ Brass Trimmed Each	No. 484½ All-Iron Each	No. 486½ Brass Trimmed Each	No. 485½ All-Iron Each	No. 487½ Brass Trimmed Each
¼	2.00	2.00						
⅜	2.00	2.00						
½	2.00	2.00			3.65	3.65		
¾	2.35	2.35			4.00	4.00		
1	2.50	2.50	3.00	3.00	4.25	4.25	4.75	4.75
1¼	3.50	3.50	4.90	4.90	5.50	5.50	6.90	6.90
1½	5.00	5.00	6.00	6.00	7.25	7.25	8.25	8.25
2	7.50	7.50	8.50	8.50	10.50	10.50	11.50	11.50
2½	12.00	12.00	13.50	13.50	17.00	17.00	18.50	18.50
3	15.00	15.00	16.90	16.90	21.00	21.00	23.00	23.00
3½	18.00	20.00	20.30	22.00	24.00	26.00	26.50	28.20
4	20.00	22.00	22.50	25.00	28.00	30.00	30.50	33.00

Size Inches	Quick Opening			
	Screwed		Flanged, F. & D.	
	No. 492 All-Iron Each	No. 494 Brass Trimmed Each	No. 492½ All-Iron Each	No. 494½ Brass Trimmed Each
½	2.00	2.00		
¾	2.35	2.35		
1	2.50	2.50	3.00	3.00
1¼	3.50	3.50	4.90	4.90
1½	5.00	5.00	6.00	6.00
2	7.50	7.50	8.50	8.50
2½	12.00	12.00	13.50	13.50
3	15.00	15.00	16.90	16.90
3½	18.00	22.00	20.30	24.00
4	20.00	24.00	22.50	27.50

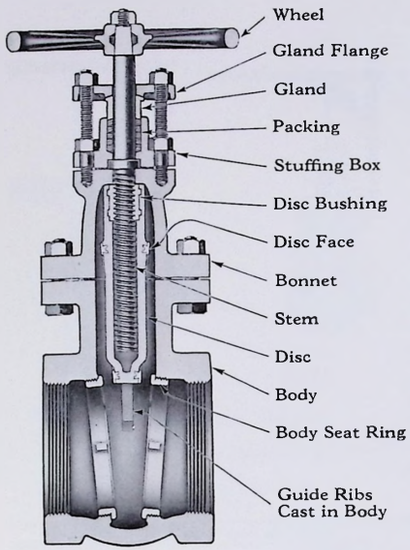
When Quick Opening Valves are used in liquid lines, a suitable cushioning device should be installed to protect the piping against water hammer.

List prices of flanged valves include facing and drilling to the 125-Pound American Cast Iron Flange Standard. No deduction is made if valves are ordered "faced only".

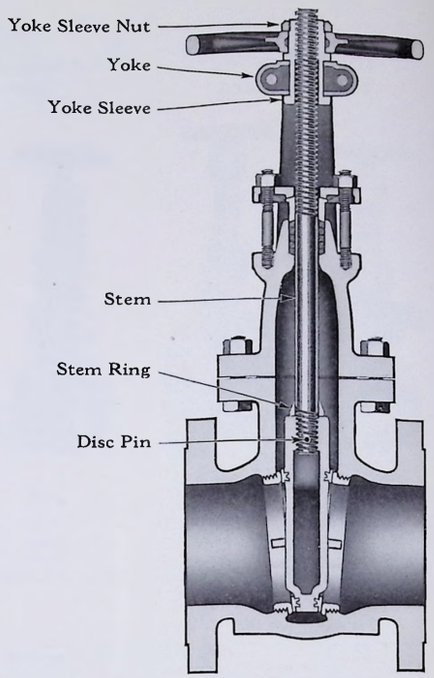
Dimensions ..... *page 87*
Templates for drilling .... *page 370*

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Iron Body Wedge Gate Valves



Non-Rising Stem Valve Open



Outside Screw and Yoke Valve Closed

General Description

The various lines of Crane Iron Body and Ferrosteel Wedge Gate Valves are very similar in construction, the important differences between them being in their proportions and in the materials used.

The illustrations above show typical valves. The principal variations in construction are explained on the opposite page.

Wedge disc: The disc is a single casting with tapered faces.

Two ribs cast in opposite sides of the body engage machined slots in the disc. They guide the disc, and prevent contact between the seating surfaces until the valve is practically closed.

In the wide open position, the disc lifts entirely clear of the seat openings, assuring a free passageway through the valve.

Non-rising stem valves: In non-rising stem valves, threads in the disc engage the stem threads, and the rotation of the stem raises or lowers the disc.

Non-rising stem valves are simple in construction, and can be used where head-room is limited. Also, as the stem merely rotates, wear on the stuffing box packing and leakage at the stuffing box are reduced to a minimum.

Hub end valves: Hub end valves, usually installed underground, are the non-rising stem type.

Their internal construction is the same as that of non-rising stem screwed or flanged valves. However, in place of a wheel, they are equipped with a square nut, to permit operating the valve with a socket wrench from above the ground.

Outside screw and yoke valves: Outside screw and yoke valves have a rising stem.

The disc is threaded on the stem and pinned to it. Threads in the yoke sleeve engage the upper stem threads, and the rotation of the yoke sleeve raises or lowers the stem and disc.

Outside screw and yoke valves are especially suited for installations where the valves are operated with reasonable frequency, and where head-room is not restricted. The outside stem threads are not subjected to the action of the fluid in the piping, and can be lubricated when required, thereby minimizing wear. Furthermore, the projection of the stem above the yoke sleeve indicates whether the valve is open, partly open, or closed.

General Description (Cont.)

Body and bonnet: All lines of valves have oval-shaped bodies and bonnets. Metal sections are more than ample, and the metal is distributed to assure maximum strength.

The body and bonnet of Low Pressure and Standard valves are made of cast iron.

In 175-Pound valves, the body is made of Crane Ferrosteel. The bonnet is Ferrosteel in sizes 8-inch and larger, and cast iron in the smaller sizes.

250-Pound and 800-Pound Hydraulic valves have a Ferrosteel body and bonnet.

Disc: Except for certain small size valves having an all-brass disc, brass trimmed valves have a cast iron disc with brass or Crane Hard Metal seating faces. In Low Pressure, Standard, and 175-Pound valves, the faces are brass; in 250-Pound and 800-Pound Hydraulic valves, they are Crane Hard Metal, a copper-tin bronze of unusual strength and hardness.

The faces are securely rolled into machined dovetails in the disc, assuring tightness under pressure.

In all-iron valves, the seating faces are cast integral with the disc.

In non-rising stem brass trimmed valves, the portion of the disc that engages the stem threads is brass-bushed.

Body seat rings: In Low Pressure, Standard, and 175-Pound brass trimmed valves, the body seat rings are brass; in 250-Pound and 800-Pound Hydraulic valves, they are Crane Hard Metal.

In Low Pressure valves, the body seat rings are rolled into machined dovetails in the body.

In Standard and in higher pressure valves, the body seat rings are screwed into the body.

All-iron valves are regularly furnished with the seats integral with the body. However, Standard and higher pressure all-iron valves can be furnished with screwed-in body seat rings; prices on application.

Stem: In non-rising stem brass trimmed valves, the stem is made of Crane Cast Manganese Bronze, an alloy of unusually high tensile and torsional strength, possessing excellent wearing qualities.

Outside screw and yoke brass trimmed valves are made with a rolled brass or a nickel-plated steel stem, as ordered. The brass stem is recommended, as a safeguard against corrosion.

All-iron valves have a steel stem, nickel-plated.

Gland and stuffing box: Low Pressure valves and Standard screwed or flanged valves have a one-piece cast iron gland.

Standard hub end valves, Underwriters' valves, and 175-Pound, 250-Pound, and 800-Pound Hydraulic valves, brass trimmed, have a two-piece gland consisting of a malleable iron or steel gland flange and a brass gland.

Stuffing boxes are packed with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

In non-rising stem valves, jamming the disc in the wide open position forces the stem collar against the machined top of the bonnet, making a pressure-tight joint.

In outside screw and yoke valves, when the valve is jammed wide open, the tapered stem ring engages a tapered machined surface in the under side of the top of the bonnet, forming a tight joint.

Yoke: In the smaller size outside screw and yoke valves, the yoke is cast integral with the bonnet. In the larger sizes, the yoke is made in two halves, bolted together at the top, and is bolted to the bonnet.

Bolted yokes are cast iron, except on 800-Pound Hydraulic valves, which have a Ferrosteel yoke.

Yoke sleeve: The yoke sleeve is made of Crane Cast Manganese Bronze.

Wheel: Wheels having a diameter of 24 inches or less are made of malleable iron to assure maximum strength. They have an oval-shaped rim, affording an easy grip.

Wheels of larger than 24 inches diameter are cast iron.

In non-rising stem valves, the wheel has a tapered square hole fitting the tapered square end of the stem, and is held in place by a steel nut.

In outside screw and yoke valves, the hole in the wheel is hexagonal and tapered, and fits the tapered hexagonal top of the yoke sleeve. The wheel is held in place by a malleable iron nut.

In both types of valves, the wheel is attached securely, yet can be removed easily.

Flange dimensions and facing: The dimensions and drilling of the end flanges on flanged valves conform to the American Cast Iron Flange Standard for their respective working pressures.

On Low Pressure and Standard valves, the flanges are plain faced, with a smooth finish.

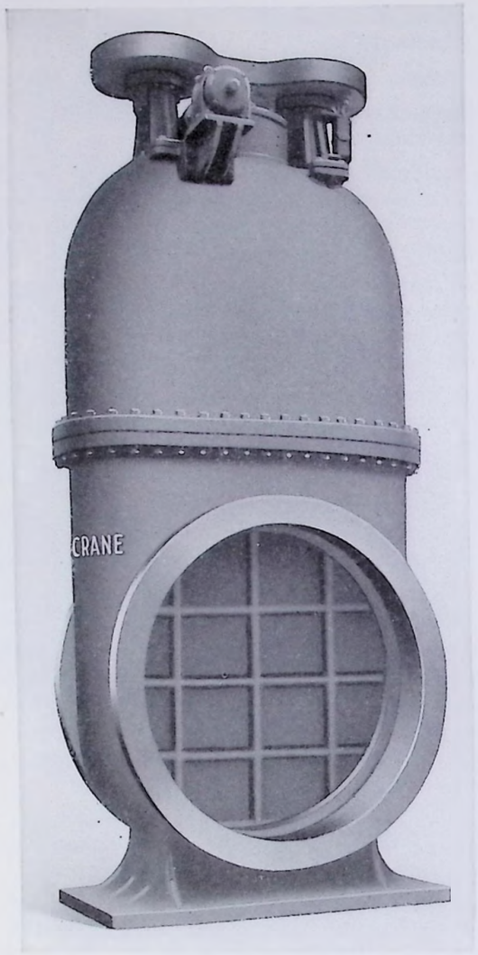
175-Pound and 250-Pound flanged valves are regularly furnished with a raised face $\frac{1}{16}$-inch high on the end flanges. Valves with male, female, tongue, or groove faces can be made to order at an additional price.

800-Pound Hydraulic flanged valves are regularly furnished with a $\frac{1}{4}$-inch male face (large male) on the end flanges. Valves with female, tongue, or groove faces can be made to order, at an additional price.

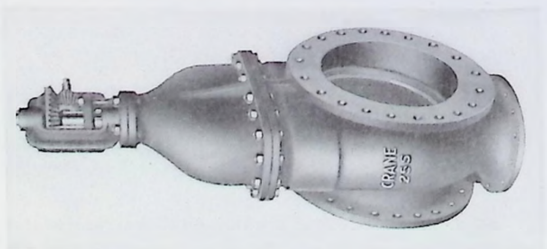
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Special Iron Body Wedge Gate Valves

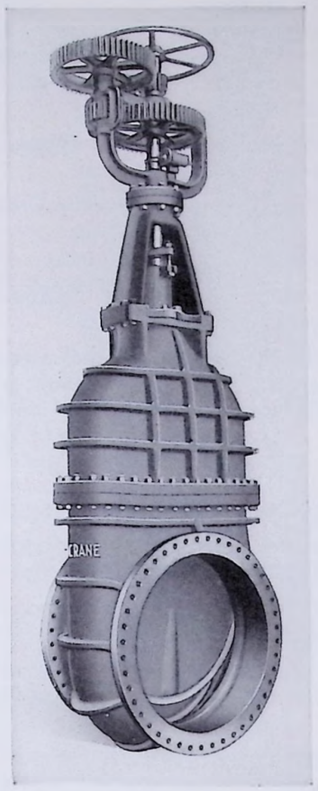
Crane Co. has exceptional facilities for building special Iron Body Wedge Gate Valves to suit unusual piping conditions. A few typical illustrations are shown below. Prices will be quoted on application.



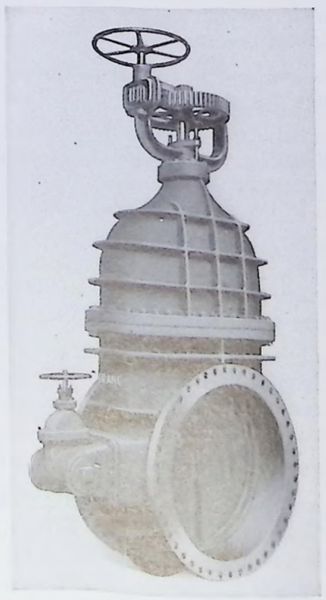
84-Inch Low Pressure Wedge Gate Valve
With Two Stems, Electric Motor Drive, and Base



Low Pressure Wedge Gate Valves with a bottom outlet for turbine exhaust relief and bleeder connections can be made to order.



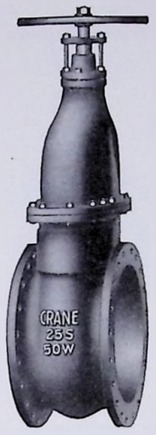
48-Inch Standard Wedge Gate Valve
With Special Spur Gearing



48-Inch Low Pressure Wedge Gate Valve
With By-Pass and Spur Gearing

Low Pressure
Iron Body Wedge Gate Valves
Brass Trimmed or All-Iron

Size of valve	Working pressures			Hydrostatic test pressures	
	Saturated steam	Cold water non-shock	Cold gas	Shell test	Seat test
12 to 24-inch	25 pounds	50 pounds	25 pounds	75 pounds	65 pounds
30 and 36-inch	25 pounds	43 pounds	25 pounds	75 pounds	55 pounds
42 and 48-inch	25 pounds	35 pounds	25 pounds	50 pounds	45 pounds



Non-Rising Stem
Flanged

No. 491
Brass Seats, Brass Stem

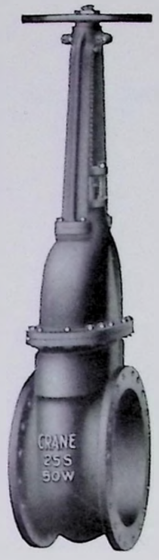
No. 491½
All-Iron

List Prices, Faced and Drilled

Size Inches	Non-Rising Stem	Outside Screw and Yoke	
	No. 491 or No. 491½ Each	No. 493 or No. 493½ Each	No. 496 Each
12	133.00	168.00	180.00
14	181.00	236.00	255.00
16	260.00	325.00	350.00
18	350.00	435.00	470.00
20	425.00	525.00	565.00
*24	600.00	725.00	775.00
*30	1100.00	1300.00	1400.00
*36	1700.00	2000.00	2150.00
*42	2450.00	2885.00	3100.00
*48	3400.00	4000.00	4300.00

Larger sizes, prices on application.
*Sizes 24-inch and larger should have a by-pass. See page 85.
*Sizes 42-inch and larger should be geared. See page 86.

Prices include drilling to the 25-Pound American Tentative Cast Iron Flange Standard. No deduction is made if valves are ordered "faced only".



Outside Screw and Yoke
Flanged

No. 496
Brass Seats, Brass Stem

No. 493
Brass Seats, Steel Stem

No. 493½
All-Iron

These valves are especially suited for exhaust, and for low pressure steam, gas, or water lines.

Brass trimmed valves: Brass trimmed valves are recommended for steam or water service.

The body seat rings and the disc faces are brass, and are rolled into the body and the disc.

The stem on non-rising stem valves is brass; the disc is brass-bushed where it engages the stem threads.

Outside screw and yoke valves are made with a brass stem or a nickel-plated steel stem, as ordered. As a safeguard against corrosion, the brass stem is recommended.

All-iron valves: All-iron valves are recommended for gas or for fluids that corrode brass but not iron.

The seats are cast integral with the body and the disc; the stem is steel, nickel-plated.

Stuffing box: The stuffing box is filled with high grade packing. The valves can be repacked when wide open and under pressure.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 25-Pound American Tentative Cast Iron Flange Standard (B16b2-1931). The flanges are plain faced, with a smooth finish.

Valves with flanges drilled to the 125-Pound American Standard can be furnished to order; a full face gasket should be used.

By-passes: A by-pass is recommended on Low Pressure Gate Valves sizes 24-inch and larger. It enables equalizing the pressure on both sides of the disc before opening the main valve. See page 85.

Gearing: Low Pressure Valves 42-inch and larger should be equipped with gears, to facilitate operation. The several styles of gearing are shown on page 86.

Motor or cylinder operation: Valves installed in inaccessible locations or used for emergency purposes should preferably be equipped with some easy means of operation. An electric or air motor drive, or an operating cylinder, fulfill this need admirably. For details, see pages 163 to 165.

Hub end valves: When Low Pressure hub end valves are required, Double Disc Gate Valves are recommended; see pages 104 and 105.

Vacuum service: Valves for vacuum exhaust lines should be specially air-tested to assure absolute tightness; an extra charge is made for air-testing. Orders must specify vacuum service, otherwise regular water-tested valves will be furnished.

Bottom outlet valves: Bottom outlet gate valves for turbine exhaust relief and bleeder connections are shown on page 72; prices on application.

Dimensions . . . pages 88 and 89

Templates for drilling . . . . page 370

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Standard

Iron Body Wedge Gate Valves

An unusually complete line, consisting of:

Brass Trimmed Valves

Non-Rising Stem.....Screwed, Flanged, or Hub Ends . . . page 75
Outside Screw and Yoke...Screwed or Flanged Ends.....page 75
Quick Opening.....Screwed or Flanged Ends.....page 76

All-Iron Valves

Non-Rising Stem.....Screwed, Flanged, or Hub Ends . . . page 75
Outside Screw and Yoke...Screwed or Flanged Ends.....page 75
Quick Opening.....Screwed or Flanged Ends.....page 76

"Exelloy" or "18-8" Trimmed Valves

Non-Rising Stem.....Screwed or Flanged Ends.....page 78
Outside Screw and Yoke...Screwed or Flanged Ends.....page 78

Malleable Iron Valves

Non-Rising Stem.....Screwed or Flanged Ends.....page 79
Outside Screw and Yoke...Screwed or Flanged Ends.....page 79

Underwriters' Valves

Non-Rising Stem.....Hub ends.....page 77
Outside Screw and Yoke...Screwed or Flanged Ends.....page 77

Brass trimmed valves: Brass trimmed valves are recommended for steam, water, or oil lines.

The body seat rings are brass, screwed into the body. The disc faces are brass, rolled into the disc.

In non-rising stem valves, the stem is brass, and the disc is brass-bushed where it engages the stem threads.

Hub end valves have a brass gland follower, with brass nuts on the gland studs.

Outside screw and yoke valves are made with a brass stem or a nickel-plated steel stem, as ordered. The brass stem is recommended, as a safe guard against corrosion.

All-iron valves: All-iron valves are recommended for oil or gas, or for fluids that corrode brass.

The seats are cast integral with the body and disc. Valves with screwed-in body seat rings can be supplied to order; prices on application.

The stem is steel, nickel-plated.

Stuffing box: The stuffing boxes are filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). The flanges are plain faced, with a smooth finish.

Hub end valves: The hubs on hub end valves are suitable for Class "D" cast iron pipe.

In place of a wheel, hub end valves are equipped with a square operating nut.

By-passes: A by-pass is recommended on Standard Valves sizes 14-inch and larger. The by-pass enables equalizing the pressure on both sides of the disc before opening the main valve. See page 85.

Gearing: To facilitate operating the valve, sizes 24-inch and larger should be equipped with gears. See page 86 for prices.

Motor or cylinder operation: These valves can be furnished with an electric motor, an air motor, or an operating cylinder, to afford an easy means of operating the valve. These methods of operation are especially desirable for valves installed in inaccessible locations or for valves used for emergency purposes. See pages 163 to 165 for description.

Indicators: The stem of an outside screw and yoke valve indicates the position of the disc. Non-rising stem valves can be supplied with an indicator. See page 85.

Clean-outs: For use on lines carrying an unusual amount of sediment, tarry fluids, etc., flanged valves can be equipped with a clean-out on the side of the body to facilitate cleaning. See page 85.

Size of valve	Working pressures			Hydrostatic test pressures	
	Screwed or flanged valves		Hub end valves	Screwed, flanged, or hub end valves	
	Saturated steam	Cold water, oil, or gas, non-shock	Cold water or gas non-shock	Shell test	Seat test
2 to 12-inch	125 pounds	(2) 200 pounds	(2) 200 pounds	300 pounds	225 pounds
14 and 16-inch	125 pounds	(2) 150 pounds	(2) 150 pounds	250 pounds	175 pounds
18 to 24-inch	(1)	150 pounds	150 pounds	250 pounds	175 pounds
30 to 48-inch	(1)	120 pounds	120 pounds	200 pounds	150 pounds

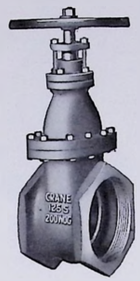
(1) For steam lines larger than 16-inch, Crane 150-Pound Cast Steel Gate Valves are recommended.
(2) Underwriters' Gate Valves, 2 to 12-inch, are recommended for 175 pounds cold water; 14-inch, for 150 pounds.

Standard

Iron Body Wedge Gate Valves

Brass Trimmed or All-Iron

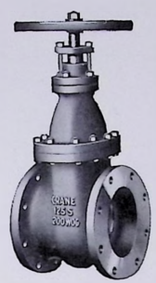
For working pressures, see the preceding page.



Non-Rising Stem
Screwed

No. 460
Brass Seats, Brass Stem

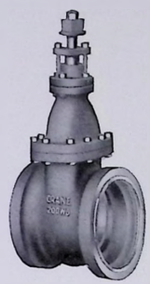
No. 472
All-Iron



Non-Rising Stem
Flanged

No. 461
Brass Seats, Brass Stem

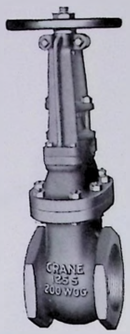
No. 473
All-Iron



Non-Rising Stem
Hub Ends

No. 462
Brass Seats, Brass Stem

No. 461½
All-Iron

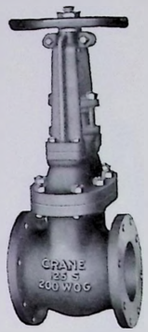


Outside Screw and Yoke
Screwed

No. 464
Brass Seats, Steel Stem

No. 464½
Brass Seats, Brass Stem

No. 475
All-Iron



Outside Screw and Yoke
Flanged

No. 465
Brass Seats, Steel Stem

No. 465½
Brass Seats, Brass Stem

No. 475½
All-Iron

List Prices

Size Inches	Non-Rising Stem			Outside Screw and Yoke			
	Screwed	Flanged, F. & D.	Hub Ends	Screwed		Flanged, F. & D.	
	No. 460 or No. 472 Each	No. 461 or No. 473 Each	No. 462 or No. 461½ Each	No. 464 or No. 475 Each	No. 464½ Each	No. 465 or No. 475½ Each	No. 465½ Each
For sizes smaller than 2-inch, use Clamp Gate Valves. See pages 68 and 69.							
2	10.00	12.00	10.00	17.50	19.00	19.50	21.00
2½	11.50	13.50		19.00	20.50	21.00	22.50
3	14.00	16.50	14.00	22.00	23.50	24.50	26.00
3½	17.00	19.50		25.00	27.00	27.50	29.50
4	19.00	23.00	19.00	30.00	32.50	34.00	36.50
5	27.50	31.50	27.50	42.00	45.00	46.00	49.00
6	32.50	36.50	32.50	48.00	52.00	52.00	56.00
8	54.00	58.00	54.00	80.00	86.00	84.00	90.00
10	90.00	95.00	90.00	122.00	131.00	127.00	136.00
12	125.00	133.00	125.00	160.00	172.00	168.00	180.00
*14		181.00	173.00			236.00	255.00
*16		260.00	250.00			325.00	350.00
*18		350.00	340.00			435.00	470.00
*20		425.00	415.00			525.00	565.00
*24		600.00	590.00			725.00	775.00
*30		1100.00	1075.00			1300.00	1400.00
*36		1700.00	1675.00			2000.00	2150.00
*42		2450.00	2400.00			2885.00	3100.00
*48		3400.00	3350.00			4000.00	4300.00

*Sizes 14-inch and larger should have a by-pass. See page 85. Sizes 24-inch and larger should be geared. See page 86.

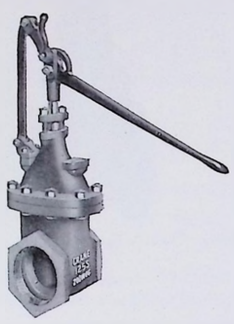
Drilling: Flanged valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the 125-Pound American Cast Iron Flange Standard. When valves are ordered "faced only", they will be furnished at the same price as for "faced and drilled".

Description . . . page 74 *Dimensions . . . pages 90 and 91* *Templates for drilling . . . page 370*

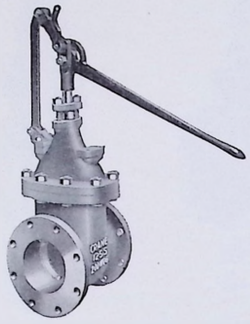
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Quick Opening
Standard Iron Body Wedge Gate Valves
Brass Trimmed or All-Iron

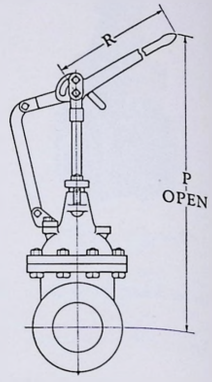
WORKING PRESSURES
125 pounds steam
200 pounds cold water, oil, or gas, non-shock



Screwed
No. 470, Brass Trimmed
No. 476, All-Iron



Flanged
No. 471, Brass Trimmed
No. 477, All-Iron



Size	List Prices, Each		Dimensions, in Inches								
	Screwed	Flanged, F. & D.	End to end Screwed	Face to face Flanged	Diameter of Flanges	Thickness of Flanges	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	P	R
Inches	No. 470 Brass Trimmed or No. 476 All-Iron	No. 471 Brass Trimmed or No. 477 All-Iron									
3	22.00	24.50	6⅛	8	7½	¾	6	4	⅝	27¾	12
3½	25.00	27.50	6½	8½	8½	13/16	7	8	⅝	38¾	12
4	30.00	34.00	6⅞	9	9	15/16	7½	8	⅝	34½	15½
5	42.00	46.00	7⅜	10	10	15/16	8½	8	¾	44½	23
6	48.00	52.00	7¾	10½	11	1	9½	8	¾	47	23
8	80.00	84.00	8¾	11½	13½	1⅛	11¾	8	¾	58¾	29
10	122.00	127.00	9⅞	13	16	13/16	14¼	12	⅞	75	41
12	160.00	168.00	11⅝	14	19	1¼	17	12	⅞	81	41

For sizes smaller than 3-inch, use Clamp Gate Valves. See pages 68 and 69.

Materials: Brass trimmed valves have body seat rings, disc faces, and stem made of brass.

In all-iron valves, the seats are cast integral with the body and the disc; the stem is steel and is nickel-plated. Valves with screwed-in body seat rings can be supplied to order; prices on application.

Drilling: List prices of flanged valves include facing and drilling to the 125-Pound American Cast Iron Flange Standard. No deduction is made when valves are ordered "faced only".

Shock: Closing one of these valves quickly on liquid lines may cause "water hammer". When severe, water hammer should be eliminated by installing a suitable cushioning device, to protect the piping.

Templates for drilling . . . page 370

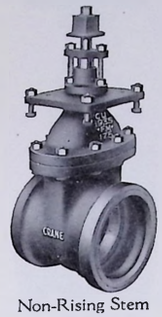
Standard
Iron Body Wedge Gate Valves
Underwriters' Pattern

WORKING PRESSURES
2½ to 12-inch — **175** pounds cold water, non-shock
14-inch — **150** pounds cold water, non-shock

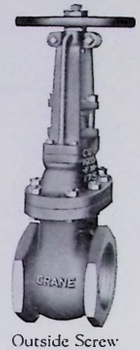
HYDROSTATIC TEST PRESSURES

	Shell Test	Seat Test
2½ to 12-inch	**300** pounds	**200** pounds
14-inch	**250** pounds	**175** pounds

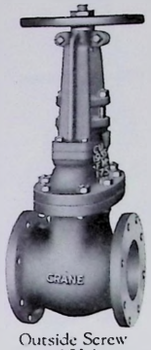
These valves conform to the Underwriters' Specifications known as "The National Standard". They are listed as approved and inspected by the Associated Factory Mutual Fire Insurance Companies, Boston, and the Underwriters' Laboratories, Chicago. They are marked "CU" and "FM".



Non-Rising Stem
Hub Ends
No. 462½



Outside Screw and Yoke
Screwed
No. 467½



Outside Screw and Yoke
Flanged
No. 467

List Prices

Size	Inches	2½	3	3½	4	5	6	8	10	12	14
No. 462½, Hub Ends	Each				19.00		32.50	54.00	90.00	125.00	173.00
No. 467½, Screwed	Each	20.50	23.50	27.00	32.50	45.00	52.00	86.00			
No. 467, Flanged, Faced and Drilled	Each	22.50	26.00	29.50	36.50	49.00	56.00	90.00	136.00	180.00	255.00

Underwriters' requirements: The valves illustrated above are constructed to comply with Underwriters' requirements for fire protection service.

Body seat rings are brass, screwed into the body. Disc faces are brass, rolled into the disc.

The stem is brass, and the bonnet and stuffing box are brass-bushed where they come in contact with the stem. In non-rising stem valves, the disc is brass-bushed where it engages the stem threads. The brass to brass contacts prevent corrosion and assure easy operation of the valve.

The gland is brass and is of the ball type; the gland flange is malleable iron. The gland nuts are brass.

Hub end valves: The hub ends fit Class "D" cast iron pipe.

Dimensions . . . . page 90

The bonnet has a square flange cast integral, to permit bolting on an indicator post when the valve is installed underground.

Outside screw and yoke: Outside screw and yoke valves are usually used in-doors. The rising stem indicates whether the valve is open or closed.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). Flanges are plain faced, with a smooth finish.

Drilling: List prices of flanged valves include facing and drilling to the 125-Pound American Cast Iron Flange Standard. No deduction is made when valves are ordered "faced only".

Templates for drilling . . . . page 370

Other Underwriters' Material

In addition to the Underwriters' Gate Valves listed above, the Crane line includes Indicator Posts, Iron Body Swing Check Valves, American Standard Sprinkler Fittings, Brass Gate Valves, and Brass Hose Gate Valves, all complying with Underwriters' requirements. These are shown on the pages referred to below.

Underwriters' Indicator Post . . . . page 162
Underwriters' Iron Body Swing Check Valves . . . . page 156
Underwriters' Brass Gate Valves . . . . page 42
Underwriters' Brass Hose Gate Valves . . . . page 46
American Standard Sprinkler Fittings . . . . pages 214 and 215

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 57 of 402
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Standard
Iron Body Wedge Gate Valves
for Process Industries

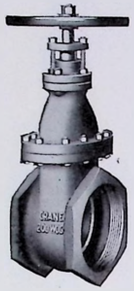
WORKING PRESSURE
200 pounds cold water, oil, gas, or gasoline, non-shock

Air Tested

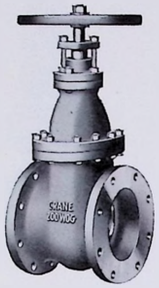
EXELLOY TRIMMED
Exelloy Body Seat Rings
Exelloy Disc Faces
Exelloy Stem

18-8 ALLOY TRIMMED
18-8 Alloy Body Seat Rings
18-8 Alloy Disc Faces
18-8 Alloy Stem

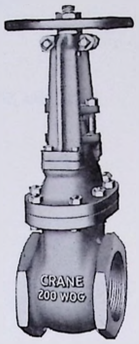
List prices of flanged valves include facing and drilling to the 125-Pound American Cast Iron Flange Standard. No deduction is made if valves are ordered "faced only".



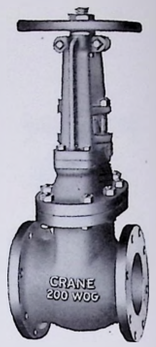
Non-Rising Stem
Screwed
No. 1470
Exelloy Trimmed
No. 1474
18-8 Alloy Trimmed



Non-Rising Stem
Flanged
No. 1471
Exelloy Trimmed
No. 1475
18-8 Alloy Trimmed



Outside Screw and Yoke
Screwed
No. 1472
Exelloy Trimmed
No. 1476
18-8 Alloy Trimmed



Outside Screw and Yoke
Flanged
No. 1473
Exelloy Trimmed
No. 1477
18-8 Alloy Trimmed

List Prices

Size	Exelloy Trimmed				18-8 Alloy Trimmed			
	Non-Rising Stem		O. S. & Y.		Non-Rising Stem		O. S. & Y.	
	No. 1470 Screwed	No. 1471 Flanged F. & D.	No. 1472 Screwed	No. 1473 Flanged F. & D.	No. 1474 Screwed	No. 1475 Flanged F. & D.	No. 1476 Screwed	No. 1477 Flanged F. & D.
Inches	Each	Each	Each	Each	Each	Each	Each	Each
2	24.50	26.50	31.25	33.25	26.00	28.00	32.75	34.75
2½	28.00	30.00	34.75	36.75	29.50	31.50	36.25	38.25
3	34.00	36.50	40.75	43.25	36.00	38.50	42.75	45.25
4	45.50	49.50	55.00	59.00	48.00	52.00	57.50	61.50
5		65.50		77.50		69.00		81.00
6		75.00		89.00		80.00		94.00
8		113.00		136.00		122.00		145.00
10		170.00		197.00		185.00		212.00
12		220.00		248.00		245.00		273.00

Exelloy Trimming: Crane Exelloy is a specially heat-treated chromium iron having a chromium content of about 12 per cent, and a carbon content of about 0.10 per cent.

Valves trimmed with Exelloy have a cast iron body, bonnet, and disc, and Exelloy body seat rings, disc faces, and stem.

They are recommended for refined oils, or for oils containing small quantities of organic sulphur compounds. They are not recommended for crude oils containing brine or for partially refined oils containing sulphurous or hydrochloric acid.

18-8 Alloy Trimming: Crane 18-8 Alloy is a chromium-nickel steel having a minimum chromium content of 18 per cent, a minimum nickel content of 8 per cent, and a maximum carbon content of 0.15 per cent.

Valves trimmed with 18-8 Alloy have a cast iron body, bonnet, and disc, and 18-8 Alloy body seat rings, disc faces, and stem.

They are recommended for use in sulphate paper mills, creosote plants, and chemical plants on fluids which are sufficiently corrosive to iron, steel, Exelloy, brass, and other non-ferrous alloys to make them unsatisfactory for valve trim. In oil refineries, they are especially suited for oil and gasoline containing hydrogen sulphide and sulphur dioxide when moisture is apt to be present.

Crane 18-8 Alloy is licensed by the Chemical Foundation, Inc., under U. S. Patents No. 1,316,817 and No. 1,339,378.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). Flanges are plain faced, with a smooth finish.

Dimensions . . . . . *page 90*

Templates for drilling . . . *page 370*

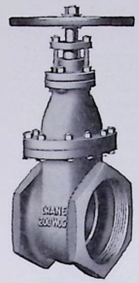
Malleable Iron Wedge Gate Valves

Standard All-Iron Valves

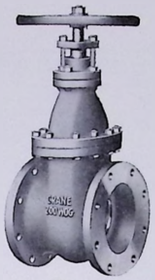
WORKING PRESSURES
200 pounds cold water, oil, gas, or gasoline, non-shock
125 pounds hot oil, **450°** F.
100 pounds hot oil, **550°** F.

Air Tested

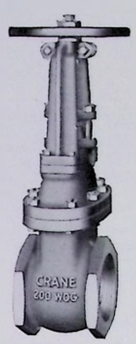
List prices of flanged valves include facing and drilling to the 125-Pound American Cast Iron Flange Standard. No deduction is made if valves are ordered "faced only".



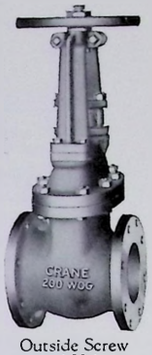
Non-Rising Stem
No. 1492
Screwed



Non-Rising Stem
No. 1493
Flanged



Outside Screw and Yoke
No. 1494
Screwed



Outside Screw and Yoke
No. 1495
Flanged

List Prices

Size		Inches	2	2½	3	4	5	6	8
Non-Rising Stem	No. 1492, Screwed	Each	20.00	23.00	28.00	38.00	54.00	64.00	
	No. 1493, Flanged, F. & D.	Each	24.00	27.00	33.00	46.00	62.00	72.00	113.00
Outside Screw and Yoke	No. 1494, Screwed	Each	28.00	31.00	36.00	49.00	68.00	80.00	
	No. 1495, Flanged, F. & D.	Each	32.00	35.00	41.00	57.00	76.00	88.00	135.00

Service recommendations: These valves are ideal for oil lines where fire hazard legislates against the use of cast iron, and for corrosive services where all-iron valves are satisfactory but where a material stronger than cast iron is desired.

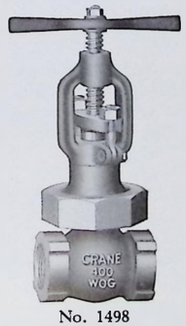
Construction: Except for materials, the valves are the same as the all-iron valves described on page 74 and illustrated on page 75.

Dimensions . . . . . *page 90*

Materials: The body and bonnet are made of malleable iron; the disc is made of cast iron. Seating surfaces are cast integral with the body and disc; valves with screwed-in body seat rings can be made to order; prices on application. Stems are steel and are nickel-plated.

Templates for drilling . . . . *page 370*

400-Pound W.O.G. All-Iron Valves



No. 1498
Screwed, with Tee Handle

WORKING PRESSURES
400 pounds cold water, oil, gas, or gasoline, non-shock
250 pounds hot oil, **550°** F.

Air Tested

The No. 1408 Valves are recommended for the same service as the valves shown above. They are especially suitable for small lines where compactness and accessibility are desired.

List Prices and Dimensions

Size	Inches	⅜	½	¾	1	1¼	1½	2
No. 1498, Screwed	Each	10.00	10.00	11.25	12.75	14.50	16.50	19.00
End to end	Inches	2⅜	2⅝	2⅞	3¼	3¾	4¼	5
Center to top of stem, open	Inches	6⅝	7 7/16	8	9⅞	10½	12¾	14½
Length of tee handle	Inches	3¾	4½	4½	6	6	7	7

Construction and materials: These valves are unusually tough, rugged, and compact. Sizes 1¼-inch and smaller have a union bonnet as illustrated; larger sizes have a bolted bonnet (not illustrated).

The body, bonnet, and disc are malleable iron; the seating surfaces are cast integral with the body and disc. The stem is steel, nickel-plated.

Stuffing box: The stuffing box is deep and is filled with high grade packing. The gland is malleable iron, of the one-piece bolted type, having hinged gland bolts. The valves, when wide open, can be repacked while under pressure.

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175-Pound
Ferrosteel Body Wedge Gate Valves
Brass Trimmed or All-Iron

Size of valve	Working pressures		Hydrostatic test pressures	
	Saturated steam	Cold water, oil, or gas, non-shock	Shell test	Seat test
2 to 12-inch	175 pounds	400 pounds	600 pounds	450 pounds
14 and 16-inch	175 pounds	250 pounds	400 pounds	300 pounds
18 to 24-inch	*	200 pounds	350 pounds	225 pounds

For steam lines larger than 16-inch, Crane 150 or 300-Pound Cast Steel Gate Valves are recommended.

Crane 175-Pound Ferrosteel Body Wedge Gate Valves are designed to meet the requirements of service more severe than Standard Iron Body Valves can safely withstand but where the use of 250-Pound Valves is not justified. They have all of the excellent design features and the high quality of the Standard Line and are heavier in construction, affording an ample safety factor under all rated service conditions.

Body and bonnet: The body and bonnet are rigidly constructed, assuring adequate strength and freedom from distortion. All sizes have bodies made of Crane Ferrosteel. Sizes 8-inch and larger have Ferrosteel bonnets; smaller sizes have cast iron bonnets.

Brass trimmed valves: Brass trimmed valves are recommended for steam, water, or oil, or for use on fluids that do not corrode brass or iron.

The brass body rings are screwed into the body in all sizes. Disc faces are brass and are rolled into the disc.

The stem in the non-rising stem valves is made of brass, and the disc is brass-bushed where it engages the stem threads.

Outside screw and yoke valves are made with brass stem or nickel-plated steel stem, as ordered. Brass stems are recommended as a safeguard against corrosion.

All-iron valves: All-iron valves are recommended for oil or gas, or for fluids that corrode brass but not iron.

These valves have the seats cast integral with the body and disc. Valves with screwed-in body seat rings can be supplied to order; prices on application.

The stem in all-iron valves is steel, nickel-plated.

Stuffing box and gland: The stuffing box is packed with high grade packing and may be repacked while the valve is wide open and under pressure. The gland consists of two pieces, a malleable iron gland flange and a brass gland.

Flange dimensions and facings: The dimensions and drilling of the end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

175-Pound Valves are regularly furnished with a 1/16-inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with male, female, tongue, or groove faces can be furnished to order at an additional price. See page 353 for prices and dimensions.

By-passes: A by-pass is recommended on 175-Pound Valves sizes 8-inch and larger.

By-passes are made in two types, the "built-up" and the "bolted".

The "built-up" by-pass is furnished only on valves for steam lines, and permits warming up the piping before the main valve is opened.

The "bolted" by-pass is furnished on valves for water, oil, or gas lines. It enables equalizing the pressure on both sides of the disc, and thus facilitates opening the main valve. Prices of by-passes are shown on page 85.

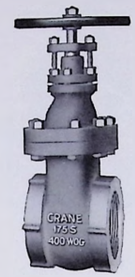
Gearing: Gear operation facilitates opening and closing large valves, and is recommended on 175-Pound Valves sizes 18-inch and larger. The several styles are listed and illustrated on page 86, and dimensions are given on page 93.

Motor or cylinder operation: Motor or cylinder operation is desirable for valves that are used for emergency purposes, or for valves that must be installed in inaccessible locations. Valves can be supplied with either electric motor or air motor, described on pages 164 and 165.

Cylinder operation is illustrated and described on page 163.

175-Pound
Ferrosteel Body Wedge Gate Valves
Brass Trimmed or All-Iron

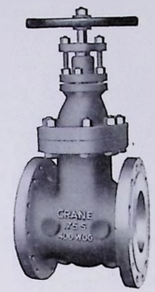
For working pressures, see the preceding page.



Non-Rising Stem
Screwed

No. 500
Brass Seats, Brass Stem

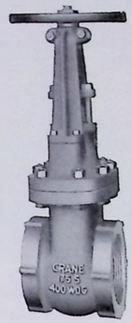
No. 502
All-Iron



Non-Rising Stem
Flanged

No. 501
Brass Seats, Brass Stem

No. 506
All-Iron

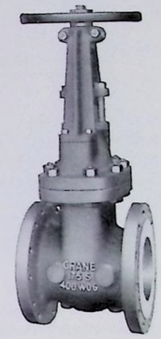


Outside Screw and Yoke
Screwed

No. 504
Brass Seats, Steel Stem

No. 504½
Brass Seats, Brass Stem

No. 509
All-Iron



Outside Screw and Yoke
Flanged

No. 505
Brass Seats, Steel Stem

No. 505½
Brass Seats, Brass Stem

No. 508
All-Iron

List Prices

Size Inches	Non-Rising Stem		Outside Screw and Yoke			
	Screwed	Flanged, F. & D.	Screwed		Flanged, F. & D.	
	No. 500 or No. 502 Each	No. 501 or No. 506 Each	No. 504 or No. 509 Each	No. 504½ Each	No. 505 or No. 508 Each	No. 505½ Each
2	15.00	17.50	23.00	24.50	25.50	27.00
2½	17.00	19.50	25.00	26.50	27.50	29.00
3	20.00	23.00	29.00	30.50	32.00	33.50
3½	25.00	28.00	35.00	37.00	38.00	40.00
4	28.00	33.00	40.00	42.50	45.00	47.50
5	40.00	45.00	54.00	57.00	59.00	62.00
6	50.00	57.00	65.00	69.00	72.00	76.00
* 8	87.00	94.00	110.00	116.00	117.00	123.00
*10	145.00	153.00	170.00	179.00	178.00	187.00
*12	185.00	195.00	215.00	227.00	225.00	237.00
*14		300.00			340.00	359.00
*16		400.00			450.00	475.00
*18		540.00			600.00	635.00
*20		700.00			775.00	815.00
*24		1085.00			1175.00	1225.00

*Sizes 8-inch and larger should have a by-pass. For prices, see page 85. Sizes 18-inch and larger should be geared. See page 86.

Drilling: Flanged valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the 250-Pound American Cast Iron Flange Standard. When valves are ordered "faced only", they will be furnished at the same price as for "faced and drilled".

Description . . . . page 80 *Dimensions . . pages 92 and 93* *Templates for drilling . . . page 371*

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250-Pound
Ferrosteel Wedge Gate Valves
Brass Trimmed or All-Iron

Size of valve	Working pressures		Hydrostatic test pressures	
	Steam 500° F.	Cold water, oil, or gas, non-shock	Shell test	Seat test
1¼ to 12-inch	250 pounds	500 pounds	800 pounds	550 pounds
14 and 16-inch	250 pounds	400 pounds	700 pounds	450 pounds
18 to 24-inch	*	400 pounds	700 pounds	450 pounds

For steam lines larger than 16-inch, Crane 300-Pound Cast Steel Gate Valves are recommended.

Crane 250-Pound Ferrosteel Wedge Gate Valves are admirably suited for a wide variety of service conditions requiring the use of rugged, substantially constructed valves. They will give excellent results on steam lines where the pressure and temperature do not require the use of steel valves, on high pressure cold water lines, on natural gas lines, oil pipe lines, and on similar service.

Rugged construction: The valves are unusually rugged. Metal sections in the body and bonnet are more than ample, and the metal is distributed to assure maximum strength and to avoid distortion. All parts have a high factor of safety.

Ferrosteel body and bonnet: The body and bonnet are made of Crane Ferrosteel, a high grade iron having a tensile strength approximately 35 per cent higher than that of cast iron. This assures added strength and rigidity in these parts.

Brass trimmed valves: Brass trimmed valves are recommended for steam, water, or oil, or for other fluids that do not corrode brass or iron.

The body seat rings are made of Crane Hard Metal, a copper-tin bronze of unusual strength and hardness. They are screwed into the body.

In sizes 2-inch and smaller, the disc is Crane Special Brass; in the larger sizes, the disc is cast iron faced with Crane Hard Metal.

The stem in the non-rising stem valve is made of brass; the disc is brass-bushed where it engages the stem threads, except on the sizes having a solid Crane Special Brass disc (2-inch and smaller).

Outside screw and yoke valves are made with a brass stem or a nickel-plated steel stem, as ordered. The brass stem is recommended, as a safeguard against corrosion.

All-iron valves: All-iron valves are recommended for gas or oil service, or for fluids that corrode brass but not iron.

They have seats cast integral with the body and the disc. Valves with screwed-in body seat rings can be supplied when ordered; prices on application.

The stem in all-iron valves is steel, nickel-plated.

Stuffing box and gland: High grade packing is used in the stuffing box. The valves are so constructed that they may be repacked when wide open and under pressure. The gland consists of two pieces, a malleable iron gland flange and a brass gland.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

250-Pound Valves are regularly furnished with a 1/16-inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with male, female, tongue, or groove faces can be furnished to order at an additional price. See page 353 for prices and dimensions

By-passes: A by-pass is recommended on 250-Pound Valves sizes 6-inch and larger.

By-passes are made in two types, the "built-up" and the "bolted".

The "built-up" by-pass is furnished only on valves for steam lines, and permits warming up the piping before the main valve is opened.

The "bolted" by-pass is furnished on valves for water, oil, or gas lines. It enables equalizing the pressure on both sides of the disc, and thus facilitates opening the main valve. Prices for by-passes will be found on page 85; dimensions, on page 95.

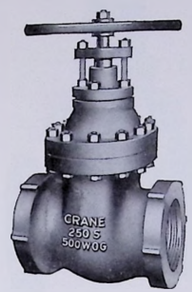
Gearing: Gear operation facilitates opening and closing large valves, and is recommended on 250-Pound Gate Valves sizes 14-inch and larger. The several styles are listed and illustrated on page 86, and dimensions are given on page 95.

Motor or cylinder operation: Motor or cylinder operation is desirable for valves that are used for emergency purposes, or for valves that must be installed in inaccessible locations. Valves can be supplied with either electric motor or air motor, described on pages 164 and 165.

Cylinder operation is illustrated and described on page 163.

250-Pound
Ferrosteel Wedge Gate Valves
Brass Trimmed or All-Iron

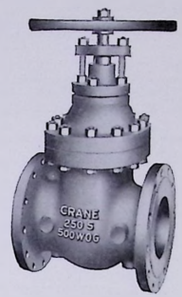
For working pressures, see the preceding page.



Non-Rising Stem
Screwed

No. 2 E
Hard Metal Seats
Brass Stem

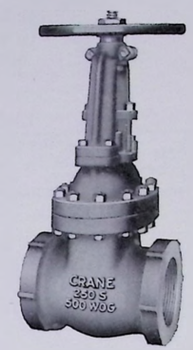
No. 4 E
All-Iron



Non-Rising Stem
Flanged

No. 3 E
Hard Metal Seats
Brass Stem

No. 8 E
All-Iron

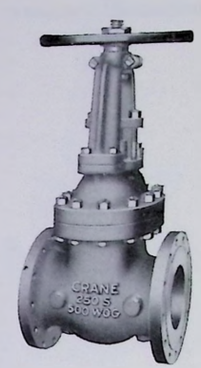


Outside Screw and Yoke
Screwed

No. 6 E
Hard Metal Seats
Steel Stem

No. 6½ E
Hard Metal Seats
Brass Stem

No. 10 E
All-Iron



Outside Screw and Yoke
Flanged

No. 7 E
Hard Metal Seats
Steel Stem

No. 7½ E
Hard Metal Seats
Brass Stem

No. 14 E
All-Iron

List Prices

Size Inches	Non-Rising Stem		Outside Screw and Yoke			
	Screwed	Flanged, F. & D.	Screwed		Flanged, F. & D.	
	No. 2 E or No. 4 E Each	No. 3 E or No. 8 E Each	No. 6 E or No. 10 E Each	No. 6½ E Each	No. 7 E or No. 14 E Each	No. 7½ E Each
1¼	24.00	26.50	32.00	34.50	34.50	37.00
1½	25.00	27.50	33.00	35.50	35.50	38.00
2	27.50	30.00	35.50	38.50	38.00	41.00
2½	33.00	35.50	41.00	44.50	43.50	47.00
3	45.00	48.00	54.00	58.00	57.00	61.00
3½	57.00	60.00	67.00	72.00	70.00	75.00
4	60.00	65.00	72.00	78.00	77.00	83.00
5	85.00	90.00	100.00	108.00	105.00	113.00
* 6	100.00	107.00	115.00	124.00	122.00	131.00
* 8	155.00	162.00	180.00	194.00	187.00	201.00
*10	250.00	258.00	275.00	297.00	283.00	305.00
*12	325.00	335.00	380.00	410.00	390.00	420.00
*14		440.00			510.00	540.00
*16		675.00			750.00	800.00
*18		890.00			975.00	1030.00
*20		1075.00			1175.00	1250.00
24		1500.00			1606.00	1700.00

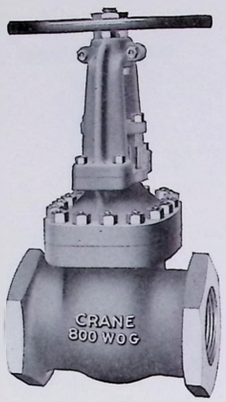
*Sizes 6-inch and larger should have a by-pass. For prices, see page 85. Sizes 14-inch and larger should be geared. See page 86.

Drilling: Flanged valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the 250-Pound American Cast Iron Flange Standard. When valves are ordered "faced only", they will be furnished at the same price as for "faced and drilled".

Description . . . page 82 *Dimensions . . . pages 94 and 95* *Templates for drilling . . . page 371*

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800-Pound Hydraulic
Ferrosteel Wedge Gate Valves
Brass Trimmed



Outside Screw and Yoke
Screwed

No. 804 H
Hard Metal Seats
Steel Stem

No. 804½ H
Hard Metal Seats
Brass Stem

WORKING PRESSURE
800 pounds cold water, oil, or gas, non-shock

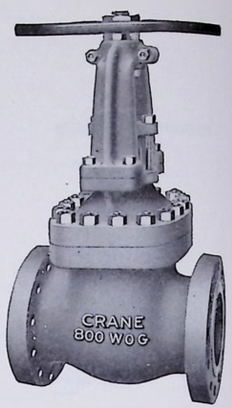
TEST PRESSURES
Shell test — **1600** pounds hydrostatic
Seat test — **850** pounds hydrostatic

List Prices

Size Inches	Screwed		Flanged, F. & D.	
	No. 804 H Each	No. 804½ H Each	No. 805 H Each	No. 805½ H Each
2	40.00	43.50	45.00	48.50
2½	60.00	65.00	68.00	73.00
3	81.00	88.00	90.00	97.00
4	113.00	122.00	120.00	129.00
* 5	150.00	162.00	160.00	172.00
* 6	195.00	211.00	210.00	226.00
* 8			315.00	340.00
*10			495.00	532.00
*12			645.00	695.00

*5-inch and larger should have a by-pass. See page 85.
*10-inch and larger should be geared. See page 86.

List prices of flanged valves include facing and drilling to the 800-Pound Hydraulic American Cast Iron Flange Standard. No deduction is made when valves are ordered "faced only".



Outside Screw and Yoke
Flanged

No. 805 H
Hard Metal Seats
Steel Stem

No. 805½ H
Hard Metal Seats
Brass Stem

Crane 800-Pound Hydraulic Ferrosteel Wedge Gate Valves are recommended for service on water, oil, or gas lines up to 800 pounds cold working pressure, non-shock.

Shock: When the valves are used in lines subjected to shock, properly designed shock absorbers should be installed to protect the piping and the valves.

Body and bonnet: The body and bonnet of these valves are extremely heavy and rugged. They are made of Crane Ferrosteel.

Hard Metal seats: The body seat rings and disc faces are made of Crane Hard Metal, a tough, hard, copper-tin bronze having excellent resistance to wear.

The body seat rings are screwed into the body.

Stem: The valves are made with a brass stem or a nickel-plated steel stem, as ordered. The brass stem is recommended, as a safeguard against corrosion.

Stuffing box and gland: High grade packing is used in the stuffing box. The valves can be repacked when wide open and under pressure. The gland consists of two pieces, a malleable iron gland flange and a brass gland.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 800-Pound Hydraulic American Cast Iron Flange Standard (B16b1-1931).

800-Pound Valves are regularly furnished with a ¼-inch male face (large male) on the end flanges. The male face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with female, tongue, or groove faces can be furnished to order at an additional price. See page 353 for prices and dimensions.

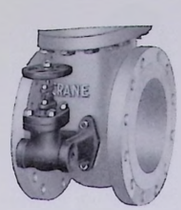
By-passes: A by-pass is recommended on 800-Pound Gate Valves sizes 5-inch and larger. It enables equalizing the pressure on both sides of the disc before opening the main valve. See page 85.

Gearing: 800-Pound Valves 10-inch and larger should be equipped with gears, to facilitate operation. The several styles of gearing are shown on page 86.

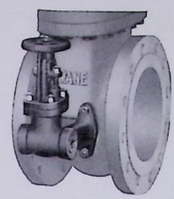
Motor or cylinder operation: Valves installed in inaccessible locations or used for emergency purposes should preferably be equipped with some easy means of operation. An electric or air motor drive, or an operating cylinder, are ideal for this purpose. For description, see pages 103 to 105.

Special facings . . . . page 353 *Dimensions . . . pages 96 and 97* *Templates for drilling . . . page 371*

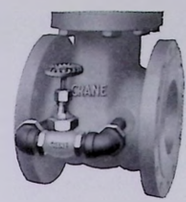
By-Passes for Iron Body Wedge Gate Valves



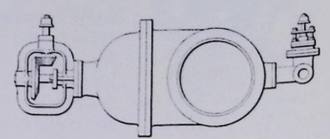
Bolted By-Pass
Non-Rising Stem



Bolted By-Pass
Outside Screw and Yoke



Built-Up By-Pass
For Steam only



Bevel Geared Valve with By-Pass

Extra List Prices for Bolted By-Pass				
Pressure Class of Valve	Size of Valve Inches	Size of By-Pass Inches	Non-Rising Stem By-Pass Each	O. S. & Y. By-Pass Each
Low Pressure Page 73	14	2	49.00	54.00
	16 to 20	3	74.00	80.00
	24 and 30	4	99.00	106.00
	36 and 42	6	140.00	152.00
	48	8	190.00	208.00
Standard Page 75	12 and 14	2	49.00	54.00
	16 to 20	3	74.00	80.00
	24 and 30	4	99.00	106.00
	36 and 42	6	140.00	152.00
	48	8	190.00	208.00
175-Pound Page 81	6	1¼	36.00	43.00
	8	1½	43.00	50.00
	10	1½	50.00	58.00
	12 and 14	2	58.00	66.00
	16 to 20	3	86.00	97.00
	24	4	123.00	136.00
250-Pound Page 83	5 and 6	1¼	43.00	51.00
	8	1½	50.00	58.00
	10	1½	66.00	76.00
	12 and 14	2	75.00	86.00
	16 to 20	3	112.00	125.00
	24	4	164.00	180.00
800-Pound Hydraulic Page 84	5 and 6	1¼		80.00
	8 and 10	1½		94.00
	12	2		115.00

Extra List Prices for Built-Up By-Pass			
Pressure Class of Valve	Size of Valve Inches	Size of By-Pass Inches	Built-Up By-Pass Each
175-Pound Page 81	6 and 8	¾	36.00
	10 and 12	1	50.00
	14 and 16	1¼	58.00
250-Pound Page 83	5 to 8	¾	43.00
	10 and 12	1	66.00
	14 and 16	1¼	75.00

When so ordered, Crane Iron Body Wedge Gate Valves can be furnished with a by-pass. Extra list prices are shown in the table.

The bolted by-pass will be supplied on Low Pressure, Standard, and 800-Pound Valves; also on 175 and 250-Pound Valves when not specifically ordered for steam. Non-rising stem valves will be equipped with a non-rising stem by-pass; O. S. & Y. valves, with an O. S. & Y. by-pass.

The built-up by-pass will be supplied only on 175 and 250-Pound Valves when specifically ordered for steam.

Bevel geared valves with by-pass have the by-pass on the bottom of the valve, as shown in the illustration above.

Dimensions . . . . pages 89 to 97

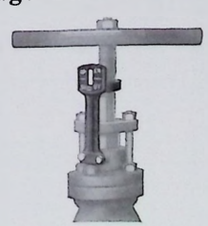
Clean-Outs and Indicators
For Standard Iron Body Wedge Gate Valves



Side Clean-Out

Size of Valve Inches	Extra for Side Clean-Out Each
3	6.50
4	7.50
5	9.00
6	10.50
8	12.00
10	15.00
12	16.50

Clean-outs should be used where sediment will accumulate in a valve. They may be either on the side as listed here, or on the bottom. Prices on bottom clean-outs are furnished on application.



Needle and Slot Indicator

Indicators of the Needle and Slot type may be applied to Standard Non-Rising Stem Valves 12-inch and smaller. Prices on application.

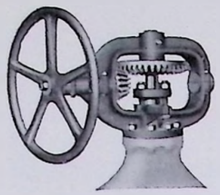


Lockup Caps

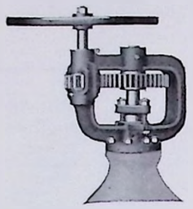
Lockup caps can be furnished for any class of Crane Non-Rising Stem Gate Valve. Prices on application.

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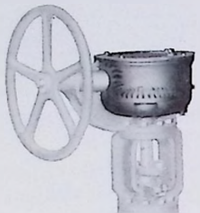
Gearing for Iron Body Wedge Gate Valves



Style U, Bevel Gearing
Non-Rising Stem



Style S, Spur Gearing
Non-Rising Stem



Grease Case for
Non-Rising Stem Valves

When so ordered, Crane Iron Body Wedge Gate Valves can be supplied with gears. Extra list prices are shown below.

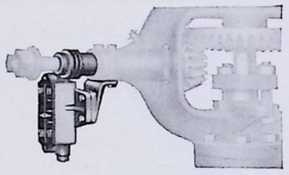
Bevel gearing: Unless otherwise ordered, non-rising stem bevel geared valves are furnished with the pinion shaft extending at right angles to the run of the valve. They can also be furnished with the shaft parallel to the run.

With Style N bevel gearing for outside screw and yoke valves, the pinion shaft extends at right angles to the run of the valve; with Style O, parallel to the run. Unless otherwise ordered, Style N will be furnished.

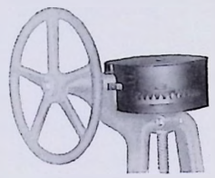
Grease cases and gear covers: Non-rising stem bevel or spur geared valves can be supplied with a grease case completely enclosing the gears.

Outside screw and yoke valves can not be equipped with a grease case, but can be supplied with a gear cover.

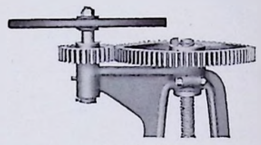
Indicator: Non-rising stem geared valves can be supplied with a worm-gear indicator, as illustrated. Prices on application.



Worm-Gear Indicator
for Non-Rising Stem Valves
Prices on application



Gear Cover
for
Outside Screw and Yoke Valves



Style P
Spur Gearing
Outside Screw and Yoke



Style N
Bevel Gearing
Outside Screw and Yoke



Style O
Bevel Gearing
Outside Screw and Yoke

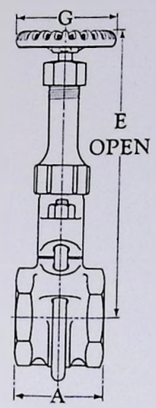
Pressure Class of Valve	Size of Valve Inches	Extra List Prices: Non-Rising Stem — Bevel Gearing Per Valve	Non-Rising Stem — Spur Gearing Per Valve	Non-Rising Stem — *Grease Cases Per Valve	Outside Screw and Yoke — Bevel Gearing Per Valve	Outside Screw and Yoke — Spur Gearing Per Valve	Outside Screw and Yoke — *Gear Covers Per Valve
Low Pressure Page 73	14 to 20	62.00	58.00	41.00	66.00	62.00	41.00
	24	70.00	66.00	50.00	74.00	70.00	50.00
	30	78.00	74.00	62.00	82.00	78.00	62.00
	36	148.00	140.00	74.00	156.00	148.00	74.00
	42	188.00	172.00	86.00	204.00	188.00	86.00
	48	330.00	305.00	100.00	355.00	330.00	100.00
Standard Page 75	12	54.00	50.00	41.00	58.00	54.00	41.00
	14 to 20	62.00	58.00	41.00	66.00	62.00	41.00
	24	70.00	66.00	50.00	74.00	70.00	50.00
	30	78.00	74.00	62.00	82.00	78.00	62.00
	36	148.00	140.00	74.00	156.00	148.00	74.00
	42	188.00	172.00	86.00	204.00	188.00	86.00
	48	330.00	305.00	100.00	355.00	330.00	100.00
175-Pound Page 81	10	62.00	58.00	41.00	66.00	62.00	41.00
	12 to 16	70.00	66.00	50.00	74.00	70.00	50.00
	18 and 20	82.00	78.00	66.00	86.00	82.00	66.00
	24	164.00	156.00	80.00	172.00	164.00	80.00
250-Pound Page 83	8	54.00	50.00	41.00	58.00	54.00	41.00
	10	70.00	66.00	50.00	74.00	70.00	50.00
	12 to 16	80.00	76.00	64.00	84.00	80.00	64.00
	18 and 20	93.00	88.00	68.00	98.00	93.00	68.00
	24	186.00	176.00	86.00	196.00	186.00	86.00
800-Pound Hydraulic Page 84	6 and 8				66.00	62.00	41.00
	10 and 12				78.00	74.00	62.00

*Prices of Grease Cases and Gear Covers are additional to prices of Gearing.

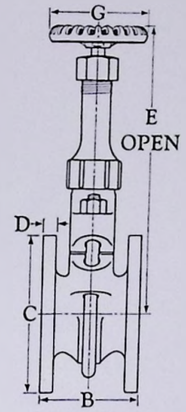
Dimensions of geared valves . . . . pages 89 to 97

Clamp Gate Valves

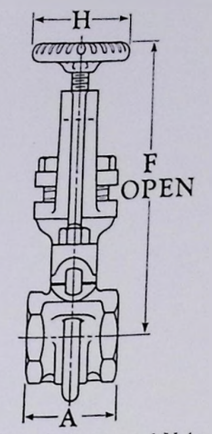
Dimensions, in Inches



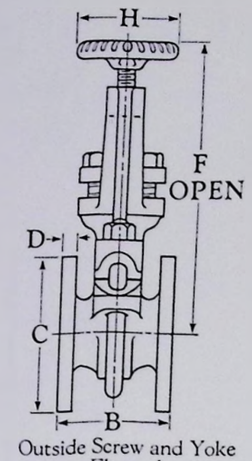
Inside Screw
Screwed



Inside Screw
Flanged

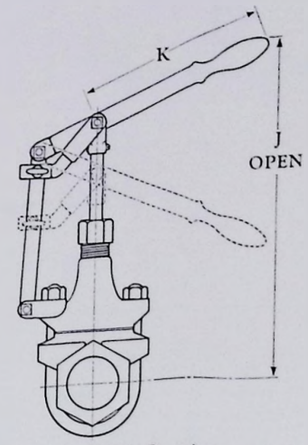


Outside Screw and Yoke
Screwed



Outside Screw and Yoke
Flanged

For Normal
Thread Engagement,
see page 367.



Quick Opening

Dimensions "A" and "B" and the dimensions of the flanges apply also to Quick Opening Valves.

Size		¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Screwed	A — End to end	1⅞	2	2 1/16	2 5/16	2 9/16	2 7/8	3⅛	3⅝	4⅛	4 9/16	5 1/16	5 9/16
Flanged	B — Face to face					3 3/16	3½	3¾	4	4 15/16	5 1/16	5 15/16	6¾
	C — Diameter of flange					4¼	4⅝	5	6	7	7½	8½	9
	D — Thickness of flange					7/16	½	9/16	⅝	11/16	¾	13/16	15/16
	Diameter of bolt circle					3⅛	3½	3⅞	4¾	5½	6	7	7½
	Number of bolts					4	4	4	4	4	4	8	8
	Diameter of bolts					½	½	½	⅝	⅝	⅝	⅝	⅝
Heights	E — Center to top, Inside Screw	4½	4½	6¼	7½	8½	10	11½	13½	15¾	18½	21¼	24¼
	F — Center to top, O. S. & Y.			6½	7½	9	10¼	12	13¾	16½	19	20¾	23¾
Wheel	G — Diameter, Inside Screw	2 1/16	2 1/16	2 1/16	2 9/16	2¾	3 1/16	3⅝	4 1/16	4¾	5⅜	7	9
	H — Diameter, O. S. & Y.			2 9/16	2 9/16	2¾	3 1/16	3⅝	4 1/16	4¾	5⅜	7	9
Quick Opening	J — Center to top			7¼	9	9¾	11¾	14½	15¾	17¾	21½	23¼	28
	K — Center to end of lever			6	7	7	7	9	9	11¼	11¼	15¼	15¼

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). The flanges are plain faced, with a smooth finish.

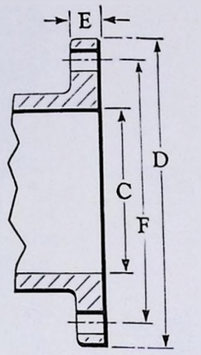
List prices . . . page 69

Templates for drilling . . . . page 370

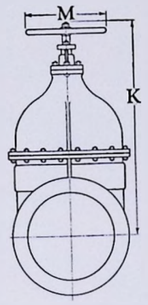
Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 62 of 402
Published by AsbestosClaims.Law
asbestosclaims.law/library/21275/62

Low Pressure
Iron Body Wedge Gate Valves

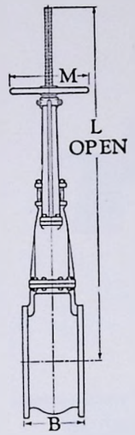
Dimensions, in Inches



Section through flange



Non-Rising Stem



Outside Screw and Yoke

Dimensions of larger sizes on application

Size		12	14	16	18	20	24	30	36	42	48
Flanged	B — Face to face	11	13½	14	14½	15½	17	21	24	27	30
	C — Inside diameter of port	12	14	16	18	20	24	30	36	42	48
	D — Diameter of flange	19	21	23½	25	27½	32	38¾	46	53	59½
	E — Thickness of flange	1	1⅛	1⅛	1¼	1¼	1⅜	1½	1⅝	1¾	2
	F — Diameter of bolt circle	17	18¾	21¼	22¾	25	29½	36	42¾	49½	56
	Number of bolts	12	12	16	16	20	20	28	32	36	44
	Diameter of bolts	⅝	¾	¾	¾	¾	¾	⅞	⅞	1	1
Heights	K — Center to top, Non-Rising	32½	36¼	40½	44¾	48¾	56½	67½	79¼		
	L — Center to top, O. S. & Y.	59	64½	71½	79¼	88	106	127¾	150½	179	203½
Wheel	M — Diameter	16	16	18	18	20	22	24	30		
Number of turns to open, without gearing		25	29	33	37	41½	49½	62	74		

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 25-Pound American Tentative Cast Iron Flange Standard (B16b2-1931). The flanges are plain faced, with a smooth finish.

By-passes: Sizes 24-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening.

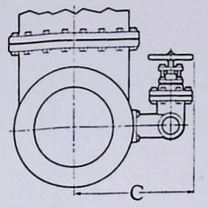
Gearing: To facilitate operating the valve, sizes 42-inch and larger should be equipped with gears.

List prices . . . page 73

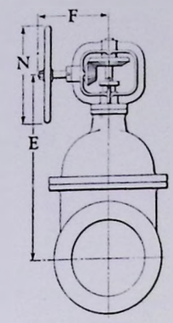
Templates for drilling . . . page 370

Low Pressure
Iron Body Wedge Gate Valves

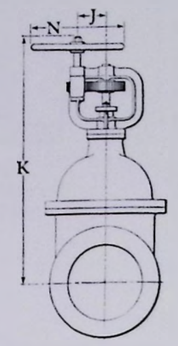
Dimensions, in Inches



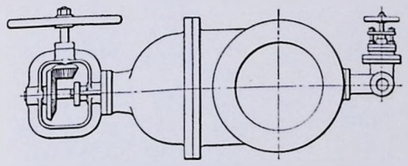
Flanged Valves
with
Bolted By-Pass

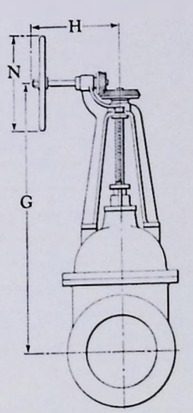


Style U
Bevel Gearing
Non-Rising Stem

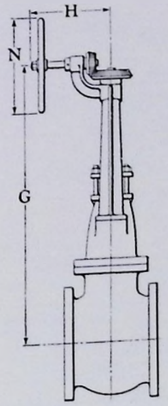


Style S
Spur Gearing
Non-Rising Stem

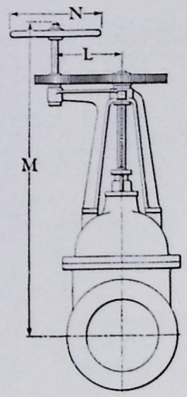

Bevel geared valves with by-pass
have the by-pass on the bottom.



Style N
Bevel Gearing
Outside Screw and Yoke



Style O
Bevel Gearing
Outside Screw and Yoke



Style P
Spur Gearing
Outside Screw and Yoke

For dimensions not given, see the preceding page.

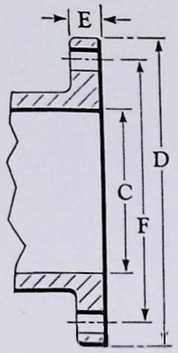
Size			14	16	18	20	24	30	36	42	48
Valves with by-pass		Size of by-pass	2	3	3	3	4	4	6	6	8
		C — Center to outside	19¾	23¾	24¼	26¼	28¼	34	40	48	49¾
Bevel Geared Valves	Non-Rising	E — Center to center	32	37¼	41	44½	53¾	62½	73¾	89¼	101¼
		F — Center to top	12¼	14½	14½	14¾	19	19½	21	29	29
		Number of turns to open	48	66	74	83	134	167	200	228	260
	O. S. & Y.	G — Center to center	50¼	55¼	61¼	67½	81	95¾	113¼	135	154¼
		H — Center to top	14	14¾	14¾	15	19	20	22½	29	29¾
		Number of turns to open	65	74	83	93½	124	155	222	228	230
Spur Geared Valves	Non-Rising	J — Center to center	5 9/16	6¼	6¼	6¼	8 11/16	8 11/16	8 11/16	14 5/16	14 5/16
		K — Center to top	41½	48¾	52¼	56¼	67¾	77	88¾	106½	118½
		Number of turns to open	48	70	78½	88	134	167	200	228	260
	O. S. & Y.	L — Center to center	10	12	12	12	14¾	14¾	17¼	19	19
		M — Center to top	53¾	61¼	67	73½	89½	104¾	122	146½	164½
		Number of turns to open	65	74	92½	104	145	185	200	228	230
Wheel for geared valves		N — Diameter	14	16	16	18	20	22	27	30	30

List prices and description . . . pages 73, 85, and 86

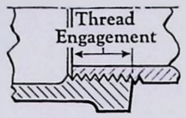
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Standard Iron Body Wedge Gate Valves

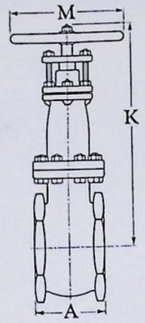
Dimensions, in Inches



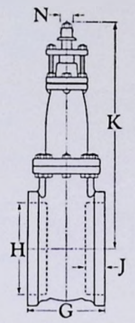
Section through flange



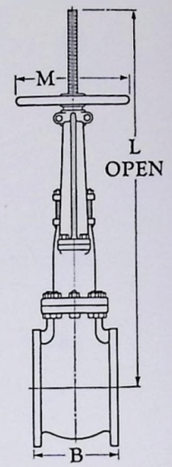
For Normal Thread Engagement, see page 367.



Non-Rising Stem



Non-Rising Stem Hub Ends



Outside Screw and Yoke

Dimensions "A", "B", and "C", and the dimensions of the flanges apply to either Non-Rising Stem or Outside Screw and Yoke valves.

Size		2	2½	3	3½	4	5	6	8	10	12
Screwed	A — End to end	5 7/16	5 7/8	6 1/8	6 1/2	6 7/8	7 3/8	7 3/4	8 3/4	9 7/8	11 5/8
Flanged	B — Face to face, without by-pass	7	7½	8	8½	9	10	10½	11½	13	14
	C — Inside diameter of port	2	2½	3	3½	4	5	6	8	10	12
	D — Diameter of flange	6	7	7½	8½	9	10	11	13½	16	19
	E — Thickness of flange	5/8	11/16	3/4	13/16	15/16	15/16	1	1 1/8	1 3/16	1 1/4
	F — Diameter of bolt circle	4 3/4	5½	6	7	7½	8½	9½	11 3/4	14 1/4	17
	Number of bolts	4	4	4	8	8	8	8	8	12	12
	Diameter of bolts	5/8	5/8	5/8	5/8	5/8	3/4	3/4	3/4	7/8	7/8
Hub ends	G — End to end, without by-pass	8½		9		10 1/4	10 1/4	10 3/4	12	12 3/4	13½
	H — Inside diameter of hub	3.25		4.75		5.62	6.75	7.87	10.00	12.25	14.37
	J — Depth of hub	2.75		2.75		3.00	3.00	3.00	3.50	3.50	3.50
Heights	K — Center to top, Non-Rising	11 1/4	12 3/4	14 3/4	15 1/4	16 1/4	19	21 1/4	26	31	36
	L — Center to top, O. S. & Y.	15	16½	19½	21½	24 3/4	29½	32½	41	50	57 1/4
Wheel or nut	M — Diameter of wheel	8	8	9	9	10	12	12	14	16	18
	N — Size of square nut	2		2		2	2	2	2	2	2
Number of turns to open, without gearing		6	7½	9½	11	8 3/4	11	13 1/4	16½	21	25

Size		14	16	18	20	24	30	36	42	48
Flanged	B — Face to face, without by-pass	15	16	17	18	20	24	28	33	36
	C — Inside diameter of port	14	16	18	20	24	30	36	42	48
	D — Diameter of flange	21	23½	25	27½	32	38 3/4	46	53	59½
	E — Thickness of flange	1 3/8	1 7/16	1 9/16	1 11/16	1 7/8	2 1/8	2 3/8	2 5/8	2 3/4
	F — Diameter of bolt circle	18 3/4	21 1/4	22 3/4	25	29½	36	42 3/4	49½	56
	Number of bolts	12	16	16	20	20	28	32	36	44
	Diameter of bolts	1	1	1 1/8	1 1/8	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2
Hub ends	G — End to end, without by-pass	13 3/4	16	17	17	18	24	27	33	36
	H — Inside diameter of hub	16.50	18.75	20.87	23.00	27.25	34.00	40.50	46.75	53.00
	J — Depth of hub	3.50	4.00	4.00	4.00	4.00	4.50	4.50	5.00	5.00
Heights	K — Center to top, Non-Rising	39 1/4	44 1/4	48 3/4	52½	63½	75½			
	L — Center to top, O. S. & Y.	67 3/4	76 1/4	83½	91 1/4	109	137	158½	192	206
Wheel or nut	M — Diameter of wheel	20	22	24	24	30	36			
	N — Size of square nut	2	2	2	2	3	3			
Number of turns to open, without gearing		30	33 1/4	37	42 1/4	50	95			

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). The flanges are plain faced, with a smooth finish.

Hub dimensions: The hubs on hub end valves are suitable for Class "D" cast iron pipe.

By-passes: Sizes 14-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening.

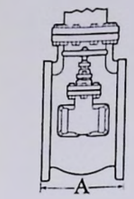
Gearing: To facilitate operating the valve, sizes 24-inch and larger should be equipped with gears.

List prices . . . . pages 75 to 79

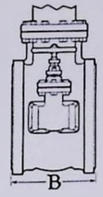
Templates for drilling . . . . page 370

Standard Iron Body Wedge Gate Valves

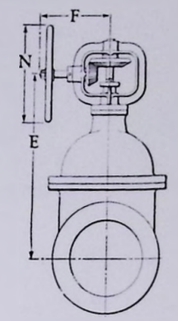
Dimensions, in Inches



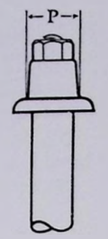
Flanged Valves with Bolted By-Pass



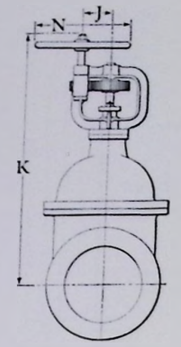
Hub End Valves with Bolted By-Pass



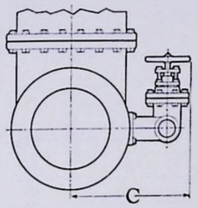
Style U
Bevel Gearing
Non-Rising Stem

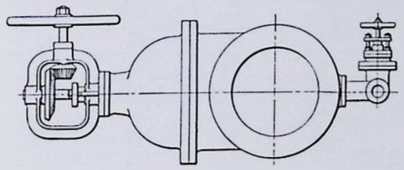


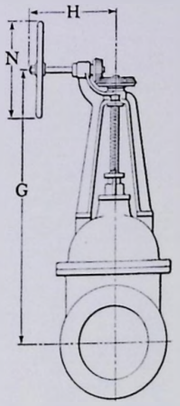
Square Operating Nut for Hub End Geared Valves



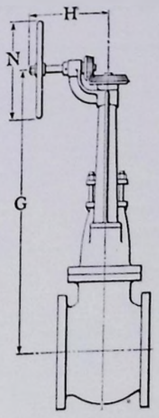
Style S
Spur Gearing
Non-Rising Stem



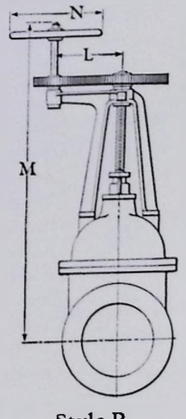

Bevel geared valves with by-pass have the by-pass on the bottom.



Style N
Bevel Gearing
Outside Screw and Yoke



Style O
Bevel Gearing
Outside Screw and Yoke



Style P
Spur Gearing
Outside Screw and Yoke

For dimensions not given, see the preceding page.

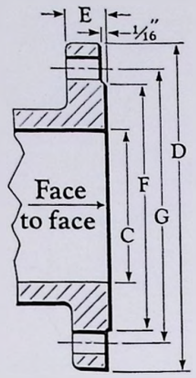
Size			12	14	16	18	20	24	30	36	42	48
Valves with by-pass		A — Face to face, flanged	14	15	16	17	18	20	30	32	33	36
		B — End to end, hub	16	16	19	20	21	22	30	32	33	36
		Size of by-pass	2	2	3	3	3	4	4	6	6	8
		C — Center to outside	19	20 1/4	23 3/4	25 1/4	26 1/4	29 1/4	34	41 3/4	45 1/4	51 1/4
Bevel Geared Valves	Non-Rising	E — Center to center	31½	36 1/4	41½	43½	47	55½	68½	83	96 1/4	105 3/4
		F — Center to top	14½	14 3/4	19	19½	19½	21	29	31	31 3/4	34½
		No. of turns to open	50	60	86½	98½	112	133	332	324	196	288
	O. S. & Y.	G — Center to center	45 3/4	53½	60	64½	70 1/4	84½	105½	122½	143	157½
		H — Center to top	14 3/4	15	19	20	20	22½	29	31	34½	34½
		No. of turns to open	62½	75	97½	108	125	135	332	380	228	260
Spur Geared Valves	Non-Rising	J — Center to center	6 1/4	6 1/4	8 11/16	8 11/16	8 11/16	8 11/16	14 5/16	16 1/4	16 1/4	17 7/8
		K — Center to top	43	47 3/4	55½	57 3/4	61 1/4	70½	85 3/4	100½	114 1/4	129
		No. of turns to open	53	63½	90	100	114	135	332	324	196	297
	O. S. & Y.	L — Center to center	12	12	14 3/4	14 3/4	14 3/4	17 1/4	19	19	23	23
		M — Center to top	51 3/4	59 3/4	68½	73½	79 1/4	93 1/4	116 3/4	133	152½	167
		No. of turns to open	62½	75	97½	108	125	135	332	380	228	260
Wheel or nut for geared valves		N — Diameter of wheel	16	18	20	22	22	27	30	30	36	36
		P — Size of square nut	2	2	2	2	2	3	3	3	3	3

List prices and description . . . . pages 75, 85, and 86

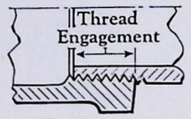
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asbestosclaims.law/library/21275/64

175-Pound
Ferrosteel Body Wedge Gate Valves

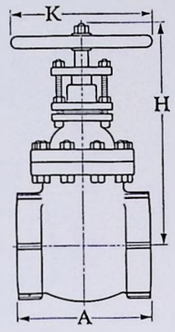
Dimensions, in Inches



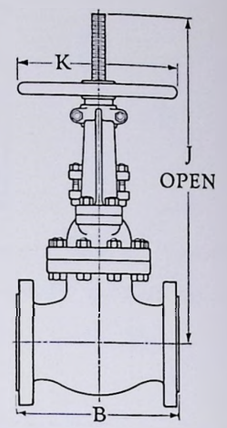
Section through flange



For Normal Thread Engagement, see page 367.



Non-Rising Stem



Outside Screw and Yoke

Dimensions "A", "B", and "C", and the dimensions of the flanges apply to either Non-Rising Stem or Outside Screw and Yoke Valves.

Size		2	2½	3	3½	4	5	6	8
Screwed	A — End to end	5½	6	7¼	7½	7¾	8½	8¾	10
Flanged	B — Face to face	7½	8	9½	10	10½	11½	12	13½
	C — Inside diameter of port	2	2½	3	3½	4	5	6	8
	D — Diameter of flange	6½	7½	8¼	9	10	11	12½	15
	E — Thickness of flange	7/8	1	1⅛	1 3/16	1¼	1⅜	1 7/16	1⅝
	F — Diameter of raised face	4 3/16	4 15/16	5 11/16	6 5/16	6 15/16	8 5/16	9 11/16	11 15/16
	G — Diameter of bolt circle	5	5⅞	6⅝	7¼	7⅞	9¼	10⅝	13
	Number of bolts	8	8	8	8	8	8	12	12
	Diameter of bolts	⅝	¾	¾	¾	¾	¾	¾	⅞
Heights	H — Center to top, Non-Rising	11½	12¾	14¼	15	17	19¾	21½	25½
	J — Center to top, O. S. & Y.	15¼	16¾	19¼	21½	24½	29¼	33	41¾
Wheel	K — Diameter	8	8	9	9	10	12	12	14
Number of turns to open, without gearing		6⅜	7⅞	9¾	11¼	9	11	25	34

Size		10	12	14	16	18	20	24
Screwed	A — End to end	11½	12½					
Flanged	B — Face to face	15	16	18	19½	21	22½	25½
	C — Inside diameter of port	10	12	13¼	15¼	17	19	23
	D — Diameter of flange	17½	20½	23	25½	28	30½	36
	E — Thickness of flange	1⅞	2	2⅛	2¼	2⅜	2½	2¾
	F — Diameter of raised face	14 1/16	16 7/16	18 15/16	21 1/16	23 5/16	25 9/16	30 5/16
	G — Diameter of bolt circle	15¼	17¾	20¼	22½	24¾	27	32
	Number of bolts	16	16	20	20	24	24	24
	Diameter of bolts	1	1⅛	1⅛	1¼	1¼	1¼	1½
Heights	H — Center to top, Non-Rising	30½	34¼	39	44¾	47¾	52	61
	J — Center to top, O. S. & Y.	50¾	57¾	67	76	84½	91½	109¾
Wheel	K — Diameter	16	18	20	22	24	24	30
Number of turns to open, without gearing		42	50	59	67	76	84	101

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

The flanges have a raised face 1/16-inch high. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

By-passes: Sizes 8-inch and larger should have a by-pass.

The "bolted" by-pass is furnished on valves for water, oil, or gas lines. It enables equalizing the pressure on both sides of the valve before opening.

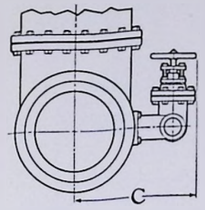
The "built-up" by-pass is furnished only on valves for steam lines, and permits warming up the piping before the main valve is opened.

Gearing: To facilitate operating the valve, sizes 18-inch and larger should be equipped with gears.

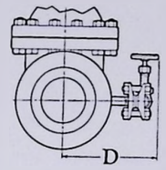
List prices . . . . page 81 *Templates for drilling . . . . page 371* *Special facings . . . . page 353*

175-Pound
Ferrosteel Body Wedge Gate Valves

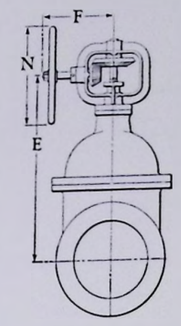
Dimensions, in Inches



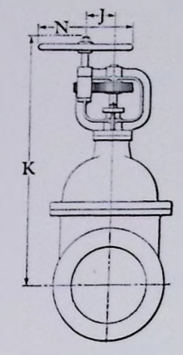
Flanged Valves with Bolted By-Pass



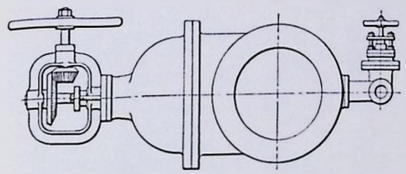
Flanged Valves with Built-Up By-Pass

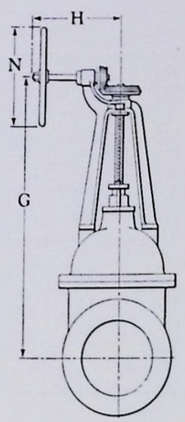


Style U
Bevel Gearing
Non-Rising Stem

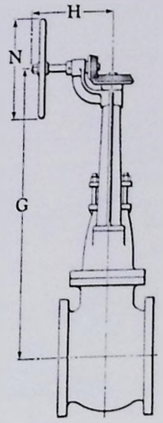


Style S
Spur Gearing
Non-Rising Stem

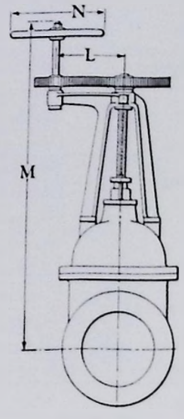

Bevel geared valves with by-pass have the by-pass on the bottom.



Style N
Bevel Gearing
Outside Screw and Yoke



Style O
Bevel Gearing
Outside Screw and Yoke



Style P
Spur Gearing
Outside Screw and Yoke

For dimensions not given, see the preceding page.

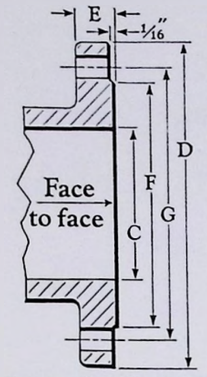
Size			6	8	10	12	14	16	18	20	24
Valves with By-pass	Bolted	Size of by-pass	1¼	1½	1½	2	2	3	3	3	4
		C — Center to outside	14¼	16¼	17½	19¼	20½	23¾	25¼	26½	29¾
	Built-up	Size of by-pass	¾	¾	1	1	1¼	1¼	1½	1½	2
		D — Center to outside	12	13¼	15	16½	18¼	19½	21¼	22¾	26¾
Bevel Geared Valves	Non-Rising	E — Center to center			28¼	31½	35	40¾	43½	47	55½
		F — Center to top			14¼	14½	14¾	19	19½	19½	21
		Number of turns to open			84	100	118	178	202	224	270
	O. S. & Y.	G — Center to center			40¾	45½	52¾	59¼	65½	70¾	85¼
		H — Center to top			14	14¾	15	19	20	20	22½
		Number of turns to open			95	113	132	168	190	210	303
Spur Geared Valves	Non-Rising	J — Center to center			6¼	6¼	6¼	8 11/16	8 11/16	8 11/16	8 11/16
		K — Center to top			39½	43	46½	54¾	58	61¼	70½
		Number of turns to open			89	106	125	181	205	226	273
	O. S. & Y.	L — Center to center			12	12	12	14¾	14¾	14¾	17¼
		M — Center to top			46½	51½	59	68	74½	79¾	93¾
		Number of turns to open			105	125	147	196	222	246	273
Wheel for geared valves		N — Diameter			14	16	18	20	22	22	27

List prices and description . . . . pages 81, 85, and 86

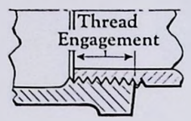
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250-Pound
Ferrosteel Wedge Gate Valves

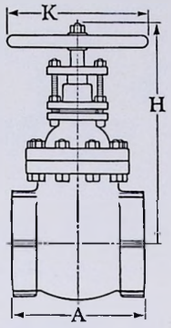
Dimensions, in Inches



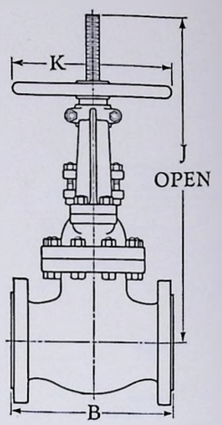
Section through flange



For Normal Thread Engagement, see page 367.



Non-Rising Stem



Outside Screw and Yoke

Dimensions "A", "B", and "C", and the dimensions of the flanges apply to either Non-Rising Stem or Outside Screw and Yoke Valves.

Size		1¼	1½	2	2½	3	3½	4	5	6
Screwed	A — End to end	5½	6¼	7	8	9	10	11	13½	15⅞
Flanged	B — Face to face	6½	7½	8½	9½	11⅛	11⅞	12	15	15⅞
	C — Inside diameter of port	1¼	1½	2	2½	3	3½	4	5	6
	D — Diameter of flange	5¼	6⅛	6½	7½	8¼	9	10	11	12½
	E — Thickness of flange	¾	13/16	⅞	1	1⅛	13/16	1¼	1⅜	1 7/16
	F — Diameter of raised face	3 1/16	3 9/16	4 3/16	4 15/16	5 11/16	6 5/16	6 15/16	8 5/16	9 11/16
	G — Diameter of bolt circle	3⅞	4½	5	5⅞	6⅝	7¼	7⅞	9¼	10⅝
	Number of bolts	4	4	8	8	8	8	8	8	12
	Diameter of bolts	⅝	¾	⅝	¾	¾	¾	¾	¾	¾
Heights	H — Center to top, Non-Rising	9¼	9¾	11	13¼	14¾	15½	17½	20¼	23
	J — Center to top, O. S. & Y.	11½	13¼	14¼	17½	20½	22	24¾	29¾	34¼
Wheel	K — Diameter	7	8	8	9	10	10	12	14	16
Number of turns to open, without gearing		12	11	14	15	14	16	18	23	28

Size		8	10	12	14	16	18	20	24
Screwed	A — End to end	16½	18	19¾					
Flanged	B — Face to face	16½	18	19¾	22½	24	26	28	31
	C — Inside diameter of port	8	10	12	13¼	15¼	17	19	23
	D — Diameter of flange	15	17½	20½	23	25½	28	30½	36
	E — Thickness of flange	1⅝	1⅞	2	2⅛	2¼	2⅜	2½	2¾
	F — Diameter of raised face	11 15/16	14 1/16	16 7/16	18 15/16	21 1/16	23 5/16	25 9/16	30 5/16
	G — Diameter of bolt circle	13	15¼	17¾	20¼	22½	24¾	27	32
	Number of bolts	12	16	16	20	20	24	24	24
	Diameter of bolts	⅞	1	1⅛	1⅛	1¼	1¼	1¼	1½
Heights	H — Center to top, Non-Rising	28¾	33¾	37¼	42¾	45¾	50	53¾	66
	J — Center to top, O. S. & Y.	42¾	52¾	60	69¼	75¼	83	93	112¼
Wheel	K — Diameter	20	22	24	24	27	30	30	36
Number of turns to open, without gearing		34	39	46	52	60	67	74	88

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

The flanges have a raised face 1/16-inch high. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

By-passes: Sizes 6-inch and larger should have a by-pass.

The "bolted" by-pass is furnished on valves for water, oil, or gas lines. It enables equalizing the pressure on both sides of the valve before opening.

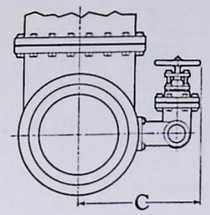
The "built-up" by-pass is furnished only on valves for steam lines, and permits warming up the piping before the main valve is opened.

Gearing: To facilitate operating the valve, sizes 14-inch and larger should be equipped with gears.

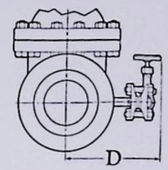
List prices . . . page 83 *Templates for drilling . . . page 371* *Special facings . . . page 353*

250-Pound
Ferrosteel Wedge Gate Valves

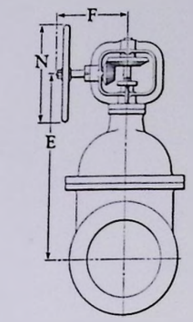
Dimensions, in Inches



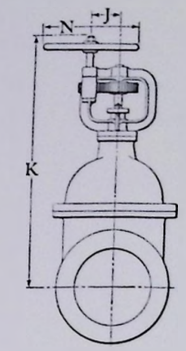
Flanged Valves with Bolted By-Pass



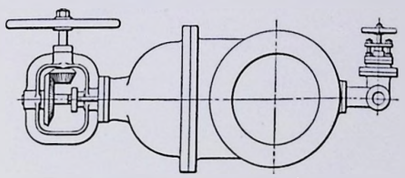
Flanged Valves with Built-Up By-Pass

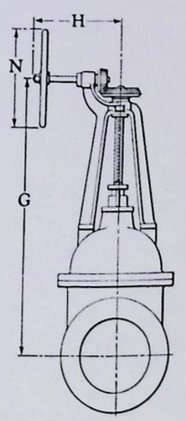


Style U
Bevel Gearing
Non-Rising Stem

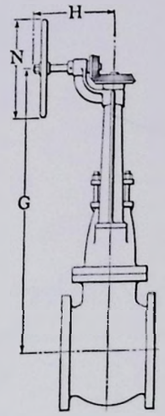


Style S
Spur Gearing
Non-Rising Stem

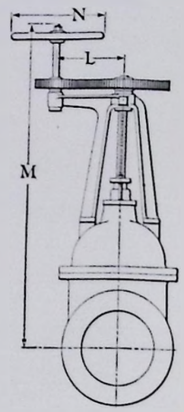

Bevel geared valves with by-pass have the by-pass on the bottom.



Style N
Bevel Gearing
Outside Screw and Yoke



Style O
Bevel Gearing
Outside Screw and Yoke



Style P
Spur Gearing
Outside Screw and Yoke

For dimensions not given, see the preceding page.

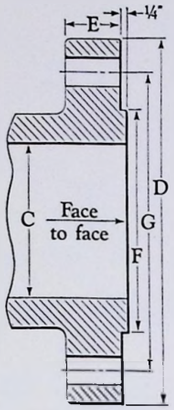
Size			5	6	8	10	12	14	16	18	20	24
Valves with By-pass	Bolted	Size of by-pass	1¼	1¼	1½	1½	2	2	3	3	3	4
		C — Center to outside	13½	14¼	17	18¾	20¾	22¼	25¾	27	28¼	33¾
	Built-up	Size of by-pass	¾	¾	¾	1	1	1¼	1¼	1½	1½	2
		D — Center to outside	11¾	12½	13¼	16½	17¾	20	21½	23	24¼	30
Bevel Geared Valves	Non-Rising	E — Center to center			24	27½	30¾	36½	39¼	43¼	47	59½
		F — Center to top			14¾	18¼	19¾	19¾	20	21	21	29
		No. of turns to open			68	78	92	138	160	178	197	306
	O. S. & Y.	G — Center to center			35	42½	47¼	54¼	59¼	65	71¾	86½
		H — Center to top			15	19	20	20	22¼	23¼	23¼	24
		No. of turns to open			76½	98½	115	130	180	201	222	273
Spur Geared Valves	Non-Rising	J — Center to center			6¼	6¼	6¼	8 11/16	8 11/16	8 11/16	8 11/16	14 5/16
		K — Center to top			35½	40¼	43¾	51	53¾	58¼	62	76½
		No. of turns to open			72	82½	92½	140	162	181	200	308
	O. S. & Y.	L — Center to center			12	14¾	14¾	14¾	17¼	19	19	22½
		M — Center to top			41¼	51¼	56¼	63¼	68¼	74	80¾	98½
		No. of turns to open			85	114	135	152	162	201	222	273
Wheel for geared valves		N — Diameter			18	20	22	22	24	27	27	30

List prices and description . . . . pages 83, 85, and 86

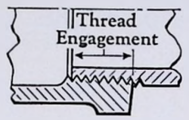
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800-Pound Hydraulic
Ferrosteel Wedge Gate Valves

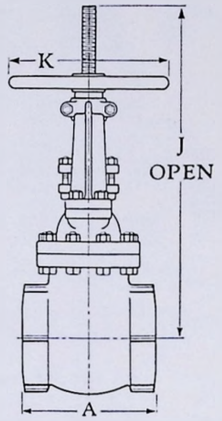
Dimensions, in Inches



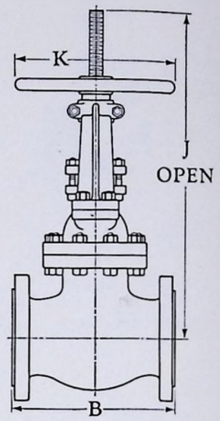
Section through flange



For Normal Thread Engagement, see page 367.



Outside Screw and Yoke Screwed



Outside Screw and Yoke Flanged

Size		2	2½	3	4	5	6	8	10	12
Screwed	A — End to end	11½	13½	14½	16½	18½	20			
Flanged	B — Face to face	11½	13	14	17	20	22	26	31	33
	C — Inside diameter of port	2	2½	3	4	5	6	7⅞	9¾	11¾
	D — Diameter of flange	6½	7½	8¼	10¾	13	14	16½	20	22
	E — Thickness of flange	1¼	1⅜	1½	1⅞	2⅛	2¼	2½	2⅞	3
	F — Diameter of male face	3⅝	4⅛	5	6 3/16	7 5/16	8½	10⅝	12¾	15
	G — Diameter of bolt circle	5	5⅞	6⅝	8½	10½	11½	13¾	17	19¼
	Number of bolts	8	8	8	8	8	12	12	16	20
	Diameter of bolts	⅝	¾	¾	⅞	1	1	1⅛	1¼	1¼
Height	J — Center to top, O. S. & Y.	18½	20¾	23½	28	32¼	36¾	46¼	54¾	63¾
Wheel	K — Diameter	10	12	14	16	18	20	24	27	30
Number of turns to open, without gearing		9½	12	14	18	23	27	30	38½	45

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 800-Pound Hydraulic American Cast Iron Flange Standard (B16b1-1931).

The valves are regularly furnished with a ¼-inch male face (large male) on the end flanges. The male face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

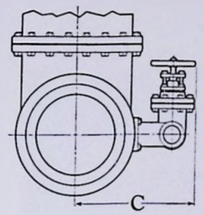
By-passes: Sizes 5-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening.

Gearing: To facilitate operating the valve, sizes 10-inch and larger should be equipped with gears.

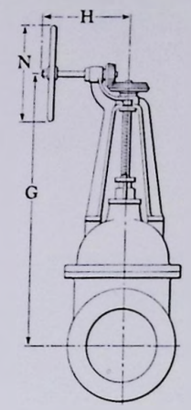
List prices . . . page 84 *Templates for drilling . . . page 371* *Special facings . . . . page 353*

800-Pound Hydraulic
Ferrosteel Wedge Gate Valves

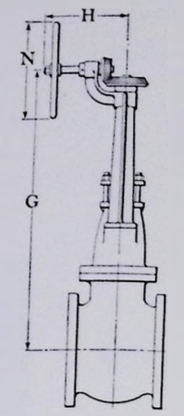
Dimensions, in Inches



Flanged Valves with Bolted By-Pass

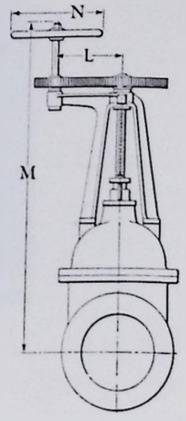


Style N
Bevel Gearing
Outside Screw and Yoke



Style O
Bevel Gearing
Outside Screw and Yoke

Bevel geared valves with by-pass have the by-pass on the bottom



Style P
Spur Gearing
Outside Screw and Yoke

For dimensions not given, see the preceding page.

Size		5	6	8	10	12
Valves with by-pass	Size of by-pass	1¼	1¼	1½	1½	2
	C — Center to outside	14¼	15	18	19¾	21¾
Bevel geared valves	G — Center to center		30¼	37¼	44	50½
	H — Center to top		15	20	22¼	23
	Number of turns to open		63	77½	117	138
Spur geared valves	L — Center to center		12	14¾	17¼	17¼
	M — Center to top		36¼	46¼	52½	59¾
	Number of turns to open		70	94	105	124
Wheel for geared valves	N — Diameter		18	22	24	27

List prices and description . . . . pages 84, 85, and 86

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Ample stocks at all times



Iron Body Gate Valves in stock at the Crane Chicago Works

Liberal stocks of valves at the Crane Factories and Branch Houses assure the user prompt delivery

Iron Body Double Disc Gate Valves

A.W.W.A. Valves....page 102
Low Pressure Valves....pages 104 to 105
Light Standard Valves....pages 106 to 107
Standard Valves....pages 108 to 109
400-Pound W.O.G. Valves....pages 110 to 111
500-Pound W.O.G. Valves....pages 112 to 113
800-Pound W.O.G. Valves....pages 114 to 115
1200-Pound W.O.G. Valves....page 116
By-passes and Clean-outs....page 117
Gearing, Grease Cases, and Gear Covers....page 118
Dimensions....pages 126 to 137

The Crane line of Iron Body Double Disc Gate Valves includes valves for water, oil, or gas pressures up to 1200 pounds, also valves for low pressure steam. It includes brass trimmed and all-iron valves in all pressure classes, and Standard valves with "Exelloy" seats.

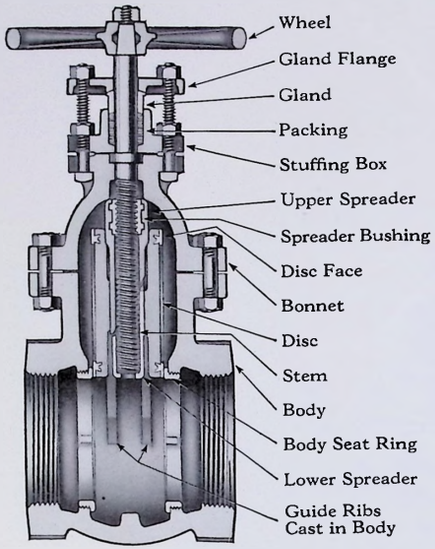
The uniformly superior quality that distinguishes all Crane products has been maintained in this line. Excellence of design, high grade materials, and workmanship of the highest order assure dependability in service.

Sluice Gates

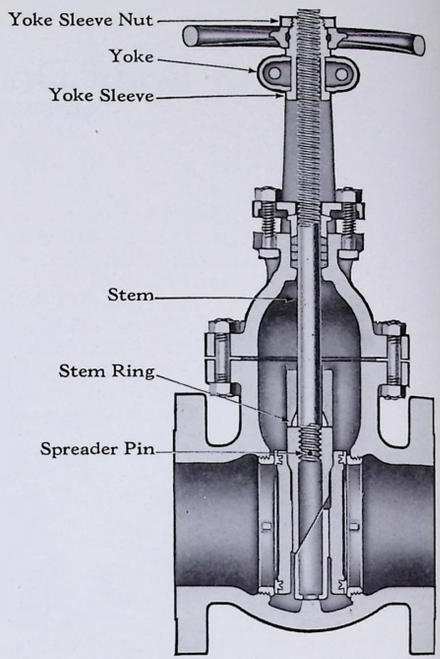
Crane Sluice Gates for water and sewage installations are illustrated and described on pages 119 to 125.

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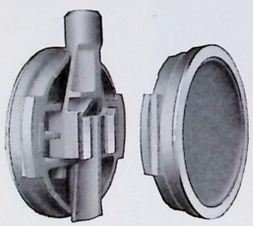
Iron Body Double Disc Gate Valves



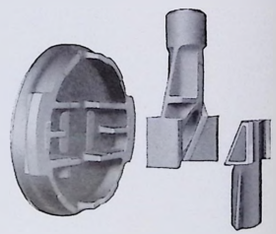
Non-Rising Stem Valve Open



Outside Screw and Yoke Valve Closed



Discs with Spreaders



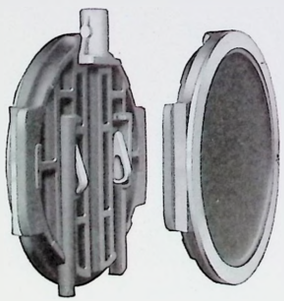
Discs with Spreaders

The Discs

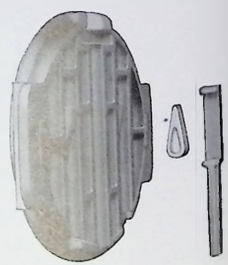
Depending upon the size of the valve and the pressure class, two types of disc construction are used in Crane Iron Body Double Disc Gate Valves.

Discs with spreaders: The upper spreader, engaging the valve stem, raises and lowers the discs. When the valve is being closed, the lower spreader strikes a stop in the bottom of the body; further rotation of the wheel brings the wedging surfaces of the spreaders into contact, and the spreaders force the discs outward against the seats.

Discs with wedges: A disc nut, engaging the valve stem, raises and lowers the discs. When the valve is being closed, two hooks, carrying Manganese Bronze wedges, strike a stop in the bottom of the body; further rotation of the wheel forces the wedges between the discs, and the wedges force the discs outward against the seats.



Discs with Wedges



Discs with Wedges

General Description

The general characteristics of Crane Iron Body and Ferrosteel Double Disc Gate Valves are illustrated on the preceding page. Except for their proportions and for the materials used, the various lines are very similar in construction.

Double discs: The seats in the valves are parallel. The disc mechanism, illustrated and described on the preceding page, assures positive, tight seating and easy opening.

Except for certain small size valves having all-brass discs, brass trimmed valves have cast iron or Ferrosteel discs with brass or Crane Hard Metal seating faces. The faces are securely rolled into machined dovetails in the discs, assuring tightness under pressure.

In all-iron valves, the seating faces are cast integral with the discs.

In non-rising stem brass trimmed valves, the portion of the discs that engages the stem threads is brass or brass-bushed.

In brass trimmed valves with spreader type discs, the lower spreader is brass in the smaller sizes, and cast iron with brass wedging faces in the larger sizes.

Body and bonnet: All lines of valves have oval-shaped bodies and bonnets. Metal sections are more than ample, and the metal is distributed to assure maximum strength.

Body seat rings: In brass trimmed valves, the body seat rings are brass or Crane Hard Metal.

In Low Pressure valves 14-inch and larger, the body seat rings are rolled into machined dovetails in the body. In Low Pressure valves 12-inch and smaller, and in valves for higher pressures, the body seat rings are screwed into the body.

All-iron valves are regularly furnished with the seats integral with the body. However, they can be furnished with screwed-in body seat rings when so ordered; prices on application.

Stem: Except for 1200-Pound W.O.G. Valves, the stem in non-rising stem brass trimmed valves is made of Crane Cast Manganese Bronze or rolled brass, depending upon size and pressure class.

Outside screw and yoke brass trimmed valves are made with a rolled brass stem.

All-iron valves have a steel stem, nickel-plated.

Gland and stuffing box: Brass trimmed valves have a two-piece gland consisting of a brass gland and a malleable iron follower.

Stuffing boxes are packed with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

In non-rising stem valves, jamming the disc in the wide open position forces the stem collar against the machined top of the bonnet, making a pressure-tight joint.

In outside screw and yoke valves, when the valve is jammed wide open, the tapered stem ring engages a tapered machined surface in the under side of the top of the bonnet, forming a tight joint.

Yoke: In the smaller size outside screw and yoke valves, the yoke is cast integral with the bonnet. In the larger sizes, the yoke is made in two halves, bolted together at the top, and is bolted to the bonnet.

Yoke sleeve: The yoke sleeve is made of Crane Cast Manganese Bronze.

Wheel: Wheels having a diameter of 24 inches or less are made of malleable iron to assure maximum strength. They have an oval-shaped rim, affording an easy grip.

Wheels of larger than 24 inches diameter are cast iron.

In non-rising stem valves, the wheel has a tapered square hole fitting the tapered square end of the stem, and is held in place by a steel nut.

In outside screw and yoke valves, the hole in the wheel is hexagonal and tapered, and fits the tapered hexagonal top of the yoke sleeve. The wheel is held in place by a malleable iron nut.

In both types of valves, the wheel is attached securely, yet can be removed easily.

Flange dimensions and facing: The dimensions and drilling of the end flanges on flanged valves conform to the American Cast Iron Flange Standard for their respective working pressures.

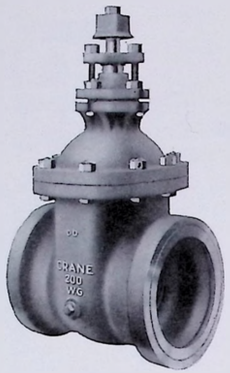
On Low Pressure, Light Standard, and Standard valves, the flanges are plain faced, with a smooth finish.

400-Pound W.O.G. and 500-Pound W.O.G. flanged valves are regularly furnished with a raised face $\frac{1}{16}$-inch high on the end flanges. Valves with male, female, tongue, or groove faces can be made to order at an additional price.

800-Pound W.O.G. flanged valves are regularly furnished with a $\frac{1}{4}$-inch male face (large male) on the end flanges. Valves with female, tongue, or groove faces can be made to order, at an additional price.

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A.W.W.A.
Water Works Iron Body Gate Valves
Brass Trimmed



No. 480½
Hub Ends

Size of valve	Working pressures	Hydrostatic test pressures	
	Cold water non-shock	Shell test	Seat test
2 to 12-inch	200 pounds	300 pounds	225 pounds
14 to 48-inch	150 pounds	300 pounds	175 pounds

The Crane line of Iron Body Double Disc Gate Valves includes a complete line of valves complying with the specifications of the American Water Works Association, adopted June 24, 1913, and revised June 9, 1916.

Although these specifications include only non-rising stem hub end valves similar to the No. 480½ valve illustrated above, Crane Co. can supply non-rising stem or outside screw and yoke valves, with screwed ends, flanged ends, hub ends, spigot ends, ends for Universal pipe, ends for Transite pipe, ends for wood pipe, or with a combination of these endings. These valves are of the same design and general proportions as the No. 480½.

Screwed valves can be supplied in sizes 2 to 12-inch. Valves with other types of endings can be supplied regularly in sizes 2 to 48-inch, and larger sizes can be made to order.

Double discs: These valves have parallel seats and double discs. The double disc mechanism is illustrated on page 100.

In non-rising stem valves, the portion of the discs that engages the stem threads is brass or brass-bushed.

Body and bonnet: The body and bonnet are made of cast iron. They are oval-shaped; metal sections are more than ample, and the metal is distributed to assure maximum strength.

Seats and discs: The body seat rings are brass, screwed into the body.

The discs, in sizes 2 to 3-inch, are brass; in the larger sizes, they are cast iron with a brass face.

Disc rollers: When valves are ordered for use in a horizontal pipe with the valve stem horizontal, sizes 14-inch and larger are equipped with a brass track in the lower side of the body, and with brass rollers and brass scrapers in the lower side of the discs.

Stem: In non-rising stem valves, the stem is made of Crane Cast Manganese Bronze, an alloy of unusually high tensile and torsional strength, possessing excellent wearing qualities.

Outside screw and yoke valves have a rolled brass stem.

Gland and stuffing box: These valves have a two-piece gland consisting of a brass gland with a ball-shaped top and a malleable iron gland flange.

The stuffing box is filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). The flanges are plain faced, with a smooth finish.

Hub dimensions: The hubs on hub end valves are suitable for Class "D" cast iron pipe.

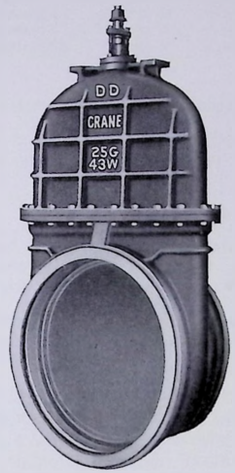
By-passes: Sizes 16-inch and larger can be equipped with a by-pass when so ordered.

Gearing: Sizes 24-inch and larger are regularly furnished with bevel or spur gearing. Sizes 12 to 20-inch can be equipped with gears when so ordered.

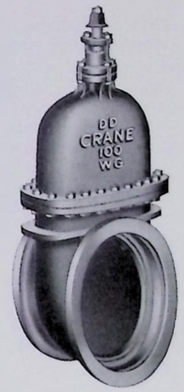
Gearing is illustrated on page 118; prices on application.

Prices and dimensions on application

Low Pressure and Light Standard
Iron Body Double Disc Gate Valves
For Water Installations



No. 798
Low Pressure
Non-Rising Stem
Hub Ends



No. 777
Light Standard
Non-Rising Stem
Hub Ends

Crane Low Pressure and Light Standard Iron Body Double Disc Gate Valves, shown on pages 104 to 107, are admirably suited for water works or sewage systems where the operating pressures do not require the use of valves as heavy as the A.W.W.A. valves shown on the preceding page.

In addition to the flanged and hub end valves listed, these valves can be furnished in non-rising stem or outside screw and yoke patterns, with hub ends, spigot ends, ends for wood pipe, ends for Universal pipe, ends for Transite pipe, or with a combination of these various ends.

They can be furnished with by-pass, and with gearing, hydraulic cylinder, electric motor drive, or air motor drive.

Prices of special valves will be quoted on application.

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Low Pressure
Iron Body Double Disc Gate Valves
Brass Trimmed or All-Iron

Size of valve	Working pressures					Hydrostatic test pressures	
	Flanged valves			Hub end valves		Flanged or hub end valves	
	Saturated steam	Cold gas	Cold water non-shock	Cold gas	Cold water non-shock	Shell test	Seat test
2 to 24-inch	25 pounds	25 pounds	50 pounds	25 pounds	50 pounds	75 pounds	60 pounds
30 and 36-inch	25 pounds	25 pounds	43 pounds	25 pounds	43 pounds	75 pounds	55 pounds
42 and 48-inch	25 pounds	25 pounds	35 pounds	25 pounds	35 pounds	50 pounds	45 pounds

Crane Low Pressure Iron Body Double Disc Gate Valves, illustrated on the opposite page, are admirably suited for a great variety of service conditions that do not require the use of "Standard" weight valves. They will give excellent service in low pressure steam, water, or gas lines, in exhaust or condensor piping, in water works, irrigation, filtration, or sewage disposal systems, in pumping engine suction lines, or in by-product coke installations.

They are short and compact, occupying a minimum of space in the pipe line.

Brass trimmed valves: Brass trimmed valves are recommended for steam or water lines.

The body seat rings are brass. In sizes 2 to 12-inch they are screwed into the body; in the larger sizes, they are rolled into the body.

The discs, in sizes 2 to 3-inch are brass; in the larger sizes, they are cast iron with a brass face.

Brass trimmed valves have a brass stem. In non-rising stem valves, the portion of the discs that engages the stem threads is brass or brass-bushed.

All-iron valves: All-iron valves are recommended for gas or for fluids that corrode brass.

The seats are cast integral with the body and discs. Valves with screwed-in body seat rings can be made to order; prices on application.

The stem is steel, nickel-plated.

Stuffing box: The stuffing boxes are filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Flange dimensions and facing: The dimensions and drilling of the end flanges on valves 4-inch and larger conform to the 25-Pound American Tentative Cast Iron Flange Standard (B16b2-1931). In sizes 2 to 3-inch, the diameter and drilling of the end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928).

When so ordered, valves 5-inch and larger can be drilled to the 125-Pound American Standard. When the valves are so drilled, full face gaskets should be used to avoid distorting the end flanges.

The flanges are plain faced, with a smooth finish.

Hub end valves: The hubs on hub end valves are suitable for Class "B" cast iron pipe.

In place of a wheel, hub end valves are equipped with a square operating nut.

By-passes: Sizes 24-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening. See page 117.

Gearing: To facilitate operating the valve, sizes 42-inch and larger should be equipped with gears. See page 118 for prices.

Motor or cylinder operation: Valves installed in inaccessible locations or used for emergency purposes should preferably be equipped with some easy means of operation. An electric or air motor drive, or an operating cylinder, fulfills this need admirably. For details, see pages 163 to 165.

Vacuum or air service: Valves for vacuum exhaust lines or for air service should be specially air-tested to assure absolute tightness; an extra charge is made. Orders must specify air-tested, otherwise water-tested valves will be furnished.

Clean-outs: When so ordered, Low Pressure Valves can be fitted with two side clean-outs, as illustrated and listed on the opposite page.

These clean-outs are useful on valves installed in gas lines. They permit passing a rod through the valve between the seats to dislodge coke or other sediment.

Stem protectors: Outside screw and yoke valves can be equipped with a shield around the stem to protect the stem threads from accumulations of dust. Prices on application.

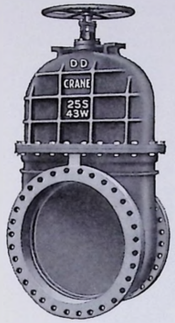
Disc rollers: When Low Pressure brass trimmed valves are ordered for use in a horizontal pipe with the valve stem horizontal, sizes 14-inch and larger will be equipped with a brass track in the lower side of the body, and with brass rollers and brass scrapers in the lower side of the discs.

Bottom outlet valves: Bottom outlet gate valves for turbine exhaust relief and bleeder connections are shown on page 138; prices on application.

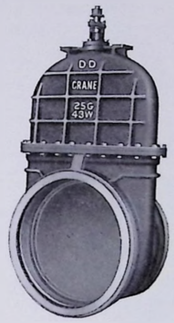
Additional description . . . pages 100 to 103

Low Pressure
Iron Body Double Disc Gate Valves
Brass Trimmed or All-Iron

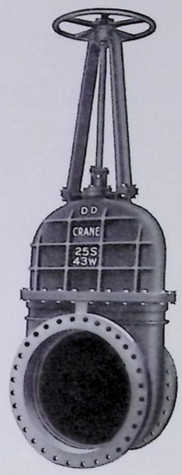
For working pressures, see the preceding page.



Non-Rising Stem
Flanged
No. 791
Brass Trimmed
No. 891
All-Iron

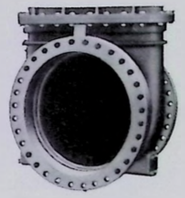


Non-Rising Stem
Hub Ends
No. 798
Brass Trimmed
No. 898
All-Iron



Outside Screw and Yoke
Flanged
No. 793½
Brass Trimmed
No. 893
All-Iron

Prices of flanged valves include facing and drilling to the 125-Pound American Cast Iron Flange Standard on the 2, 2½, and 3-inch sizes, and to the 25-Pound American Tentative Cast Iron Flange Standard on sizes 4-inch and larger. No deduction is made if flanged valves are ordered "faced only".



Double Clean-Out

List Prices

Size	Non-Rising Stem				Outside Screw and Yoke		Extra for Two Clean-Outs
	Flanged, F. & D.		Hub Ends		Flanged, F. & D.		
Inches	No. 791 Brass Trimmed Each	No. 891 All-Iron Each	No. 798 Brass Trimmed Each	No. 898 All-Iron Each	No. 793½ Brass Trimmed Each	No. 893 All-Iron Each	Per Valve
2	20.00	20.00	19.00	19.00	26.00	26.00	
2½	25.00	25.00			32.50	32.50	
3	30.00	30.00	26.00	26.00	37.50	37.50	
4	38.00	38.00	33.00	33.00	47.50	47.50	
5	51.00	51.00	46.00	46.00	64.00	64.00	
6	60.00	60.00	55.00	55.00	75.00	75.00	
8	90.00	90.00	85.00	85.00	112.00	112.00	
10	128.00	128.00	118.00	118.00	160.00	160.00	
12	170.00	170.00	155.00	155.00	212.00	212.00	
14	238.00	238.00	223.00	223.00	286.00	286.00	51.00
16	332.00	332.00	307.00	307.00	382.00	382.00	51.00
18	442.00	442.00	417.00	417.00	510.00	510.00	51.00
20	544.00	544.00	514.00	514.00	615.00	615.00	57.00
*24	850.00	850.00	800.00	800.00	950.00	950.00	57.00
*30	1530.00	1530.00	1450.00	1450.00	1725.00	1725.00	127.00
*36	2380.00	2380.00	2270.00	2270.00	2650.00	2650.00	127.00
*42	3400.00	3400.00	3260.00	3260.00	3800.00	3800.00	127.00
*48	4750.00	4750.00	4575.00	4575.00	5300.00	5300.00	150.00

Larger sizes, prices on application.
*Sizes 24-inch and larger should have a by-pass. See page 117. Sizes 42-inch and larger should be geared. See page 118.

Description . . . . page 104 *Dimensions . . . . pages 126 and 127* *Templates for drilling . . . page 370*

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Light Standard
Iron Body Double Disc Gate Valves
Brass Trimmed or All-Iron

Size of valve	Working pressures		Hydrostatic test pressures	
	Flanged valves	Hub end valves	Flanged or hub end valves	
	Cold water, oil, or gas non-shock	Cold water or gas non-shock	Shell test	Seat test
2 to 24-inch	100 pounds	100 pounds	200 pounds	125 pounds
30 and 36-inch	80 pounds	80 pounds	150 pounds	100 pounds
42 and 48-inch	60 pounds	60 pounds	120 pounds	75 pounds

Crane Light Standard Iron Body Double Disc Gate Valves, illustrated on the opposite page, are recommended for service conditions that do not require the use of "Standard" weight valves but that are too severe for Low Pressure valves. They are particularly suitable for moderate water, oil, or gas pressures.

Brass trimmed valves: Brass trimmed valves are recommended for water or oil lines.

The body seat rings are brass, screwed into the body.

The discs, in sizes 2 to 3-inch are brass; in the larger sizes, they are cast iron with a brass face.

Brass trimmed valves have a brass stem. In non-rising stem valves, the portion of the discs that engages the stem threads is brass or brass-bushed, and the bonnet and stuffing box are brass-bushed where in contact with the stem.

All-iron valves: All-iron valves are recommended for gas or for fluids that corrode brass.

The seats are cast integral with the body and discs. Valves with screwed-in body seat rings can be made to order; prices on application.

The stem is steel, nickel-plated.

Stuffing box: The stuffing boxes are filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). The flanges are plain faced, with a smooth finish.

Hub end valves: The hubs on hub end valves are suitable for Class "C" cast iron pipe.

In place of a wheel, hub end valves are equipped with a square operating nut.

By-passes: Sizes 18-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening. See page 117.

Gearing: To facilitate operating the valve, sizes 30-inch and larger should be equipped with gears. See page 118 for prices.

Motor or cylinder operation: Valves installed in inaccessible locations or used for emergency purposes should preferably be equipped with some easy means of operation. An electric or air motor drive, or an operating cylinder, fulfills this need admirably. For details, see pages 163 to 165.

Air Service: Valves for air service should be specially air-tested to assure absolute tightness; an extra charge is made. Orders must specify air-tested, otherwise water-tested valves will be furnished.

Clean-outs: When so ordered, Light Standard Valves can be fitted with two side clean-outs, as illustrated and listed on the opposite page.

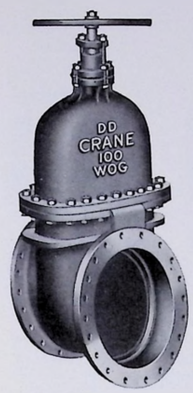
These clean-outs are useful on valves installed in gas lines. They permit passing a rod through the valve between the seats to dislodge coke or other sediment.

Disc rollers: When Light Standard brass trimmed valves are ordered for use in a horizontal pipe with the valve stem horizontal, sizes 14-inch and larger will be equipped with a brass track in the lower side of the body, and with brass rollers and brass scrapers in the lower side of the discs.

Additional description . . . pages 100 to 103

Light Standard
Iron Body Double Disc Gate Valves
Brass Trimmed or All-Iron

For working pressures, see the preceding page.



Non-Rising Stem
Flanged
No. 776
Brass Trimmed
No. 779
All-Iron

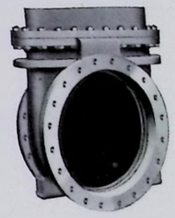


Non-Rising Stem
Hub Ends
No. 777
Brass Trimmed
No. 780
All-Iron



Outside Screw and Yoke
Flanged
No. 778
Brass Trimmed
No. 781
All-Iron

Prices of flanged valves include facing and drilling to the 125-Pound American Cast Iron Flange Standard. No deduction is made if flanged valves are ordered "faced only".



Double Clean-Out

List Prices

Size	Non-Rising Stem				Outside Screw and Yoke		Extra for Two Clean-Outs
	Flanged, F. & D.		Hub Ends		Flanged, F. & D.		
Inches	No. 776 Brass Trimmed Each	No. 779 All-Iron Each	No. 777 Brass Trimmed Each	No. 780 All-Iron Each	No. 778 Brass Trimmed Each	No. 781 All-Iron Each	Per Valve
2	20.00	20.00	19.00	19.00	26.00	26.00	
2½	25.00	25.00			32.50	32.50	
3	30.00	30.00	26.00	26.00	37.50	37.50	
4	38.00	38.00	33.00	33.00	47.50	47.50	
5	51.00	51.00	46.00	46.00	64.00	64.00	
6	60.00	60.00	55.00	55.00	75.00	75.00	
8	90.00	90.00	85.00	85.00	112.00	112.00	
10	128.00	128.00	118.00	118.00	160.00	160.00	
12	170.00	170.00	155.00	155.00	212.00	212.00	
14	238.00	238.00	223.00	223.00	286.00	286.00	51.00
16	332.00	332.00	307.00	307.00	382.00	382.00	51.00
*18	442.00	442.00	417.00	417.00	510.00	510.00	51.00
*20	544.00	544.00	514.00	514.00	615.00	615.00	57.00
*24	850.00	850.00	800.00	800.00	950.00	950.00	57.00
*30	1530.00	1530.00	1450.00	1450.00	1725.00	1725.00	127.00
*36	2380.00	2380.00	2270.00	2270.00	2650.00	2650.00	127.00
*42	3400.00	3400.00	3260.00	3260.00	3800.00	3800.00	127.00
*48	4750.00	4750.00	4575.00	4575.00	5300.00	5300.00	150.00

Larger sizes, prices on application.
*Sizes 18-inch and larger should have a by-pass. See page 117. Sizes 30-inch and larger should be geared. See page 118.

Description . . . page 106 *Dimensions . . . pages 128 and 129* *Templates for drilling . . . page 37*

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Standard

Iron Body Double Disc Gate Valves

Brass Trimmed, All-Iron, or with Exelloy Seats

WORKING PRESSURES
2 to 12-inch — **200** pounds cold water, oil, or gas, non-shock
14 to 24-inch — **150** pounds cold water, oil, or gas, non-shock

HYDROSTATIC TEST PRESSURES
2 to 12-inch — **300**-pound shell test
— **225**-pound seat test
14 to 24-inch — **250**-pound shell test
— **175**-pound seat test

Air tested

Crane Standard Iron Body Double Disc Gate Valves, illustrated on the opposite page, are especially recommended for use in the oil and gas industry, and for water lines requiring rugged, substantially constructed valves. In oil or gas fields, in oil refineries, and in stations for storing and dispensing gasoline or oil, they are exceptionally well suited for general utility service in oil, gas, or water lines.

Air test: In addition to the hydrostatic tests specified above, these valves are given an air test in the shell and at the seats.

Brass trimmed valves: Brass trimmed valves are recommended for water, oil, or gas lines.

The body seat rings are brass, screwed into the body.

The discs, in sizes 2 to 3½-inch are brass; in the larger sizes, they are cast iron with a brass face.

Brass trimmed valves have a brass stem. In non-rising stem valves, the portion of the discs that engages the stem threads is brass or brass-bushed.

All-iron valves: All-iron valves are recommended for oil or gas, or for fluids that corrode brass.

The seats are cast integral with the body and discs. Valves with screwed-in body seat rings can be made to order; prices on application.

The stem is steel, nickel-plated.

Valves with Exelloy seats: Crane Exelloy is a specially heat-treated chromium iron having a chromium content of about 12 per cent, and a carbon content of about 0.10 per cent.

Valves with Exelloy seats are recommended for refined oils or for oils containing small quantities of organic sulphur compounds. They are not recommended for crude oils containing brine or for partially refined oils containing sulphurous or hydrochloric acid.

The body seat rings are made of Exelloy, and are screwed into the body. The discs are Exelloy or faced with Exelloy.

The stem is brass.

Stuffing box: The stuffing boxes are filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). The flanges are plain faced, with a smooth finish.

Hub end valves: Hub end valves conforming to the American Water Works Association specifications can be made to order; prices on application.

See page 102 for description.

By-passes: Sizes 14-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening. See page 117.

Gearing: To facilitate operating the valve, sizes 24-inch and larger should be equipped with gears. See page 118 for prices.

Motor or cylinder operation: Valves installed in inaccessible locations or used for emergency purposes should preferably be equipped with some easy means of operation. An electric or air motor drive, or an operating cylinder, fulfills this need admirably. For details, see pages 163 to 165.

Clean-outs: For use on lines carrying an unusual amount of sediment, tarry fluids, etc., flanged valves can be equipped with a clean-out on the side of the body to facilitate cleaning. See page 117.

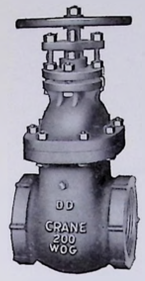
Additional description . . . pages 100 and 101

Standard

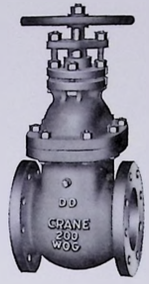
Iron Body Double Disc Gate Valves

Brass Trimmed, All-Iron, or with Exelloy Seats

For working pressures, see the preceding page.

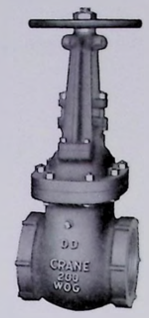


Non-Rising Stem
Screwed
No. 480
Brass Trimmed
No. 1080
All-Iron
No. 1488
Exelloy Seats

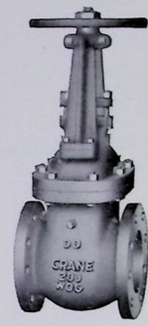


Non-Rising Stem
Flanged
No. 481
Brass Trimmed
No. 1081
All-Iron
No. 1489
Exelloy Seats

Prices of flanged valves include facing and drilling to the 125-Pound American Cast Iron Flange Standard. No deduction is made if flanged valves are ordered "faced only".



Outside Screw
and Yoke
Screwed
No. 482
Brass Trimmed
No. 1082
All-Iron
No. 1490
Exelloy Seats



Outside Screw
and Yoke
Flanged
No. 483
Brass Trimmed
No. 1083
All-Iron
No. 1491
Exelloy Seats

List Prices, Brass Trimmed or All-Iron

Size	Non-Rising Stem				Outside Screw and Yoke			
	Screwed		Flanged, F. & D.		Screwed		Flanged, F. & D.	
Inches	No. 480 Brass Trimmed Each	No. 1080 All-Iron Each	No. 481 Brass Trimmed Each	No. 1081 All-Iron Each	No. 482 Brass Trimmed Each	No. 1082 All-Iron Each	No. 483 Brass Trimmed Each	No. 1083 All-Iron Each
2	19.00	19.00	20.00	20.00	25.00	25.00	26.00	26.00
2½	24.00	24.00	25.00	25.00	31.50	31.50	32.50	32.50
3	28.50	28.50	30.00	30.00	36.00	36.00	37.50	37.50
3½	32.50	32.50	34.00	34.00	41.00	41.00	42.50	42.50
4	36.00	36.00	38.00	38.00	45.50	45.50	47.50	47.50
5	48.50	48.50	51.00	51.00	61.50	61.50	64.00	64.00
6	57.00	57.00	60.00	60.00	72.00	72.00	75.00	75.00
8	90.00	90.00	90.00	90.00	112.00	112.00	112.00	112.00
10	128.00	128.00	128.00	128.00	160.00	160.00	160.00	160.00
12	170.00	170.00	170.00	170.00	212.00	212.00	212.00	212.00
*14			238.00	238.00			286.00	286.00
*16			332.00	332.00			382.00	382.00
*18			442.00	442.00			510.00	510.00
*20			544.00	544.00			615.00	615.00
*24			850.00	850.00			950.00	950.00

Larger sizes, prices on application.
*Sizes 14-inch and larger should have a by-pass. See page 117. Sizes 24-inch and larger should be geared. See page 118.

List Prices, Each, with Exelloy Seats

Size	Inches	2	2½	3	4	5	6	8	10	12
Non-Rising Stem	No. 1488, Screwed	30.00	38.00	44.00	60.00					
	No. 1489, Flanged, F. & D.	33.00	41.00	48.00	65.00	89.00	107.00	162.00	245.00	337.00
Outside Screw and Yoke	No. 1490, Screwed	38.00	47.00	53.00	72.00					
	No. 1491, Flanged, F. & D.	41.00	50.00	57.00	77.00	104.00	122.00	187.00	283.00	390.00

Description . . . . page 108 *Dimensions . . . . pages 130 and 131* *Templates for drilling . . . . page 370*

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400-Pound W.O.G.
Ferrosteel Double Disc Gate Valves
Brass Trimmed or All-Iron

WORKING PRESSURE
400 pounds cold water, oil, or gas, non-shock

HYDROSTATIC TEST PRESSURES
600-pound shell test
450-pound seat test

Air tested

Crane 400-Pound W.O.G. Ferrosteel Double Disc Gate Valves, illustrated on the opposite page, are of the pressure class formerly known commercially as "700-Pound Test" valves. They are especially recommended for use in the oil and gas industry. In oil or gas fields, in oil refineries, in pump houses, or in pipe lines, they are well suited for service where the pressures and operating conditions require the use of somewhat heavier iron body valves than "Standard" weight.

Air test: In addition to the hydrostatic tests specified above, these valves are given an air test in the shell and at the seats.

Ferrosteel body and bonnet: The body and bonnet are made of Crane Ferrosteel, a high grade iron having a tensile strength approximately 35 per cent greater than that of cast iron. This assures added strength and rigidity in these parts.

Brass trimmed valves: Brass trimmed valves are recommended for water, oil, or gas lines.

The body seat rings are brass, screwed into the body.

The discs, in sizes 2 to 3-inch are brass; in the larger sizes, they are cast iron with a brass face.

Brass trimmed valves have a brass stem. In non-rising stem valves, the portion of the discs that engages the stem threads is brass or brass-bushed.

All-iron valves: All-iron valves are recommended for oil or gas, or for fluids that corrode brass.

The seats are cast integral with the body and discs. Valves with screwed-in body seat rings can be made to order; prices on application.

The stem is steel, nickel-plated.

Stuffing box: The stuffing boxes are filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

400-Pound W.O.G. Valves are regularly furnished with a 1/16-inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with male, female, tongue, or groove faces can be furnished to order at an additional price. See page 353 for prices and dimensions.

By-passes: Sizes 8-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening. See page 117.

Gearing: When so ordered, sizes 10 and 12-inch can be equipped with gears, to facilitate operation. The various styles of gearing are illustrated and listed on page 118.

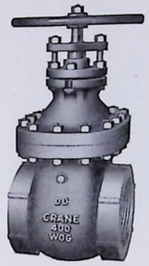
Motor or cylinder operation: Motor or cylinder operation is desirable for valves that are used for emergency purposes, or for valves that must be installed in inaccessible locations. Valves can be supplied with either electric motor or air motor, described on pages 164 and 165.

Cylinder operation is illustrated and described on page 163.

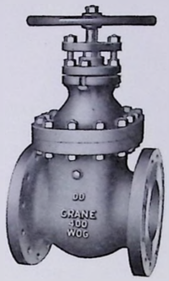
Additional description . . . pages 100 and 101

400-Pound W.O.G.
Ferrosteel Double Disc Gate Valves
Brass Trimmed or All-Iron

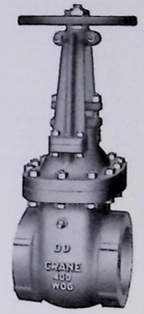
For working pressures, see the preceding page.



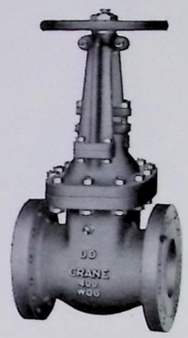
Non-Rising Stem
Screwed
No. 754
Brass Trimmed
No. 754½
All-Iron



Non-Rising Stem
Flanged
No. 755
Brass Trimmed
No. 755½
All-Iron



Outside Screw and Yoke
Screwed
No. 756
Brass Trimmed
No. 756½
All-Iron



Outside Screw and Yoke
Flanged
No. 757
Brass Trimmed
No. 757½
All-Iron

Prices of flanged valves include facing and drilling to the 250-Pound American Cast Iron Flange Standard. No deduction is made if flanged valves are ordered "faced only"

List Prices

Size	Non-Rising Stem				Outside Screw and Yoke			
	Screwed		Flanged, F. & D.		Screwed		Flanged, F. & D.	
Inches	No. 754 Brass Trimmed Each	No. 754½ All-Iron Each	No. 755 Brass Trimmed Each	No. 755½ All-Iron Each	No. 756 Brass Trimmed Each	No. 756½ All-Iron Each	No. 757 Brass Trimmed Each	No. 757½ All-Iron Each
2	33.00	33.00	34.00	34.00	43.00	43.00	44.00	44.00
2½	42.50	42.50	43.50	43.50	55.50	55.50	56.50	56.50
3	49.50	49.50	51.00	51.00	62.50	62.50	64.00	64.00
4	63.00	63.00	65.00	65.00	79.00	79.00	81.00	81.00
5	84.50	84.50	87.00	87.00	106.50	106.50	109.00	109.00
6	99.00	99.00	102.00	102.00	124.00	124.00	127.00	127.00
*8	153.00	153.00	153.00	153.00	191.00	191.00	191.00	191.00
*10	218.00	218.00	218.00	218.00	272.00	272.00	272.00	272.00
*12	290.00	290.00	290.00	290.00	362.00	362.00	362.00	362.00

Larger sizes, prices on application.
*Sizes 8-inch and larger should have a by-pass. See page 117.

Description . . . page 110 *Dimensions . . . pages 132 and 133* *Templates for drilling . . . page 371*

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500-Pound W.O.G
Ferrosteel Double Disc Gate Valves
Brass Trimmed or All-Iron

WORKING PRESSURES
2 to 12-inch — **500** pounds cold water, oil, or gas, non-shock
14 to 24-inch — **400** pounds cold water, oil, or gas, non-shock

HYDROSTATIC TEST PRESSURES
2 to 12-inch — **800**-pound shell test
— **550**-pound seat test
14 to 24-inch — **700**-pound shell test
— **450**-pound seat test

Air tested

Crane 500-Pound W.O.G. Ferrosteel Double Disc Gate Valves, illustrated on the opposite page, are of the pressure class formerly known commercially as "1000-Pound Test" valves. They are especially suitable for use in oil or gas fields, in oil refineries, in pump houses, in pipe lines, in high pressure water lines, or for similar service requiring heavy, massive iron body valves.

Working pressures: In sizes larger than 12-inch, the use of iron body or Ferrosteel valves for pressures as high as 500 pounds is apt to be hazardous, regardless of how heavily the valves may be constructed. In recent years, there has been a rapidly growing trend toward the use of Cast Steel for such service.

For this reason, the valves illustrated on the opposite page, in sizes 14 to 24-inch, are recommended for 400 pounds cold water, oil, or gas working pressure, non-shock. For 500 pounds cold working pressure, the use of Crane 300-Pound Cast Steel Gate Valves is recommended.

Air test: In addition to the hydrostatic tests specified above, these valves are given an air test in the shell and at the seats.

Rugged construction: The valves are unusually rugged. Metal sections in the body and bonnet are more than ample, and the metal is distributed to assure maximum strength and to avoid distortion. All parts have a high factor of safety.

Ferrosteel body and bonnet: The body and bonnet are made of Crane Ferrosteel, a high grade iron having a tensile strength approximately 35 per cent greater than that of cast iron. This assures added strength and rigidity in these parts.

Brass trimmed valves: Brass trimmed valves are recommended for water, oil, or gas lines.

The body seat rings are made of Crane Hard Metal, a copper-tin bronze of unusual strength and hardness. They are screwed into the body.

The discs, in sizes 2 to 4-inch, are Crane Hard Metal; in the larger sizes, they are cast iron faced with Crane Hard Metal.

Brass trimmed valves have a brass stem. In non-rising stem valves, the portion of the discs that engages the stem threads is brass or brass-bushed.

All-iron valves: All-iron valves are recommended for oil or gas, or for fluids that corrode brass.

The seats are cast integral with the body and discs. Valves with screwed-in body seat rings can be made to order; prices on application.

The stem is steel, nickel-plated.

Stuffing box: The stuffing boxes are filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

500-Pound W.O.G. Valves are regularly furnished with a 1/16-inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with male, female, tongue, or groove faces can be furnished to order at an additional price. See page 353 for prices and dimensions.

By-passes: Sizes 6-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening. See page 117.

Gearing: To facilitate operating the valve, sizes 14-inch and larger should be equipped with gears. See page 118 for prices.

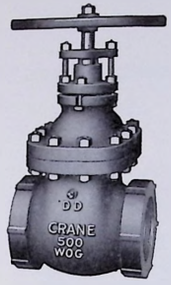
Motor or cylinder operation: Motor or cylinder operation is desirable for valves that are used for emergency purposes, or for valves that must be installed in inaccessible locations. Valves can be supplied with either electric motor or air motor, described on pages 164 and 165.

Cylinder operation is illustrated and described on page 163.

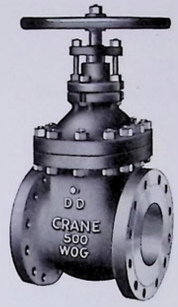
Additional description . . . . pages 100 and 101

500-Pound W.O.G.
Ferrosteel Double Disc Gate Valve
Brass Trimmed or All-Iron

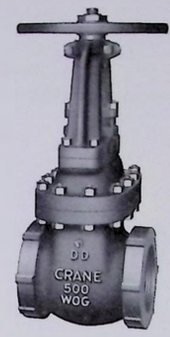
For working pressures, see the preceding page



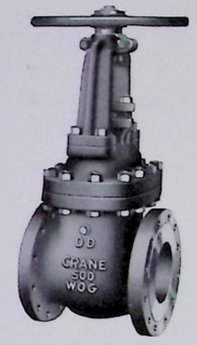
Non-Rising Stem
Screwed
No. 340 E
Hard Metal Seats
Brass Stem
No. 340½ E
All-Iron



Non-Rising Stem
Flanged
No. 341 E
Hard Metal Seats
Brass Stem
No. 341½ E
All-Iron



Outside Screw and Yoke
Screwed
No. 342 E
Hard Metal Seats
Brass Stem
No. 342½ E
All-Iron



Outside Screw and Yoke
Flanged
No. 343 E
Hard Metal Seats
Brass Stem
No. 343½ E
All-Iron

Prices of flanged valves include facing and drilling to the 250-Pound American Cast Iron Flange Standard. No deduction is made if flanged valves are ordered "faced only".

List Prices

Size	Non-Rising Stem				Outside Screw and Yoke			
	Screwed		Flanged, F. & D.		Screwed		Flanged, F. & D.	
Inches	No. 340 E Brass Trimmed Each	No. 340½ E All-Iron Each	No. 341 E Brass Trimmed Each	No. 341½ E All-Iron Each	No. 342 E Brass Trimmed Each	No. 342½ E All-Iron Each	No. 343 E Brass Trimmed Each	No. 343½ E All-Iron Each
2	37.00	37.00	38.00	38.00	49.00	49.00	50.00	50.00
2½	47.00	47.00	48.00	48.00	62.00	62.00	63.00	63.00
3	55.50	55.50	57.00	57.00	69.50	69.50	71.00	71.00
4	70.00	70.00	72.00	72.00	88.00	88.00	90.00	90.00
5	94.50	94.50	97.00	97.00	118.50	118.50	121.00	121.00
*6	117.00	117.00	120.00	120.00	147.00	147.00	150.00	150.00
*8	180.00	180.00	180.00	180.00	225.00	225.00	225.00	225.00
*10	255.00	255.00	255.00	255.00	320.00	320.00	320.00	320.00
*12	340.00	340.00	340.00	340.00	425.00	425.00	425.00	425.00
*14			475.00	475.00			570.00	570.00
*16			665.00	665.00			765.00	765.00
*18			885.00	885.00			1020.00	1020.00
*20			1100.00	1100.00			1240.00	1240.00
*24			1700.00	1700.00			1915.00	1915.00

*Sizes 6-inch and larger should have a by-pass. See page 117. Sizes 14-inch and larger should be geared. See page 118.

Description . . . page 112 ***Dimensions . . . . pages 134 and 135*** ***Templates for drilling . . . page 371***

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800-Pound W.O.G.
Ferrosteel Double Disc Gate Valves
Brass Trimmed or All-Iron

WORKING PRESSURE
800 pounds cold water, oil, or gas, non-shock

HYDROSTATIC TEST PRESSURES
1600-pound shell test
850-pound seat test

Air tested

Crane 800-Pound W.O.G. Ferrosteel Double Disc Gate Valves, illustrated on the opposite page, are of the pressure class formerly known commercially as "1600-Pound Test" valves. They are especially suitable for use in oil or gas fields, in oil refineries, in pump houses, in pipe lines, in high pressure water lines, or for similar service requiring unusually heavy iron body valves.

Air test: In addition to the hydrostatic tests specified above, these valves are given an air test in the shell and at the seats.

Rugged construction: All parts are exceptionally rugged and massive, assuring a high factor of safety in operation.

Ferrosteel body and bonnet: The body and bonnet are made of Crane Ferrosteel, a high grade iron approximately 35 per cent stronger than cast iron. The metal sections are heavy, and the metal is distributed to provide maximum strength.

The joint between the body and bonnet is made with tongue and groove facing; the bonnet gasket is retained inside and outside, to minimize the possibility of blowing out in service.

Lipped for lead: The threaded ends of screwed valves are recessed for lead.

Brass trimmed valves: Brass trimmed valves are recommended for water, oil, or gas lines.

The body seat rings are made of Crane Hard Metal, a copper-tin bronze of unusual strength and hardness. They are screwed into the body.

The discs, in sizes 2½ to 4-inch, are Crane Hard Metal; in the larger sizes, they are cast iron faced with Crane Hard Metal.

Brass trimmed valves have a brass stem. In non-rising stem valves, the portion of the discs that engages the stem threads is brass or brass-bushed.

All-iron valves: All-iron valves are recommended for oil or gas, or for fluids that corrode brass.

The seats are cast integral with the body and discs. Valves with screwed-in body seat rings can be made to order; prices on application.

The stem is steel, nickel-plated.

Stuffing box: The stuffing boxes are filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 800-Pound Hydraulic American Cast Iron Flange Standard (B16b1-1931).

800-Pound W.O.G. Valves are regularly furnished with a ¼-inch male face (large male) on the end flanges. The male face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with female, tongue, or groove faces can be furnished to order at an additional price. See page 353 for prices and dimensions.

Valves with tongue or groove flanges conforming to the National Transit (Pipe Line) Standard can be made to order; prices on application.

By-passes: A by-pass is recommended on 800-Pound W.O.G. Valves sizes 6-inch and larger. It enables equalizing the pressure on both sides of the disc before opening the main valve. See page 117.

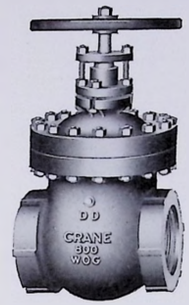
Gearing: 800-Pound W.O.G. Valves 10-inch and larger should be equipped with gears, to facilitate operation. The several styles of gearing are shown on page 118.

Motor or cylinder operation: Valves installed in inaccessible locations or used for emergency purposes should preferably be equipped with some easy means of operation. An electric or air motor drive, or an operating cylinder, are ideal for this purpose. For description, see pages 163 to 165.

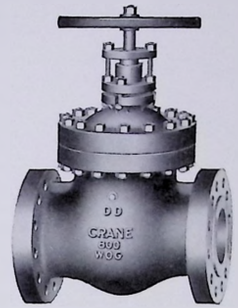
Additional description . . . pages 100 and 101

800-Pound W.O.G.
Ferrosteel Double Disc Gate Valves
Brass Trimmed or All-Iron

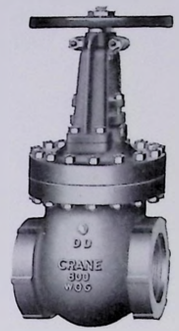
For working pressures, see the preceding page.



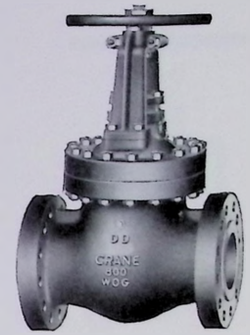
Non-Rising Stem
Screwed
No. 214 H
Hard Metal Seats
Brass Stem
No. 214½ H
All-Iron



Non-Rising Stem
Flanged
No. 215 H
Hard Metal Seats
Brass Stem
No. 215½ H
All-Iron



Outside Screw and Yoke
Screwed
No. 216 H
Hard Metal Seats
Brass Stem
No. 216½ H
All-Iron



Outside Screw and Yoke
Flanged
No. 217 H
Hard Metal Seats
Brass Stem
No. 217½ H
All-Iron

Prices of flanged valves include facing and drilling to the 800-Pound Hydraulic American Cast Iron Flange Standard. No deduction is made if flanged valves are ordered "faced only".

List Prices

Size	Non-Rising Stem				Outside Screw and Yoke			
	Screwed		Flanged, F. & D.		Screwed		Flanged, F. & D.	
Inches	No. 214 H Brass Trimmed Each	No. 214½ H All-Iron Each	No. 215 H Brass Trimmed Each	No. 215½ H All-Iron Each	No. 216 H Brass Trimmed Each	No. 216½ H All-Iron Each	No. 217 H Brass Trimmed Each	No. 217½ H All-Iron Each
2½	55.00	55.00			72.00	72.00		
3	73.50	73.50	75.00	75.00	92.50	92.50	94.00	94.00
4	98.00	98.00	100.00	100.00	123.00	123.00	125.00	125.00
5	155.00	155.00						
*6	182.00	182.00	185.00	185.00	228.00	228.00	231.00	231.00
*8	300.00	300.00	300.00	300.00	375.00	375.00	375.00	375.00
*10	550.00	550.00	550.00	550.00	690.00	690.00	690.00	690.00
*12	975.00	975.00	975.00	975.00	1220.00	1220.00	1220.00	1220.00

*Sizes 6-inch and larger should have a by-pass. See page 117. Sizes 10-inch and larger should be geared. See page 118.

Description . . . page 114 *Dimensions . . . pages 136 and 137* *Templates for drilling . . . page 371*

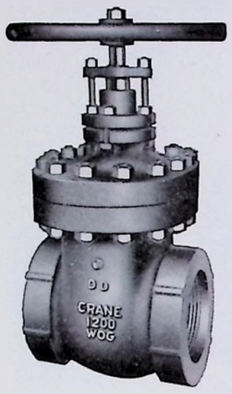
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1200-Pound W.O.G.
Ferrosteel Double Disc Gate Valves
Brass Trimmed or All-Iron

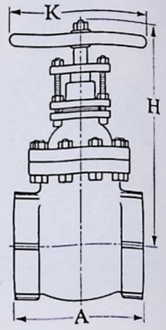
WORKING PRESSURE
1200 pounds cold water, oil, or gas, non-shock

HYDROSTATIC TEST PRESSURES
2000-pound shell test
1300-pound seat test

Air tested



Non-Rising Stem
Screwed
No. 218 H
Hard Metal Seats
Steel Stem
No. 218½ H
All-Iron



Size Inches	List Prices: No. 218 H Brass Trimmed Each	List Prices: No. 218½ H All-Iron Each	Dimensions, in Inches: A End to end	H Center to top	K Diameter of wheel	Number of turns to open
2	59.00	59.00	7½	13	9	14½
2½	74.00	74.00	9½	16¾	9	13
3	88.50	88.50	10½	17¼	9	15
4	148.00	148.00	12½	21	12	20
6	322.00	322.00	18	29¼	20	29
8	600.00	600.00	22	34½	24	38

These valves are of the pressure class formerly known commercially as "2000-Pound Test" valves. They are unusually massive and rugged, and are recommended for use in oil or gas fields, pump houses, and pipe lines.

Air test: In addition to the hydrostatic tests specified above, these valves are given an air test in the shell and at the seats.

Ferrosteel body and bonnet: The body and bonnet are made of Crane Ferrosteel, a high grade iron having a tensile strength approximately 35 per cent greater than that of cast iron.

Lipped for lead: The threaded ends are recessed for lead.

Brass trimmed valves: Brass trimmed valves are recommended for water, oil, or gas lines.

The body seat rings are made of Crane Hard Metal, a copper-tin bronze of unusual strength and hardness. They are screwed into the body.

The discs, in sizes 2 to 4-inch, are Crane Hard Metal; in the larger sizes, they are Ferrosteel faced with Crane Hard Metal.

The stem is steel, nickel-plated.

The portion of the discs that engages the stem threads is brass or brass-bushed.

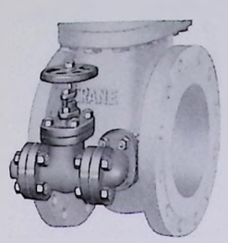
All-iron valves: All-iron valves are recommended for oil or gas, or for fluids that corrode brass.

The seats are cast integral with the body and discs. Valves with screwed-in body seat rings can be made to order; prices on application.

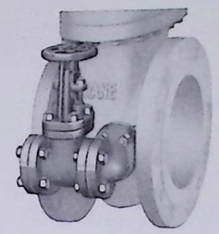
The stem is steel, nickel-plated.

Additional description . . . pages 100 and 101

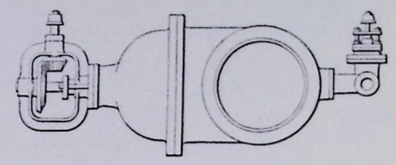
By-Passes for Iron Body Double Disc Gate Valves



Bolted By-Pass
Non-Rising Stem



Bolted By-Pass
Outside Screw and Yoke



Bevel Geared Valve with By-Pass

Pressure Class of Valve	Size of Valve Inches	Size of By-Pass Inches	Non-Rising Stem By-Pass Each	O. S. & Y. By-Pass Each
		Extra List Prices for Bolted By-Pass		
Low Pressure Page 105	14	2	60.00	66.00
	16 to 20	3	90.00	97.50
	24 and 30	4	120.00	129.50
	36 and 42	6	170.00	185.00
	48	8	230.00	252.00
Light Standard Page 107	12 and 14	2	60.00	66.00
	16 to 20	3	90.00	97.50
	24 and 30	4	120.00	129.50
	36 and 42	6	170.00	185.00
	48	8	230.00	252.00
Standard Page 109	12 and 14	2	60.00	66.00
	16 to 20	3	90.00	97.50
	24	4	120.00	129.50
400-Pound W.O.G. Page 111	6	1¼	44.00	52.00
	8	1½	52.00	61.00
	10	1½	60.00	70.00
	12	2	70.00	80.00
500-Pound W.O.G. Page 113	6	1¼	52.00	62.00
	8	1½	61.00	71.00
	10	1½	80.00	93.00
	12 and 14	2	91.00	105.00
	16 to 20	3	136.00	152.00
	24	4	200.00	220.00
800-Pound W.O.G. Page 115	6	1¼	83.00	98.00
	8 and 10	1½	100.00	115.00
	12	2	125.00	140.00

When so ordered, Crane Iron Body Double Disc Gate Valves can be furnished with a by-pass. Extra list prices are shown in the table.

Non-rising stem valves will be equipped with a non-rising stem by-pass; O. S. & Y. valves, with an O. S. & Y. by-pass.

Bevel geared valves with by-pass have the by-pass on the bottom of the valve, as shown in the illustration above.

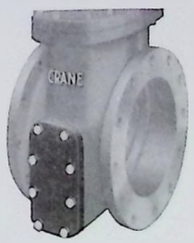
Dimensions . . . pages 127 to 137

Lockup Caps



Lockup caps can be furnished for any class of Crane Non-Rising Stem Gate Valve. Prices on application.

Single Clean-Outs For Standard Iron Body Double Disc Gate Valves



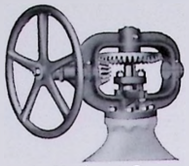
Single Side Clean-Out

Size of Valve Inches	Extra for Single Side Clean-Out Per Valve
3	8.00
4	9.00
5	10.50
6	12.00
8	14.00
10	18.00
12	20.00

Clean-outs should be used where sediment will accumulate in a valve. They may be either on the side as listed here, or on the bottom. Prices on bottom clean-outs are furnished on application

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Gearing for Iron Body Double Disc Gate Valves



Style U, Bevel Gearing
Non-Rising Stem

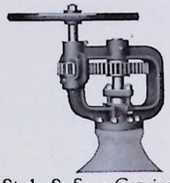
When so ordered, Crane Iron Body Double Disc Gate Valves can be supplied with gears. Extra list prices are shown below.

Bevel gearing: Unless otherwise ordered, non-rising stem bevel geared valves are furnished with the pinion shaft extending at right angles to the run of the valve. They can also be furnished with the shaft parallel to the run.

With Style N bevel gearing for outside screw and yoke valves, the pinion shaft extends at right angles to the run of the valve; with Style O, parallel to the run. Unless otherwise ordered, Style N will be furnished.



Style N
Bevel Gearing
Outside Screw and Yoke



Style S, Spur Gearing
Non-Rising Stem

Grease cases and gear covers: Non-rising stem bevel or spur geared valves can be supplied with a grease case completely enclosing the gears.

Outside screw and yoke valves can not be equipped with a grease case, but can be supplied with a gear cover.

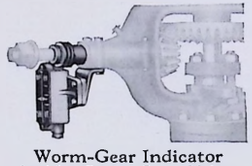


Style O
Bevel Gearing
Outside Screw and Yoke

Indicator: Non-rising stem geared valves can be supplied with a worm-gear indicator, as illustrated. Prices on application.



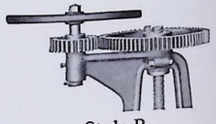
Grease Case for
Non-Rising Stem Valves



Worm-Gear Indicator
for Non-Rising Stem Valves
Prices on application



Gear Cover
for
Outside Screw and Yoke Valves



Style P
Spur Gearing
Outside Screw and Yoke

Pressure Class of Valve	Size of Valve Inches	Extra List Prices					
		Non-Rising Stem			Outside Screw and Yoke		
		Bevel Gearing Per Valve	Spur Gearing Per Valve	*Grease Cases Per Valve	Bevel Gearing Per Valve	Spur Gearing Per Valve	*Gear Covers Per Valve
Low Pressure Page 105	14 to 20	75.00	70.00	50.00	80.00	75.00	50.00
	24	85.00	80.00	60.00	90.00	85.00	60.00
	30	95.00	90.00	75.00	100.00	95.00	75.00
	36	180.00	170.00	90.00	190.00	180.00	90.00
	42	230.00	210.00	105.00	250.00	230.00	105.00
	48	400.00	370.00	120.00	430.00	400.00	120.00
Light Standard Page 107	14 to 20	75.00	70.00	50.00	80.00	75.00	50.00
	24	85.00	80.00	60.00	90.00	85.00	60.00
	30	95.00	90.00	75.00	100.00	95.00	75.00
	36	180.00	170.00	90.00	190.00	180.00	90.00
	42	230.00	210.00	105.00	250.00	230.00	105.00
	48	400.00	370.00	120.00	430.00	400.00	120.00
Standard Page 109	12	65.00	60.00	50.00	70.00	65.00	50.00
	14 to 20	75.00	70.00	50.00	80.00	75.00	50.00
	24	85.00	80.00	60.00	90.00	85.00	60.00
400-Pound W. O. G. Page 111	10	75.00	70.00	50.00	80.00	75.00	50.00
	12	85.00	80.00	60.00	90.00	85.00	60.00
500-Pound W. O. G. Page 113	8	65.00	60.00	50.00	70.00	65.00	50.00
	10	85.00	80.00	60.00	90.00	85.00	60.00
	12 to 16	97.00	92.00	75.00	102.00	97.00	75.00
	18 and 20	114.00	108.00	80.00	120.00	114.00	80.00
	24	227.00	215.00	105.00	239.00	227.00	105.00
800-Pound W. O. G. Page 115	6 and 8	75.00	70.00	50.00	80.00	75.00	50.00
	10 and 12	92.00	87.00	75.00	97.00	92.00	75.00

*Prices of Grease Cases and Gear Covers are additional to prices of Gearing.

Dimensions of geared valves . . . pages 127 to 137

Sluice Gates

Crane Sluice Gates are in use in some of the largest sewage and filtration plants throughout the world. They are engineered with the same skill and manufactured with the same precision that has made Crane valves the standard for over 80 years. The Crane line of sluice gates includes requirements for any project. Circular and rectangular gates can be built in all commercial sizes for seating and unseating pressures, having either flanged or spigot frames, and made for rising or non-rising stems. They are fully bronze mounted and are made with or without adjustable bronze side wedges. A complete line of operating mechanisms is available for hand or power operation, including hydraulic cylinder, electric, and air motor drive.

Data Required with Orders or Inquiries

The following data are necessary for making quotations or ordering sluice gates.

Type: Rising Stem or Non-Rising Stem.

Size of Gate: If rectangular, width should be stated first. If circular, give diameter through port.

Type of Frame: Flat, Flange, Spigot, or Flange and Spigot.

Service: Is gate subject to seating or unseating pressure? (See following pages.)

Mounting: Where gate is to be bolted against wall thimble, type and width of thimble should be given. Where bolting against pipe, diameter and drilling of flange should be given.

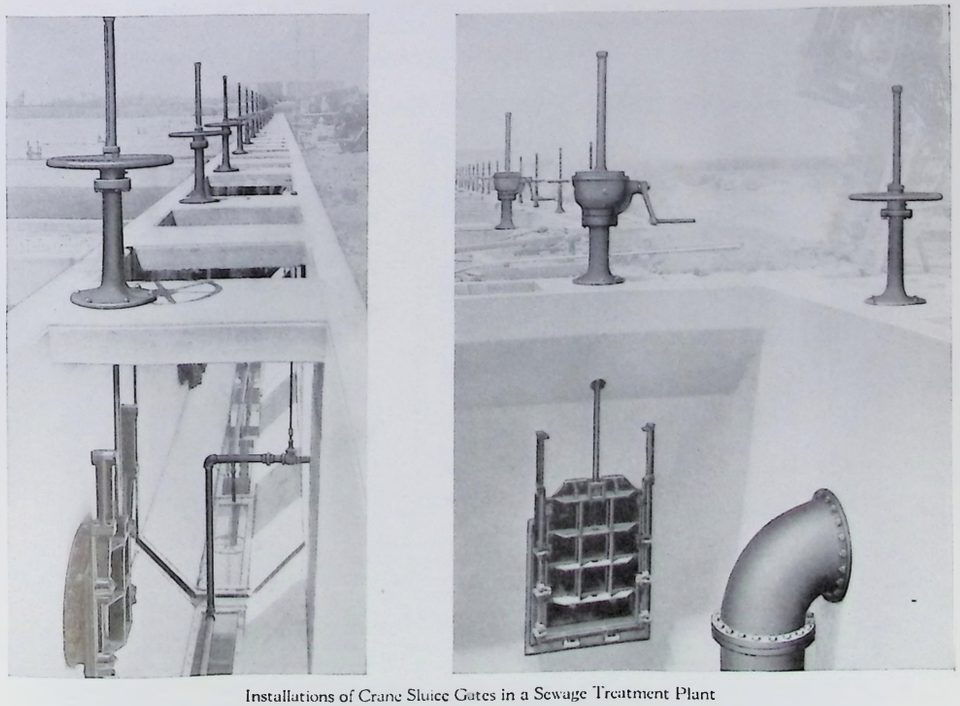
Pressure: Give actual maximum static head above center of gate. Also maximum unbalanced head under which gate will be operated.

Stem: Specify distance from center of gate to operating floor, or to end of stem if non-rising. State if stem wanted is to be of steel, bronze or a combination of steel and bronze (bronze threaded section).

Operation: If hand operated, state if to be geared or hand wheel stand, also if indicator is wanted. If operation is to be by hydraulic cylinder give available cylinder pressure. If stand is to be electric motor operated give voltage and whether A.C. or D.C. and current characteristics if A.C.

All sluice gates are built to open by turning to left or counterclockwise unless otherwise ordered.

Pages 120 and 121. Illustrate and give catalog number of various types.
Pages 122 and 123. Illustrate installation methods.
Pages 124 and 125. Illustrate floor stands and operating mechanisms.

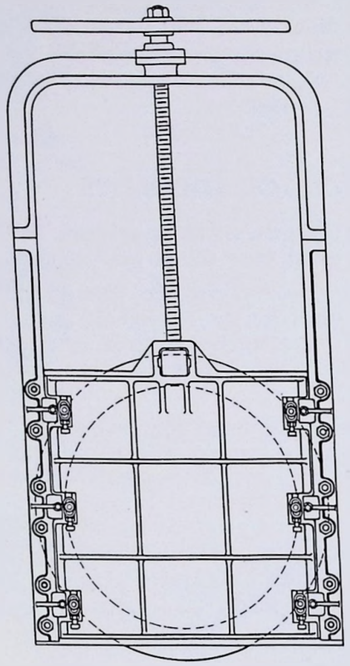


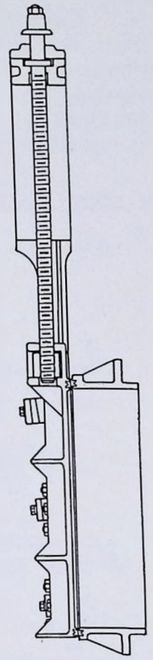
Installations of Crane Sluice Gates in a Sewage Treatment Plant

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asbestosclaims.law/library/21275/78

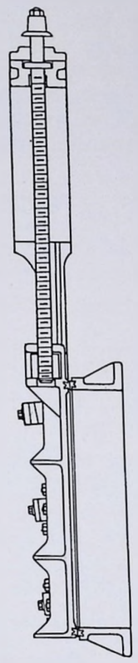
Circular Sluice Gates

Rectangular Slide—Adjustable Wedges—Non-Rising Stem (Self-Contained)





No. 2400
Flange and Spigot Frame with Side Wedges

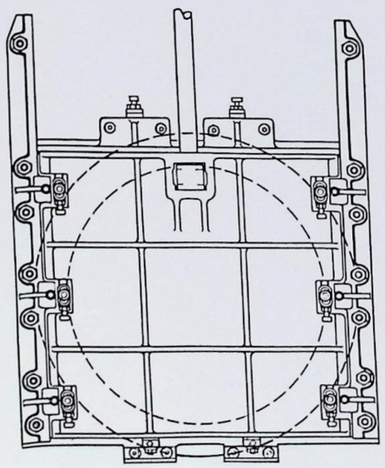


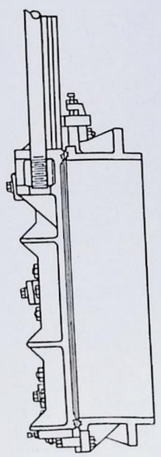
No. 2401
Flange Frame with Side Wedges

No. 2402 — Spigot Frame with Side Wedges

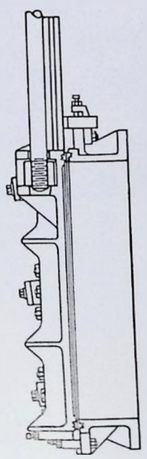
All Sluice Gates Furnished with Square Operating Nuts (Hand-Wheel Furnished When Specified)

Rectangular Slide—Rising Stem—With and Without Adjustable Wedges





No. 2430
Flange and Spigot Frame with Side, Top and Bottom Wedges



No. 2431
Flange Frame with Side, Top and Bottom Wedges

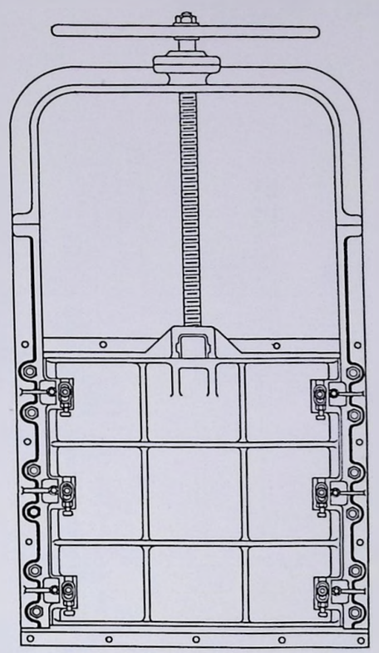
No. 2410 — Flange and Spigot Frame with Side Wedges
No. 2411 — Flange Frame with Side Wedges
No. 2412 — Spigot Frame with Side Wedges

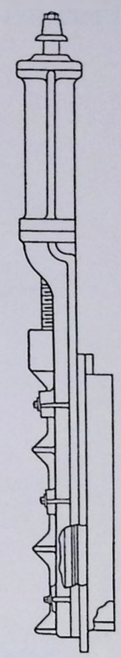
No. 2420 — Flange and Spigot Frame, No Wedges
No. 2421 — Flange Frame, No Wedges
No. 2422 — Spigot Frame, No Wedges

Prices and Dimensions on Request

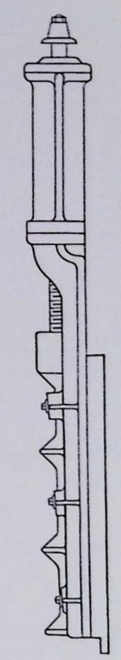
Rectangular Sluice Gates

Rectangular Slide—Adjustable Wedges—Non-Rising Stem (Self-Contained)





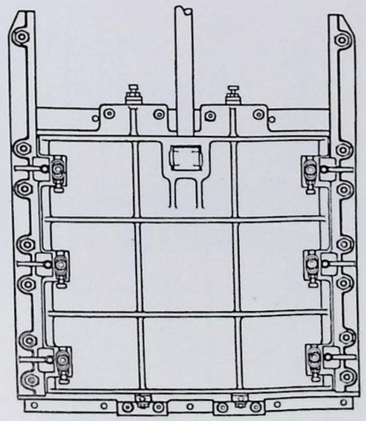
No. 2442
Spigot Frame with Side Wedges

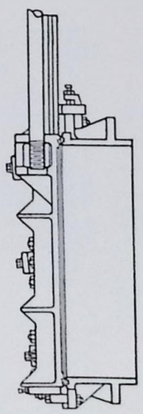


No. 2443
Flat Frame with Side Wedges

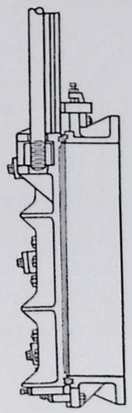
All Sluice Gates Furnished with Square Operating Nuts (Hand-Wheel Furnished When Specified)

Rectangular Slide—Rising Stem—With and Without Adjustable Wedges





No. 2470
Flange and Spigot Frame With Side, Top and Bottom Wedges



No. 2471
Flange Frame With Side, Top and Bottom Wedges

No. 2452 — Spigot Frame with Side Wedges
No. 2453 — Flat Frame with Side Wedges
No. 2462 — Spigot Frame, No Wedges
No. 2463 — Flat Frame, No Wedges

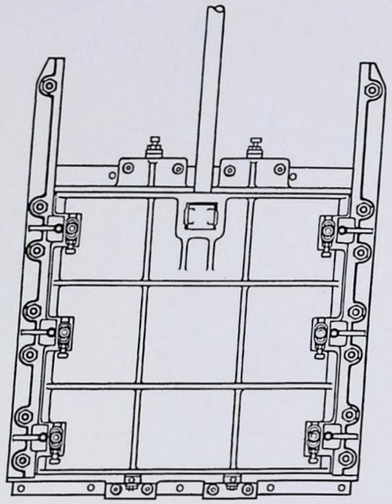
Prices and Dimensions on Request

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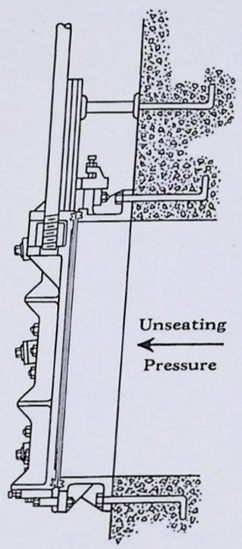
Representative Method of

Installing Sluice Gates for Unseating Pressure

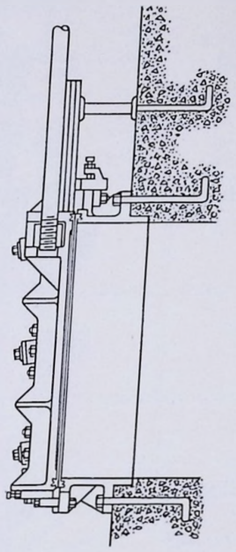
Having Top and Bottom Wedges



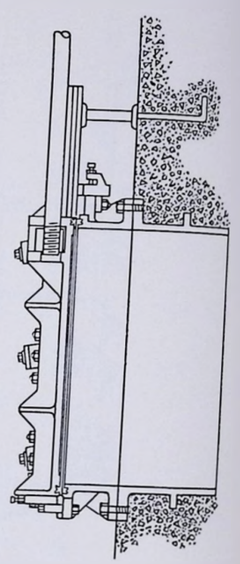
Rectangular Sluice Gates



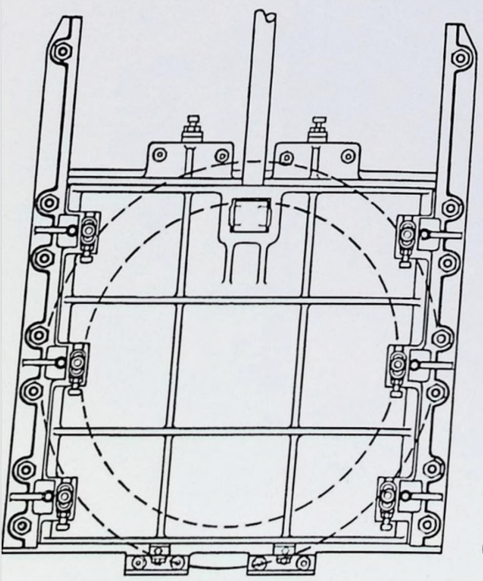
Flange Frame Bolted to Concrete



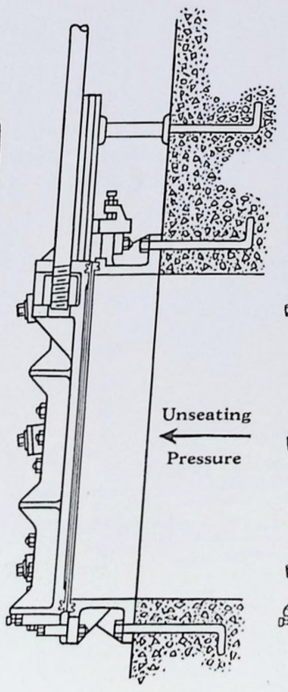
Flange and Spigot Frame Bolted to Concrete



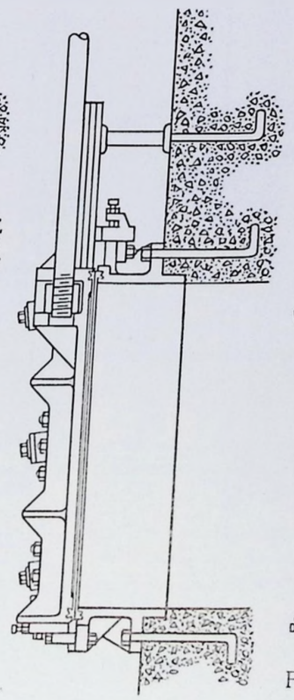
Flange Frame Bolted to Wall Thimble



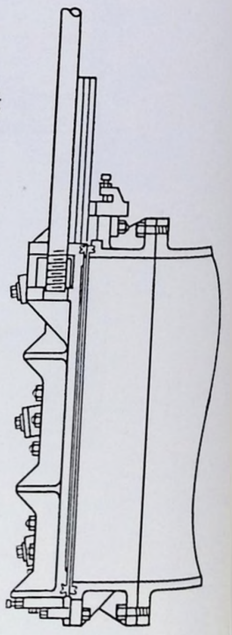
Circular Sluice Gates



Flange Frame Bolted to Concrete



Flange and Spigot Frame Bolted to Concrete

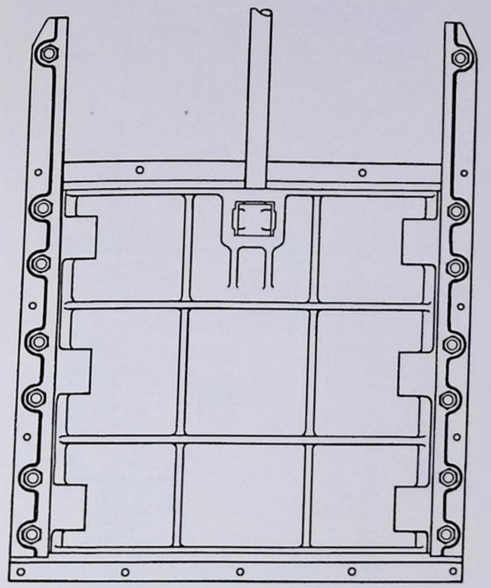


Flange Frame Bolted to Pipe

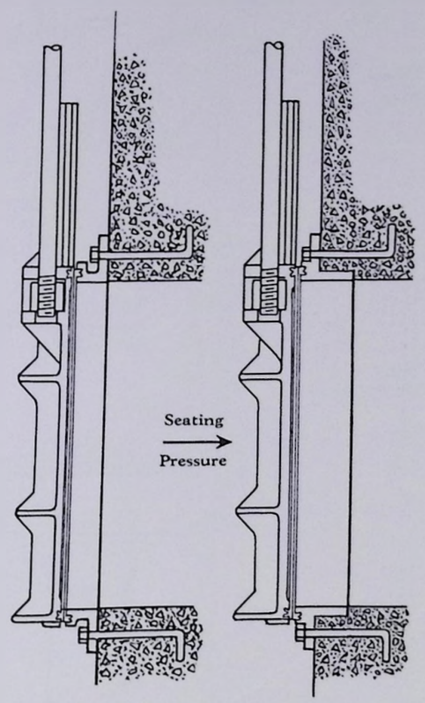
Representative Method of

Installing Sluice Gates for Seating Pressure

Without Top and Bottom Wedges



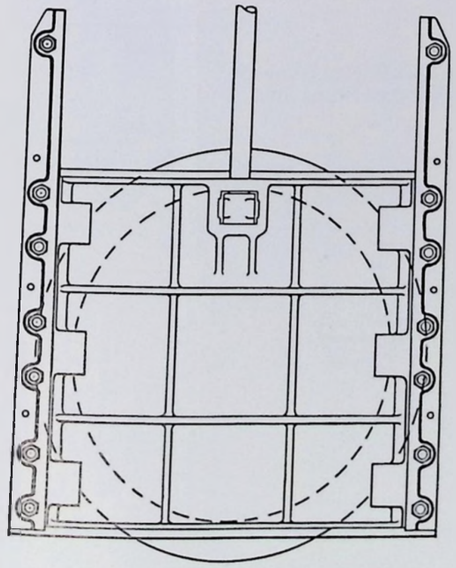
Rectangular Sluice Gates



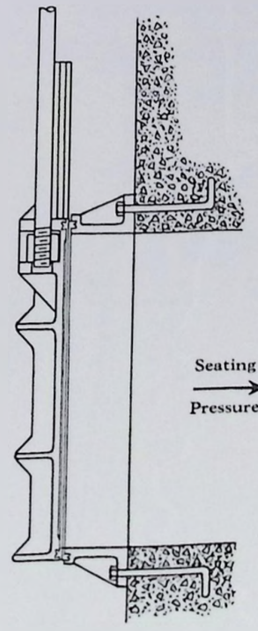
Flat Frame Bolted to Concrete

Spigot Frame Bolted to Concrete

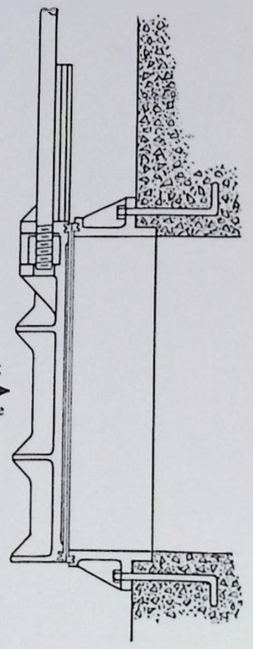
Flat Frame Bolted to Wall Thimble



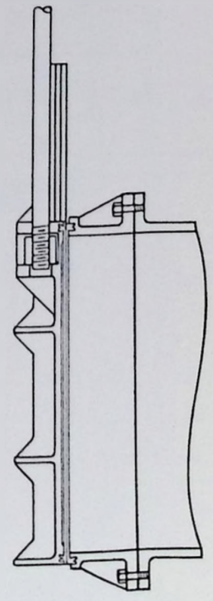
Circular Sluice Gates



Flange Frame Bolted to Concrete



Flange and Spigot Frame Bolted to Concrete

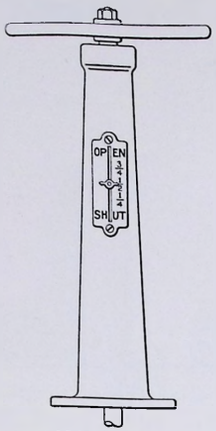


Flange Frame Bolted to Pipe

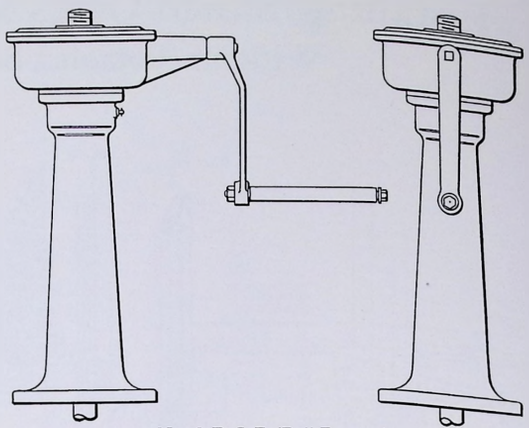
The same frames are used for gates having adjustable wedges on sides only.

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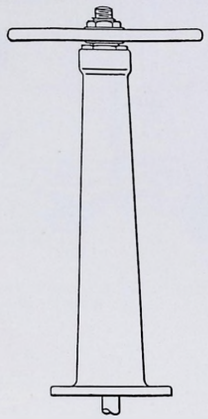
Hand Operated Floor Stands



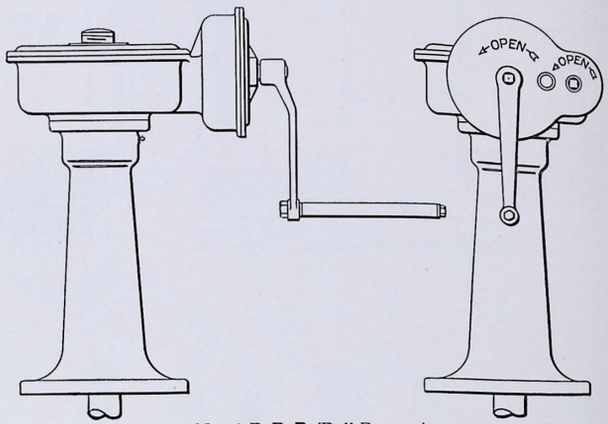
No. 1-N-R (Plain Bearing)
Non-Rising Stem With Indicator



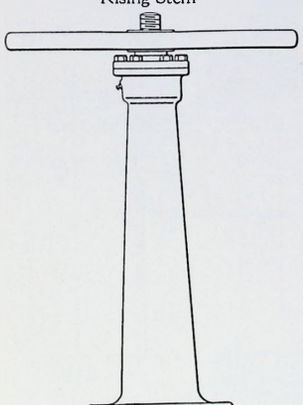
No. 3-R-S-B (Ball Bearing)
Single Speed Rising Stem



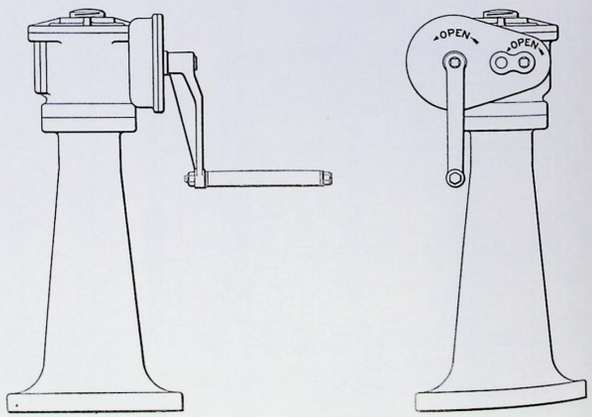
No. 1-R (Plain Bearing)
Rising Stem



No. 4-R-D-B (Ball Bearing)
Double Speed Rising Stem



No. 2-R (Plain Bearing) Rising Stem
No. 2-R-B (Ball Bearing) Rising Stem



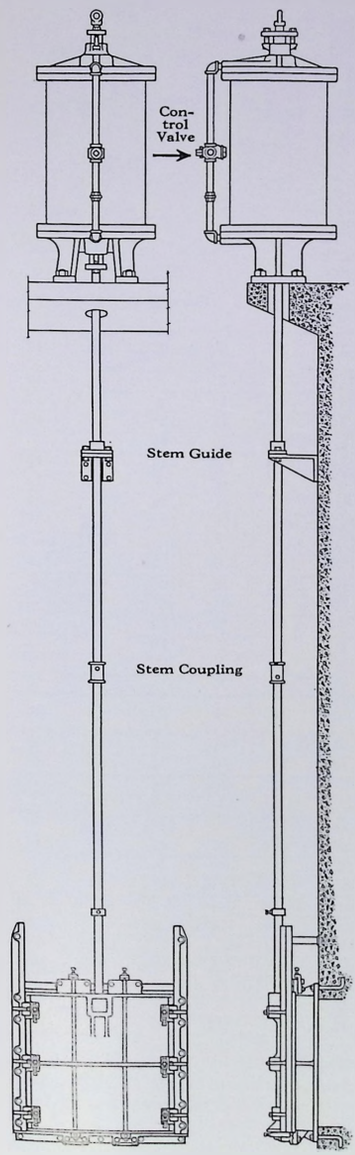
No. 5-R-D-B (Ball Bearing)
Double Speed (Rising Stem)

Prices and Dimensions on Request

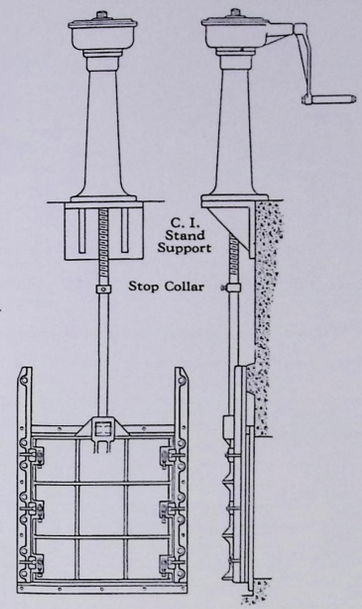
Typical Installations

Sluice Gate Operating Mechanisms

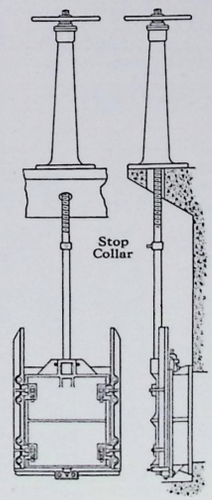
Hydraulic or Oil Cylinder Operated



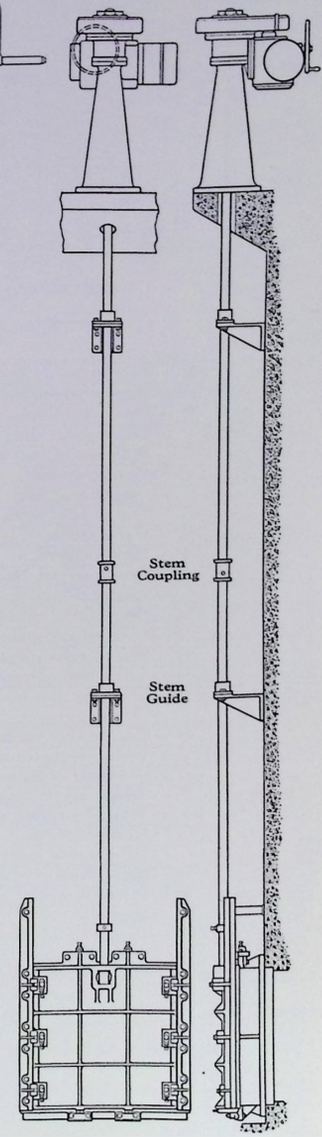
Geared Floor Stand



Handwheel Floor Stand



Motor Operated Floor Stand



Circular Sluice Gates on page 120.

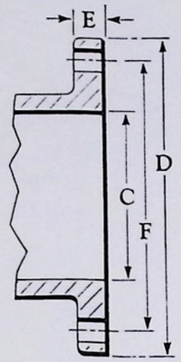
Rectangular Sluice Gates on page 121.

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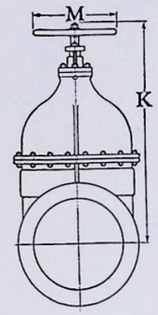
Low Pressure

Iron Body Double Disc Gate Valves

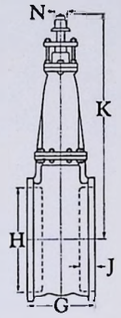
Dimensions, in Inches



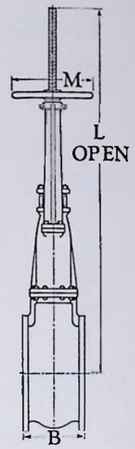
Section through flange



Non-Rising Stem



Non-Rising Stem
Hub Ends



Outside Screw and Yoke

Dimensions of larger sizes on application

Size		2	2½	3	4	5	6	8	10	12
Flanged	B — Face to face, without by-pass	5¼	5¾	6½	7½	7¾	8	9	9½	10
	C — Inside diameter of port	2	2½	3	4	5	6	8	10	12
	D — Diameter of flange	6	7	7½	9	10	11	13½	16	19
	E — Thickness of flange	½	9/16	5/8	¾	¾	¾	¾	7/8	1
	F — Diameter of bolt circle	4¾	5½	6	7½	8½	9½	11¾	14¼	17
	Number of bolts	4	4	4	8	8	8	8	12	12
	Diameter of bolts	5/8	5/8	5/8	5/8	5/8	5/8	5/8	5/8	5/8
Hub ends	G — End to end, without by-pass	8⅛		8¾	9 13/16	10¼	10⅜	12¼	12⅜	12⅝
	H — Inside diameter of hub	3.25		4.66	5.70	6.70	7.80	10.00	12.10	14.20
	J — Depth of hub	2.75		2.75	3.00	3.00	3.00	3.50	3.50	3.50
Heights	K — Center to top, Non-Rising	9¼	10	11½	13⅝	16½	18	22½	27	30
	L — Center to top, O. S. & Y.	14⅛	15⅞	18¼	22¼	27	30½	38½	47	54¼
Wheel or nut	M — Diameter of wheel, Non-Rising	5½	5½	6	8	8	9	10	12	12
	M — Diameter of wheel, O. S. & Y.	6	6	7	8	8	9	10	12	12
	N — Size of square nut	2		2	2	2	2	2	2	2
Number of turns to open, without gearing		9¾	11¾	10½	13¼	16½	20	17½	22	26

Size		14	16	18	20	24	30	36	42	48
Flanged	B — Face to face, without by-pass	10½	11	11½	12	13	14½	16	17½	19
	C — Inside diameter of port	14	16	18	20	24	30	36	42	48
	D — Diameter of flange	21	23½	25	27½	32	38¾	46	53	59½
	E — Thickness of flange	1⅛	1⅛	1¼	1¼	1⅜	1½	1⅝	1¾	2
	F — Diameter of bolt circle	18¾	21¼	23¾	25	29½	36	42¾	49½	56
	Number of bolts	12	16	16	20	20	28	32	36	44
	Diameter of bolts	¾	¾	¾	¾	¾	7/8	7/8	1	1
Hub ends	G — End to end, without by-pass	13⅛	14⅛	14½	15¼	15¾	17⅞	18½	21	22
	H — Inside diameter of hub	16.10	18.40	20.50	22.60	26.80	33.00	39.30	45.50	51.80
	J — Depth of hub	3.50	4.00	4.00	4.00	4.00	4.50	4.87	5.00	5.00
Heights	K — Center to top, Non-Rising	33¼	36¼	41	44½	51¼	62¼	72¼	86¼	99
	L — Center to top, O. S. & Y.	64½	71¾	80¼	88¼	104	128	149¼	176½	201
Wheel or nut	M — Diameter of wheel	14	14	18	18	20	22	27	30	36
	N — Size of square nut	2	2	2	2	2	2	3	3	3
Number of turns to open, without gearing		29	33	38	42	49	124	147	131	149

Flange dimensions and facing: The dimensions and drilling of the end flanges, 4 to 48-inch, conform to the 25-Pound American Tentative Cast Iron Flange Standard (B16b2-1931). The flanges are plain faced, with a smooth finish.

Hub dimensions: The hubs on hub end valves are suitable for Class "B" cast iron pipe.

By-passes: Sizes 24-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening.

Gearing: To facilitate operating the valve, sizes 42-inch and larger should be equipped with gears.

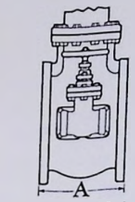
List prices . . . page 105

Templates for drilling . . . page 370

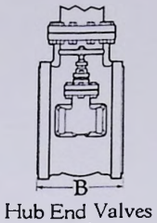
Low Pressure

Iron Body Double Disc Gate Valves

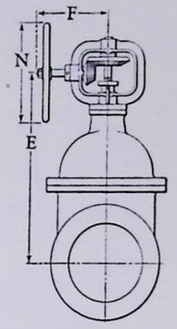
Dimensions, in Inches



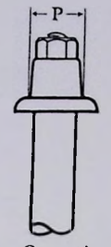
Flanged Valves with Bolted By-Pass



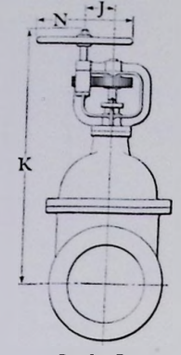
Hub End Valves with Bolted By-Pass



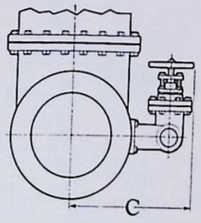
Style U
Bevel Gearing
Non-Rising Stem

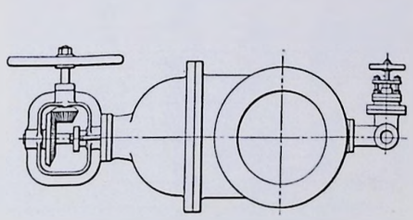


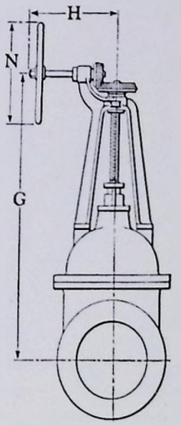
Square Operating Nut for Hub End Geared Valves



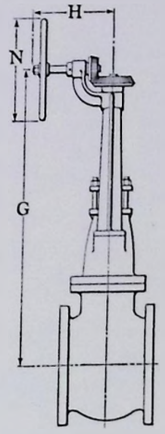
Style S
Spur Gearing
Non-Rising Stem



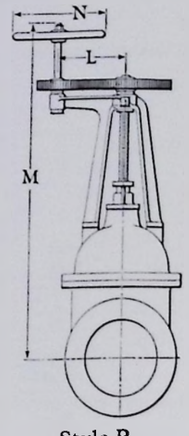

Bevel geared valves with by-pass have the by-pass on the bottom.



Style N
Bevel Gearing
Outside Screw and Yoke



Style O
Bevel Gearing
Outside Screw and Yoke



Style P
Spur Gearing
Outside Screw and Yoke

For dimensions not given, see the preceding page.

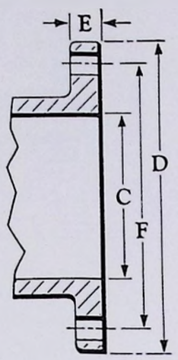
Size			14	16	18	20	24	30	36	42	48
Valves with by-pass		A — Face to face, flanged	16	18	18½	18½	20	20½	24	25½	29½
		B — End to end, hub	18	21	21	21½	22½	23½	27½	28	32
		Size of by-pass	2	3	3	3	4	4	6	6	8
		C — Center to outside	20	24¼	25	26	30¼	33¼	40¾	44½	51½
Bevel Geared Valves	Non-Rising	E — Center to center	30	33	38½	42	48½	58	68¼	80	92
		F — Center to top	12	12	14½	14½	14¾	15½	20	21	29
		Number of turns to open	48	55	76	84	98	248	390	354	524
	O. S. & Y.	G — Center to center	51¼	56¼	62¼	68¼	79¾	97½	112¾	133¼	152¾
		H — Center to top	13	13	14¾	14¾	15	19	22¼	22½	29¾
		Number of turns to open	65	74	83	104	124	248	390	354	524
Spur Geared Valves	Non-Rising	J — Center to center	5 9/16	5 9/16	6¼	6¼	6¼	6¼	8 11/16	8 11/16	14 5/16
		K — Center to top	39¼	42¼	49¾	53½	60	69¾	82¾	95	109¼
		Number of turns to open	48	55	81	89	104	263	396	354	524
	O. S. & Y.	L — Center to center	10	10	12	12	12	14¾	17¼	17¼	19
		M — Center to top	54¾	59¾	68¼	74	86	106	121½	142½	163
		Number of turns to open	65	74	83	104	124	263	390	354	524
Wheel or nut for geared valves		N — Diameter of wheel	12	12	16	16	18	20	24	27	30
		P — Size of square nut	2	2	2	2	2	2	2	3	3

List prices and description . . . pages 105, 117, and 118

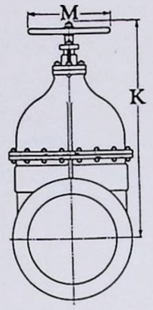
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Light Standard
Iron Body Double Disc Gate Valves

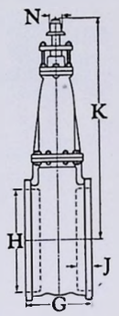
Dimensions, in Inches



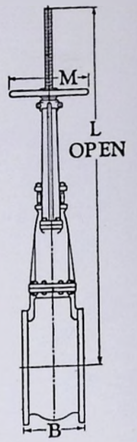
Section through flange



Non-Rising Stem



Non-Rising Stem Hub Ends



Outside Screw and Yoke

Dimensions of larger sizes on application

Size		2	2½	3	4	5	6	8	10	12
Flanged	B — Face to face, without by-pass	5½	6	6¾	8	8½	8¾	10	11	12
	C — Inside diameter of port	2	2½	3	4	5	6	8	10	12
	D — Diameter of flange	6	7	7½	9	10	11	13½	16	19
	E — Thickness of flange	5/8	11/16	3/4	15/16	15/16	1	1⅛	1 3/16	1¼
	F — Diameter of bolt circle	4¾	5½	6	7½	8½	9½	11¾	14¼	17
	Number of bolts	4	4	4	8	8	8	8	12	12
	Diameter of bolts	5/8	5/8	5/8	3/4	3/4	3/4	3/4	7/8	7/8
Hub ends	G — End to end, without by-pass	8⅛		8¾	9 13/16	10¼	10⅜	12¼	14	14½
	H — Inside diameter of hub	3.25		4.66	5.70	6.70	7.80	10.00	12.10	14.20
	J — Depth of hub	2.75		2.75	3.00	3.00	3.00	3.50	4.00	4.00
Heights	K — Center to top, Non-Rising	9¼	10	11½	13¾	16½	18	22½	28¼	32¾
	L — Center to top, O. S. & Y.	14	16	18¼	22¼	27	30½	38½	47¼	55
Wheel or nut	M — Diameter of wheel, Non-Rising	5½	5½	6	8	9	9	10	12	14
	M — Diameter of wheel, O. S. & Y.	6	6	7	8	9	9	10	12	14
	N — Size of square nut	2		2	2	2	2	2	2	2
Number of turns to open, without gearing		9¾	11¾	10½	13¼	16½	20	17½	21½	25½

Size		14	16	18	20	24	30	36	42	48
Flanged	B — Face to face, without by-pass	13½	15	16½	18	19½	23	25½	28	32
	C — Inside diameter of port	14	16	18	20	24	30	36	42	48
	D — Diameter of flange	21	23½	25	27½	32	38¾	46	53	59½
	E — Thickness of flange	1⅜	1 7/16	1 9/16	1 11/16	1⅞	2⅛	2⅜	2⅝	2¾
	F — Diameter of bolt circle	18¾	21¼	22¾	25	29½	36	42¾	49½	56
	Number of bolts	12	16	16	20	20	28	32	36	44
	Diameter of bolts	1	1	1⅛	1⅛	1¼	1¼	1½	1½	1½
Hub ends	G — End to end, without by-pass	15¼	15½	16½	18	19½	23	25½	28	32
	H — Inside diameter of hub	16.45	18.80	20.92	23.06	27.32	33.40	39.70	46.10	52.40
	J — Depth of hub	4.00	4.00	4.00	4.00	4.00	4.50	4.50	5.00	5.00
Heights	K — Center to top, Non-Rising	36	39¾	43	49½	56¼	69½	82½		
	L — Center to top, O. S. & Y.	62½	70¼	78¾	87¼	102½	128½	152	177	201½
Wheel or nut	M — Diameter of wheel	14	16	18	20	24	30	36		
	N — Size of square nut	2	2	2	2	2	3	3		
Number of turns to open, without gearing		29½	33¾	37¾	41¾	50	93	111		

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). The flanges are plain faced, with a smooth finish.

Hub dimensions: The hubs on hub end valves are suitable for Class "C" cast iron pipe.

By-passes: Sizes 18-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening.

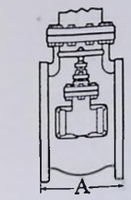
Gearing: To facilitate operating the valve, sizes 30-inch and larger should be equipped with gears.

List prices . . . . page 107

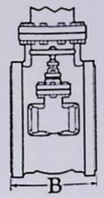
Templates for drilling . . . . page 370

Light Standard
Iron Body Double Disc Gate Valves

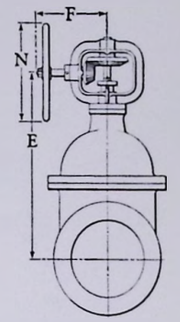
Dimensions, in Inches



Flanged Valves with Bolted By-Pass



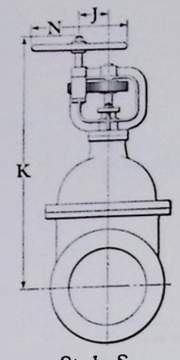
Hub End Valves with Bolted By-Pass



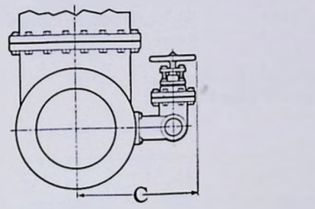
Style U
Bevel Gearing
Non-Rising Stem

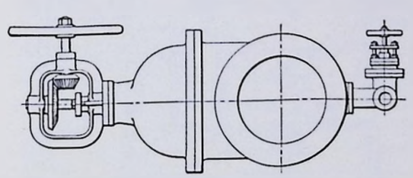


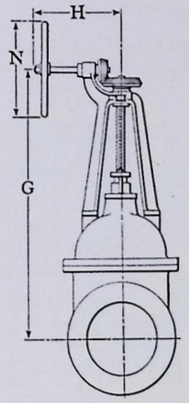
Square Operating Nut for Hub End Geared Valves



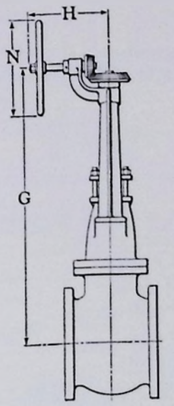
Style S
Spur Gearing
Non-Rising Stem



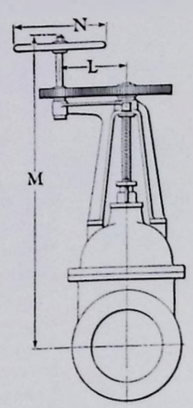

Bevel geared valves with by-pass have the by-pass on the bottom.



Style N
Bevel Gearing
Outside Screw and Yoke



Style O
Bevel Gearing
Outside Screw and Yoke



Style P
Spur Gearing
Outside Screw and Yoke

For dimensions not given, see the preceding page.

Size			12	14	16	18	20	24	30	36	42	48
Valves with by-pass		A — Face to face, flanged	19¼	20	23	23½	24	26	26½	27½	31	32
		B — End to end, hub	19¼	20	23	23½	24	26	26½	27½	31	32
		Size of by-pass	2	2	3	3	3	4	4	6	6	8
		C — Center to outside	21	22	25	25¾	27	31¼	35	43½	47¼	53
Bevel Geared Valves	Non-Rising	E — Center to center		32½	37¾	41	44½	52¾	63½	77¼	86½	102
		F — Center to top		12¼	14½	14½	14¾	19	21	29	29	31
		No. of turns to open		49	67	75	82	132	167	260	226	222
	O. S. & Y.	G — Center to center		50	54½	60¾	67	79½	97	114½	132	150½
		H — Center to top		14	14¾	14¾	15	19	22½	29	29	31
		No. of turns to open		67	75	84	93	123	186	222	228	224
Spur Geared Valves	Non-Rising	J — Center to center		5 9/16	6¼	6¼	6¼	8 11/16	8 11/16	14 5/16	14 5/16	16¼
		K — Center to top		41½	49½	52¼	56½	67½	78	94½	104½	117½
		No. of turns to open		51½	74	83	93½	140	167	260	226	222
	O. S. & Y.	L — Center to center		10	12	12	12	14¾	17¼	19	19	21¾
		M — Center to top		53½	60½	67¾	73	88	104	125½	143	160½
		No. of turns to open		67	75	93½	103	145	167	200	228	224
Wheel or nut for geared valves		N — Diameter of wheel		14	16	16	18	22	27	30	30	36
		P — Size of square nut		2	2	2	2	2	3	3	3	3

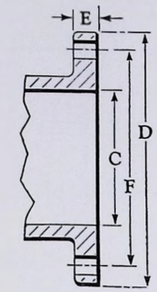
List prices and description . . . . pages 107, 117, and 118

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 83 of 402
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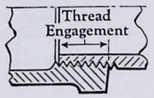
Standard

Iron Body Double Disc Gate Valves

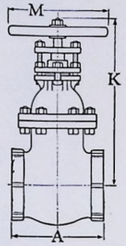
Dimensions, in Inches



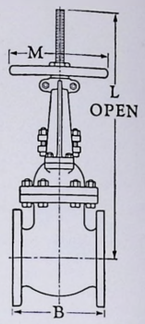
Section through flange



For Normal Thead Engagement, see page 367.



Non-Rising Stem



Outside Screw and Yoke

Dimensions "A", "B", and "C", and the dimensions of the flanges apply to either Non-Rising Stem or Outside Screw and Yoke Valves.

Size		2	2½	3	3½	4	5	6	8
Screwed	A — End to end	5½	6¼	7	7⅛	7½	11	11¼	12⅝
Flanged	B — Face to face, without by-pass	5⅝	6¼	6⅞	7½	8¼	10¾	11⅛	13¼
	C — Inside diameter of port	2	2½	3	3½	4	5	6	8
	D — Diameter of flange	6	7	7½	8½	9	10	11	13½
	E — Thickness of flange	⅝	11/16	¾	13/16	15/16	15/16	1	1⅛
	F — Diameter of bolt circle	4¾	5½	6	7	7½	8½	9½	11¾
	Number of bolts	4	4	4	8	8	8	8	8
	Diameter of bolts	⅝	⅝	⅝	⅝	⅝	¾	¾	¾
Heights	K — Center to top, Non-Rising	12	12½	14	15¼	17¼	19½	21	26
	L — Center to top, O. S. & Y.	14¾	16	19	21¼	23¼	28½	32	41
Wheel	M — Diameter	8	8	9	9	10	12	12	14
Number of turns to open, without gearing		7½	9	10½	12	9	11	13	18

Size		10	12	14	16	18	20	24
Screwed	A — End to end	13⅜	15⅝					
Flanged	B — Face to face, without by-pass	13¾	14⅝	15¾	17	18½	20	24
	C — Inside diameter of port	10	12	14	16	18	20	24
	D — Diameter of flange	16	19	21	23½	25	27½	32
	E — Thickness of flange	13/16	1¼	1⅜	17/16	19/16	111/16	1⅞
	F — Diameter of bolt circle	14¼	17	18¾	21¼	22¾	25	29½
	Number of bolts	12	12	12	16	16	20	20
	Diameter of bolts	⅞	⅞	1	1	1⅛	1⅛	1¼
Heights	K — Center to top, Non-Rising	30	33¾	39¼	44½	48	51¾	63½
	L — Center to top, O. S. & Y.	49¾	57	66¾	75½	83½	93	109¾
Wheel	M — Diameter	16	18	20	22	24	24	30
Number of turns to open, without gearing		22	26	31	35	39	44	52

Dimensions of larger sizes on application

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). The flanges are plain faced, with a smooth finish.

By-passes: Sizes 14-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening.

Gearing: To facilitate operating the valve, sizes 24-inch and larger should be equipped with gears.

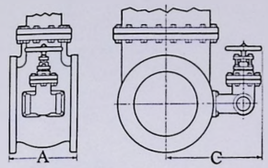
List prices . . . . page 109

Templates for drilling . . . page 370

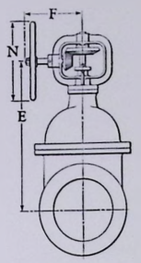
Standard

Iron Body Double Disc Gate Valves

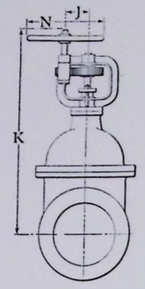
Dimensions, in Inches



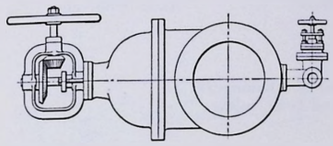
Flanged Valves with Bolted By-Pass

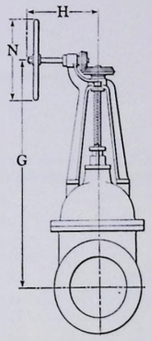


Style U
Bevel Gearing
Non-Rising Stem

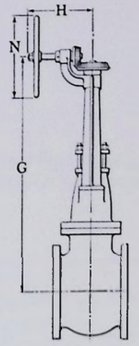


Style S
Spur Gearing
Non-Rising Stem

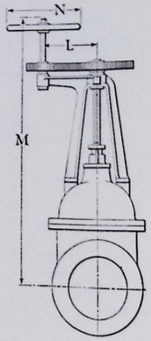

Bevel geared valves with by-pass have the by-pass on the bottom.



Style N
Bevel Gearing
Outside Screw and Yoke



Style O
Bevel Gearing
Outside Screw and Yoke



Style P
Spur Gearing
Outside Screw and Yoke

For dimensions not given, see the preceding page.

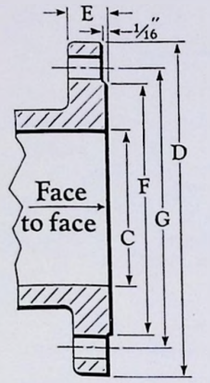
Size			12	14	16	18	20	24
Valves with by-pass		A — Face to face, flanged	18	18½	26½	27	28	32
		Size of by-pass	2	2	3	3	3	4
		C — Center to outside	22	23	25¾	27¼	28½	32½
Bevel Geared Valves	Non-Rising	E — Center to center	31¾	36	41¼	44¾	47½	58¼
		F — Center to top	14½	14¾	19	19½	19½	21
		Number of turns to open	52	62	93	104	117	138
	O. S. & Y.	G — Center to center	44¾	52½	59	64½	71¼	84¾
		H — Center to top	14¾	15	19	20	20	22½
		Number of turns to open	58½	70	87½	97	110	156
Spur Geared Valves	Non-Rising	J — Center to center	6¼	6¼	811/16	811/16	811/16	811/16
		K — Center to top	43	47½	55¼	59	613/4	73
		Number of turns to open	55	65½	95	105	119	140
	O. S. & Y.	L — Center to center	12	12	14¾	14¾	14¾	17¼
		M — Center to top	50½	58½	67½	73¼	80	93½
		Number of turns to open	65	77	102	114	129	140
Wheel for geared valves		N — Diameter	16	18	20	22	22	27

List prices and description . . . pages 109, 117, and 118

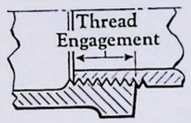
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asbestosclaims.law/library/21275/84

400-Pound W.O.G.
Ferrosteel Double Disc Gate Valves

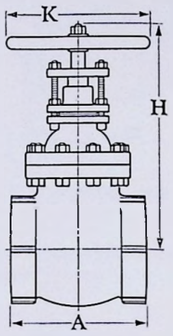
Dimensions, in Inches



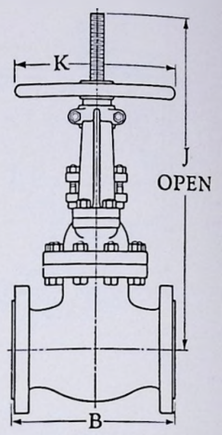
Section through flange



For Normal Thread Engagement, see page 367.



Non-Rising Stem



Outside Screw and Yoke

Dimensions "A", "B", and "C", and the dimensions of the flanges apply to either Non-Rising Stem or Outside Screw and Yoke Valves.

Size		2	2½	3	4	5	6	8	10	12
Screwed	A — End to end	6	6¾	7¼	7⅞	9⅝	10½	11⅞	14	15¾
Flanged	B — Face to face, without by-pass	7¼	8	9¼	9½	12⅛	13	14¼	16¾	17½
	C — Inside diameter of port	2	2½	3	4	5	6	8	10	12
	D — Diameter of flange	6½	7½	8¼	10	11	12½	15	17½	20½
	E — Thickness of flange	⅞	1	1⅛	1¼	1⅜	1 7/16	1⅝	1⅞	2
	F — Diameter of raised face	4 3/16	4 15/16	5 11/16	6 15/16	8 5/16	9 11/16	11 15/16	14 1/16	16 7/16
	G — Diameter of bolt circle	5	5⅞	6⅝	7⅞	9¼	10⅝	13	15¼	17¾
	Number of bolts	8	8	8	8	8	12	12	16	16
	Diameter of bolts	⅝	¾	¾	¾	¾	¾	⅞	1	1⅛
Heights	H — Center to top, Non-Rising	11½	12¼	14	17	19¾	20¾	26	30	33½
	J — Center to top, O. S. & Y.	14½	16	19	24	29	32¼	42	51	58¼
Wheel	K — Diameter	8	8	9	10	12	12	14	16	18
Number of turns to open, without gearing		7	9	10¼	9	11	13	35	42½	51

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

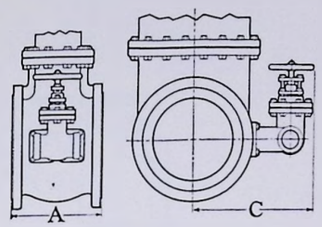
The flanges have a raised face 1/16-inch high. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

By-passes: Sizes 8-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening.

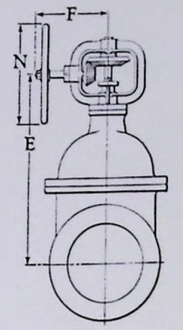
List prices . . . . page 111 *Templates for drilling . . . . page 371* *Special facings . . . . page 353*

400-Pound W.O.G.
Ferrosteel Double Disc Gate Valves

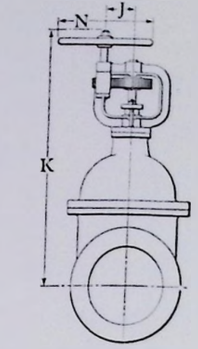
Dimensions, in Inches



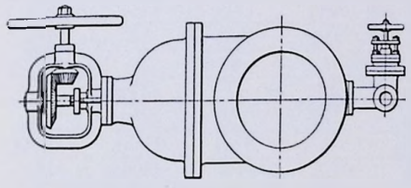
Flanged Valves with Bolted By-Pass

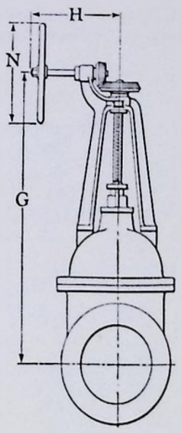


Style U
Bevel Gearing
Non-Rising Stem

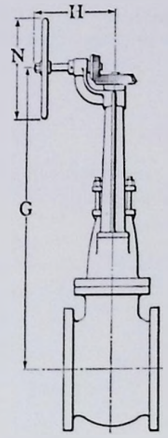


Style S
Spur Gearing
Non-Rising Stem

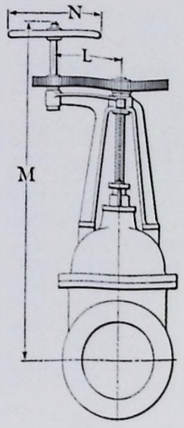

Bevel geared valves with by-pass have the by-pass on the bottom.



Style N
Bevel Gearing
Outside Screw and Yoke



Style O
Bevel Gearing
Outside Screw and Yoke



Style P
Spur Gearing
Outside Screw and Yoke

For dimensions not given, see the preceding page.

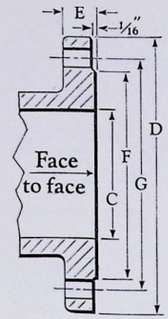
Size			6	8	10	12
Valves with by-pass		Size of by-pass	1¼	1½	1½	2
		A — Face to face	Dimensions on application			
		C — Center to outside				
Bevel Geared Valves	Non-Rising	E — Center to center			28¼	31¾
		F — Center to top			14¼	14½
		Number of turns to open			85	102
	O. S. & Y.	G — Center to center			41¼	46¼
		H — Center to top			14	14¾
		Number of turns to open			96	110
Spur Geared Valves	Non-Rising	J — Center to center			6¼	6¼
		K — Center to top			39½	43
		Number of turns to open			90	108
	O. S. & Y.	L — Center to center			12	12
		M — Center to top			47	52¼
		Number of turns to open			96	110
Wheel for geared valves		N — Diameter			14	16

List prices and description . . . . pages 111, 117, and 118

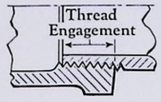
Published by AsbestosClaims.Law
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500-Pound W.O.G.
Ferrosteel Double Disc Gate Valves

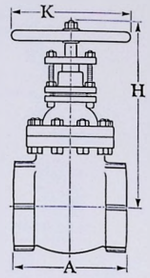
Dimensions, in Inches



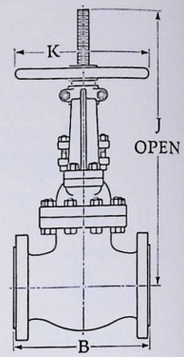
Section through flange



For Normal Thread Engagement, see page 367.



Non-Rising Stem



Outside Screw and Yoke

Dimensions "A", "B", and "C", and the dimensions of the flanges apply to either Non-Rising Stem or Outside Screw and Yoke Valves.

Size		2	2½	3	4	5	6	8
Screwed	A — End to end	8	8⅞	9⅝	10½	12⅛	13¼	15¼
Flanged	B — Face to face, without by-pass	7¼	8	9¼	9½	12⅛	13	14¼
	C — Inside diameter of port	2	2½	3	4	5	6	8
	D — Diameter of flange	6½	7½	8¼	10	11	12½	15
	E — Thickness of flange	⅞	1	1⅛	1¼	1⅜	1 7/16	1⅝
	F — Diameter of raised face	4 3/16	4 15/16	5 11/16	6 15/16	8 5/16	9 11/16	11 15/16
	G — Diameter of bolt circle	5	5⅞	6⅝	7⅞	9¼	10⅝	13
	Number of bolts	8	8	8	8	8	12	12
	Diameter of bolts	⅝	¾	¾	¾	¾	¾	⅞
Heights	H — Center to top, Non-Rising	12½	14½	15¼	17¾	21¼	22¾	28
	J — Center to top, O. S. & Y.	17	18¾	21	25¼	30	34	42¾
Wheel	K — Diameter	9	9	10	12	14	16	20
Number of turns to open, without gearing		15	18	15	19	25	28	36

Size		10	12	14	16	18	20	24
Screwed	A — End to end	17¾	19					
Flanged	B — Face to face, without by-pass	16¾	17½	22½	24	26	28	31
	C — Inside diameter of port	10	12	13¼	15¼	17	19	23
	D — Diameter of flange	17½	20½	23	25½	28	30½	36
	E — Thickness of flange	1⅞	2	2⅛	2¼	2⅜	2½	2¾
	F — Diameter of raised face	14 1/16	16 7/16	18 5/16	21 1/16	23 5/16	25 9/16	30 5/16
	G — Diameter of bolt circle	15¼	17¾	20¼	22½	24¾	27	32
	Number of bolts	16	16	20	20	24	24	24
	Diameter of bolts	1	1⅛	1⅛	1¼	1¼	1¼	1½
Heights	H — Center to top, Non-Rising	35	39	40¼	45½	49½	56	64
	J — Center to top, O. S. & Y.	53¼	61	69	75¾	83½	94	112½
Wheel	K — Diameter	22	24	24	27	30	30	36
Number of turns to open, without gearing		46	52	52	60	67	74	89

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

The flanges have a raised face 1/16-inch high. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

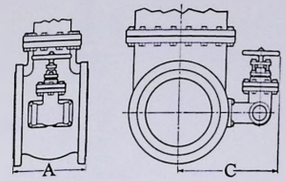
By-passes: Sizes 6-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening.

Gearing: To facilitate operating the valve, sizes 14-inch and larger should be equipped with gears.

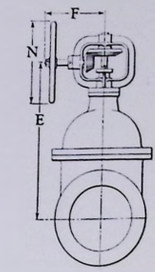
List prices . . . page 113 *Templates for drilling . . . page 371* *Special facings . . . page 353*

500-Pound W.O.G.
Ferrosteel Double Disc Gate Valves

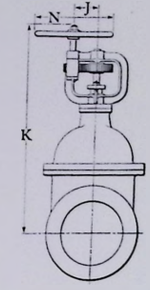
Dimensions, in Inches



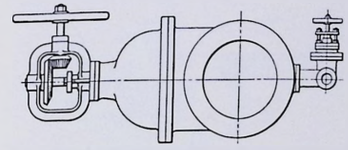
Flanged Valves with Bolted By-Pass

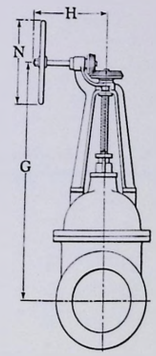


Style U Bevel Gearing Non-Rising Stem

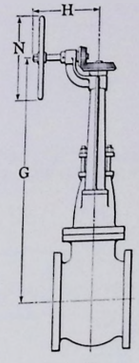


Style S Spur Gearing Non-Rising Stem

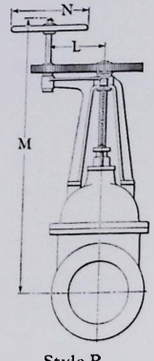

Bevel geared valves with by-pass have the by-pass on the bottom.



Style N Bevel Gearing Outside Screw and Yoke



Style O Bevel Gearing Outside Screw and Yoke



Style P Spur Gearing Outside Screw and Yoke

For dimensions not given, see the preceding page.

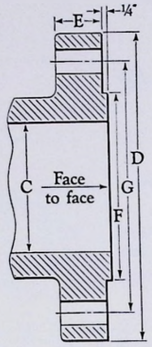
Size			6	8	10	12	14	16	18	20	24
Valves with by-pass		Size of by-pass	1¼	1½	1½	2	2	3	3	3	4
		A — Face to face	Dimensions on application								
		C — Center to outside									
Bevel Geared Valves	Non-Rising	E — Center to center	25¼	29½	33¼	34¾	39¼	42¾	48¾	56¼
		F — Center to top	14¾	18¼	19¾	19¾	20	21	21	21¾
		Number of turns to open	70	86	104	104	155	174	193	232
	O. S. & Y.	G — Center to center	34½	42½	47¾	54¼	59¼	65	73½	86½
		H — Center to top	15	19	20	20	22¼	23	23	24
		Number of turns to open	87½	107	130	130	175	197	220	262
Spur Geared Valves	Non-Rising	J — Center to center	6¼	6¼	6¼	6¼	8 11/16	8 11/16	8 11/16	8 11/16
		K — Center to top	37	42¼	46½	47¾	53¾	57¾	63¾	71½
		Number of turns to open	74	91	110	143	162	182	200	301
	O. S. & Y.	L — Center to center	12	14¾	14¾	14¾	17¼	19	19	22½
		M — Center to top	40¾	51¼	56¾	63¼	68	74	82½	98½
		Number of turns to open	87½	126	152	152	158	197	220	272
Wheel for geared valves		N — Diameter	18	20	22	22	24	27	27	30

List prices and description . . . . pages 113, 117, and 118

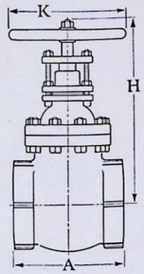
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800-Pound W.O.G.
Ferrosteel Double Disc Gate Valves

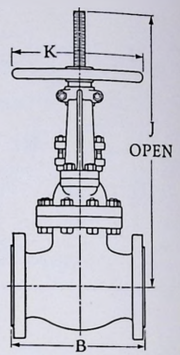
Dimensions, in Inches



Section through flange



Non-Rising Stem



Outside Screw and Yoke

Dimensions "A", "B", and "C", and the dimensions of the flanges apply to either Non-Rising Stem or Outside Screw and Yoke Valves.

Size		2½	3	4	5	6	8	10	12
Screwed	A — End to end	8⅞	9⅝	10½	13¾	14¾	19	23⅝	27¼
Flanged	B — Face to face, without by-pass		14	17		22	26	31	33
	C — Inside diameter of port		3	4		6	7⅞	9¾	11¾
	D — Diameter of flange		8¼	10¾		14	16½	20	22
	E — Thickness of flange		1½	1⅞		2¼	2½	2⅞	3
	F — Diameter of male face		5	6³⁄₁₆		8½	10⅝	12¾	15
	G — Diameter of bolt circle		6⅝	8½		11½	13¾	17	19¼
	Number of bolts		8	8		12	12	16	20
	Diameter of bolts		¾	⅞		1	1⅛	1¼	1¼
Heights	H — Center to top, Non-Rising	15	16¾	18¾	21¼	23¾	29¼	36¼	39¾
	J — Center to top, O. S. & Y.	18½	20¾	26½		34¼	43	53½	61
Wheel	K — Diameter	9	10	12	14	16	20	22	24
Number of turns to open, without gearing		18	15	19	23	28	36	46	56

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 800-Pound Hydraulic American Cast Iron Flange Standard (B16b1-1931).

The valves are regularly furnished with a ¼-inch male face (large male) on the end flanges. The male face is finished with concentric grooves approximately 16 grooves per inch, known as a "serrated" finish.

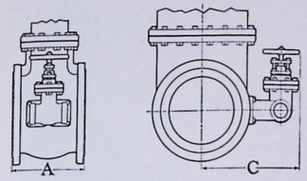
By-passes: Sizes 6-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening.

Gearing: To facilitate operating the valve, sizes 10-inch and larger should be equipped with gears.

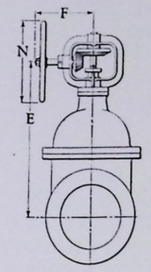
List prices . . . page 115 *Templates for drilling . . . page 371* *Special facings . . . page 353*

800-Pound W.O.G.
Ferrosteel Double Disc Gate Valves

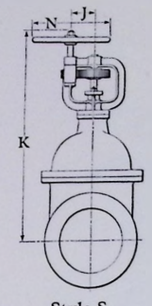
Dimensions, in Inches



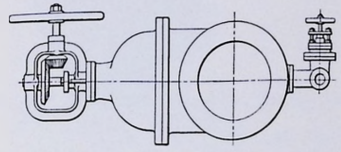
Flanged Valves with Bolted By-Pass

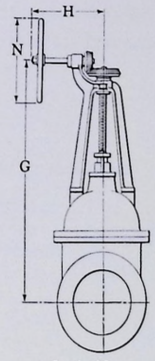


Style U
Bevel Gearing
Non-Rising Stem

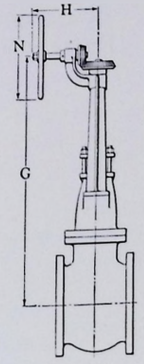


Style S
Spur Gearing
Non-Rising Stem

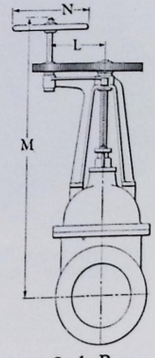

Bevel geared valves with by-pass have the by-pass on the bottom.



Style N
Bevel Gearing
Outside Screw and Yoke



Style O
Bevel Gearing
Outside Screw and Yoke



Style P
Spur Gearing
Outside Screw and Yoke

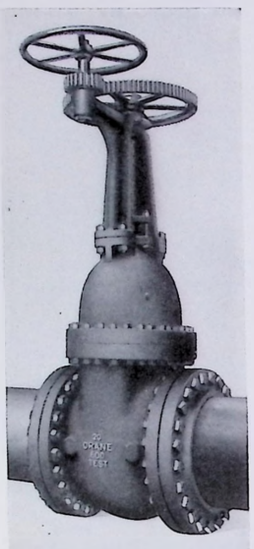
For dimensions not given, see the preceding page.

Size			6	8	10	12
Valves with by-pass		Size of by-pass	1¼	1½	1½	2
		A — Face to face	Dimensions on application			
		C — Center to outside				
Bevel Geared Valves	Non-Rising	E — Center to center	20¼	26¼	30¾	34¼
		F — Center to top	12¼	14¾	18¼	19¾
		Number of turns to open	46½	72	92	120
	O. S. & Y.	G — Center to center	28¼	34½	42¾	48
		H — Center to top	14	15	19	20
		Number of turns to open	63	90	130	164
Spur Geared Valves	Non-Rising	J — Center to center	5⁹⁄₁₆	6¼	6¼	6¼
		K — Center to top	29¼	37¾	43½	47¼
		Number of turns to open	46½	76	97½	119
	O. S. & Y.	L — Center to center	10	12	14¾	14¾
		M — Center to top	32	41	51¼	57
		Number of turns to open	63	81	115	140
Wheel for geared valves		N — Diameter	14	18	20	22

List prices and description . . . pages 115, 117, and 118

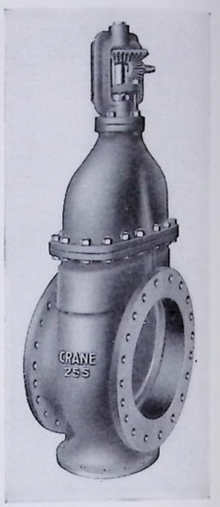
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Special Iron Body Double Disc Gate Valves

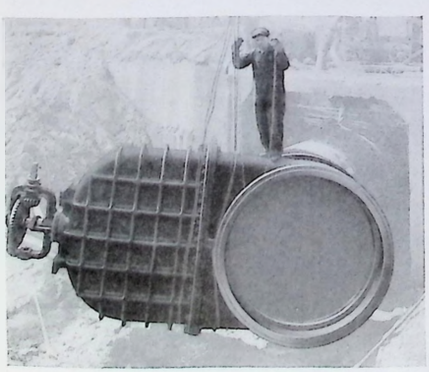


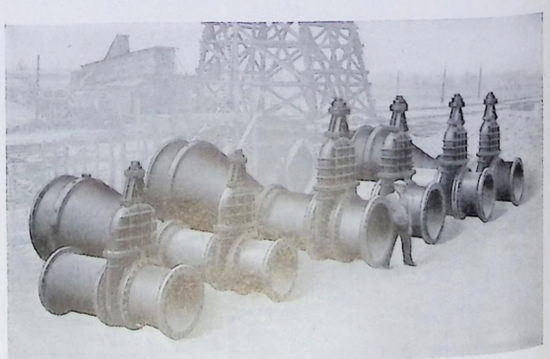
20-Inch Spur Geared Valve
600 Pounds Test

Crane Co. is well equipped to build special Iron Body Double Disc Gate Valves for unusual installations. A few typical illustrations are shown on this page. Prices will be quoted on application.



Low Pressure Valve
With Bottom Outlet
For Turbine Exhaust





Large Special Double Disc Valves in Water Installations

Iron Body Globe, Angle, Cross, Check, and Foot Valves

The Crane line of Iron Body Globe, Angle, Cross, Check, and Foot Valves is illustrated on pages 140 to 158 inclusive. A liberal variety of sizes and types are included in each pressure classification, assuring an adequate selection for every service requirement.

Iron Body Globe, Angle, and Cross Valves

150-Pound Globe and Angle Valves ..... page 140
400-Pound W.O.G. Malleable Iron Globe and Angle Valves ..... page 141
Standard Brass Mounted Globe and Angle Valves ..... page 142
Standard Globe, Angle, and Cross Valves ..... pages 144 and 145
175-Pound Globe, Angle, and Cross Valves ..... page 146
250-Pound Globe, Angle, and Cross Valves ..... page 147
Dimensions — Standard, 175-Pound, and 250-Pound Valves ..... pages 148 and 149

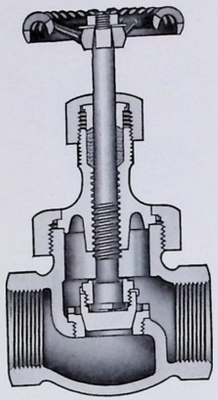
Iron Body Check and Foot Valves

150-Pound Horizontal and Angle Check Valves ..... page 150
400-Pound W.O.G. Malleable Iron Swing Check Valves ..... page 150
Standard Horizontal and Vertical Check Valves ..... page 151
Standard Swing Check Valves ..... pages 152 and 153
Standard Clearway Swing Check Valves, Underwriters' Pattern ..... page 156
250-Pound Swing Check Valves ..... page 157
800-Pound Swing Check Valves ..... page 158
Swing Check Valves with Outside Lever and Weight ..... page 155
Foot Valves ..... pages 154 and 155

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150-Pound
Iron Body Globe and Angle Valves
Plug Type or Cranite Composition Disc

WORKING PRESSURES
150 pounds steam
250 pounds cold water, oil, or gas, non-shock



Cross Section
*No. 314 P, Globe
Plug Type Disc

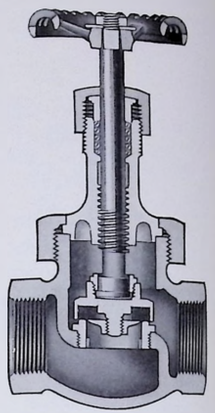


Globe Valve
Screwed
*No. 314 P, Plug Type Disc
No. 350½ C, Cranite Disc



Angle Valve
Screwed
*No. 316 P, Plug Type Disc
No. 352½ C, Cranite Disc

*2½ and 3-inch sizes have bolted bonnet.



Cross Section
No. 350½ C, Globe
Cranite Composition Disc

List Prices

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 314 P or No. 316 P, with Plug Type Disc	Each	1.10	1.25	1.60	2.20	2.80	4.00	5.50	8.75	12.00	16.50
No. 350½ C or No. 352½ C, with Cranite Disc	Each	1.10	1.25	1.60	2.20	2.80	4.00	5.50	8.75		

For list prices of Composition Discs for No. 350½ C or No. 352½ C Valves, see page 168.
For wrenches for removing body seat rings, see page 169.

Service recommendations: These are compact and ruggedly constructed valves. They are recommended for small lines carrying steam, hot water, cold water, oil, gas, and similar fluids. The No. 314 P and No. 316 P Valves are ideally suited for severe service, such as for throttling. The No. 350½ C and No. 352½ C Valves are especially suitable for service where discs must be frequently renewed.

Construction and materials: The valves have cast iron bodies and brass union bonnets, except the 2½ and 3-inch plug disc valves, which have cast iron bonnets similar to the No. 350 Valves shown on page 144. The valves have renewable brass body seat rings. Stems, plug type discs, and disc holders are brass. Union bonnet rings are malleable iron.

On union bonnet valves, the union ring provides a strong joint and facilitates dismantling. Bolted bonnet valves have a yoke-type bonnet, bringing the stem threads outside and providing a rugged body-bonnet connection that can be easily taken apart.

No. 314 P and No. 316 P: The plug type disc and seat used in these valves is ideal for severe service. The wide seat bearing is unusually resistant to wire-drawing and foreign matter. The tapered disc permits easy flow regulation when throttling.

No. 350½ C and No. 352½ C: Unless otherwise ordered, these valves are equipped with a No. 4 Cranite Disc, suitable for high-pressure steam.

When ordered for hot water, oil, gas, or gasoline, they are furnished with a No. 2 Hot Water Disc. When ordered for cold water or air, they are furnished with a No. 3 Cold Water Disc. For description and dimensions of discs, see page 168.

Stuffing box: The stuffing box on all of these valves is fitted with a gland and is filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

A metal plate, secured to the valve by the wheel nut, identifies the type of disc.

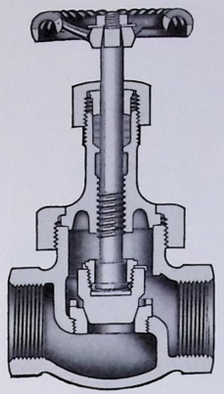
Dimensions, in Inches

Size			¼	⅜	½	¾	1	1¼	1½	2	2½	3
End to end, Globe			2⅜	2⅝	3	3½	4⅛	4⅝	5¼	6⅜	7	8
Center to end, Angle			1⅛	1¼	1⅜	1⁹⁄₁₆	1⅞	2³⁄₁₆	2⅜	3	3½	4
Center to top of wheel, open	Globe	No. 314 P	4⅛	4⅝	5¼	6	6⅞	7¼	8¼	9½	12¼	14
		No. 350½ C	4½	4⅝	5⅜	6⅛	7⅛	7⅞	8¾	10		
	Angle	No. 316 P	4	4½	5⅛	6	6⅞	7¼	8⅛	9½	12¼	13¾
		No. 352½ C	4⅜	4½	5¼	6	7	7¾	8⅝	10		
Diameter of wheel			1¾	2¹⁄₁₆	2⁹⁄₁₆	2¾	3¹⁄₁₆	3⅝	4¹⁄₁₆	4¾	8	9

400-Pound W.O.G.
Malleable Iron Globe and Angle Valves
Plug Type Disc

WORKING PRESSURES
No. 254 P, No. 255 P, No. 256 P, and No. 257 P
250 pounds steam, 550° F.
400 pounds cold water, oil, or gas, non-shock
No. 346 P and No. 347 P
250 pounds oil, 550° F.
400 pounds cold water, oil, or gas, non-shock

Air Tested



Cross Section
Globe
No. 254 P
with Exelloy Stem
No. 255 P
with Steel Stem



Globe
Screwed
No. 254 P
Exelloy Stem
No. 255 P
Steel Stem



Angle
Screwed
No. 256 P
Exelloy Stem
No. 257 P
Steel Stem

Nickel Alloy Plug Type Disc and Exelloy Renewable Seat
Union Bonnet

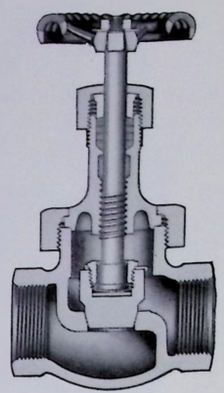


Globe
Screwed
No. 346 P
Steel Stem



Angle
Screwed
No. 347 P
Steel Stem

All-Iron with Iron Plug Type Disc and Integral Seat
Union Bonnet



Cross Section
Globe
No. 346 P
with Steel Stem

List Prices

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2
No. 254 P, No. 255 P, No. 256 P, or No. 257 P	Each	5.40	5.70	6.50	7.60	9.75	13.00	18.00	26.50
No. 346 P or No. 347 P	Each	1.10	1.25	1.60	2.20	2.80	4.00	5.50	8.75

For wrenches for removing seat rings in Nos. 254 P, 255 P, 256 P, or 257 P Valves, see page 169.

Service recommendations: These valves are exceptionally strong, compact, and rugged. The plug type disc and seat is ideal for severe service. The tapered disc permits easy flow regulation when throttling, and the wide seat bearing is unusually resistant to wiredrawing and to foreign matter.

No. 254 P line: The No. 254 P, No. 255 P, No. 256 P, and No. 257 P Valves are equipped with a Crane Nickel Alloy disc and an Exelloy renewable seat ring. These metals are a superior combination, offering excellent resistance to wear, temperature, and galling; they are harder, tougher, and stronger than metals ordinarily used in iron valves.

The No. 254 P and No. 256 P Valves have an Exelloy stem; the No. 255 P and No. 257 P, a steel stem, nickel-plated.

No. 346 P line: The No. 346 P and No. 347 P Valves have an iron disc, an integral seat, and a nickel-plated steel stem. They are especially suitable for oil lines where fire hazard legislates against the use of cast iron, and for corrosive services where all-iron valves are satisfactory but where a material stronger than cast iron is desired.

Malleable iron: The bodies, bonnets, and union bonnet rings are made of a good grade malleable iron. It is exceptionally strong, tough, and durable, providing a very liberal safety factor.

Union bonnet: The valves are made with the practical and serviceable union bonnet. It maintains a strong, tight joint, yet it can be easily dismantled and reassembled.

Stuffing box: The stuffing box is unusually deep; it has a gland and is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

Dimensions, in Inches

Size	¼	⅜	½	¾	1	1¼	1½	2
End to end, Globe	2⅜	2⅝	3	3½	4⅛	4⅝	5¼	6⅜
Center to end, Angle	1⅛	1¼	1⅜	1⁹⁄₁₆	1⅞	2³⁄₁₆	2⅜	3
Center to top of wheel, open, Globe or Angle	4⅜	4⅝	5¼	6⅛	6⅞	7⅝	8⅝	9⅞
Diameter of wheel	1¾	2¹⁄₁₆	2⁹⁄₁₆	2¾	3¹⁄₁₆	3⅝	4¹⁄₁₆	4¾

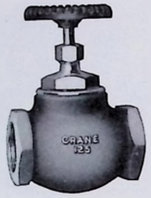
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Standard — Brass Mounted
Iron Body Globe and Angle Valves
Brass Disc or Composition Disc

WORKING PRESSURE
125 pounds steam

TEST PRESSURES

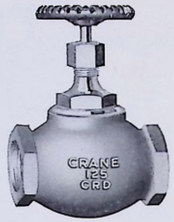
Brass Disc Valves	Composition Disc Valves
Shell test — 300 pounds hydrostatic	Shell test — 300 pounds hydrostatic
Seat test — 225 pounds hydrostatic	Seat test — 125 pounds steam



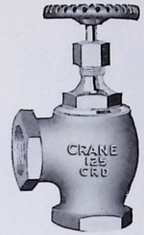
Brass Disc
No. 354, Globe
Screwed



Brass Disc
No. 356, Angle
Screwed



Composition Disc
No. 360, Globe
Screwed



Composition Disc
No. 360, Angle
Screwed

When ordering No. 360 Valves, specify whether globe or angle valves are wanted.

List Prices

Size	Inches	2	2½	3
No. 354, Globe, or No. 356, Angle, with Brass Disc	Each	5.40	7.35	9.80
No. 360, Globe or Angle, with Composition Disc	Each	7.25	11.00	16.00

For list prices of Composition Discs for No. 360 Valves, see page 168.

Construction: These valves are well proportioned and are sturdily constructed. Bodies are made of cast iron. Bonnets are made of brass and are screwed into the body; the stem threads are on the inside. Stems, body seat rings, and discs or disc holders also are made of brass.

The disc or disc holder swivels on the stem. It is securely fastened to the stem with a disc stem ring and is locked with a lock washer.

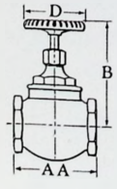
No. 354 and No. 356 Valves: The No. 354 and No. 356 Valves have a solid brass disc. They are recommended for general service on steam, water, oil, or gas lines.

No. 360 Valves: The No. 360 Globe and Angle Valves, being equipped with a composition disc, are suitable for a wide range of service. They are recommended for lines carrying steam, water, oil, air, gas, gasoline, or similar fluids.

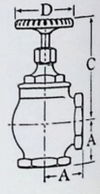
Unless otherwise ordered, No. 360 Valves are furnished with a No. 1 Steam Disc, suitable for steam service. When ordered for hot water, oil, gas, or gasoline, they are furnished with a No. 2 Hot Water Disc. When ordered for cold water or air, they are furnished with a No. 3 Cold Water Disc. For description and dimensions of discs, see page 168.

Repacking: All of the valves shown on this page, when wide open, can be repacked while under pressure.

Dimensions, in Inches

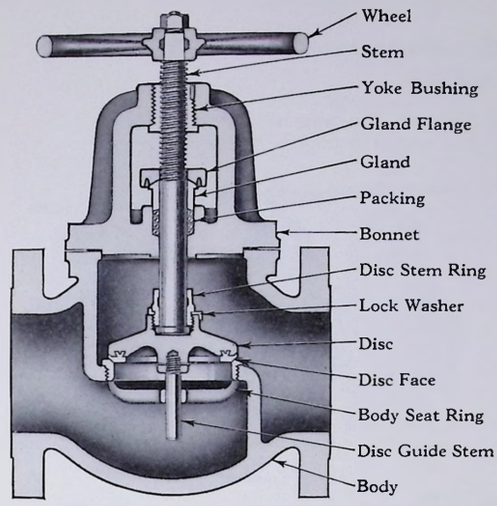


Size		2	2½	3
Brass Disc No. 354 and No. 356	AA—End to end, Globe	6½	7	8
	A—Center to end, Angle	3¼	3½	4
	B—Center to top, open, Globe	7¾	9	10
	C—Center to top, open, Angle	7	8¼	9¼
	D—Diameter of wheel	4 1/16	5⅜	6
Composition Disc No. 360	AA—End to end, Globe	6½	8	8¼
	A—Center to end, Angle	3¼	4	4⅛
	B—Center to top, open, Globe	9	10	11¾
	C—Center to top, open, Angle	8¼	9¼	10¾
	D—Diameter of wheel	4¾	5⅜	6

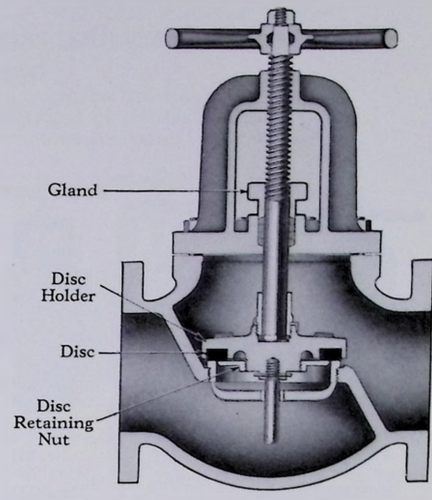


Union Bonnet Iron Body Globe and Angle Valves . . . pages 140 and 141

Iron Body Globe, Angle, and Cross Valves
With Yoke Bonnet



Globe Valve, Brass Trimmed



Globe Valve, with Composition Disc

General Description

Crane Iron Body Globe, Angle, and Cross Valves with yoke bonnet are made in three weights:

Standard Valves . . . . . pages 144 and 145
175-Pound Valves . . . . . page 146
250-Pound Valves . . . . . page 147

All of these valves are similar in construction, differing principally in proportions and in materials. The illustrations appearing above show typical valves. Variations in design are explained on this page; materials are covered in detail on the pages that follow, numbers 144 to 147.

Rugged construction: The valves are well proportioned and are ruggedly constructed. They have amply thick metal sections, and the metal is properly distributed to assure maximum strength.

Bonnet: The bonnet is the yoke type, bringing the stem threads on the outside where they are not affected by the fluid in the line and where they can be easily lubricated when necessary, thereby minimizing wear.

A brass yoke bushing screwed into the top of the bonnet engages the stem threads in Standard Valves sizes 8-inch and larger and in all sizes of 175-Pound and 250-Pound Valves. In Standard Valves sizes 6-inch and smaller, the stem threads engage directly with the iron bonnet.

Disc-stem connection: All of these valves have a swivel disc or disc holder, securely fastened to the stem with a disc stem ring. The connection is locked with a special lock washer.

Guided disc: The disc or disc holder is closely guided throughout its travel by a guide stem operating in the bridge cast integral with the body seat ring. Vibration or rattling of the internal parts is thereby eliminated, and square seating of the disc is assured.

The smaller size valves have the disc guide stem cast integral with the disc or disc holder; the larger sizes have a separate disc guide stem screwed tightly into the disc or disc holder and pinned.

Gland and stuffing box: Standard Brass Trimmed and Composition Disc Valves have either a one-piece cast iron gland or a two-piece gland (consisting of a malleable iron gland flange and a brass gland), depending upon the size of the valve. All sizes of Standard All-Iron Valves have a one-piece cast iron gland.

175-Pound and 250-Pound Valves in all sizes have a malleable iron gland flange and a brass gland.

Stuffing boxes are of liberal depth and are packed with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

Wheel: The wheel has a tapered square hole which fits over the tapered square end of the valve stem. It is held securely in place by a steel nut, yet it can be easily removed.

All wheels 24-inch in diameter and smaller are made of malleable iron. They are unusually strong, and have an oval-shaped rim, affording an easy grip. Wheels that are larger than 24 inches in diameter are made of cast iron.

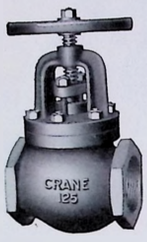
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Standard
Iron Body Globe, Angle, and Cross Valves
Brass Trimmed or All-Iron

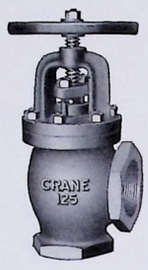
WORKING PRESSURE — 125 pounds steam

TEST PRESSURES

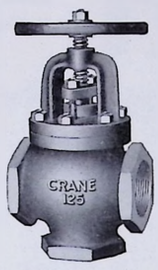
12-inch and smaller	14 and 16-inch
Shell test, **300** pounds hydrostatic	Shell test, **250** pounds hydrostatic
Seat test, **225** pounds hydrostatic	Seat test, **175** pounds hydrostatic



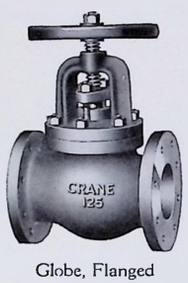
Globe, Screwed
No. 350
Brass Trimmed
No. 350¼
All-Iron



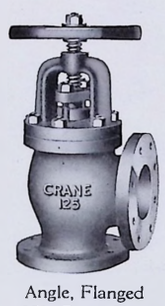
Angle, Screwed
No. 352
Brass Trimmed
No. 352¼
All-Iron



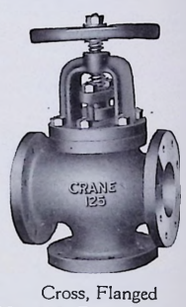
Cross, Screwed
No. 362
Brass Trimmed



Globe, Flanged
No. 351, Brass Trimmed
No. 351¼, All-Iron



Angle, Flanged
No. 353, Brass Trimmed
No. 353¼, All-Iron



Cross, Flanged
No. 363, Brass Trimmed

List Prices, Each

Size		Inches	2	2½	3	3½	4	5	6	8	10	12	14	16
Brass Trimmed	Screwed	No. 350 or No. 352	7.00	9.00	12.50	15.25	19.00	27.00	37.50	72.00				
		No. 362	8.50	11.75	16.25	20.00	23.50	35.25	47.25	92.00				
	Flanged F. & D.	No. 351 or No. 353	8.60	10.75	15.00	18.50	22.50	31.00	42.00	77.00	123.00	187.00	350.00	475.00
		No. 363	11.00	14.50	20.00	25.00	28.50	41.00	54.00	100.00	175.00	265.00		
All-Iron	Screwed	No. 350¼ or No. 352¼	7.00	9.00	12.50		19.00							
	Flanged F. & D.	No. 351¼ or No. 353¼	8.60	10.75	15.00		22.50	31.00	42.00	77.00				

Brass trimmed valves: Brass trimmed valves are recommended for steam or water lines, or for fluids that do not corrode brass or iron.

The valves have cast iron bodies and bonnets. Sizes 6-inch and smaller have a solid brass disc; larger sizes have cast iron discs with a large brass seating face rolled in. All sizes have a brass stem and a brass screwed-in body seat ring.

All-iron valves: All-iron valves are recommended for fluids that corrode brass but not iron. They have cast iron discs and screwed-in Ni-Resist Cast Iron body seat rings. Stems are steel, nickel-plated. Bodies and bonnets are made of cast iron.

Flange dimensions and facing: The dimensions and drilling of end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). Flanges are plain faced, with a smooth finish.

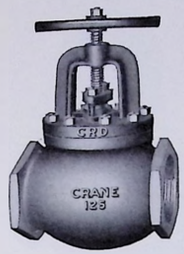
Drilling: List prices of flanged valves include facing and drilling to the 125-Pound American Cast Iron Flange Standard. No deduction is made when valves are ordered "faced only".

Description . . . page 143 *Dimensions . . . page 148* *Templates for drilling . . . page 370*

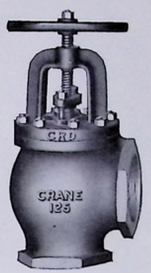
Standard
Iron Body Globe, Angle, and Cross Valves
Composition Disc

WORKING PRESSURE — 125 pounds steam

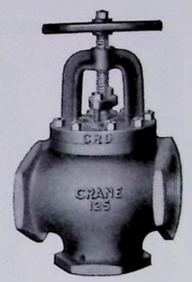
TEST PRESSURES
Shell test — 300 pounds hydrostatic
Seat test — 125 pounds steam



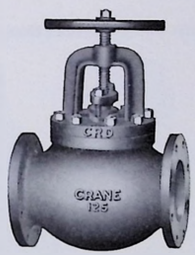
Globe, Screwed
No. 358



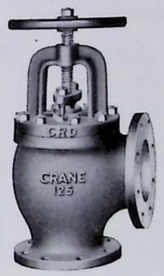
Angle, Screwed
No. 360½



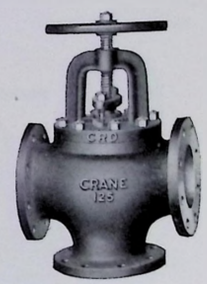
Cross, Screwed
No. 358½



Globe, Flanged
No. 359



Angle, Flanged
No. 361½



Cross, Flanged
No. 359½

List Prices

Size		Inches	2½	3	3½	4	5	6	8	10	12
Screwed	No. 358, Globe, or No. 360½, Angle	Each	12.00	16.75	19.50	24.00	40.00	48.00	90.00		
	No. 358½, Cross	Each	16.00	21.00		30.00	45.00	58.00	100.00		
Flanged F. & D.	No. 359, Globe, or No. 361½, Angle	Each	14.00	18.50	21.50	26.00	42.00	50.00	90.00	130.00	185.00
	No. 359½, Cross	Each	19.00	24.00		33.00	48.00	62.00	100.00	180.00	270.00

For list prices of Composition Discs, see page 168.

Service recommendations: These valves are sturdy and well proportioned. Being equipped with a composition disc, they are suitable for a wide range of service. They will give excellent results on steam or water lines.

Materials: The bodies and bonnets of these valves are made of cast iron. The stems and the body seat rings are made of brass. Disc holders in the 2½ and 3-inch sizes are made of brass; in larger sizes, of cast iron.

Discs: Unless otherwise ordered, the valves are furnished with a No. 1 Steam Disc, suitable for steam service. When ordered for hot water, they are furnished with a No. 2 Hot Water Disc. When ordered for cold water, they are furnished with a No. 3 Cold Water Disc.

For description and dimensions of discs, see page 168.

Flange dimensions and facing: The dimensions and drilling of end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). Flanges are plain faced, with a smooth finish.

Drilling: List prices of flanged valves include facing and drilling to the 125-Pound American Cast Iron Flange Standard. No deduction is made when valves are ordered "faced only".

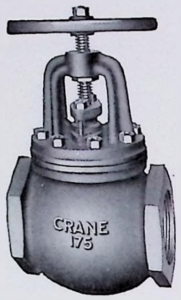
Description . . . page 143 *Dimensions . . . page 148* *Templates for drilling . . . page 370*

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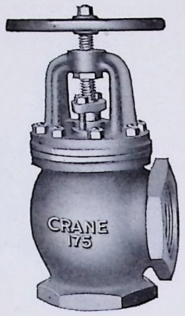
175-Pound
Ferrosteel Body Globe, Angle, and Cross Valves
Brass Trimmed

WORKING PRESSURE — 175 pounds steam

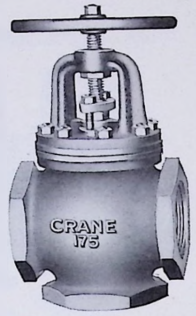
TEST PRESSURES
Shell test — 600 pounds hydrostatic
Seat test — 450 pounds hydrostatic



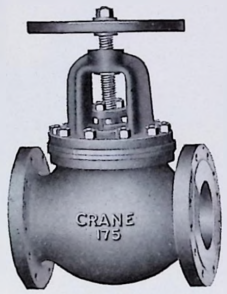
Globe, Screwed
No. 340



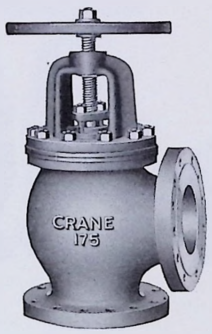
Angle, Screwed
No. 342



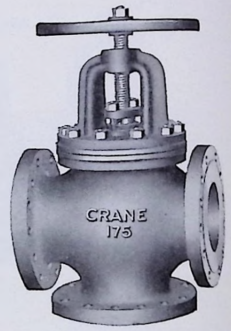
Cross, Screwed
No. 344



Globe, Flanged
No. 341



Angle, Flanged
No. 343



Cross, Flanged
No. 345

List Prices

Size		Inches	2	2½	3	3½	4	5	6	8	10	12
Screwed	No. 340, Globe, or No. 342, Angle	Each	13.00	16.00	20.00	24.00	28.00	42.00	50.00	90.00		
	No. 344, Cross	Each		22.00	27.00	32.00	37.00	54.00	65.00	115.00		
Flanged F. & D.	No. 341, Globe, or No. 343, Angle	Each	15.00	18.00	23.00	28.00	33.00	47.00	55.00	95.00	145.00	200.00
	No. 345, Cross	Each		25.00	31.00	37.00	43.00	60.00	72.00	122.00	195.00	275.00

Service recommendations: These valves are heavier, sturdier, and more rugged than Standard Iron Body Valves. They are designed for services that are more severe than Standard Valves can safely withstand but where the use of 250-Pound Valves is not justified. They are recommended for general service on steam or water lines.

Materials: Bodies are made of Ferrosteel; bonnets are made of cast iron on sizes 6-inch and smaller, and of Ferrosteel on sizes 8-inch and larger. Discs are solid brass on sizes 5-inch and smaller and iron with a large brass seating face rolled in on larger sizes. Body seat rings and stems also are brass.

Flange dimensions and facing: The dimensions and drilling of end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928). Flanges have a 1/16-inch raised face; the raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with male, female, tongue, or groove faces are made to order at an additional price. See page 353 for prices and dimensions.

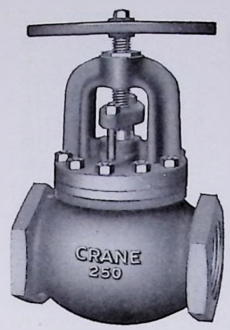
Drilling: List prices of flanged valves include facing and drilling to the 250-Pound American Cast Iron Flange Standard. No deduction is made when valves are ordered "faced only".

Description . . page 143 *Dimensions . . page 149* *Templates for drilling . . page 371* *Special Facings . . page 353*

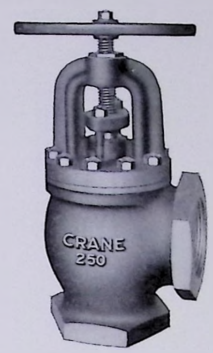
250-Pound
Ferrosteel Globe, Angle, and Cross Valves
Brass Trimmed

WORKING PRESSURE — 250 pounds steam, 500° F.

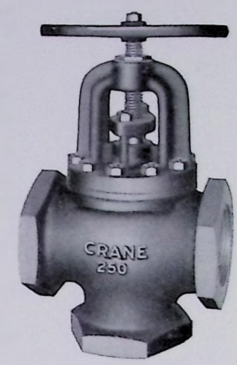
TEST PRESSURES
Shell test — 800 pounds hydrostatic Seat test — 550 pounds hydrostatic



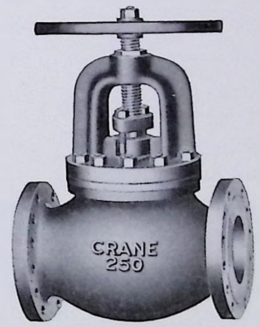
Globe, Screwed
No. 20 E



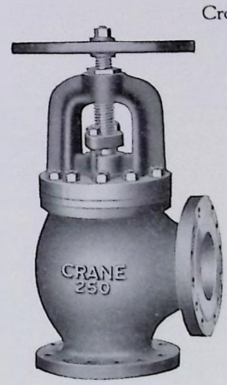
Angle, Screwed
No. 22 E



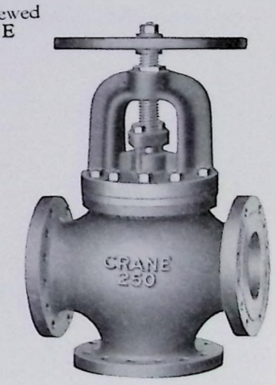
Cross, Screwed
No. 24 E



Globe, Flanged, No. 21 E



Angle, Flanged, No. 23 E



Cross, Flanged, No. 25 E

List Prices

Size		Inches	2	2½	3	3½	4	5	6	8	10
Screwed	No. 20 E, Globe, or No. 22 E, Angle	Each	26.00	33.00	37.00	42.00	46.00	61.00	75.00		
	No. 24 E, Cross	Each	33.00	40.00	45.00	50.00	55.00	75.00	95.00		
Flanged F. & D.	No. 21 E, Globe, or No. 23 E, Angle	Each	27.50	35.00	40.00	45.00	50.00	65.00	80.00	120.00	200.00
	No. 25 E, Cross	Each	35.00	43.00	50.00	55.00	60.00	80.00	100.00	150.00	250.00

Service recommendations: These valves have very heavy metal sections and are unusually rugged. They are recommended for high pressure and severe service on steam or water lines.

Materials: Bodies and bonnets are Ferrosteel. Discs are solid Crane Hard Metal in sizes 3½-inch and smaller, and iron with a large Hard Metal seating face rolled in on larger sizes. Body seat rings, too, are Crane Hard Metal, a strong copper-tin bronze. Stems are brass.

Seat: Sizes 6-inch and smaller have a 45° seat; larger sizes have a flat seat.

Flange dimensions and facing: The dimensions and drilling of end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928). Flanges have a 1/16-inch raised face; the raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with male, female, tongue, or groove faces are made to order at an additional price. See page 353 for prices and dimensions.

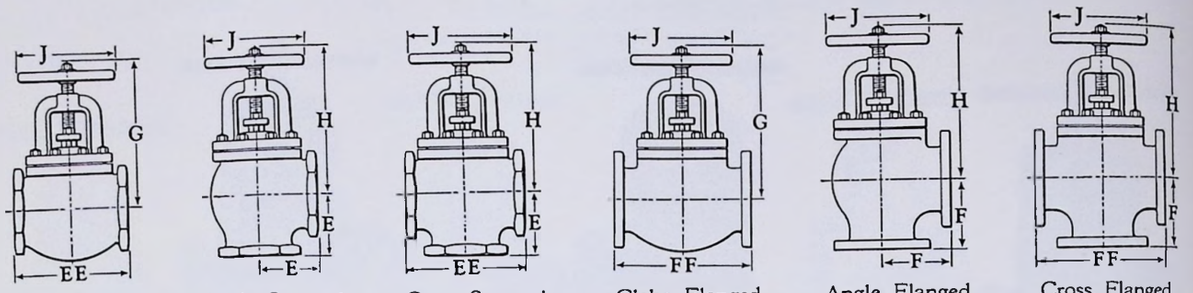
Drilling: List prices of flanged valves include facing and drilling to the 250-Pound American Cast Iron Flange Standard. No deduction is made when valves are ordered "faced only".

Description . . page 143 *Dimensions . . page 149* *Templates for drilling . . page 371* *Special facings . . page 353*

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Standard Iron Body
Globe, Angle, and Cross Valves

Dimensions, in Inches



Globe, Screwed
No. 350
Brass Trimmed
No. 350¼
All-Iron
No. 358
Composition Disc

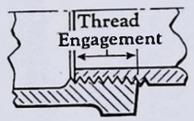
Angle, Screwed
No. 352
Brass Trimmed
No. 352¼
All-Iron
No. 360½
Composition Disc

Cross, Screwed
No. 362
Brass Trimmed
No. 358½
Composition Disc

Globe, Flanged
No. 351
Brass Trimmed
No. 351¼
All-Iron
No. 359
Composition Disc

Angle, Flanged
No. 353
Brass Trimmed
No. 353¼
All-Iron
No. 361½
Composition Disc

Cross, Flanged
No. 363
Brass Trimmed
No. 359½
Composition Disc



For Normal Thread Engagement, see page 367.

Size		2	2½	3	3½	4	5	6	8	10	12	14	16
Brass Trimmed or All-Iron Nos. 350, 351, 352, 353, 362, 363, 350¼, 351¼, 352¼, and 353¼	EE—End to end, Globe or Cross	6½	7	8	9	10	11¼	13	18½				
	E—Center to end, Angle or Cross	3¼	3½	4	4½	5	5⅝	6½	9¼				
	FF—Face to face, Globe or Cross	8	8½	9½	10½	11½	13	14	19½	24½	27½	31	36
	F—Center to face, Angle or Cross	4	4¼	4¾	5¼	5¾	6½	7	9¾	12¼	13¾	15½	18
	G—Center to top, open, Globe	11¼	11¾	13¼	13½	15½	17¼	19½	25¼	30½	33½	38½	42¾
	H—C. to top, open, Angle or Cross	11¼	11¾	13	13½	15	17	19¼	22½	26½	30	33½	37¾
	J—Diameter of wheel	8	8	9	9	10	10	12	16	18	20	24	27
Composition Disc Nos. 358, 358½, 359, 359½, 360½, and 361½	EE—End to end, Globe or Cross		8	8¼	9½	10½	12¼	14	18½				
	E—Center to end, Angle or Cross		4	4⅛	4¾	5¼	6⅛	7	9¼				
	FF—Face to face, Globe or Cross		9½	10	11	12	14	16	19½	24½	27½		
	F—Center to face, Angle or Cross		4¾	5	5½	6	7	8	9¾	12¼	13¾		
	G—Center to top, open, Globe		11	12¾	13½	15½	17¾	19½	24¼	29	33		
	H—C. to top, open, Angle or Cross		10¼	12¼	13½	14½	16¼	19¼	22½	26¼	30¾		
	J—Diameter of wheel		8	9	9	10	10	12	16	18	20		
Flange dimensions	Diameter of flange	6	7	7½	8½	9	10	11	13½	16	19	21	23½
	Thickness of flange	⅝	11/16	¾	13/16	15/16	15/16	1	1⅛	13/16	1¼	1⅜	17/16
	Diameter of bolt circle	4¾	5½	6	7	7½	8½	9½	11¾	14¼	17	18¾	21¼
	Number of bolts	4	4	4	8	8	8	8	8	12	12	12	16
	Diameter of bolts	⅝	⅝	⅝	⅝	⅝	¾	¾	¾	⅞	⅞	1	1

*All-Iron Valves are listed only in sizes 2, 2½, 3, and 4-inch screwed and in sizes 2, 2½, 3, 4, 5, 6, and 8-inch flanged; see page 144.

Flange dimensions and facing: The dimensions and drilling of the end flanges on flanged end valves conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). Flanges are plain faced, with a smooth finish.

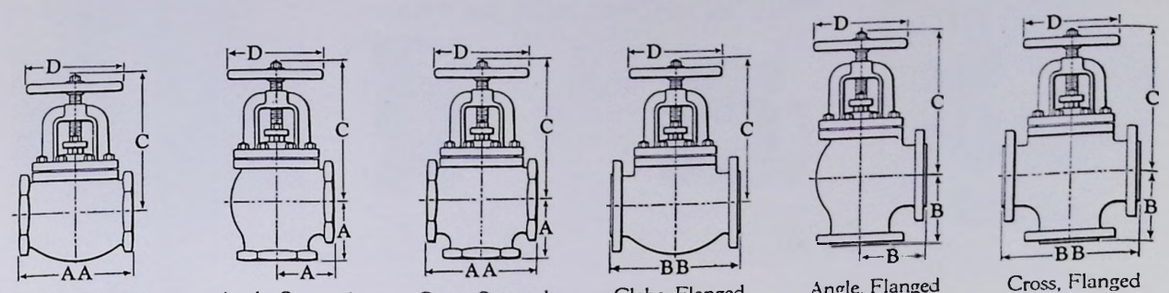
Center to top dimensions: The dimensions given for the distance from the center of the valve to the top are accurate enough to estimate head room but should not be used to figure extension stems.

List prices and description . . . pages 144 and 145

Templates for drilling . . . . page 370

175-Pound Ferrosteel Body and 250-Pound Ferrosteel
Globe, Angle, and Cross Valves

Dimensions, in Inches



Globe, Screwed
No. 340
175-Pound
No. 20 E
250-Pound

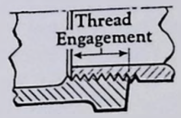
Angle, Screwed
No. 342
175-Pound
No. 22 E
250-Pound

Cross, Screwed
No. 344
175-Pound
No. 24 E
250-Pound

Globe, Flanged
No. 341
175-Pound
No. 21 E
250-Pound

Angle, Flanged
No. 343
175-Pound
No. 23 E
250-Pound

Cross, Flanged
No. 345
175-Pound
No. 25 E
250-Pound



For Normal Thread Engagement, see page 367.

Size		2	2½	3	3½	4	5	6	8	10	12
175-Pound Nos. 340, 341, 342, 343, 344, and 345	AA—End to end, Globe or *Cross	7¾	8	8¼	9½	10½	12¼	14	18½		
	A—Center to end, Angle or *Cross	3⅞	4	4⅛	4¾	5¼	6⅛	7	9¼		
	BB—Face to face, Globe or Cross	9	10	11	12	13	14½	16	20	22½	25½
	B—Center to face, Angle or Cross	4½	5	5½	6	6½	7¼	8	10	11¼	12¾
	C—Center to top, open	11½	12½	14¼	15½	16¼	18¼	20¼	24¾	28½	31¼
	D—Diameter of wheel	8	9	10	10	10	12	14	16	20	20
250-Pound Nos. 20 E, 21 E, 22 E, 23 E, 24 E, and 25 E	AA—End to end, Globe or Cross	9½	10¾	11¾	12¼	13	15	16½			
	A—Center to end, Angle or Cross	4¾	5⅜	5⅞	6⅛	6½	7½	8¼			
	BB—Face to face, Globe or Cross	10½	11½	12½	13¼	14	15¾	17½	21	24½	
	B—Center to face, Angle or Cross	5¼	5¾	6¼	6⅝	7	7⅞	8¾	10½	12¼	
	C—Center to top, open — Globe	13¾	14¾	16¼	17	18¾	21	23½	28¾	33	
	C—Center to top, open — Angle or Cross	13	13¾	15¼	17¼	17½	19½	22	26¼	29¾	
	D—Diameter of wheel	9	10	10	10	12	14	16	20	24	
Flange dimensions	Diameter of flange	6½	7½	8¼	9	10	11	12½	15	17½	20½
	Thickness of flange	⅞	1	1⅛	1 3/16	1¼	1⅜	1 7/16	1⅝	1⅞	2
	Diameter of raised face	4 3/16	4 15/16	5 11/16	6 5/16	6 15/16	8 5/16	9 11/16	11 5/16	14 1/16	16 7/16
	Diameter of bolt circle	5	5⅞	6⅝	7¼	7⅞	9¼	10⅝	13	15¼	17¾
	Number of bolts	8	8	8	8	8	8	12	12	16	16
	Diameter of bolts	⅝	¾	¾	¾	¾	¾	¾	⅞	1	1⅛

*175-Pound Screwed End Cross Valves are not made in the 2-inch size.

Flange dimensions: The dimensions and drilling of end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

Facing: Flanges have a 1/16-inch raised face, finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Face to face, center to face, and thickness of flange dimensions include the 1/16-inch raised face.

Center to top dimensions: The dimensions given for the distance from the center of the valve to the top are accurate enough to estimate head room but should not be used to figure extension stems.

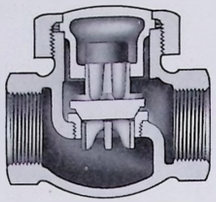
List prices and description . . . . pages 146 and 147

Templates for drilling . . . page 371

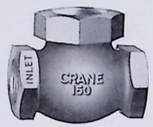
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150-Pound
Iron Body Check Valves
Nickel Alloy or Cranite Composition Disc

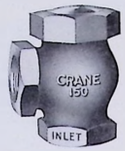
WORKING PRESSURES
150 pounds steam
250 pounds cold water, oil, or gas, non-shock



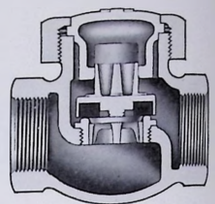
Cross Section
No. 366½, Horizontal
Crane Nickel Alloy Disc
Crane Nickel Alloy Seat



Horizontal, Screwed
No. 366½, Nickel Alloy Disc
No. 366½ C, Cranite Disc



Angle, Screwed
No. 367½, Nickel Alloy Disc
No. 367½ C, Cranite Disc



Cross Section
No. 366½ C, Horizontal
Cranite Composition Disc
Brass Seat

List Prices and Dimensions

Size		Inches	¼	⅜	½	¾	1	1¼	1½	2
No. 366½, No. 367½, No. 366½ C, or No. 367½ C		Each	1.10	1.20	1.30	1.90	2.60	3.60	5.00	7.50
End to end, Horizontal		Inches	2⅜	2⅝	3	3½	4⅛	4⅝	5¼	6⅜
Center to end, Angle		Inches	1⅛	1¼	1⅜	1 9/16	1⅞	2 3/16	2⅜	3
Center to top	Horizontal	Inches	1 7/16	1 9/16	1¾	2 1/16	2 5/16	2 11/16	3	3⅝
	Angle	Inches	1⅜	1½	1 11/16	2	2¼	2 9/16	2⅞	3⅜

For list prices of Composition Discs for No. 366½ C or No. 367½ C Valves, see page 168.

Service recommendations: These check valves are recommended for small lines carrying steam, hot water, cold water, oil, gas, and similar fluids. They are compact and are ruggedly constructed.

Construction: The valves have a union cap, providing a strong, tight joint. The disc or disc holder is guided both at the top and at the bottom, assuring square seating.

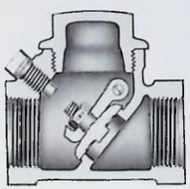
Materials: The body is made of cast iron; the cap is made of Crane Special Brass; and the cap ring, of malleable iron.

The No. 366½ and No. 367½ Valves have a Nickel Alloy disc and body seat ring. Crane Nickel Alloy is hard and offers excellent resistance to wear.

The No. 366½ C and No. 367½ C Valves have a brass disc holder and a brass body seat ring.

Unless otherwise ordered, the Nos. 366½ C and 367½ C Valves are furnished with a No. 4 Cranite Disc, suitable for steam. When ordered for hot water, oil, or gas, they are furnished with a No. 2 Hot Water Disc; when ordered for cold water or air, with a No. 3 Cold Water Disc. For description and dimensions of discs, see page 168.

400-Pound W.O.G.
Malleable Iron Swing Check Valves



Cross Section, No. 346½

WORKING PRESSURES
250 pounds oil, 550° F.
400 pounds cold water, oil, or gas, non-shock

Air tested



No. 346½, Screwed

List Prices and Dimensions

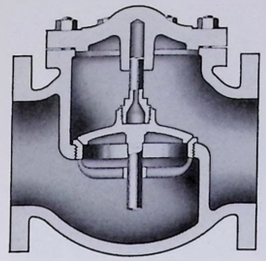
Size	Inches	⅜	½	¾	1	1¼	1½	2
No. 346½, Screwed	Each	1.25	1.60	2.00	2.50	3.50	4.50	6.75
End to end	Inches	2¾	2¾	3 1/16	3⅝	4⅛	4 13/16	5 13/16
Center to top of cap	Inches	1⅞	1⅞	2⅛	2½	2⅞	3⅜	3⅞

Service recommendations: These valves are especially suitable for oil lines where fire hazard legislates against the use of cast iron, and for corrosive services where all-iron valves are satisfactory but where a material stronger than cast iron is desired. The valves are compact and rugged.

Materials: The body, cap, disc, and hinge are made of tough, durable malleable iron. The hinge pin is made of Exelloy.

Regrinding: The valves can be reground without taking the body from the line. By removing the stop plug, a screw driver can be engaged with the slot in the disc spud, making it easy to rotate the disc when regrinding.

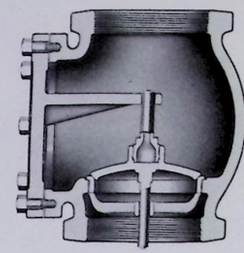
Standard
Iron Body Check Valves
Brass Trimmed



Cross Section
No. 367, Horizontal

WORKING PRESSURE
125 pounds steam

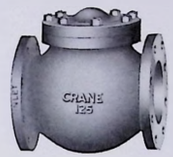
TEST PRESSURES
Shell test — 300 pounds hydrostatic
Seat test — 225 pounds hydrostatic



Cross Section
No. 368, Vertical



No. 366, Horizontal
Screwed



No. 367, Horizontal
Flanged

List prices of flanged valves include facing and drilling to the 125-Pound American Cast Iron Flange Standard. No deduction is made when valves are ordered "faced only".



No. 368, Vertical
Screwed

List Prices

Size		Inches	2	2½	3	4	5	6	8
Horizontal	No. 366, Screwed	Each	3.60	6.50	8.90	14.25	22.00	30.00	
	No. 367, Flanged, F. & D.	Each			11.50	18.00	26.00	35.00	62.00
Vertical	No. 368, Screwed	Each		9.50	12.50	21.00	33.00	40.00	

Service recommendations: These horizontal and vertical check valves are recommended for general service on steam lines.

Construction: The valves are rugged and well proportioned. The disc is accurately guided both at the top and bottom, assuring square seating. The body seat ring is screwed into the body.

Horizontal check valves: The No. 366 and No. 367 Horizontal Check Valves have a brass screwed-in cap on sizes 3-inch and smaller and an iron bolted cap on larger sizes. Sizes 6-inch and smaller have a solid brass disc; the 8-inch size has an iron disc with a brass seating face. All sizes have a brass body seat ring.

Vertical check valves: The No. 368 Vertical Check Valves have an iron bolted cap, a solid brass disc, and a brass body seat ring.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). The flanges are plain faced, with a smooth finish.

Larger sizes: When larger size check valves are wanted, we recommend the use of the swing check valves shown on page 153.

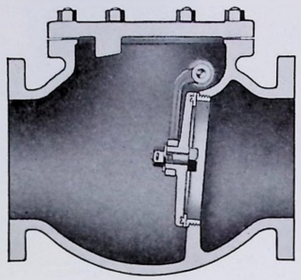
Dimensions, in Inches

Size			2	2½	3	4	5	6	8
Horizontal	Screwed	End to end	6½	7	8	10	11¼	13	
	Flanged	Face to face			9½	11½	13	14	19½
		Diameter of flange			7½	9	10	11	13½
		Thickness of flange			¾	15/16	15/16	1	1⅛
		Diameter of bolt circle			6	7½	8½	9½	11¾
		Number of bolts			4	8	8	8	8
		Diameter of bolts			⅝	⅝	¾	¾	¾
	Center to top of valve		3½	4¼	5	6¼	7	8¼	11¼
Vertical	End to end, Screwed			7	8	10	11¼	13	
	Center to outside of cap screws			4¼	5	6	7	7¾	

Templates for drilling . . . page 370 *Normal thread engagement . . . . . page 367*

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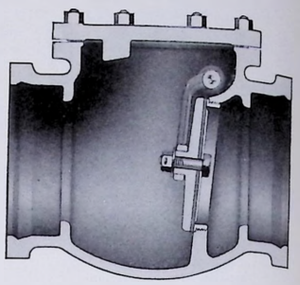
Standard
Iron Body Swing Check Valves
Brass Trimmed or All-Iron



Cross Section
No. 373, Flanged
Brass Trimmed

Brass Trimmed Valves
No. 372, Screwed
No. 373, Flanged
No. 374¼, Hub Ends

All-Iron Valves
No. 372½, Screwed
No. 373½, Flanged



Cross Section
Hub End Valve
Made special with
Leather Faced Disc

These valves may be used either in a horizontal position or in a vertical position for upward flow.

Brass trimmed valves: Brass trimmed valves are recommended for steam or water, or for fluids that do not corrode brass.

Unless otherwise ordered, No. 372, No. 373, and No. 374¼ brass trimmed valves are furnished with a brass or brass faced disc. Sizes 3-inch and smaller have a solid brass disc; large sizes have a cast iron disc with a brass seating face.

The body seat ring is brass and is screwed into the body.

All-iron valves: All-iron valves are recommended for gas, or for fluids that corrode brass but not iron.

The seating surfaces are cast integral with the body and disc. Valves with screwed-in body seat rings can be supplied when ordered; prices on application.

Leather disc: When so ordered, any of the brass trimmed valves can be furnished with a leather faced disc. The table of list prices shown on the opposite page includes the extra charge for leather faced discs.

Leather faced disc valves are recommended only for cold water lines.

Construction: Standard Iron Body Swing Check Valves are well proportioned and are sturdily constructed. The bodies are oval or globular in shape, providing an ample flow area around the disc when the valve is wide open. Sizes 8-inch and larger have the hinge suspended in the body as shown in the cross section. Smaller sizes have the hinge suspended from the cap (not illustrated).

The valves are designed so that the disc cannot stick in the open position.

Hub end valves: The hubs on hub end valves are suitable for Class "D" cast iron pipe.

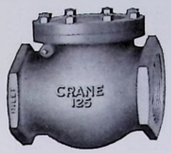
By-passes: Extra list prices for by-passes on sizes 12-inch and larger are shown on the opposite page. By-passes are the "bolted" type, made with a brass trimmed iron wedge gate valve having a non-rising stem.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 125-Pound Cast Iron Flange Standard (B16a-1928). The flanges are plain faced, with a smooth finish.

Size of Valve	Working pressures			Hydrostatic test pressures	
	Screwed or flanged valves		Hub end valves	Screwed, flanged, or hub end valves	
	Saturated steam	Cold water, oil, or gas, non-shock	Cold water or gas non-shock	Shell test	Seat test
2 to 12-inch	125 pounds	200 pounds	200 pounds	300 pounds	225 pounds
14 and 16-inch	125 pounds	150 pounds	150 pounds	250 pounds	175 pounds
18 to 24-inch		150 pounds	150 pounds	250 pounds	175 pounds
30-inch		120 pounds		200 pounds	150 pounds

Standard
Iron Body Swing Check Valves
Brass Trimmed or All-Iron

For working pressures, see the preceding page.



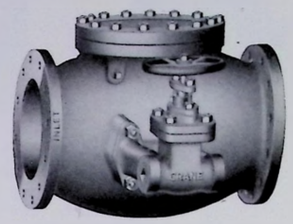
Screwed
No. 372, Brass Trimmed
No. 372½, All-Iron



Flanged
No. 373, Brass Trimmed
No. 373½, All-Iron



Hub Ends
No. 374¼, Brass Trimmed



No. 373 Check Valve
with Bolted By-Pass

The list prices of flanged valves include facing and drilling to the 125-Pound American Cast Iron Flange Standard. No deduction is made when valves are ordered "faced only".

List Prices

Size	Brass Trimmed Valves			All-Iron Valves		Extra for Leather Faced Disc for No. 372, No. 373, or No. 374¼ Valves	Extra for Bolted By-Pass	
	No. 372 Screwed	No. 373 Flanged F. & D.	No. 374¼ Hub Ends	No. 372½ Screwed	No. 373½ Flanged F. & D.		Size of By-Pass	Per Valve
Inches	Each	Each	Each	Each	Each	Per Valve	Inches	
2	11.00	13.00	13.00	11.00	13.00	1.00		
2½	12.00	14.50		12.00	14.50	1.50		
3	13.50	17.00	17.00	13.50	17.00	2.00		
3½	17.50	21.00				2.50		
4	20.00	24.00	24.00	20.00	24.00	3.00		
5	30.00	34.00	34.00		34.00	4.00		
6	36.00	41.00	41.00		41.00	4.00		
8	70.00	75.00	75.00		75.00	7.50		
10		115.00	115.00			10.00		
12		168.00	168.00			12.00	2	49.00
14		340.00	340.00			No Extra Charge	3	74.00
16		450.00	450.00					
18		600.00	600.00					
20		700.00	700.00				4	99.00
24		1000.00	1000.00					
30		1650.00						

Dimensions, in Inches

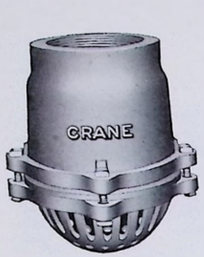
Size		2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24	30
Screwed	End to end	6½	7	8	9	10	11¼	12½	18½								
Flanged	Face to face	8	8½	9½	10½	11½	13	14	19½	24½	27½	31	36	36	40	48	60
	I.D. of port	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24	30
	Flange dia.	6	7	7½	8½	9	10	11	13½	16	19	21	23½	25	27½	32	38¾
	Flange thick.	5/8	11/16	¾	13/16	15/16	15/16	1	1⅛	1 3/16	1¼	1⅜	1 7/16	1 9/16	1 11/16	1⅞	2⅛
	Bolt circle	4¾	5½	6	7	7½	8½	9½	11¾	14¼	17	18¾	21¼	22¾	25	29½	36
	No. of bolts	4	4	4	8	8	8	8	8	12	12	12	16	16	20	20	28
	Dia. of bolts	5/8	5/8	5/8	5/8	5/8	¾	¾	¾	⅞	⅞	1	1	1⅛	1⅛	1¼	1¼
Hub Ends	End to end	10⅛		10½		12	13	14	19½	24½	27½	31	36	32	35	40	
	I.D. of hub	3.25		4.75		5.62	6.75	7.87	10.00	12.25	14.37	16.50	18.75	20.87	23.00	27.25	
	Depth of hub	2.75		2.75		3.00	3.00	3.00	3.50	3.50	3.50	3.50	4.00	4.00	4.00	4.00	
By-Pass	Size of by-pass										2	2	3	3	3	4	4
	C. to outside										22	23¾	27½	29¼	30¾	34¾	35
	Center to top										11½	11½	14¼	14¼	14¼	17	17
Center to top of valve		4	4¼	5	5½	6	6½	7¼	10¼	12	13½	16	17¾	17½	20	21	29

Templates for drilling . . . page 370 *Normal thread engagement . . . . page 367*

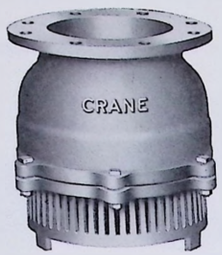
Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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Iron Body Foot Valves

Leather or Brass Disc



Screwed



Flanged

Leather or Brass Disc Foot Valves
No. 394, Leather Disc, Screwed
No. 395, Leather Disc, Flanged
No. 394½, Brass Disc, Screwed
No. 395½, Brass Disc, Flanged

SERVICE RECOMMENDATIONS

These valves are recommended for suction lines on shallow well pumps where the pressure does not exceed 34-foot head (approximately 15 pounds), but they will safely stand 25 pounds pressure on priming pump service, when not subjected to the pulsations of the pump.

The leather disc valves are especially suitable for cold water; the brass disc valves, for hot water.

List prices of flanged valves include facing and drilling to the 125-Pound American Cast Iron Flange Standard on sizes 3½-inch and smaller, and to the 25-Pound American Tentative Cast Iron Flange Standard on sizes 4-inch and larger. No deduction is made if valves are ordered "faced only".

Size	List Prices, Each								Dimensions, in Inches								
	Leather Disc Valves				Brass Disc Valves				Largest Outside Diameter of Body				Flange dimensions				
	No. 394 Screwed		No. 395 Flanged F. & D.		No. 394½ Screwed		No. 395½ Flanged F. & D.										
Inches	Black	Galv.	Black	Galv.	Black	Galv.	Black	Galv.	No. 394	No. 395	No. 394½	No. 395½	Diameter	Thickness	Bolt circle	No. of bolts	Dia. of bolts
¾	1.15	1.75							3¾								
1	1.30	2.00							3¾								
1¼	1.40	2.10			8.00	8.30			4⅛		4⅛						
1½	1.90	2.85			9.00	9.40			4¾		4¾						
2	2.40	3.60	3.50	5.50	10.00	10.50			5½	6	5½		6	½	4¾	4	⅝
2½	3.30	5.00	4.50	7.00	11.00	11.70			6¼	7	6¼		7	9/16	5½	4	⅝
3	3.90	5.75	5.75	9.00	12.00	12.80	13.00	14.30	7	7½	7	7½	7½	⅝	6	4	⅝
3½	5.60	8.50	7.50	12.00	13.00	14.20	14.00	15.80	8⅞	8⅞	8⅞	8⅞	8½	11/16	7	8	⅝
4	7.30	11.00	9.50	15.00	14.00	15.50	15.00	17.25	8⅞	9	8⅞	9	9	¾	7½	8	⅝
5	11.25	16.75	14.00	22.00	15.00	17.20	16.00	19.20	10½	10½	10½	10½	10	¾	8½	8	⅝
6	14.75	22.00	17.50	27.00	18.00	21.00	20.00	23.85	11¾	11¾	11¾	11¾	11	¾	9½	8	⅝
8	41.00	62.00	45.00	72.00	45.00	53.50	48.00	59.00	15⅛	15⅛	15⅛	15⅛	13½	¾	11¾	8	⅝
10	64.00	110.00	70.00	120.00	80.00	98.50	85.00	105.00	18	18	20¼	20¼	16	⅞	14¼	12	⅝
12	100.00	155.00	112.00	170.00			135.00	159.00	20¼	20¼		24⅛	19	1	17	12	⅝
14			150.00										21	1⅛	18¾	12	¾
16			200.00										23½	1⅛	21¼	16	¾

Shape of strainer: Sizes 6-inch and smaller have a semi-spherical strainer as shown on the illustration of the screwed end valve; the larger sizes have a flat bottom strainer as shown on the illustration of the flanged end valve.

Materials and construction: The leather disc valves have a cast iron body, strainer, and seat. Sizes 6-inch and smaller have one disc; larger sizes have two discs.

The brass disc valves have a cast iron body and strainer and a brass seat. Size 6-inch and smaller have one disc; larger sizes have four discs.

Brass Foot Valves . . . page 31

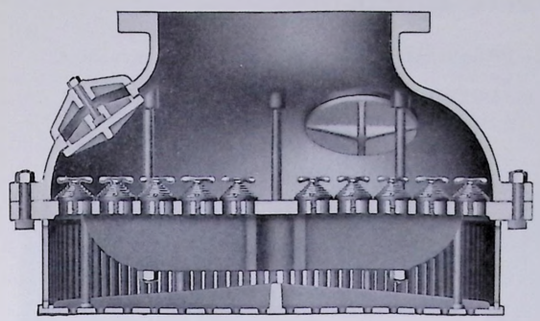
Flange dimensions and facing: The dimensions and drilling of the end flange on valves 4-inch and larger conform to the 25-Pound American Tentative Cast Iron Flange Standard (B16b2-1931). On smaller sizes, the diameter and drilling of the end flange conform to the 125-Pound Cast Iron Flange Standard (B16a-1929). The flange is plain faced, with a smooth finish.

When so ordered, the flange on sizes 5-inch and larger can be drilled to the 125-Pound American Standard. Full face gaskets should then be used to avoid distorting the flange.

Templates for drilling . . . page 370

Ferrosteel Foot Valves

Multiple Rubber Disc



Multiple Rubber Disc Foot Valve
No. 397, Flanged

Size	List Prices	Dimensions, in Inches						
	No. 397 Flanged F. & D. Black	Largest Outside Diameter of Body	Flange dimensions					
Inches	Each		Diameter	Thickness	Bolt Circle	No. of Bolts	Dia. of Bolts
16	190.00	34¾	23½	1⅛	21¼	16	¾
18	235.00	40¾	25	1¼	22¾	16	¾
20	265.00	46	27½	1¼	25	20	¾
24	400.00	54½	32	1⅜	29½	20	¾
30	780.00	69½	38¾	1½	36	28	⅞
36	1200.00	82	46	1⅝	42¾	32	⅞

Service recommendations: These valves are recommended for the same service as the leather disc valves shown on the opposite page.

Materials and construction: The valves have a Ferrosteel body, cast iron strainer and seat, and brass valve stems and springs; they have handholes to facilitate cleaning and repairing.

Flange dimensions and facing: The dimensions and drilling of the end flange conform to the 25-Pound American Tentative Cast Iron Flange Standard (B16b2-1931). The flange is plain faced, with a smooth finish.

When so ordered, the flange can be drilled to the 125-Pound American Cast Iron Flange Standard. Full face gaskets should then be used to avoid distorting the flange.

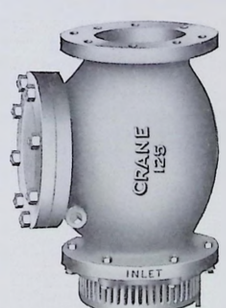
Drilling: List prices include facing and drilling to the 25-Pound American Tentative Cast Iron Flange Standard. No deduction is made if valves are ordered "faced only".

Brass disc valves: Multiple Brass Disc Foot Valves can be made to order; prices on application.

Templates for drilling . . . page 370

High Pressure

Iron Body Foot Valves

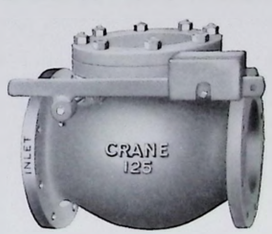


When foot valves are wanted for high pressures or for severe service, Crane No. 373 Flanged Standard Iron Body Swing Check Valves having a strainer bolted on the inlet end, as illustrated above, are recommended. These are furnished with either a leather faced disc or a solid brass or brass faced disc.

Prices on application

Swing Check Valves

With Outside Lever and Weight



Any Crane Iron Body, Ferrosteel, or Cast Steel Swing Check Valve can be furnished with an outside lever and weight as illustrated above. The weight is mounted on the lever either in a position that will assist the disc in closing, thereby making the valve extremely sensitive to a reversal of flow, or in a position where it will balance the disc, causing the valve to open under a minimum of pressure. Orders must specify which type is wanted.

Unless otherwise ordered, the lever and weight are placed on the side that is on the right when looking into the valve inlet.

Prices on application

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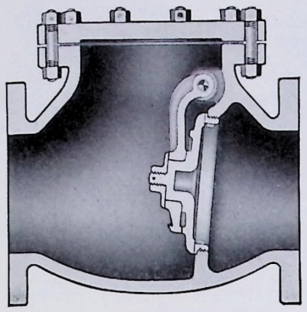
Standard

Iron Body Clearway Swing Check Valves

Underwriters' Pattern

WORKING PRESSURE — 175 pounds cold water, non-shock

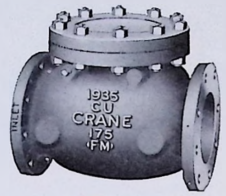
HYDROSTATIC TEST PRESSURES
Shell test — 250 pounds Seat test — 200 pounds



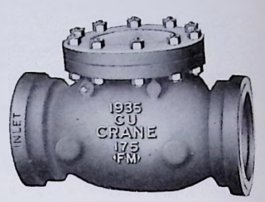
Cross Section, No. 375



No. 374½, Screwed



No. 375, Flanged



No. 375½, Hub Ends

These valves also may be used in a vertical position for upward flow.

List Prices

Size	Inches	2½	3	3½	4	5	6	8	10	12
No. 374½, Screwed	Each	14.50	17.00		24.00	34.00	41.00	75.00		
No. 375, Flanged, F. & D.	Each	14.50	17.00	21.00	24.00	34.00	41.00	75.00	115.00	168.00
No. 375½, Hub Ends	Each				24.00		41.00	75.00	115.00	168.00
Extra for Leather Faced Disc	Per Valve	1.50	2.00	2.50	3.00	4.00	4.00	7.50	10.00	12.00

Underwriters' requirements: These valves are designed for fire protection service. They conform to the Underwriters' Specifications known as "The National Standard", and they are listed as approved and inspected by the Associated Factory Mutual Fire Insurance Companies, Boston, and the Underwriters' Laboratories, Chicago. They are marked "FM" and "CU".

Construction: The body is large, providing liberal clearance around the disc. When opening, the disc swings entirely clear of the waterway; it is so constructed that it will not stick in the open position.

Materials: The body seat ring is brass and is screwed into the body. Sizes 6-inch and smaller have a brass disc and a brass hinge. In larger sizes, the disc is iron with a brass seating face and has a brass collar where it engages the hinge, and the hinge is malleable iron, having a brass hinge-pin bushing and a brass disc-hub bushing. All sizes have a brass hinge pin.

Leather disc: An extra charge is made for leather faced disc valves. See the list prices shown above.

Hub end valves: The No. 375½ Valves have hub ends suitable for Class "D" cast iron pipe.

Bosses on body: Each valve is equipped with four bosses for by-pass, two on each side of the body. An extra charge is made for drilling and tapping the bosses and for furnishing a by-pass.

Flange dimensions and facings: The dimensions and drilling of the end flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928). Flanges are plain faced, with a smooth finish.

Drilling: The list prices of flanged valves include facing and drilling to the 125-Pound American Cast Iron Flange Standard. No deduction is made when valves are ordered "faced only".

Dimensions, in Inches

Size		2½	3	3½	4	5	6	8	10	12
Screwed	End to end	10	11		13	15	16	18		
Flanged	Face to face	10	11	12	13	15	16	18	22	26
	Inside diameter of port	2½	3	3½	4	5	6	8	10	12
	Diameter of flange	7	7½	8½	9	10	11	13½	16	19
	Thickness of flange	11/16	¾	13/16	15/16	15/16	1	1⅛	1 3/16	1¼
	Diameter of bolt circle	5½	6	7	7½	8½	9½	11¾	14¼	17
	Number of bolts	4	4	8	8	8	8	8	12	12
	Diameter of bolts	⅝	⅝	⅝	⅝	¾	¾	¾	⅞	⅞
Hub ends	End to end				16½		20	22¼	26	29½
	Inside diameter of hub				5.62		7.87	10.00	12.25	14.37
	Depth of hub				3.00		3.00	3.50	3.50	3.50
Center to top of valve		6¼	6¾	7	7½	8½	9¼	11¼	13½	15¼

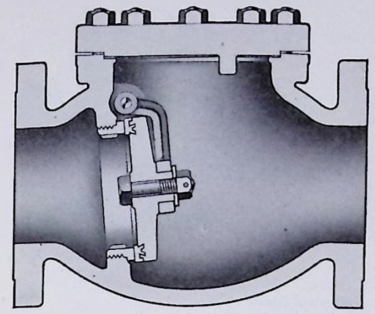
Templates for drilling . . . page 370 *Normal thread engagement . . . page 367*

250-Pound

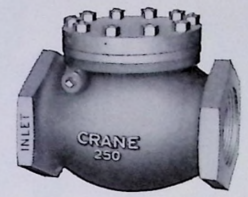
Ferrosteel Swing Check Valves

Brass Trimmed

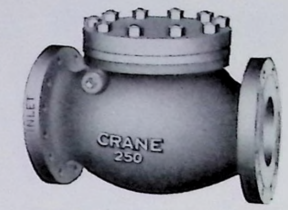
Size of Valve	Working pressures: Steam 500° F.	Working pressures: Cold water, oil, or gas, non-shock	Hydrostatic test pressures: Shell test	Hydrostatic test pressures: Seat test
2 to 12-inch	250 pounds	500 pounds	800 pounds	550 pounds
14-inch	250 pounds	400 pounds	700 pounds	450 pounds



Cross Section, No. 39 E



No. 38 E, Screwed



No. 39 E, Flanged

These valves also may be used in a vertical position for upward flow.

List Prices

Size	Inches	2	2½	3	3½	4	5	6	8	10	12	14
No. 38 E, Screwed	Each	15.00	20.00	28.00	36.00	41.00	54.00	66.00				
No. 39 E, Flanged, F. & D.	Each	17.00	22.00	30.00	38.00	44.00	57.00	70.00	105.00	175.00	250.00	350.00

Service recommendations: Crane 250-Pound Ferrosteel Swing Check valves are well suited for a wide variety of services requiring the use of rugged, sturdily constructed Valves. They will give excellent results on steam lines where the pressure and temperature do not require the use of steel valves, on high pressure water, oil, or gas lines, and on similar service.

Construction: The valves are heavily proportioned and are unusually rugged. The body is oval in shape, providing ample flow area when the valve is open. The valves have a disc stop which keeps the disc from sticking in the open position.

Materials: The body and cap are made of Crane Ferrosteel. The body seat ring is made of Crane Hard Metal; it is screwed into the body. Sizes 3½-inch and smaller have a solid Crane Hard Metal disc; larger sizes have an iron disc with a Hard Metal seating face. Crane Hard Metal is a copper-tin bronze having unusual strength and hardness.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928). Flanges have a 1/16-inch raised face. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with male, female, tongue, or groove faces are made to order at an additional price. See page 353 for prices and dimensions.

Drilling: The list prices of flanged valves include facing and drilling to the 250-Pound American Cast Iron Flange Standard. No deduction is made when valves are ordered "faced only".

Dimensions, in Inches

Size		2	2½	3	3½	4	5	6	8	10	12	14
Screwed	End to end	9½	10¾	11¾	12¼	13	15	16½				
Flanged	*Face to face	10½	11½	12½	13¼	14	15¾	17½	21	24½	28	33
	Inside diameter of port	2	2½	3	3½	4	5	6	8	10	12	13¼
	Diameter of flange	6½	7½	8¼	9	10	11	12½	15	17½	20½	23
	*Thickness of flange	⅞	1	1⅛	1 3/16	1¼	1⅜	1 7/16	1⅝	1⅞	2	2⅛
	Diameter of raised face	4 3/16	4 15/16	5 11/16	6 5/16	6 15/16	8 5/16	9 11/16	11 15/16	14 1/16	16 7/16	18 15/16
	Diameter of bolt circle	5	5⅞	6⅝	7¼	7⅞	9¼	10⅝	13	15¼	17¾	20¼
	Number of bolts	8	8	8	8	8	8	8	12	12	16	20
	Diameter of bolts	⅝	¾	¾	¾	¾	¾	¾	¾	⅞	1	1⅛
Center to top of valve		5¼	6	6¼	6¾	7¼	8¼	9	11	13	14¾	15¾

*Face to face and thickness of flange dimensions include the 1/16-inch raised face.

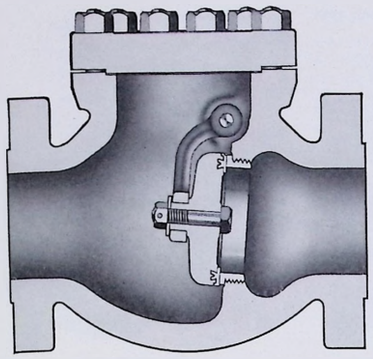
Templates for drilling . . . . page 371 *Special facings . . . page 353* *Normal thread engagement . . . . page 367*

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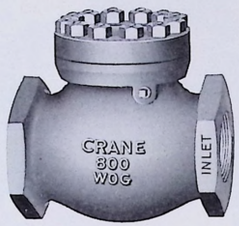
800-Pound Hydraulic
Ferrosteel Swing Check Valves
Brass Trimmed

WORKING PRESSURE
800 pounds cold water, oil, or gas, non-shock

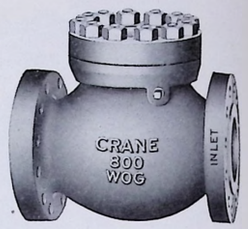
TEST PRESSURES
Shell test — **1600** pounds hydrostatic
Seat test — **850** pounds hydrostatic



Cross Section, No. 821 H



No. 820 H, Screwed



No. 821 H, Flanged

These valves also may be used in a vertical position for upward flow.

List Prices

Size	Inches	2	2½	3	4	5	6	8	10	12
No. 820 H, Screwed	Each	37.50	45.00	60.00	83.00	113.00	165.00			
No. 821 H, Flanged, F. & D.	Each	37.50	45.00	60.00	83.00	113.00	165.00	285.00	360.00	525.00

Service recommendations: Crane 800-Pound Hydraulic Ferrosteel Swing Check Valves are recommended for high-pressure hydraulic lines and for high-pressure gas lines.

Construction: The valves are extremely heavy and rugged. The bodies are oval or globular in shape, providing ample flow area around the disc when the valve is open. The valves are constructed so that the disc cannot stick in the open position.

Materials: The body and cap are made of Crane Ferrosteel. The body seat ring is screwed into the body and is made of Crane Hard Metal. Sizes 4-inch and smaller have a solid Crane Hard Metal disc; larger sizes have an iron disc with a large Hard Metal seating face. Crane Hard Metal is a tough, hard, copper-tin bronze having excellent wear resisting qualities.

Flange dimensions and facing: The dimensions and drilling of end flanges conform to the 800-Pound Hydraulic American Cast Iron Flange Standard (B16b1-1931). The flanges have a ¼-inch male face (large male); the male face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with female, tongue, or groove faces are made to order at an additional price. See page 353 for prices and dimensions.

Drilling: The list prices of flanged valves include facing and drilling to the 800-Pound Hydraulic American Cast Iron Flange Standard. No deduction is made when valves are ordered "faced only".

Shock: When these valves are used in lines subjected to shock, properly designed shock absorbers should be installed to protect the piping and the valves.

Dimensions, in Inches

Size		2	2½	3	4	5	6	8	10	12
Screwed	End to end	10½	12	13½	15¼	17¼	19			
Flanged	*Face to face	11½	13	14	17	20	22	26	31	33
	Inside diameter of port	2	2½	3	4	5	6	7⅞	9¾	11¾
	Diameter of flange	6½	7½	8¼	10¾	13	14	16½	20	22
	*Thickness of flange	1¼	1⅜	1½	1⅞	2⅛	2¼	2½	2⅞	3
	Diameter of male face	3⅝	4⅛	5	6 3/16	7 3/16	8½	10⅝	12¾	15
	Diameter of bolt circle	5	5⅞	6⅝	8½	10½	11½	13¾	17	19¼
	Number of bolts	8	8	8	8	8	12	12	16	20
	Diameter of bolts	⅝	¾	¾	⅞	1	1	1⅛	1¼	1¼
Center to top of valve		6	6¾	8¼	9¼	10½	12	15	15¾	17

*Face to face dimensions include the ¼-inch male face; thickness of flange dimensions do not.

Templates for drilling . . . page 371 *Special facings . . . page 353* *Normal thread engagement . . . page 367*

Valve Accessories and Parts

For greater convenience, various valve accessories and parts, many of which are used with nearly all Crane Valves, have been grouped together on the following pages, numbers 160 to 170.

Floor Stands . . . . . pages 160 and 161
Extension Stems . . . . . page 161
Indicator Posts . . . . . page 162
Cylinder Operated Valves . . . . . page 163
Motor Operated Valves . . . . . pages 164 and 165
Wheels and Handles . . . . . page 166
Chain Wheels . . . . . page 167
Keys for Lock Shield Valves . . . . . page 167
Composition Discs . . . . . page 168
Wrenches for Body Seat Rings . . . . . page 169
Replacement Parts for Valves . . . . . page 170

For operating mechanisms for Sluice Gates, see pages 124 and 125.

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Floor Stands

With or Without Indicator



Floor Stand
Without Indicator

These Floor Stands, when equipped with the proper extension stem, are suitable for operating either rising or non-rising stem valves. The list prices shown below include the Floor Stand with wheel and wheel stem coupling, and in addition, on the Floor Stand with Indicator, the complete indicator parts; they do not include an extension stem.

Extension stems are illustrated on the opposite page.

The 20-inch high Floor Stand is used on valves having an 8-inch or smaller diameter hand wheel; the 32-inch high Floor Stand is used on valves having a 9-inch or larger diameter hand wheel.

Prices on extension stems and on valve stem or yoke sleeve couplings are furnished on application. They depend upon the length of the extension stem and upon the size and kind of valve on which the coupling will be used.



Floor Stand
With Indicator

List Prices

Including wheel stem coupling, but no extension stem

Height of Floor Stand		Inches	20	32
Without Indicator	Painted column, japanned wheel	Each	15.00	20.00
	Finished column, japanned wheel	Each	28.00	35.00
	Finished column; rim and hub of wheel finished, spokes japanned	Each	40.00	48.00
With Indicator	Painted column, japanned wheel	Each	22.00	27.00
	Finished column, japanned wheel	Each	35.00	42.00
	Finished column; rim and hub of wheel finished, spokes japanned	Each	47.00	55.00

Directions for Ordering

Floor Stand Only

For Crane Valves, specify:

1. Style (with or without indicator) and finish of Floor Stand
2. Size and catalogue number of valve, and whether valve opens by turning to the right or the left

For other than Crane Valves, specify:

3. Style (with or without indicator) and finish of Floor Stand
4. Size, style, and catalogue number of valve
5. Manufacturer's name
6. Diameter of hand wheel on valve
7. Number of turns to open
8. Whether valve opens by turning to the right or the left

Floor Stand with Extension Stem

For Crane Valves, specify:

Information requested when ordering Floor Stand only (1 and 2, above)

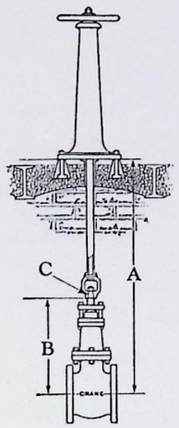
9. Dimension A, center of valve to floor level

For other than Crane Valves, specify:

Information requested when ordering Floor Stand only (3 to 8 inclusive, above)

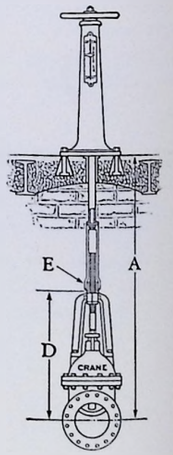
10. Dimension A, center of valve to floor level
11. If non-rising stem gate valve, or globe, angle, or cross valve, include:
    Dimension B, center of valve to bottom of square on stem
    Dimension C, size and length of square on stem, and shape (whether straight or tapered)
12. If outside screw and yoke gate valve, include:
    Dimension D, center of valve to bottom of hub on hand wheel
    Dimension E, detail dimensions of the part of the yoke sleeve on which the hand wheel fits

Prices of Floor Stands with Extension Stem are furnished on application.



Non-Rising Stem Gate Valve

Unless otherwise ordered, extension stems are made of Extra Strong Pipe.

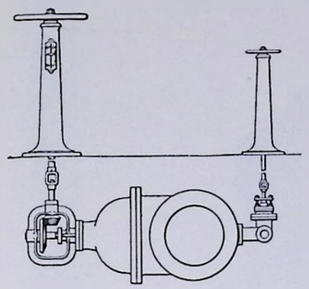


Outside Screw and Yoke Gate Valve

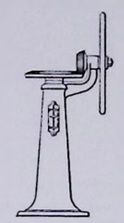
Unusually long extension stems must be properly supported.

Floor Stands

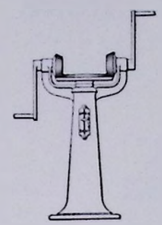
Typical Application and Special Designs



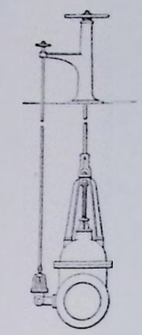
Application E
Floor Stands Applied to Gate Valve with By-Pass in Horizontal Position



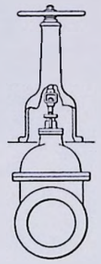
Application F
Floor Stand with Single Bevel Gearing and Hand Wheel



Application G
Floor Stand with Double Bevel Gearing and Crank Handles



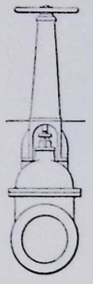
Application K
Floor Stand with Arm for Operating By-Pass



Application L
Bell Bottom Floor Stand Used on Non-Rising Stem Gate Valve Projecting Above Floor Line

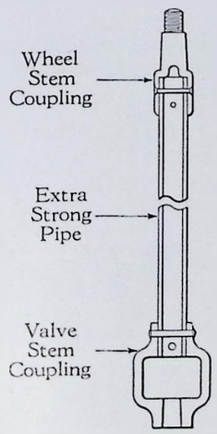
The Floor Stands shown on the opposite page can be used to operate globe, angle, or cross valves or rising or non-rising stem gate valves, either with or without gearing. These meet the requirements of ordinary installations.

In addition, Floor Stands of special designs, a few of which are illustrated on this page, can be made to order for unusual installations. Prices on the special designs, such as those equipped with gears, ball bearings, cranks, electric or air motors, arms, or bell or wide bottom, are furnished on application. Inquiries and orders should indicate clearly what is wanted.



Application J
Wide Bottom Floor Stand Used on Rising Stem Gate Valve Projecting Above Floor Line

Extension Stems



Extension Stem For Non-Rising Stem Gate Valves or Globe, Angle, or Cross Valves

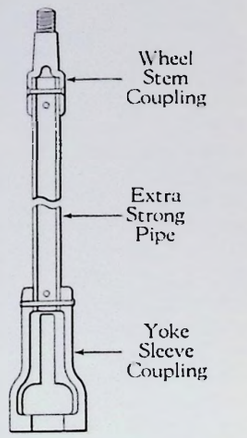
Extension stems are frequently required for valves that are to be operated from a distance. Ordinarily, a Floor Stand is used to support the stem and hand wheel, but in many installations the extension stem only is used.

Non-rising stem gate valves and globe, angle, or cross valves are furnished with the same style of wheel stem coupling and valve stem coupling. Outside screw and yoke gate valves have the same style wheel stem coupling as non-rising stem gate valves and globe, angle, or cross valves, but have a different style of coupling at the valve. It is designed to absorb the rise of the valve stem, making the extension stem non-rising.

Unless otherwise ordered, extension stems are made of Extra Strong Pipe.

Extension stems, especially long extension stems, must be properly supported to prevent straining the valve stem and to make operation easier.

Prices on application

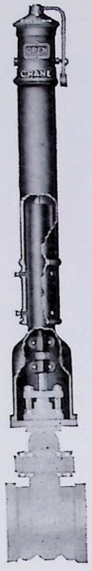


Extension Stem For Rising Stem Outside Screw and Yoke Gate Valves

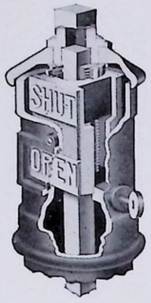
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Indicator Posts

Standard Pattern



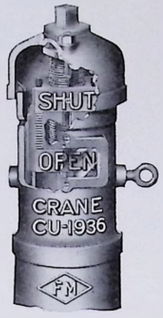
No. 520
Applied to
No. 462
Gate Valve



Enlarged
Sectional View
of Head
No. 520 Post

When ordering, specify the catalogue number of the Post, the size and catalogue number of the valve with which it will be used, and the depth of the trench (distance from ground level to bottom of pipe line).

Underwriters' Pattern



Enlarged
Sectional View
of Head
No. 510 Post



No. 510
Applied to
No. 462½
Gate Valve

List Prices and Dimensions

Depth of trench		Feet	2 to 6
No. 510 or No. 520, with Wrench		Each	40.00
Extra for each 6 inches over 6-foot trench		Each	2.00
Distance from ground level to top of Post	No. 510	Inches	38
	No. 520	Inches	33¼

Service recommendations: Crane Indicator Posts provide an ideal means for operating iron body non-rising stem gate valves buried underground. They are used principally in factory and mill yards, on valves for fire protection service.

The Standard Pattern, recommended when the Underwriters' Pattern is not required, is suitable for valves sizes 2 to 14-inch inclusive. It is generally used with No. 462 Gate Valves, page 75.

The Underwriters' Pattern is used with No. 462½ Underwriters' Pattern Gate Valves shown on page 77. It conforms to the Underwriters' Specification known as "The National Standard", and is listed as approved and inspected by the Associated Factory Mutual Fire Insurance Companies, Boston, and the Underwriters' Laboratories, Chicago. The Post is marked "CU" and "FM".

Construction: Crane Indicator Posts are sturdily constructed of cast iron. Each Post is furnished with an angle wrench which can be locked or sealed at the side of the Post when not in use. The operating nut is 1¼ inches square.

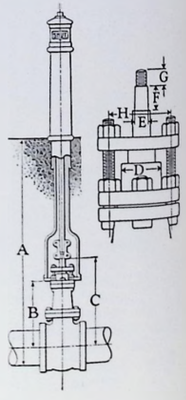
The word "OPEN" or "SHUT", in large, easily read letters, appears behind the indicator glass when the valve is open or closed, respectively. The lower plate, marked "OPEN", is adjustable, and its position is changed to suit the size of the valve. The indicator opening is fitted with a heavy plate glass ½-inch thick; small openings under the cap ventilate the entire Post and prevent accumulation of moisture on the glass in cold weather.

Attaching Post to valve: These Posts have the standard N.F.P.A. (National Fire Protection Association) flange for attachment to the valve; the operating rod has a socket for the valve stem.

When No. 462 Valves are ordered for use with Indicator Post, they are furnished with an indicator post flange cast integral with the bonnet, at no extra charge. When the No. 520 Post is required for valves already installed and not equipped with a flange, a separate Adaptor Plate for the valve is furnished with the Post, at no extra charge.

No. 462½ Gate Valves used with the No. 510 Post are furnished regularly with an indicator post flange cast integral with the bonnet.

Special Indicator Posts: Indicator Posts for other than Crane Valves can be made to order at a special price. When ordering, specify the name of the valve manufacturer, the valve size, whether it opens by turning to the right or the left, the number of turns to open, and give the following dimensions:



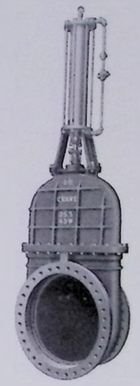
A — Depth of trench
B — Center of pipe to top of stuffing box flange
C — Center of pipe to bottom of valve stem square
D — Diameter of stuffing box
E — Size of stem square
F — Height of stem square
G — Length of stem thread
H — Stuffing box bolt circle
Diameter of stuffing box studs
Number of stuffing box studs

Cylinder Operated Gate, Globe, and Angle Valves

For All Pressures and Purposes



Low Pressure Double Disc Gate Valve
With Cast Iron, Brass Lined
Hydraulic Lift Cylinder



Low Pressure Double Disc Gate Valve
With Brass Hydraulic Lift Cylinder

As the name indicates, these valves are actuated by means of a piston and cylinder using water, air, or oil as the operating medium. Control is obtained by simply operating a Four-Way Valve which may be located in any convenient place within reasonable distance from the valve.

Cylinders: The actuating cylinders are made of cast iron or steel with or without brass liners or of brass pipe, depending upon the operating medium and pressure used.

Remote Control: When remote control is required, supply lines to the cylinder must be large enough to compensate for line pressure drop in the cylinder feed line and assure a minimum back pressure in the cylinder exhaust line.

Indicating Rod: Unless otherwise specified, these valves will be furnished with the piston rod extending through the top cylinder head for the purpose of indicating whether the valve is operating, or fully open or closed.

Maintaining Cylinder Pressure: In order to maintain the valve disc in either the open or closed positions, pressure must be maintained in the cylinder at all times, with the exception of the following cases:

1. On Globe and Angle Valves when closed, if installed with their stems vertical and line pressure is on top of the disc.
2. On Gate Valves when fully open and installed with their stems horizontal or when the stem is vertically hanging down from the disc.

Hand Releasing Device: When cylinder operated gate valves are required with a special hand releasing device for the purpose of releasing the wedge from its seat after it has been closed tightly by the piston, the order should read accordingly.

Unless the hand releasing device is specifically called for, valves will be furnished without it.

It should be noted that the hand releasing device has a very short travel and therefore is not suitable for fully closing or opening the valve.

Information Required for Inquiries and Orders: The following questions must be answered when sending in orders or inquiries for these valves:

1. Are screwed, flanged, or hub end valves wanted?
2. Is a by-pass required?
3. Are the valves to be installed with the stems in horizontal or vertical position?
4. Designate the service for which valve is to be used: Steam, Water, Oil, or Gas, etc.
5. What is the maximum and minimum line pressure?
6. Designate the fluid to be used in the cylinder for the operation of the valve: Air, Hot or Cold Water or Oil, etc.
7. What pressure is available for operating the cylinder? It is recommended that the pressure for actuating the cylinder be as high as possible thus allowing the use of a minimum diameter cylinder.

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Motor Operated Valves

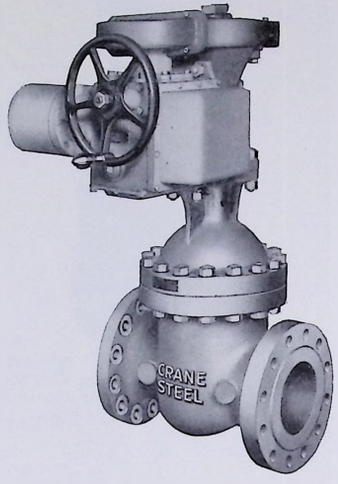
Electric Motor Control Unit

The complete electric motor control comprises push button station with indicating lights, enclosed magnetic controller with contactors operable by any number of push button stations and an integrated unit consisting of motor, gearings and disc travel controls.

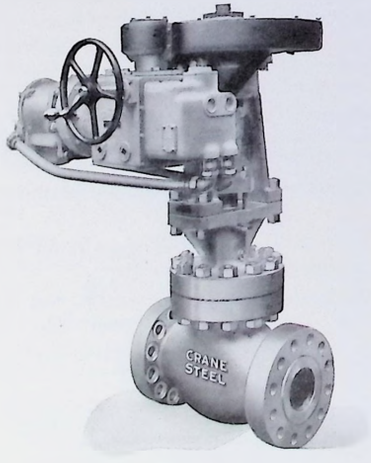
Motors are regularly furnished for direct or alternating current of standard voltages. Motors having special current characteristics also can be furnished to order.

Pushing the desired button in the control station sets the magnetic controller contactors into action—completes the motor circuit to effect proper movement of valve stem and disc and disc travel devices—or breaks the motor circuit to instantaneously stop the disc if so desired.

Where automatic valve operation is needed, switches actuated by floats, or by variations in temperature or pressure may be used in lieu of the usual push button control station.



Air or Gas Motor Control Unit



The air or gas motor control consists of a rotary motor, gearing and disc travel limit valves, all built into a single cast housing. A four-way valve is used for admitting air or gas to the motor for opening or closing the main valve.

Motors are of the reversible rotary type, designed for operation by either air or gas at pressures from 70 to 125 pounds gauge.

These units are particularly advantageous for operating valves in refineries, oil and gas lines and various process industries where sparks from electric motors and wires will ignite explosive laden atmosphere. They will operate even when totally submerged in water or when the temperature surrounding them is high.

Crane Air or Gas Motor Control Units are recommended for continuous operation of valves, a service that may cause overheating of electric motors.

Prices and complete description furnished on application.

Motor Operated Valves

Patented and Patents Pending

Mechanical developments follow one another so rapidly that alertness is necessary to grasp their entire significance. Tasks formerly taking hours or days are now accomplished in seconds or minutes. Time, itself, measured in dollars and cents becomes more and more valuable with the conquest of distance. The mechanical management of time and distance has brought complete safety in operations that used to be hazardous to life and property. The wide adoption of remote controls exerts a great influence upon the saving of time and the virtual elimination of the distance factor in performance.

Crane Motor Operated Valves faithfully perform a fitting part in the general utility of remote control of flow of liquids and gases. Crane motor units are furnished with electric motors or with rotary motors actuated by air or gas. Most of the various lines of Crane valves can be equipped with these units. They are attachable to Crane valves already in service.

A thoughtful analysis of improved operations and economies made possible by the use of Crane Motor Operated Valves will clearly indicate their wide application — in power plants for isolating, sectionalizing, turbine extraction, reheat and circulating water lines — in refineries and gas and oil pipe lines and booster stations — in water works systems for distribution line control, reservoir control and sluices — in processing plants for hazardous locations, for controlling several units simultaneously, for automatic operation by variations in liquid level, pressure and temperature.

Large valves that require much time and effort to open and close, emergency valves that must be operable even under unusual circumstances, valves in remote, inaccessible or dangerous locations can be operated quickly, easily, safely and economically from one or more convenient points of control through the application of Crane Motor Control Units.

The Crane valve, whether actuated by electric motor or air or gas rotary motor, is designed to effect tight valve closure under specified service conditions and to prevent the disc from jamming in the wide open position.

Inquiries and Orders for Motor Operated Valves Should Give the Following Information

Electric Motor

1. Quantity — size — flanged, screwed, hub or welding ends.
2. Catalogue number of regular valve preferred.
3. Rising or non-rising stem.
4. With or without by-pass.
5. Working pressure and temperature.
6. Service — Steam, water, oil, air, gas, etc.
7. Valves used for — Equalizing, boiler feed, etc.
8. Information on any special conditions, such as whether valve must close against full flow.
9. Maximum velocity through valve if obtainable.
10. Voltage — A.C. or D.C.— and phase and cycle if A.C.
11. State whether open-stop-close, close-only, or open-only stations are wanted. Also number of stations per valve.
12. Approximate maximum room temperature at point where valve yoke will be located.

Air or Gas Motor

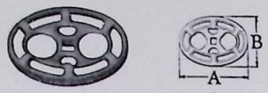
1. Quantity — size — flanged, screwed, hub or welding ends.
2. Catalogue number of regular valve preferred.
3. Rising or non-rising stem.
4. With or without by-pass.
5. Working pressure and temperature.
6. Service — Steam, water, oil, air, gas, etc.
7. Valves used for — Equalizing, boiler feed, etc.
8. Information on any special conditions, such as whether valve must close against full flow.
9. Maximum velocity through valve if obtainable.
10. Available air or gas pressure for operating motor (minimum 70 pounds — maximum 125 pounds.)
11. State whether valves are to open and close, close only or open only by means of the motor.

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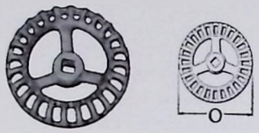
Wheels and Handles

For Brass, Iron, and Steel Valves

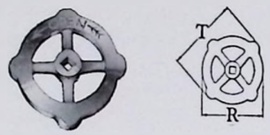
Dimensions are given in inches.



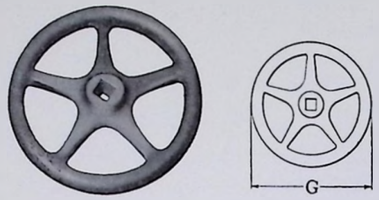
Style C Wheel, Malleable Iron
Oval Pattern, Non-Heating
Patented



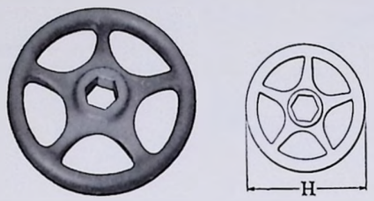
Style F Wheel, Malleable Iron
Round Pattern, Non-Heating



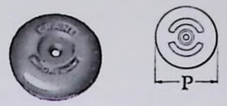
Style N Wheel, Polished Brass
"Navy" Four-Ball Pattern



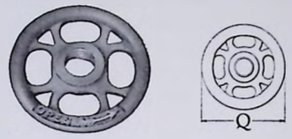
Style D Wheel, Malleable Iron
Oval Rim, Square Hole



Style E Wheel, Malleable Iron
Oval Rim, Hexagon Hole



Style L Wheel
Black Moulded Composition



Style M Wheel, Malleable Iron
Round Pattern, Round Rim



Style U Wheel, Cast Iron
Round Pattern, Round Rim

List Prices, Wheels

Style C			Style D		Style E		Style F		Style L		Style M		Style N			Style U	
Size A	B	Price Each	Size G	Price Each	Size H	Price Each	Size O	Price Each	Size P	Price Each	Size Q	Price Each	Size R	T	Price Each	Size V	Price Each
2¼	1½	.08	3½	.20			1½	.08	1½	.13	3 5/16	.60	1½	1¾	.75	4⅛	.40
2⅝	1¾	.08	4½	.35			1¾	.08	1¾	.14	3⅜	.65	1¾	2	.75	6	1.00
3	2	.09	5½	.67			2 1/16	.08	2	.15	3⅞	.75	2	2⅜	.85		
3⅜	2¼	.10	6	.75	6	.75	2 9/16	.09	2¼	.16	4⅜	1.00	*2½	3	1.00		
3¾	2½	.12	7	1.00	7	1.00	2¾	.10	2½	.17	4 13/16	1.25	3	3½	1.25		
4¼	2⅝	.16	8	1.30	8	1.30	3 1/16	.12	2¾	.22	5¾	1.50	3½	4⅛	1.75		
4¾	2¾	.20	9	1.75	9	1.75	3⅝	.16	3	.28	6 11/16	2.00	4	4⅝	2.25		
5¾	3	.25	*10	2.15	*10	2.15	4 1/16	.20					5	5⅝	3.50		
			12	2.85	12	2.85	4¾	.25					6	6⅝	5.00		
			14	4.00	14	4.00	5⅜	.35									
			16	4.90	16	4.90											
			18	6.25	18	6.25											
			20	7.25	20	7.25											
			22	10.25	22	10.25											
			24	13.00	24	13.00											
			**27	23.00	**27	23.00											
			**30	31.50	**30	31.50											
			**36	44.00	**36	44.00											

*The Wheels indicated by a single asterisk are made with two sizes of squares or hexagons; orders for these should specify the size and catalogue number of the valve on which the Wheel will be used.

**The 27, 30, and 36-inch Style D and Style E Wheels are made of cast iron and have a round rim.



Style J Tee Handle, Cast Iron



Style S Tee Handle, Malleable Iron

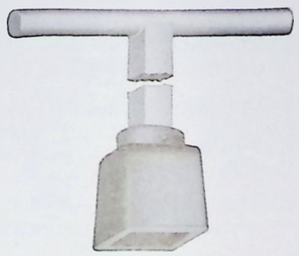


Style K Lever Handle
Malleable Iron

List Prices, Handles

Style J		Style K		Style S	
Size W	Price Each	Size Y	Price Each	Size Z	Price Each
5⅛	.15	3⅛	.09	2 9/16	.10
5¾	.25	3 5/16	.10	3 9/16	.12
6½	.30	3½	.10	4⅛	.15
8¼	.40	3⅞	.12	4¾	.18
		4¼	.15	5⅜	.25
		4⅝	.18	7	.30
		5	.23		
		5¾	.40		

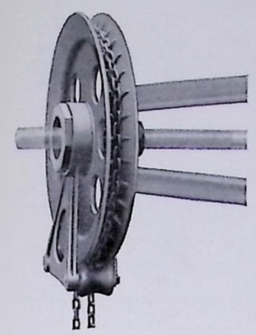
Tee Wrench



For Hub End Gate Valves
Having Square Operating Nut
Prices on application

Chain Wheels

For Brass, Iron, and Steel Valves



Chain Wheel
With Guide and Chain

These are high quality cast iron Chain Wheels, ruggedly constructed and designed to provide a good grip for the chain. The Guides for 7½-inch and larger diameter wheels are equipped with rollers, as illustrated; plain loop Guides are used on the smaller wheels. Both types hold the chain to a large portion of the circumference of the wheel, preventing slipping or jumping of the chain.

Hammer Blow Chain Wheels: Hammer Blow Chain Wheels are ideal for large or high pressure valves where extra power is needed to overcome the starting resistance of the valve disc. The wheel turns through a large angle before its operating lugs engage. This free movement, through the power gained by momentum, results in the delivery of a "hammer blow" upon the valve stem, facilitating opening and closing the valve. Prices on application.

When a valve is ordered equipped with Chain Wheel or Chain Wheel and Guide, no extra charge is made for the labor to mount it on the valve, but no allowance is made for the regular valve wheel or handle.

Pitch Diameter of Chain Wheel	List Prices, Each		Chain Wheels are applicable to valves having the following style and size of Wheel or Handle				
	Chain Wheels only for Rising or Non-Rising Stem Valves	Chain Wheels and Guides for Rising or Non-Rising Stem Valves	Style D Wheel Size	Style E Wheel Size	Style F Wheel Size	Style K Handle Size	Style S Handle Size
Inches			Inches	Inches	Inches	Inches	Inches
2⅜	2.35	9.85			2¾, 3 1/16	3½, 3⅞	
3	2.50	10.00	3½		3⅝, 4 1/16	4¼, 4⅝	4⅛, 4¾
4	2.65	10.15	4½, 5½		4¾, 5⅜	5	5⅜
5	3.00	11.00	6, 7	6, 7		5¾	7
7½	4.30	20.00	8, 9	8, 9			
10	6.25	24.00	10, 12	10, 12			
14	9.00	29.00	14, 16	14, 16			
18	13.00	35.00	18, 20, 22	18, 20, 22			
24	23.00	50.00	24, 27	24, 27			
30	40.00	80.00	30, 36	30, 36			

List price of Chain for Chain Wheels .20 per foot | List price for connecting ends of Chain .30 per Chain

When ordering chain only, be sure to specify the pitch diameter of the wheel on which it will be used.

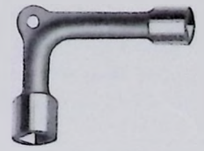
Keys for Lock Shield



T-Shape Key
Brass, Not Plated
No. 200 and No. 201

List Prices

No. 198 Key	Each	.70
No. 199 Key	Each	1.00
No. 200 Key	Each	.25
No. 201 Key	Each	.20



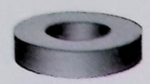
L-Shape Key
Malleable Iron, Nickel-Plated
No. 198 and No. 199

Keys Used with Lock Shield Valves

Size of Valve	For No. 67 G or No. 145 G Valves	For No. 112 or No. 113 Valves	For No. 174 Valves	For No. 226 or No. 227 Valves	For No. 455 Valves	For No. 1210 or No. 1211 Valves	For No. 1213 Valves	For No. 4270 Valves
Inches	Use Key No.	Use Key No.	Use Key No.	Use Key No.	Use Key No.	Use Key No.	Use Key No.	Use Key No.
¼						201		200
⅜					200			
½	198	200	200	200		200	200	198
¾					198			
1	198 or 199	198		198		198	198	198 or 199
1¼			198		198 or 199		199	
1½	199	198 or 199						
2								

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Composition Discs



No. 1 Steam Disc
No. 2 Hot Water Disc
No. 3 Cold Water Disc
*No. 6 Gasoline Disc



No. 4
Granite Disc



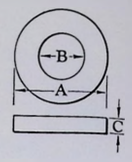
*No. 5
Cranoil Disc



Low Pressure
No. 7 Steam Disc
No. 8 Hot Water Disc



Copper Disc
For prices, see page 21.



(*No. 5 and No. 6 Discs always are furnished complete with disc holder.*)

Size	List Prices, Each			Approximate Dimensions In Inches					
				No. 1, No. 2, No. 3, No. 4, or Copper Discs			No. 7 or No. 8 Low Pressure Discs		
Inches	No. 1 Steam, No. 2 Hot Water, or No. 3 Cold Water Discs	No. 4 Granite Discs	No. 7 Steam or No. 8 Hot Water Low Pressure Discs	A	B	C	A	B	C
1/8	.03	.07	.03	21/32	1/4	7/32	19/32	3/16	1/8
1/4	.03	.07	.03	21/32	1/4	7/32	19/32	3/16	1/8
3/8	.04	.09	.04	3/4	1/4	7/32	21/32	3/16	1/8
1/2	.04	.10	.04	13/16	1/4	1/4	3/4	3/16	1/8
3/4	.05	.12	.05	1 1/16	3/8	1/4	1	13/32	7/32
1	.06	.15	.06	1 3/8	9/16	1/4	1 1/4	5/8	1/4
1 1/4	.09	.21	.09	1 5/8	25/32	11/32	1 1/2	23/32	1/4
1 1/2	.12	.30	.12	2	1 1/32	11/32	1 13/16	1	9/32
2	.18	.45	.18	2 9/16	1 1/2	11/32	2 9/32	1 1/4	5/16
2 1/2	.29	.75		3 3/16	1 31/32	15/32			
3	.48	1.25		3 15/16	2 13/32	1/2			
3 1/2	.60			4 3/8	2 25/32	9/16			
4	.80			4 7/8	3 1/32	19/32			
5	1.10			6 1/16	3 31/32	19/32			
6	1.35			7 1/16	4 3/4	19/32			
8	1.90			9 11/32	7 1/8	19/32			
10	3.00			11 3/16	9 1/32	5/8			
12	4.50			13 3/16	11	5/8			

Crane Composition Discs are the result of years of constant study, research, and test. They are made from specially selected materials, and are of unusually fine quality. Each type is ideally suited for the particular service for which it is recommended.

No. 1 Steam Discs: No. 1 Steam Discs are made of high quality materials, properly compounded to provide satisfactory and lasting service.

Recommended for 150 pounds saturated steam
300 pounds hot water, 300° F.

No. 2 Hot Water Discs: No. 2 Discs are made of a medium-hard composition that gives excellent results on hot water, oil, gas, or gasoline lines.

Recommended for 500 pounds hot water, 225° F.
400 pounds oil, gas, or gasoline, 100° F.

No. 3 Cold Water Discs: No. 3 Cold Water Discs are made of a soft, tough rubber compound that is especially suitable for cold water or air service.

Recommended for 600 pounds water or air, 100° F.

No. 4 Granite Discs: Granite Discs consist principally of long fibre asbestos and a binder, molded and vulcanized under high compressive loads. They give unusually satisfactory results on high pressure-temperature lines and on services that are too severe for ordinary composition discs.

Recommended for 300 pounds steam, 550° F.
600 pounds hot water, 150 to 450° F.

No. 5 Cranoil Discs: Cranoil Discs are a compounded phenol formaldehyde resinoid. When furnished, they are cemented into the disc holder of the valve, and have a specially machined face to fit a specially machined seat. They are recommended for oils, gasoline, air, and gases at temperatures up to 250° F., especially on services where valves with an ordinary metal or composition disc cannot be made tight. See page 18.

No. 6 Gasoline Discs: No. 6 Discs are a specially prepared compound that is completely resistant to gasoline. They are soft enough to make a tight seat on suction lines and on gravity pressures up to 15 pounds. They are recommended for use in check and foot valves only, and always are furnished complete with disc holder. See the section of this catalogue devoted to Valves and Fittings for Gasoline.

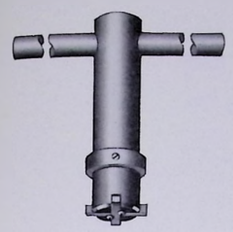
Low Pressure Discs: The No. 7 Steam Discs and No. 8 Hot Water Discs are not interchangeable with other Crane Discs; they are slightly smaller in size, being used only in valves for low pressure.

Recommended for, No. 7 — 100 pounds saturated steam
No. 8 — 125 pounds water, 200° F.
— Domestic gas service

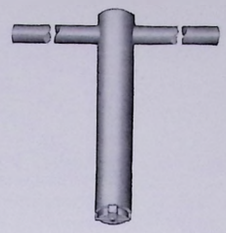
Copper Discs: Copper Discs are preferred by some engineers for special services. They are furnished regularly only in the No. 213 and No. 215 Valves shown on page 21.

Wrenches

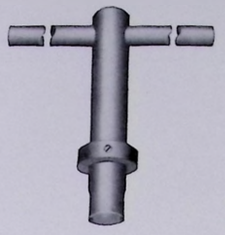
For Body Seat Rings



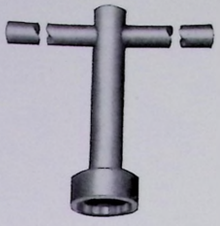
Style No. 1



Style No. 2



Style No. 3



Style No. 4

When ordering, specify the wrench number or state the size and catalogue number of the valve.

These wrenches were designed especially for removing and inserting body seat rings in Crane Globe, Angle, and Check Valves. The wrench faces properly engage the slots or lugs in the body seat ring, affording a much better grip than can be had with a makeshift wrench.

The wrenches are strong, rugged, and durable. Each wrench is stamped with its number for ready identification.

The table appearing below shows the wrench numbers, list prices, and the size and catalogue number of the valve with which each wrench can be used.

Style No. 1

Wrench Number		55	56	57	58	59	60	61	62	63	63a	64	64a
List Prices	Each	3.75	3.90	4.25	5.00	5.65	7.70	8.50	11.00	12.75	13.50	13.50	15.30
Nos. 14 P, 16 P	Size	1/8, 1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2		2 1/2		3
Nos. 85 P, 85 1/2 P, 87 P, 87 1/2 P Nos. 212 P, 214 P Nos. 254 P, 255 P, 256 P, 257 P Nos. 314 P, 316 P Nos. 372 P, 373 P, 374 P, 375 P Nos. 382 P, 383 P, 384 P, 385 P	Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2		3	
No. 1823 P	Size		3/8 x 1/2 1/2 x 1/2										
Nos. 1824 P, 1825 P	Size		1/2 x 3/8	3/4 x 1/2	1 x 3/4	1 1/4 x 1	1 1/2 x 1 1/4	2 x 1 1/2	2 1/2 x 2	3 x 2 1/2			
Nos. 1826 P, 1827 P	Size			1/2	3/4	1	1 1/4	1 1/2	2				

Wrench Number		79	80	81	82	83	84	85	86	87
List Prices	Each	5.10	6.00	6.50	6.80	8.50	9.35	11.00	8.50	9.35
Nos. 176 P, 177 P	Size		1/2	3/4	1	1 1/4	1 1/2	2		
Nos. 196 P, 197 P	Size			1/2, 3/4	1	1 1/4	1 1/2	2		
Nos. 216 P, 217 P, 218 P, 219 P	Size	1/4, 3/8	1/2	3/4	1	1 1/4			1 1/2	2

Style No. 4 — Style No. 2

Wrench Number		65	66	67	68	69	70	71
List Prices	Each	4.25	4.75	6.00	7.65	5.10	9.85	8.00
Nos. 178 X, 178 1/2 X	Size		1/2	3/4	1	1 1/4	1 1/2	2
Nos. 198 X, 198 1/2 X	Size			1/2, 3/4	1	1 1/4	1 1/2	2
No. 208 X	Size	1/4, 3/8	1/2	3/4	1	1 1/4		
Nos. 376 X, 377 X	Size		1/2	3/4	1	1 1/4	1 1/2	2
Nos. 396 X, 397 X	Size			1/2, 3/4	1	1 1/4	1 1/2	2

Style No. 3

Wrench Number		45	46	47	48	49	50	51
List Prices	Each	2.90	2.90	3.05	3.40	5.10	6.80	9.00
Nos. 212 C, 214 C Nos. 213, 215 Nos. 350 1/2 C, 352 1/2 C	Size	1/4, 3/8	1/2	3/4	1	1 1/4	1 1/2	2

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Replacement Parts for Valves

Replacement parts for any Crane Valve can be furnished upon receipt of an order. A few of those commonly used are listed on pages 166, 167, and 168. Wrenches for removing or inserting body seat ring in certain Crane Valves are shown on page 169. Prices on other parts are furnished on application.

When ordering replacement parts, specify the catalogue number and the size of the valve, and give the name of the part required. In addition, since the valve must be clearly identified before a part that will fit correctly can be furnished, indicate in detail how the valve is marked and where the marking appears.

Malleable Iron Screwed Fittings

Standard Fittings ..... pages 172 to 178
Circulating Boiler Fittings ..... page 179
Air-Tested Standard Fittings ..... page 180
Standard Refinery Oil Fittings ..... page 181
300-Pound Fittings ..... pages 182 to 183
Heavy Fittings ..... pages 184 to 185
A.A.R. Fittings ..... page 186
Hydraulic Fittings ..... page 187

The Crane line of Malleable Iron Fittings includes fittings for steam working pressures up to 300 pounds and for water, oil, or gas working pressures up to 2000 pounds, depending upon size. The user is afforded a wide variety of types and an unusually liberal assortment of straight and reducing sizes.

Although differing in their weight and proportions, the various lines are alike in that no detail of manufacture is overlooked to provide fittings of exceptionally high quality. Except for Plain Standard Fittings, the pipe ends are reinforced with bands. Tough, close-grained iron, threads accurately cut to gauge and in true alignment, openings chamfered to permit easy entrance of the pipe, —these and other features contribute to making Crane fittings uniformly satisfactory.

* * * * * * * * *

The list at the top of this page does not include all the Malleable Iron Fittings manufactured by Crane Co. For greater convenience, the following fittings are shown in other sections of this catalogue:

Bushings ..... page 224
Plugs ..... page 226
Faced Couplings and Locknuts ..... page 230
One-Strap and Two-Strap Clamps ..... page 231
Screwed Unions and Union Fittings ..... pages 235 to 242
Flange Unions ..... pages 247 to 248
Railing Fittings ..... pages 264 to 268
Floor Flanges ..... page 288
Companion Flanges ..... page 290

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Standard Malleable Iron Fittings

WORKING PRESSURES, BANDED FITTINGS
150 pounds steam
300 pounds cold water, oil, or gas, non-shock

The Crane line of Standard Malleable Iron Fittings illustrated on pages 173 to 178 is unusually complete. It includes a great variety of types and a large assortment of reducing sizes. It affords the user a selection sufficient for almost any piping installation within its pressure and size range.

Rugged construction: The fittings are well proportioned and of good weight. Their strength is very high, providing a very liberal factor of safety over the recommended working pressures.

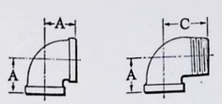
Threading: All openings are accurately threaded to gauge, and in true alignment. Each opening is chamfered slightly, to permit easy entrance of the pipe.

Plain fittings: Plain fittings are satisfactory for low pressure gas and water lines, for house plumbing, or for railings.

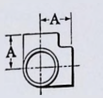
Air-tested fittings: Crane Air-Tested Standard Malleable Iron Fittings are suitable for air brake and other compressed air lines. A liberal assortment of types and sizes is carried in stock. These fittings are shown on page 180.

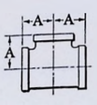
Dimensions: The table below gives the dimensions of the most currently used straight size fittings and of reducers. Plain fittings have the same center to end dimensions as the corresponding size of banded fitting. Dimensions of other types and of reducing sizes will be furnished on request.

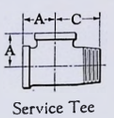
Dimensions, in Inches

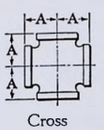

90° Elbow

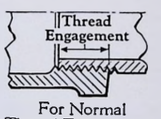
90° Street Elbow


Side Outlet Elbow

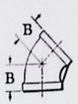

Tee


Service Tee


Cross

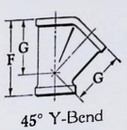


For Normal Thread Engagement, see page 367.


45° Elbow


45° Street Elbow

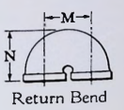

Four-Way Tee


45° Y-Bend


Cap


Coupling


Reducer


Return Bend

Size	A	B	C	D	E	F	G	H	J	K
⅛	11/16	½	1	11/16	13/16			9/16	15/16	
¼	13/16	¾	13/16	⅝	15/16			⅝	1 1/16	1
⅜	15/16	13/16	17/16	11/16	1 1/16	2 1/8	1 7/16	¾	1 3/16	1 1/8
½	1 1/8	⅞	1⅝	13/16	1 3/16	2 7/16	1 11/16	⅞	1 5/16	1 1/4
¾	1 5/16	1	1 7/8	15/16	1 5/16	2 13/16	2 1/16	1 1/16	1½	1 7/16
1	1½	1 1/8	2 1/8	1 1/16	1½	3 3/8	2 7/16	1 3/16	1 11/16	1 11/16
1¼	1¾	1 5/16	2 7/16	1¼	1 11/16	4 1/16	2 15/16	1¼	1 15/16	2 1/16
1½	1 15/16	1 7/16	2 11/16	1⅜	1⅞	4½	3 5/16	1 5/16	2½	2 1/8
2	2¼	1 11/16	3¼	1 11/16	2¼	5 7/16	4	1 7/16	2½	2 13/16
2½	2 11/16	1 15/16	3 13/16	1⅞	2 9/16	6¼	4 11/16	1⅝	2⅞	3¼
3	3⅛	2 3/16	4½	2⅛	3	7¼	5 9/16	1¾	3 3/16	3 11/16
3½	3 7/16	2⅜	5⅛	2⅜	3⅜			1 15/16	3 7/16	4
4	3¾	2⅝	5 11/16	2½	3¾	8⅞	6 15/16	2 1/16	3 11/16	4⅜
5	4½	3 1/16	6⅞					2 5/16	4¼	3⅞
6	5⅛	3 7/16	8					2 9/16	4¾	4⅜

Return Bends								
Size	M	N	Size	M	N	Size	M	N
Close Pattern			Open Pattern			Wide Pattern		
½	1	1¾	½	1½	1 7/8	⅜	1½	1⅝
¾	1¼	2 3/16	¾	2	2¼	¾	4	3 3/16
1	1½	2½	1	2½	2⅝	¾	6	4½
1¼	1¾	2 13/16	1¼	3	3 3/16	1	6	4½
1½	2 3/16	3 3/16	1½	3½	3⅝	1¼	6	4¾
2	2⅝	3⅞	2	4	4 3/8	1½	6	5
Medium Pattern			2½	4½	4 15/16	2	5	4¾
½	1¼	1⅝	3	5	5 9/16	2	6	5 5/16
¾	1½	1 15/16	4	6	6 11/16	3	7½	6 13/16
1	1⅞	2¼				3	8	6 13/16
1¼	2¼	2 13/16				6	12	11 1/16
1½	2½	3 3/16						
2	3	3⅞						

Standard Malleable Iron Fittings

List Prices, Each



90° Elbows, Banded Right Hand		
Size Inches	Black Each	Galv. Each
⅛	.05	.07
¼	.05	.07
⅜	.06	.08
½	.07	.09
¾	.10	.13
1	.13	.17
1¼	.20	.26
1½	.25	.33
2	.40	.52
2½	.72	.95
3	1.00	1.30
3½	1.50	1.95
4	1.80	2.35
5	3.25	4.25
6	4.65	6.05
¼ x ⅛	* .06	* .08
⅜ x ¼	.07	.09
⅜ x ⅛	* .07	* .09
½ x ⅜	.08	.10
½ x ¼	.08	.10
¾ x ½	.11	.14
¾ x ⅜	.11	.14
¾ x ¼	* .11	* .14
1 x ¾	.14	.18
1 x ½	.14	.18
1 x ⅜	.14	.18
1¼ x 1	.22	.29
1¼ x ¾	.22	.29
1¼ x ½	.22	.29
1½ x 1¼	.28	.36
1½ x 1	.28	.36
1½ x ¾	.28	.36
2 x 1½	.44	.57
2 x 1¼	.44	.57
2 x 1	.44	.57
2 x ¾	* .44	* .57
2½ x 2	.80	1.05
2½ x 1½	.80	1.05
3 x 2½	1.10	1.45
3 x 2	1.10	1.45
3 x 1	*1.10	*1.45
3½ x 3	1.65	2.15
4 x 3½	*2.00	*2.60
4 x 3	2.00	2.60
4 x 2	*2.00	*2.60
4 x 1½	*2.00	*2.60
6 x 4	*5.15	*6.70
6 x 2½	*5.15	*6.70



90° Elbows, Banded Right and Left		
Size Inches	Black Each	Galv. Each
¼	.06	.08
⅜	.07	.09
½	.08	.10
¾	.12	.16
1	.15	.20
1¼	.23	.30
1½	.29	.38
2	.46	.60



45° Elbows Banded		
Size Inches	Black Each	Galv. Each
⅛	.06	.08
¼	.06	.08
⅜	.07	.09
½	.09	.12
¾	.12	.16
1	.16	.21
1¼	.24	.31
1½	.30	.39
2	.48	.62
2½	.86	1.10
3	1.20	1.55
3½	1.80	2.35
4	2.20	2.85
5	3.90	5.10
6	5.60	7.30



90° Street Elbows Banded		
Size Inches	Black Each	Galv. Each
⅛	.06	.08
¼	.06	.08
⅜	.07	.09
½	.08	.10
¾	.12	.16
1	.15	.20
1¼	.23	.30
1½	.29	.38
2	.46	.60
2½	.83	1.10
3	1.15	1.50
3½	*1.80	*2.35
4	2.10	2.75
5	*3.75	*4.90
6	*5.35	*6.95
A B		
⅜ x ⅛	* .08	* .10
¾ x ½	.13	.17
1 x ¾	.17	.22
1 x ½	* .17	* .22
1¼ x 1	.25	.33
1¼ x ¾	* .25	* .33
1½ x 1¼	.32	.42
1½ x 1	* .32	* .42
1½ x ¾	* .32	* .42
2 x 1½	.51	.66
2 x 1¼	* .51	* .66
2 x 1	* .51	* .66
2½ x 2	* .92	*1.20
2½ x 1½	* .92	*1.20
3 x 2½	*1.30	*1.70
3 x 2	*1.30	*1.70
4 x 3	*2.30	*3.00



45° Street Elbows Banded		
Size Inches	Black Each	Galv. Each
⅛	* .07	* .09
¼	* .07	* .09
⅜	.08	.10
½	.10	.13
¾	.14	.18
1	.18	.23
1¼	.28	.36
1½	.35	.46
2	.55	.72
2½	*1.00	*1.30
3	*1.40	*1.85
4	*2.55	*3.30



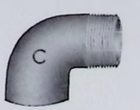
90° Elbows Plain		
Size Inches	Black Each	Galv. Each
⅛	.05	.07
¼	.05	.07
⅜	.06	.08
½	.07	.09
¾	.10	.13
1	.13	.17
1¼	.20	.26
1½	.25	.33
2	.40	.52
¼ x ⅛	.06	.08
⅜ x ¼	.07	.09
⅜ x ⅛	.07	.09
½ x ⅜	.08	.10
½ x ¼	.08	.10
½ x ⅛	* .08	* .10
¾ x ½	.11	.14
¾ x ⅜	.11	.14
1 x ¾	.14	.18
1 x ½	.14	.18
1 x ⅜	.14	.18
1¼ x 1	.22	.29
1½ x 1¼	.28	.36
2 x 1½	.44	.57



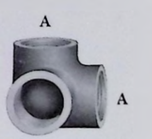
45° Elbows Plain		
Size Inches	Black Each	Galv. Each
¼	* .06	* .08
⅜	* .07	* .09
½	* .09	* .12
¾	* .12	* .16
1	* .16	* .21
1¼	* .24	* .31
1½	* .30	* .39
2	* .48	* .62



60° Elbows Plain		
Size Inches	Black Each	Galv. Each
1¼	.31	.40
1½	.40	.52
2	* .62	* .80



90° Street Elbows Plain		
Size Inches	Black Each	Galv. Each
⅛	* .06	* .08
¼	* .06	* .08
⅜	* .07	* .09
½	* .08	* .10
¾	* .12	* .16
1	* .15	* .20



Side Outlet Elbows Plain		
Size Inches	Black Each	Galv. Each
¼	* .10	* .13
⅜	.12	.16
½	.14	.18
¾	.20	.26
1	.26	.34
1¼	.40	.52
1½	.50	.65
2	.80	1.05
A B		
⅜ x ¼	* .14	* .18
½ x ⅜	* .16	* .21
¾ x ½	* .22	* .29
¾ x ⅜	* .22	* .29
1 x ¾	* .28	* .36
1¼ x 1	* .44	* .57

*Non-Standard sizes: Sizes indicated with an asterisk (*) are "Non-Standard", and are sold at an advance in price over "Standard" sizes. See the Crane Discount Sheet for prices.

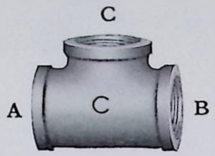
Sizes not listed are special. Prices on application.

Larger sizes: For 90° and 45° Elbows larger than 6-inch, Crane Standard Malleable Iron Refinery Oil Fittings are recommended. See page 181.

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Standard Malleable Iron Fittings

List Prices, Each



Tees, Banded

Size Inches	Black Each	Galv. Each
1/8	.07	.09
1/4	.07	.09
3/8	.08	.10
1/2	.10	.13
3/4	.13	.17
1	.17	.22
1 1/4	.26	.34
1 1/2	.33	.43
2	.52	.68
2 1/2	.90	1.20
3	1.30	1.70
3 1/2	2.00	2.60
4	2.40	3.10
5	4.25	5.55
6	6.00	7.80
A B C		
1/4 x 1/4 x 1/8	* .08	* .10
1/8 x 1/8 x 1/4	* .08	* .10
3/8 x 3/8 x 1/4	.09	.12
3/8 x 3/8 x 1/8	* .09	* .12
3/8 x 1/4 x 3/8	* .09	* .12
3/8 x 1/4 x 1/4	* .09	* .12
1/4 x 1/4 x 3/8	.09	.12
1/2 x 1/2 x 3/8	.11	.14
1/2 x 1/2 x 1/4	.11	.14
1/2 x 1/2 x 1/8	* .11	* .14
1/2 x 3/8 x 1/2	.11	.14
1/2 x 3/8 x 1/4	* .11	* .14
1/2 x 1/4 x 1/2	.11	.14
1/2 x 1/4 x 1/4	* .11	* .14
3/8 x 3/8 x 1/2	.11	.14
3/4 x 3/4 x 1/2	.15	.20
3/4 x 3/4 x 3/8	.15	.20
3/4 x 3/4 x 1/4	.15	.20
3/4 x 1/2 x 3/4	.15	.20
3/4 x 1/2 x 1/2	.15	.20
3/4 x 1/2 x 3/8	.15	.20
3/4 x 3/8 x 3/4	.15	.20
3/4 x 3/8 x 1/2	.15	.20
3/4 x 3/8 x 3/8	.15	.20
3/4 x 1/4 x 3/4	* .15	* .20
1/2 x 1/2 x 3/4	.15	.20
1/2 x 3/8 x 3/4	.15	.20
3/8 x 3/8 x 3/4	.15	.20

Size Inches	Black Each	Galv. Each
A B C		
1 x 1 x 3/4	.19	.25
1 x 1 x 1/2	.19	.25
1 x 1 x 3/8	.19	.25
1 x 1 x 1/4	.19	.25
1 x 3/4 x 1	.19	.25
1 x 3/4 x 3/4	.19	.25
1 x 3/4 x 1/2	.19	.25
1 x 3/4 x 3/8	.19	.25
1 x 1/2 x 1	.19	.25
1 x 1/2 x 1/2	.19	.25
1 x 3/8 x 1	.19	.25
3/4 x 3/4 x 1	.19	.25
3/4 x 1/2 x 1	.19	.25
1/2 x 1/2 x 1	* .19	* .25
1 1/4 x 1 1/4 x 1	.29	.38
1 1/4 x 1 1/4 x 3/4	.29	.38
1 1/4 x 1 1/4 x 1/2	.29	.38
1 1/4 x 1 1/4 x 3/8	.29	.38
1 1/4 x 1 x 1 1/4	.29	.38
1 1/4 x 1 x 1	.29	.38
1 1/4 x 1 x 3/4	.29	.38
1 1/4 x 1 x 1/2	.29	.38
1 1/4 x 3/4 x 1 1/4	.29	.38
1 1/4 x 3/4 x 1	.29	.38
1 1/4 x 3/4 x 3/4	.29	.38
1 1/4 x 1/2 x 1	* .29	* .38
1 1/4 x 3/8 x 1 1/4	.29	.38
1 x 1 x 1 1/4	.29	.38
1 x 3/4 x 1 1/4	* .29	* .38
3/4 x 3/4 x 1 1/4	* .29	* .38
1 1/2 x 1 1/2 x 1 1/4	.37	.48
1 1/2 x 1 1/2 x 1	.37	.48
1 1/2 x 1 1/2 x 3/4	.37	.48
1 1/2 x 1 1/2 x 1/2	.37	.48
1 1/2 x 1 1/2 x 3/8	.37	.48
1 1/2 x 1 1/4 x 1 1/2	.37	.48
1 1/2 x 1 1/4 x 1 1/4	.37	.48
1 1/2 x 1 1/4 x 1	.37	.48
1 1/2 x 1 1/4 x 3/4	.37	.48
1 1/2 x 1 1/4 x 1/2	* .37	* .48
1 1/2 x 1 x 1 1/2	.37	.48
1 1/2 x 1 x 1 1/4	.37	.48

Size Inches	Black Each	Galv. Each
A B C		
1 1/2 x 1 x 1	.37	.48
1 1/2 x 1 x 3/4	.37	.48
1 1/2 x 3/4 x 1 1/2	.37	.48
1 1/2 x 3/4 x 1 1/4	* .37	* .48
1 1/2 x 3/4 x 1	* .37	* .48
1 1/2 x 3/4 x 3/4	.37	.48
1 1/2 x 1/2 x 1 1/2	.37	.48
1 1/2 x 3/8 x 1 1/2	* .37	* .48
1 1/4 x 1 1/4 x 1 1/2	.37	.48
1 1/4 x 1 x 1 1/2	* .37	* .48
1 x 1 x 1 1/2	.37	.48
2 x 2 x 1 1/2	.57	.75
2 x 2 x 1 1/4	.57	.75
2 x 2 x 1	.57	.75
2 x 2 x 3/4	.57	.75
2 x 2 x 1/2	.57	.75
2 x 2 x 3/8	.57	.75
2 x 1 1/2 x 2	.57	.75
2 x 1 1/2 x 1 1/2	.57	.75
2 x 1 1/2 x 1 1/4	.57	.75
2 x 1 1/2 x 1	.57	.75
2 x 1 1/4 x 2	.57	.75
2 x 1 1/4 x 1 1/2	.57	.75
2 x 1 1/4 x 1 1/4	.57	.75
2 x 1 1/4 x 1	.57	.75
2 x 1 1/4 x 3/4	.57	.75
2 x 1 1/4 x 1/2	* .57	* .75
2 x 1 x 2	.57	.75
2 x 1 x 1 1/2	* .57	* .75
2 x 1 x 1 1/4	* .57	* .75
2 x 1 x 1	* .57	* .75
2 x 3/4 x 2	.57	.75
2 x 1/2 x 2	* .57	* .75
2 x 3/8 x 2	* .57	* .75
1 1/2 x 1 1/2 x 2	.57	.75
1 1/2 x 1 1/4 x 2	* .57	* .75
1 1/4 x 1 1/4 x 2	.57	.75
1 x 1 x 2	* .57	* .75
3/4 x 3/4 x 2	* .57	* .75
2 1/2 x 2 1/2 x 2	1.00	1.30
2 1/2 x 2 1/2 x 1 1/2	1.00	1.30
2 1/2 x 2 1/2 x 1 1/4	1.00	1.30
2 1/2 x 2 1/2 x 1	1.00	1.30
2 1/2 x 2 1/2 x 3/4	1.00	1.30
2 1/2 x 2 x 2 1/2	1.00	1.30
2 1/2 x 2 x 2	1.00	1.30

Size Inches	Black Each	Galv. Each
A B C		
2 1/2 x 2 x 1 1/2	*1.00	*1.30
2 1/2 x 1 1/2 x 2 1/2	1.00	1.30
2 1/2 x 1 1/2 x 2	*1.00	*1.30
2 1/2 x 1 1/2 x 1 1/2	*1.00	*1.30
2 1/2 x 1 1/4 x 1 1/4	*1.00	*1.30
2 x 2 x 2 1/2	1.00	1.30
3 x 3 x 2 1/2	1.45	1.90
3 x 3 x 2	1.45	1.90
3 x 3 x 1 1/2	1.45	1.90
3 x 3 x 1 1/4	1.45	1.90
3 x 3 x 1	1.45	1.90
3 x 3 x 3/4	*1.45	*1.90
3 x 2 1/2 x 3	1.45	1.90
3 x 2 1/2 x 2 1/2	*1.45	*1.90
3 x 2 1/2 x 2	*1.45	*1.90
3 x 2 x 3	1.45	1.90
3 x 2 x 2 1/2	*1.45	*1.90
3 x 2 x 2	1.45	1.90
3 x 1 x 3	*1.45	*1.90
2 1/2 x 2 1/2 x 3	1.45	1.90
2 x 2 x 3	*1.45	*1.90
3 1/2 x 3 1/2 x 3	2.20	2.85
3 1/2 x 3 1/2 x 2 1/2	2.20	2.85
4 x 4 x 3 1/2	*2.65	*3.45
4 x 4 x 3	2.65	3.45
4 x 4 x 2 1/2	2.65	3.45
4 x 4 x 2	2.65	3.45
4 x 4 x 1 1/2	2.65	3.45
4 x 4 x 1 1/4	*2.65	*3.45
4 x 4 x 1	*2.65	*3.45
4 x 3 x 4	*2.65	*3.45
4 x 3 x 3	*2.65	*3.45
3 x 3 x 4	*2.65	*3.45
5 x 5 x 4	*4.70	*6.10
5 x 5 x 3	4.70	6.10
5 x 5 x 2	*4.70	*6.10
6 x 6 x 4	6.60	8.60
6 x 6 x 3	6.60	8.60
6 x 6 x 2 1/2	6.60	8.60
6 x 6 x 2	6.60	8.60
6 x 4 x 6	*6.60	*8.60

***Non-Standard sizes:** Sizes indicated with an asterisk (*) are "Non-Standard", and are sold at an advance in price over "Standard" sizes. See the Crane Discount Sheet for prices.

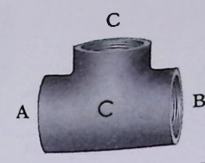
Sizes not listed are special. Prices on application.

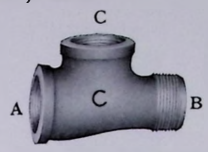
Larger sizes: For sizes larger than 6-inch, Crane Standard Malleable Iron Refinery Oil Fittings are recommended. See page 181.

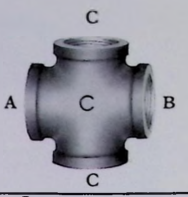
Description.....page 172 *Dimensions.....page 172* *Working pressures.....page 172*

Standard Malleable Iron Fittings

List Prices, Each







Tees Plain

Size Inches	Black Each	Galv. Each
1/8	.07	.09
1/4	.07	.09
3/8	.08	.10
1/2	.10	.13
3/4	.13	.17
1	.17	.22
1 1/4	.26	.34
1 1/2	.33	.43
2	.52	.68
A B C		
1/4 x 1/4 x 1/8	.08	.10
1/8 x 1/8 x 1/4	*.08	*.10
3/8 x 3/8 x 1/4	.09	.12
3/8 x 3/8 x 1/8	.09	.12
3/8 x 1/4 x 3/8	*.09	*.12
3/8 x 1/4 x 1/4	*.09	*.12
1/4 x 1/4 x 3/8	.09	.12
1/2 x 1/2 x 3/8	.11	.14
1/2 x 1/2 x 1/4	.11	.14
1/2 x 3/8 x 1/2	.11	.14
1/2 x 3/8 x 1/4	*.11	*.14
1/2 x 1/4 x 1/2	.11	.14
3/8 x 3/8 x 1/2	.11	.14
3/4 x 3/4 x 1/2	.15	.20
3/4 x 3/4 x 3/8	.15	.20
3/4 x 3/4 x 1/4	.15	.20
3/4 x 1/2 x 3/4	.15	.20
3/4 x 1/2 x 1/2	.15	.20
3/4 x 1/2 x 3/8	.15	.20
3/4 x 1/2 x 1/4	*.15	*.20
3/4 x 3/8 x 3/4	.15	.20
3/4 x 3/8 x 1/2	.15	.20
3/4 x 3/8 x 3/8	.15	.20
3/4 x 1/4 x 3/4	*.15	*.20
1/2 x 1/2 x 3/4	.15	.20
1/2 x 3/8 x 3/4	.15	.20
3/8 x 3/8 x 3/4	.15	.20

Size Inches	Black Each	Galv. Each
A B C		
1 x 1 x 3/4	.19	.25
1 x 1 x 1/2	.19	.25
1 x 1 x 3/8	.19	.25
1 x 1 x 1/4	.19	.25
1 x 3/4 x 1	.19	.25
1 x 3/4 x 3/4	.19	.25
1 x 3/4 x 1/2	.19	.25
1 x 3/4 x 3/8	.19	.25
1 x 1/2 x 1	.19	.25
1 x 1/2 x 3/4	.19	.25
1 x 1/2 x 1/2	.19	.25
1 x 1/2 x 3/8	*.19	*.25
1 x 3/8 x 1	.19	.25
1 x 3/8 x 3/4	*.19	*.25
1 x 3/8 x 1/2	*.19	*.25
3/4 x 3/4 x 1	.19	.25
3/4 x 1/2 x 1	.19	.25
3/4 x 3/8 x 1	*.19	*.25
1 1/4 x 1 1/4 x 1	.29	.38
1 1/4 x 1 1/4 x 3/4	.29	.38
1 1/4 x 1 1/4 x 1/2	.29	.38
1 1/4 x 1 1/4 x 3/8	.29	.38
1 1/4 x 1 x 1 1/4	.29	.38
1 1/4 x 1 x 1	.29	.38
1 1/4 x 1 x 3/8	*.29	*.38
1 1/4 x 3/8 x 1 1/4	*.29	*.38
1 x 1 x 1 1/4	.29	.38
1 1/2 x 1 1/2 x 1 1/4	.37	.48
1 1/2 x 1 1/2 x 1	.37	.48
1 1/2 x 1 1/2 x 3/4	.37	.48
1 1/2 x 1 1/4 x 1 1/2	.37	.48
2 x 2 x 1 1/2	.57	.75
2 x 2 x 1 1/4	.57	.75
2 x 2 x 1	.57	.75
2 x 2 x 3/4	.57	.75
2 x 1 1/2 x 2	.57	.75
2 x 1 1/2 x 1 1/2	.57	.75
1 1/2 x 1 1/2 x 2	.57	.75

*Non-Standard sizes: Sizes indicated with an asterisk (*) are "Non-Standard", and are sold at an advance in price over "Standard" sizes. See the Crane Discount Sheet for prices.

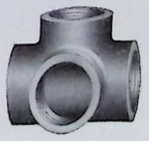
Sizes not listed are special. Prices on application.

Larger size Crosses: For Crosses larger than 6-inch, Crane Standard Malleable Iron Refinery Oil Fittings are recommended. See page 181.

Description.....page 172 *Dimensions.....page 172* *Working pressures.....page 172*

Service Tees Banded

Size Inches	Black Each	Galv. Each
1/4	* .08	* .10
3/8	.09	.12
1/2	.12	.16
3/4	.15	.20
1	.20	.26
1 1/4	.30	.39
1 1/2	.38	.50
2	.60	.78
2 1/2	*1.05	*1.37
3	*1.50	*1.95
4	*2.75	*3.60
A B C		
3/8 x 3/8 x 1/2	* .13	* .17
3/4 x 1/2 x 3/4	* .17	* .22
1 x 1 x 3/4	.22	.29
1 x 3/4 x 1	* .22	* .29
1 x 1/2 x 1	* .22	* .29
3/4 x 3/4 x 1	* .22	* .29
1 1/4 x 1 x 1 1/4	.33	.43
1 1/4 x 1 x 1	* .33	* .43
1 1/4 x 3/4 x 1 1/4	.33	.43
1 x 1 x 1 1/4	* .33	* .43
1 1/2 x 1 1/4 x 1 1/2	.42	.55
1 1/2 x 1 x 1 1/2	* .42	* .55
1 1/2 x 3/4 x 1 1/2	* .42	* .55
2 x 2 x 1	* .66	* .86
2 x 1 1/2 x 2	.66	.86
2 x 1 1/4 x 2	* .66	* .86
2 x 1 x 2	* .66	* .86
2 x 3/4 x 2	* .66	* .86
2 1/2 x 2 x 2 1/2	*1.15	*1.50
3 x 2 1/2 x 3	*1.65	*2.15
3 x 3 x 4	*3.05	*3.95



Four-Way Tees Plain

Size Inches	Black Each	Galv. Each
1/4	*.14	*.18
3/8	.16	.21
1/2	.20	.26
3/4	.26	.34
1	.34	.44
1 1/4	.52	.68
1 1/2	.66	.86
2	1.05	1.35

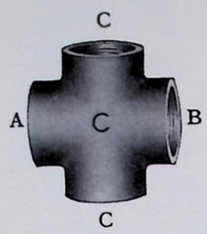
Crosses, Banded

Size Inches	Black Each	Galv. Each
1/8	*.09	* .12
1/4	.09	.12
3/8	.11	.14
1/2	.13	.17
3/4	.18	.23
1	.23	.30
1 1/4	.35	.46
1 1/2	.44	.57
2	.70	.90
2 1/2	1.25	1.65
3	1.75	2.30
3 1/2	2.65	3.45
4	3.15	4.10
5	5.70	7.40
6	8.15	10.60
A B C		
1/4 x 1/4 x 1/8	*.10	* .13
3/8 x 3/8 x 1/4	*.12	* .16
1/2 x 1/2 x 3/8	.14	.18
1/2 x 1/2 x 1/4	*.14	* .18
3/4 x 3/4 x 1/2	.20	.26
3/4 x 3/4 x 3/8	.20	.26
1 x 1 x 3/4	.25	.33
1 x 1 x 1/2	.25	.33
1 x 1 x 3/8	.25	.33
1 1/4 x 1 1/4 x 1	.38	.50
1 1/4 x 1 1/4 x 3/4	.38	.50
1 1/4 x 1 1/4 x 1/2	.38	.50
1 1/4 x 1 1/4 x 3/8	*.38	* .50
1 1/4 x 1 x 1	*.38	* .50
1 1/4 x 1 x 3/4	*.38	* .50
1 1/2 x 1 1/2 x 1 1/4	.48	.62
1 1/2 x 1 1/2 x 1	.48	.62
1 1/2 x 1 1/2 x 3/4	.48	.62
1 1/2 x 1 1/2 x 1/2	*.48	* .62
1 1/2 x 1 1/4 x 1 1/4	*.48	* .62
2 x 2 x 1 1/2	.77	1.00
2 x 2 x 1 1/4	.77	1.00
2 x 2 x 1	.77	1.00
2 x 2 x 3/4	.77	1.00
2 x 2 x 1/2	*.77	*1.00
2 x 1 1/4 x 1 1/4	*.77	*1.00
2 1/2 x 2 1/2 x 2	1.40	1.85
2 1/2 x 2 1/2 x 1 1/2	*1.40	*1.85
2 1/2 x 2 1/2 x 1	*1.40	*1.85
3 x 3 x 2 1/2	*1.95	*2.55
3 x 3 x 2	1.95	2.55
3 x 3 x 1	*1.95	*2.55
4 x 4 x 3	*3.45	*4.50
4 x 4 x 2	3.45	4.50
6 x 6 x 4	*9.00	*11.70
6 x 6 x 3	*9.00	*11.70
6 x 6 x 2	*9.00	*11.70

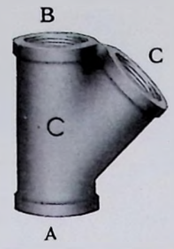
Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 106 of 402
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Standard Malleable Iron Fittings

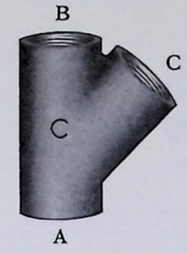
List Prices, Each



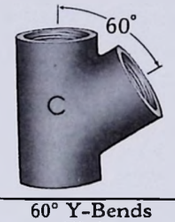
Crosses Plain			
Size Inches		Black Each	Galv. Each
1/4		.09	.12
3/8		.11	.14
1/2		.13	.17
3/4		.18	.23
1		.23	.30
1 1/4		.35	.46
1 1/2		.44	.57
2		.70	.90
A	B C		
3/8	x 3/8 x 1/4	*.12	* .16
1/2	x 1/2 x 3/8	.14	.18
1/2	x 1/2 x 1/4	*.14	* .18
1/2	x 3/8 x 3/8	*.14	* .18
3/4	x 3/4 x 1/2	.20	.26
3/4	x 3/4 x 3/8	.20	.26
3/4	x 1/2 x 1/2	*.20	* .26
3/4	x 1/2 x 3/8	*.20	* .26
3/4	x 3/8 x 1/2	*.20	* .26
1	x 1 x 3/4	.25	.33
1	x 1 x 1/2	.25	.33
1	x 1 x 3/8	.25	.33
1	x 3/4 x 3/4	*.25	* .33
1	x 3/4 x 1/2	*.25	* .33
1	x 3/4 x 3/8	*.25	* .33
1	x 1/2 x 3/8	*.25	* .33
1 1/4	x 1 1/4 x 1	.38	.50
1 1/4	x 1 1/4 x 3/4	.38	.50
1 1/2	x 1 1/2 x 1 1/4	.48	.62
1 1/2	x 1 1/2 x 1	.48	.62
2	x 2 x 1 1/2	.77	1.00
2	x 2 x 1 1/4	.77	1.00
2	x 2 x 1	.77	1.00



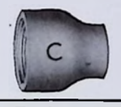
45° Y-Bends Banded			
Size Inches		Black Each	Galv. Each
3/8		* .10	* .13
1/2		.14	.18
3/4		.18	.23
1		.25	.33
1 1/4		.40	.52
1 1/2		.57	.75
2		.85	1.10
2 1/2		1.55	2.00
3		2.80	3.65
4		4.80	6.25
A	B C		
1	x 1 x 3/4	* .28	* .36
1 1/4	x 1 1/4 x 1	* .44	* .57
1 1/4	x 1 1/4 x 3/4	* .44	* .57
1 1/2	x 1 1/2 x 1 1/4	* .63	* .82
1 1/2	x 1 1/2 x 1	* .63	* .82
1 1/2	x 1 1/4 x 1 1/2	* .63	* .82
1 1/2	x 1 1/4 x 1 1/4	* .63	* .82
2	x 2 x 1 1/2	* .95	* 1.25
2	x 2 x 1 1/4	* .95	* 1.25
2	x 2 x 1	* .95	* 1.25
2	x 1 1/2 x 2	* .95	* 1.25
2	x 1 1/2 x 1 1/2	* .95	* 1.25
2	x 1 1/2 x 1 1/4	* .95	* 1.25
2	x 1 1/4 x 2	* .95	* 1.25
2	x 1 1/4 x 1 1/2	* .95	* 1.25
2	x 1 1/4 x 1 1/4	* .95	* 1.25
2 1/2	x 2 1/2 x 2	* 1.70	* 2.20
2 1/2	x 1 1/2 x 1 1/2	* 1.70	* 2.20
3	x 3 x 2 1/2	* 3.10	* 4.05
3	x 2 1/2 x 2 1/2	* 3.10	* 4.05
5	x 5 x 2	* 9.00	*11.70
6	x 6 x 2	*13.00	*16.90



45° Y-Bends Plain			
Size Inches		Black Each	Galv. Each
1 1/4		* .40	* .52
1 1/2		* .57	* .75
2		.85	1.10
A	B C		
1 1/2	x 1 1/2 x 1 1/4	* .63	* .82
2	x 2 x 1 1/2	.95	1.25
2	x 1 1/2 x 2	.95	1.25
2	x 1 1/2 x 1 1/2	.95	1.25



60° Y-Bends Plain		
Size Inches	Black Each	Galv. Each
2	*1.00	*1.30



Reducers Plain			
Size Inches		Black Each	Galv. Each
1/4	x 1/8	.05	.07
3/8	x 1/4	.05	.07
3/8	x 1/8	.05	.07
1/2	x 3/8	.06	.08
1/2	x 1/4	.06	.08
1/2	x 1/8	* .06	* .08
3/4	x 1/2	.09	.12
3/4	x 3/8	.09	.12
3/4	x 1/4	.09	.12
1	x 3/4	.12	.16
1	x 1/2	.12	.16
1	x 3/8	.12	.16
1	x 1/4	.12	.16
1 1/4	x 1	.15	.20
1 1/4	x 3/4	.15	.20
1 1/4	x 1/2	.15	.20
1 1/4	x 3/8	.15	.20
1 1/4	x 1/4	* .15	* .20
1 1/2	x 1 1/4	.18	.23
1 1/2	x 1	.18	.23
1 1/2	x 3/4	.18	.23
1 1/2	x 1/2	.18	.23
1 1/2	x 3/8	* .18	* .23
1 1/2	x 1/4	* .18	* .23
2	x 1 1/2	.28	.36
2	x 1 1/4	.28	.36
2	x 1	.28	.36
2	x 3/4	.28	.36
2	x 1/2	.28	.36
2	x 3/8	.28	.36
2	x 1/4	* .28	* .36
2 1/2	x 2	.50	.65
2 1/2	x 1 1/2	.50	.65
2 1/2	x 1 1/4	.50	.65
2 1/2	x 1	.50	.65
3	x 2 1/2	.75	1.00
3	x 2	.75	1.00
3	x 1 1/2	.75	1.00
3	x 1 1/4	.75	1.00
3	x 1	.75	1.00
3	x 3/4	* .75	*1.00
3 1/2	x 3	1.10	1.45
3 1/2	x 2 1/2	1.10	1.45
3 1/2	x 2	1.10	1.45
4	x 3 1/2	1.40	1.85
4	x 3	1.40	1.85
4	x 2 1/2	1.40	1.85
4	x 2	1.40	1.85
4	x 1 1/2	*1.40	*1.85
4	x 1 1/4	*1.40	*1.85
4	x 1	*1.40	*1.85
5	x 4	*2.50	*3.25
5	x 3	*2.50	*3.25
5	x 2	*2.50	*3.25
6	x 5	*3.60	*4.70
6	x 4	*3.60	*4.70
6	x 3	*3.60	*4.70
6	x 2	*3.60	*4.70



***Non-Standard sizes:** Sizes indicated with an asterisk (*) are "Non-Standard", and are sold at an advance in price over "Standard" sizes. See the Crane Discount Sheet for prices.

Sizes not listed are special. Prices on application.

Description . . . . *page 172* *Dimensions* . . . . *page 172*
Working pressures . . . . *page 172*

Standard Malleable Iron Fittings

List Prices, Each



Couplings, Banded Right Hand		
Size Inches	Black Each	Galv. Each
1/8	* .05	* .07
1/4	* .05	* .07
3/8	* .05	* .07
1/2	* .06	* .08
3/4	* .09	* .12
1	* .12	* .16
1 1/4	.16	.21
1 1/2	.21	.27
2	.34	.44
2 1/2	.60	.78
3	.85	1.10
3 1/2	1.25	1.60
4	1.50	1.95
5	*2.00	*2.60
6	*3.05	*3.95



Couplings, Banded Right and Left		
Size Inches	Black Each	Galv. Each
1/8	* .05	* .07
1/4	* .05	* .07
3/8	* .05	* .07
1/2	* .06	* .08
3/4	* .09	* .12
1	* .12	* .16
1 1/4	.16	.21
1 1/2	.21	.27
2	.34	.44
2 1/2	.60	.78
3	* .85	*1.10



Couplings, Plain Right Hand		
Size Inches	Black Each	Galv. Each
1/8	.05	.07
1/4	.05	.07
3/8	.05	.07
1/2	.06	.08
3/4	.09	.12
1	.12	.16
1 1/4	.16	.21
1 1/2	.21	.27
2	.34	.44



Caps Banded		
Size Inches	Black Each	Galv. Each
1/4	* .03	* .04
3/8	* .04	* .05
1/2	* .05	* .07
3/4	* .08	* .10
1	* .10	* .13
1 1/4	.13	.17
1 1/2	.18	.23
2	.25	.33
2 1/2	.40	.52
3	.60	.78
3 1/2	.80	1.05
4	1.10	1.45
5	1.80	2.35
6	2.70	3.50



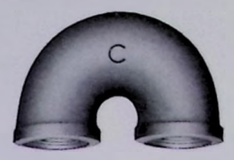
Caps Plain		
Size Inches	Black Each	Galv. Each
1/8	.03	.04
1/4	.03	.04
3/8	.04	.05
1/2	.05	.07
3/4	.08	.10
1	.10	.13

Sizes 1/8, 1/4, and 3/8 inch are made of steel.



Locknuts Hexagonal		
Size Inches	Black Each	Galv. Each
1/8	.02	.03
1/4	.02 1/2	.03 1/2
3/8	.02 1/2	.03 1/2
1/2	.03	.04
3/4	.04	.05
1	.06	.08
1 1/4	.08	.10
1 1/2	.10	.13
2	.12	.16
2 1/2	.30	.39
3	.38	.50
3 1/2	.43	.56
4	.48	.62

For sizes 5 to 12-inch, use Cast Iron. See page 195.



Return Bends Banded					
Size Inches	Center to Center Inches	Right Hand		Right & Left	
		Black Each	Galv. Each	Black Each	Galv. Each
Close Pattern					
1/2	1	.16	.21	.18	.23
3/4	1 1/4	.18	.23	.21	.27
1	1 1/2	.24	.31	.28	.36
1 1/4	1 3/4	.36	.47	.42	.55
1 1/2	2 3/16	.49	.64	.56	.73
2	2 5/8	.80	1.05	.92	1.20
Medium Pattern					
1/2	1 1/4	.17	.22	.19	.25
3/4	1 1/2	.20	.26	.23	.30
1	1 7/8	.26	.34	.30	.39
1 1/4	2 1/4	.40	.52	.46	.60
1 1/2	2 1/2	.55	.72	.63	.82
2	3	.88	1.15	1.00	1.30
Open Pattern					
1/2	1 1/2	.19	.25	.22	.29
3/4	2	.22	.29	.26	.34
1	2 1/2	.29	.38	.34	.44
1 1/4	3	.44	.57	.51	.66
1 1/2	3 1/2	.62	.80	.70	.90
2	4	1.00	1.30	1.15	1.50
2 1/2	4 1/2	1.45	1.90	1.65	2.15
3	5	2.15	2.80	2.45	3.20
4	6	5.80	7.55		
Special Wide Pattern					
3/8	1 1/2	* .25	* .30		
3/4	4	* 1.00	* 1.35		
3/4	6	* 1.25	* 1.65		
1	6	* 1.25	* 1.70		
1 1/4	6	* 1.25	* 1.70		
1 1/2	6	* 2.00	* 2.75		
2	5	* 3.00	* 4.00		
2	6	* 4.00	* 5.00		
3	7 1/2	* 5.00	* 6.50		
3	8	* 5.00	* 6.50		
6	12	*16.00	*21.00		

Close Pattern Return Bends can not be used to make up parallel coils. The center to center dimension is so close that the bands of adjacent bends will not clear each other.

***Non-Standard sizes:** Sizes indicated with an asterisk (*) are "Non-Standard", and are sold at an advance in price over "Standard" sizes. See the Crane Discount Sheet for prices.

Sizes not listed are special. Prices on application.

Description . . . . . *page 172*
Dimensions . . . . . *page 172*
Working pressures . . . . *page 172*

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Standard Malleable Iron Fittings

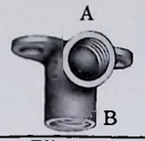
List Prices, Each



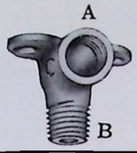
Extension Pieces Plain		
Size Inches	Black Each	Galv. Each
3/8	.05	.07
1/2	.07	.09
3/4	.11	.14
1	.16	.21
1 1/4	.18	.23
1 1/2	.23	.30
2	.33	.43
A B		
1/2 x 3/8	* .07	* .09
3/4 x 1/2	* .11	* .14



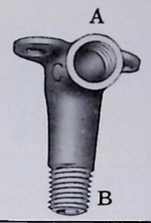
Waste Nuts		
Size In.	Black Each	Galv. Each
1/8	*.03	*.04
1/4	.03	.04
3/8	.04	.05
1/2	.04	.05
3/4	.05	.07
1	.06	.08
1 1/4	.11	.14
1 1/2	.25	.33
2	.41	.53



Drop Elbows, Plain Female		
Size Inches	Black Each	Galv. Each
1/4	.07	.09
3/8	.08	.11
1/2	.12	.16
3/4	.18	.23
A B		
3/8 x 1/4	* .09	* .12
3/4 x 1/2	* .20	* .26



Drop Elbows, Plain Male and Female Short Drop		
Size Inches	Black Each	Galv. Each
3/8	.08	.11
1/2	* .12	* .16
A B		
1/4 x 3/8	* .09	* .12
1/2 x 3/8	* .13	* .17



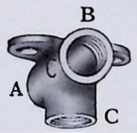
Drop Elbows, Plain Male and Female Long Drop		
Size Inches	Black Each	Galv. Each
3/8	.10	.13
1/2	.15	.20
A B		
1/4 x 3/8	* .11	* .14
1/2 x 3/8	* .17	* .22



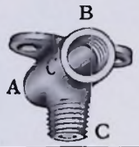
Chandelier Hooks Female	
Size Inches	Black Each
3/8	.07
1/2	.09



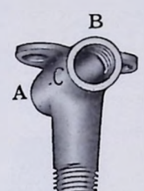
Chandelier Hooks Male	
Size Inches	Black Each
3/8	.07
1/2	.09



Drop Tees, Plain Female		
Size Inches	Black Each	Galv. Each
3/8	.10	.13
1/2	.15	.20
3/4	.22	.28
A B C		
3/8 x 3/8 x 1/4	*.11	*.14
1/2 x 1/2 x 3/8	.17	.22
1/2 x 3/8 x 3/8	*.17	*.22
3/4 x 3/4 x 1/2	.24	.31
3/4 x 3/4 x 3/8	*.24	*.31
3/4 x 3/4 x 1/4	*.24	*.31
3/4 x 1/2 x 3/8	*.24	*.31
1 x 1 x 3/8	*.32	*.42



Drop Tees, Plain Male and Female Short Drop		
Size Inches	Black Each	Galv. Each
3/8	.10	.13
A B C		
1/4 x 1/4 x 3/8	*.11	*.14
3/8 x 1/4 x 3/8	*.11	*.14
1/2 x 1/2 x 3/8	*.17	*.22
1/2 x 3/8 x 3/8	*.17	*.22
3/4 x 3/4 x 3/8	*.24	*.31
3/4 x 1/2 x 3/8	*.24	*.31
1 x 1 x 3/8	*.32	*.42



Drop Tees, Plain Male and Female Long Drop		
Size Inches	Black Each	Galv. Each
3/8	*.12	*.16
A B C		
3/4 x 3/4 x 1/2	*.29	*.38
1 x1 x 1/2	*.40	*.52
1 1/4 x 1 1/4 x 1/2	*.65	*.85



Chandelier Loops Male	
Size Inches	Black Each
3/8	.07
1/2	.09



Wall Plates	
Size Inches	Black Each
3/8	.14
1/2	.18
3/4	*.28



Crossovers Banded		
Size Inches	Black Each	Galv. Each
1/2	.20	.25
3/4	.30	.40
1	.45	.60



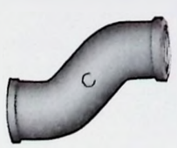
Crossover Tees Banded	
Size Inches	Galv. Each
1/2	.38
3/4	.56



Wash Tray Tees Plain	
Size Inches	Galv. Each
1/2	.20
3/4	.30
A B C	
3/4 x 3/4 x 1/2	.30



Hexagon Nipples Right and Left	
Size Inches	Black Each
1/4	.20
3/8	.20
1/2	.20
3/4	.25
1	.30
1 1/4	.40
1 1/2	.50
2	.70
2 1/2	1.10
3	1.50
3 1/2	1.90
4	2.40



Offsets Banded			
Size Inches	Offset Inches	Black Each	Galv. Each
3/4	1 1/2	.20	.26
1	1 1/2	.30	.39
1 1/4	2	.50	.65

*Non-Standard sizes: Sizes indicated with an asterisk (*) are "Non-Standard", and are sold at an advance in price over "Standard" sizes. See the Crane Discount Sheet for prices.

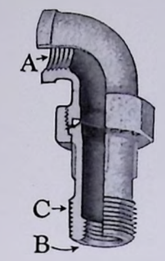
Sizes not listed are special. Prices on application.

Description . . . page 172 *Working pressures . . . page 172*

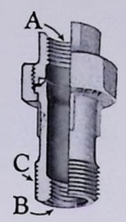
Circulating Boiler Fittings

Malleable Iron—Galvanized

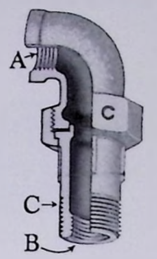
150 pounds water working pressure, 200° F.



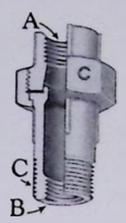
No. 586 1/2 Elbow with Gem Union



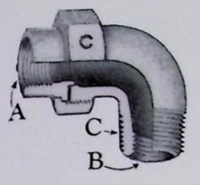
No. 589 1/2 Coupling with Gem Union



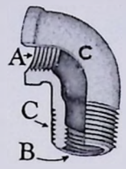
No. 586 New Style Elbow with Gasket Union



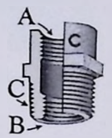
No. 589 Coupling with Gasket Union



No. 585 Old Style Elbow with Gasket Union



No. 587 Elbow

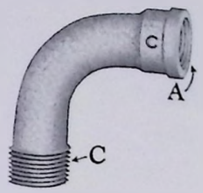


No. 588 Coupling

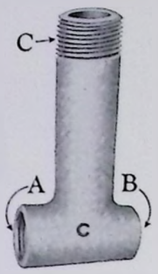
Elbows and couplings with Gem union have a brass to iron ground joint seat.

The No. 585 and No. 586 Elbows and the No. 589 Couplings are furnished with a rubber gasket.

When ordering, be sure the correct size is specified.



No. 587 1/2 Long Turn Elbow



No. 588 1/2 Tee

List Prices

Size		Inches	A B C 1/2 x 1/2 x 3/4	A B C 3/4 x 1/2 x 3/4	A B C 1/2 x 1/2 x 1	A B C 3/4 x 1/2 x 1	A B C 3/4 x 3/4 x 1	A C 3/4 x 1
Gem Union Type	No. 586 1/2, Elbows	Each			.60	.75	.75	
	No. 589 1/2, Couplings	Each			.60	.75	.75	
Gasket Union Type	No. 585, Elbows	Each	.60	.75	.60	.75	.75	
	No. 586, Elbows	Each	.60	.75	.60	.75	.75	
	No. 589, Couplings	Each	.60	.75	.60	.75	.75	
Without Union	No. 587, Elbows	Each			.40	.40	.40	
	No. 587 1/2, Elbows	Each						.58
	No. 588, Couplings	Each			.40	.40	.40	
	No. 588 1/2, Tees	Each				.50		

With the exception of the Long Turn Elbow and the Tee, Circulating Boiler Fittings are used where it is necessary to connect to a tank or receiver that requires a length of pipe extending into it. The cold water connection to a range boiler or hot water tank is a common example. The internal pipe is screwed into the female thread at the male end of the fitting, and the male end is then screwed into the tank. The cold water supply is connected to the female opening at the opposite end of the fitting.

The No. 587 1/2 Long Turn Elbow is useful for making a connection to a heat-insulated tank. Its radius is long enough to clear the insulation.

The No. 588 1/2 Tee may be used to connect to the bottom opening of a range boiler.



No. 586 1/2 No. 589 1/2 No. 586 No. 585 No. 589 No. 587 No. 588 No. 587 1/2 No. 588 1/2

Dimensions, in Inches

Size	A B C 1/2 x 1/2 x 3/4	A B C 3/4 x 1/2 x 3/4	A B C 1/2 x 1/2 x 1	A B C 3/4 x 1/2 x 1	A B C 3/4 x 3/4 x 1
A			1 1/8	1 5/16	1 5/16
B			3 13/16	3 15/16	3 15/16
C			3 5/16	3 3/8	3 3/8
D	1 1/8	1 5/16	1 1/8	1 5/16	1 5/16
E	3 13/16	3 15/16	3 13/16	3 15/16	3 15/16
F	2 3/16	2 1/2	2 5/16	2 3/4	2 3/4
G	1 13/16	2	1 7/8	1 15/16	1 15/16
H	3 3/8	3 7/16	3 3/8	3 7/16	3 7/16

Dimensions, in Inches

Size	A B C 1/2 x 1/2 x 1	A B C 3/4 x 1/2 x 1	A B C 3/4 x 3/4 x 1	A C 3/4 x 1
J	1 1/8	1 5/16	1 5/16	
K	1 13/16	2	2	
L	1 13/16	1 13/16	1 13/16	
M				3
N				3
P		1 5/16		
R		1 1/8		
S		4 1/2		

Extra Gaskets . . . page 362

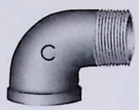
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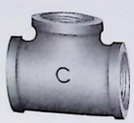
Standard
Malleable Iron Fittings
Air-Tested

For Air Brake and other Compressed Air service

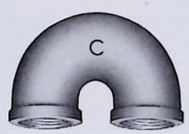

90° Elbow


45° Elbow


90° Street Elbow


Tee


Cross


Return Bend


Coupling


Reducer

Any of the Standard Malleable Iron Fittings shown on pages 173 to 177 can be furnished air-tested, to order. The list prices of Air-Tested Fittings are the same as for untested, but the Air-Tested are sold at an advance in price. See the Crane Discount Sheet for prices.

Air-Tested Fittings are admirably suited for air brake and other compressed air lines. They are given an air-under-water test.

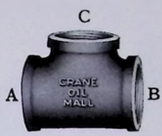
Banded 90° Elbows, 90° Street Elbows, and Tees, Black and Galvanized, sizes ¼ to 2-inch, are carried in stock, but other types and sizes can be furnished to order at short notice.

Standard Malleable Iron Refinery Oil Fittings

WORKING PRESSURES
175 pounds steam
350 pounds cold water, oil, or gas, non-shock


No. 760
90° Elbow


No. 762
45° Elbow



No. 764
Tee


No. 766
Cross


No. 768
90° Street Elbow

List Prices, Black

Size	Inches	2	2½	3	3½	4	6	8	10	12	*5 3/16	*6 5/8
No. 760, 90° Elbows	Each	.90	1.50	2.40	3.25	4.25	11.00	21.00	37.00	60.00	8.00	19.00
No. 762, 45° Elbows	Each	1.10	1.85	2.85	4.00	5.00	12.75	26.00				
No. 764, Tees	Each	1.35	2.25	3.60	5.00	6.50	16.50	32.00	55.00	90.00	12.00	28.50
No. 766, Crosses	Each	2.70	4.50	7.20	10.00	13.00	33.00	63.00				
No. 768, 90° Street Elbows	Each	1.25	2.10	3.10		5.60						

Reducing Fittings: No. 764 Reducing Tees are carried in stock in the sizes shown in the table below; stock reducing sizes will be furnished at the same prices as straight size Tees. Other reductions can be made to order by bushing in the sand; when so bushed, non-stock sizes use the same list prices as straight size Tees, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing 90° Elbows, 45° Elbows, Crosses, and 90° Street Elbows can be made to order by bushing in the sand from straight sizes. When so bushed, reducing sizes use the same list prices as straight sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

90° Street Elbows can be furnished reducing on the female end only.

Reducing fittings that require a new pattern are entirely special. Prices on application.

Rugged construction: Crane Standard Malleable Iron Refinery Oil Fittings are heavier than commercial standard malleable iron fittings but are not as heavy as the 300-Pound Fittings shown on page 182.

Service recommendations: These fittings have long threads and are particularly adapted for making tight joints on oil lines, gasoline lines, vapor lines, and natural gas lines. They also give excellent service when used on steam, water, gas, and air lines.

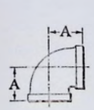
***Casing sizes:** Orders must specify the outside diameter of the casing, the number of threads per inch, and the style of the casing.

No. 764 Reducing Tees Carried in Stock

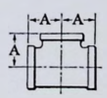
A B C	A B C	A B C	A B C	A B C
3 x 3 x 2	6 x 6 x 4	8 x 8 x 6	10 x 10 x 8	12 x 12 x 10
4 x 4 x 3	6 x 6 x 3	8 x 8 x 4	10 x 10 x 6	12 x 12 x 6
4 x 4 x 2	6 x 6 x 2	8 x 8 x 3	10 x 10 x 4	

Dimensions, in Inches

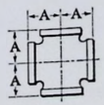
Dimensions apply only to straight sizes; dimensions of Reducing Tees will be furnished on request.



No. 760
90° Elbow



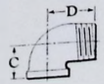
No. 764
Tee



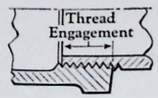
No. 766
Cross



No. 762
45° Elbow



No. 768
90° Street Elbow



For Normal Thread Engagement, see page 367.

Size	2	2½	3	3½	4	6	8	10	12	*5 3/16	*6 5/8
A Center to end	2½	3¼	3¾	4⅛	4½	6¼	7¾	9¼	11½	5½	†6⅞
B Center to end, 45° Elbows	2	2¼	2½	2⅝	2 13/16	3½	4 5/16				
C Center to end, Street Elbows	2 7/16	3	3½		4½						
D Center to end, Street Elbows	3 3/16	3⅞	4 9/16		5 11/16						

*These are casing sizes.

†When 6⅝-inch fittings are threaded for 6⅝-inch A. P. I. Casing, dimension "A" will be 6¼ inches.

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300-Pound Malleable Iron Fittings

*WORKING PRESSURES

300 pounds steam or oil, 550° F. — 300 pounds ammonia
¼ to 1-inch — 2000 pounds cold water, oil, or gas, non-shock
1¼ to 2-inch — 1500 pounds cold water, oil, or gas, non-shock
2½ and 3-inch — 1000 pounds cold water, oil, or gas, non-shock

300-pound air-under-water test


No. 260 E
90° Elbow


No. 262 E
45° Elbow


No. 264 E
Tee


No. 266 E
Cross


No. 280 E
Coupling


No. 267 E
Reducer


No. 276 E
45° Y-Bend


No. 268 E
90° Street Elbow


No. 262½ E
45° Street Elbow


No. 278 E
Cap


No. 272 E
Return Bend


No. 1564
Return Bend
with ½-inch Back
Outlet

List Prices, Black

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 260 E, 90° Elbows	Each	.20	.25	.30	.35	.40	.55	.70	.90	1.50	2.40
No. 262 E, 45° Elbows	Each	.25	.30	.35	.42	.50	.65	.85	1.10	1.85	2.85
No. 262½ E, 45° Street Elbows	Each	.31	.38	.50	.56	.63	.88	1.12	1.55		
No. 264 E, Tees	Each	.30	.40	.45	.50	.60	.80	1.05	1.35	2.25	3.60
No. 266 E, Crosses	Each	.60	.80	.90	1.00	1.20	1.60	2.10	2.70	4.50	7.20
No. 267 E, Reducers	Each		.25	.28	.30	.40	.45	.55	.70	1.30	2.25
No. 268 E, 90° Street Elbows	Each	.25	.30	.40	.45	.50	.70	.90	1.25	2.10	3.10
No. 276 E, 45° Y-Bends	Each			.95	1.05	1.25	1.70	2.20	2.85	4.75	7.55
No. 278 E, Caps	Each	.16	.17	.19	.23	.29	.38	.50	.65	1.00	1.35
No. 280 E, Couplings	Each	.16	.18	.20	.25	.32	.46	.60	.85	1.30	1.80

For sizes 3½-inch and larger, see page 184.

List Prices, Return Bends, Black

Size	Inches	1	1	1	1¼	1¼	1¼	1¼	1¼	1¼	1½
Center to center	Inches	1¾	2½	3	2¼	2½	3	3½	4	6	2½
No. 272 E, Return Bends	Each	.60	.75	.85	.90	.95	1.00	1.15	1.20	1.55	1.05
No. 1564, Return Bends, with ½-inch Back Outlet	Each									1.90	
Size	Inches	1½	1½	1½	1½	2	2	2	2	2	2
Center to center	Inches	3	3½	6	8	3	3½	4	4⅝	6	8
No. 272 E, Return Bends	Each	1.15	1.25	1.75	2.00	1.25	1.30	1.90	2.25	3.25	3.50
No. 1564, Return Bends, with ½-inch Back Outlet	Each						2.15	2.25			

Reducing fittings: Reducing fittings are carried in stock in the sizes and types shown in the table on the opposite page. These sizes are furnished at the same prices as straight sizes.

Reducing sizes not carried in stock, and reducing 45° Elbows, 45° and 90° Street Elbows, Crosses, and 45° Y-Bends can be made to order by bushing in the sand. When so bushed, non-stock sizes use the same list prices as straight size fittings, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing 45° and 90° Street Elbows can be furnished reduced on the female end only.

Reducing fittings that require making a new pattern are entirely special. Prices on application.

***Working pressures:** The working pressures given above for cold service, do not apply to Street Elbows or to 45° Y-Bends; these are recommended for only 500 pounds cold water, oil, or gas, non-shock.

Rugged construction: These fittings are exceptionally tough, strong, and rugged. They are far superior to so-called heavy malleable fittings made from standard cast iron patterns. Their thread lengths are correct for use with Line Pipe.

Service recommendations: The fittings are especially suitable for severe service; they will withstand rough usage, piping strains, vibration, and expansion and contraction.

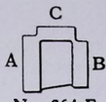
Ammonia service: The openings of these fittings have a machined chamfer to permit soldering, in order that they may be used for ammonia service.

Galvanized fittings: Galvanized fittings are made to order only. Prices are 50% higher than the list prices shown above for black fittings.

300-Pound Malleable Iron Fittings

Reducing Fittings Carried in Stock


No. 260 E
90° Elbow


No. 264 E
Tee


No. 267 E
Reducer

Reducing 90° Elbows, Tees, and Reducers are carried in stock in the sizes shown in the table below. These sizes are furnished at the same prices as straight sizes.

For prices of reducing fittings not carried in stock, see the footnotes on the preceding page.

No. 260 E, 90° Elbows

⅜ x ¼	2	x 1½
½ x ⅜	2	x 1¼
¾ x ½	2	x 1
¾ x ⅜	2	x ¾
1 x ¾	2	x ½
1 x ½	2½	x 2
1¼ x 1	2½	x 1½
1¼ x ¾	3	x 2½
1¼ x ½	3	x 2
1½ x 1¼		
1½ x 1		

No. 264 E, Tees

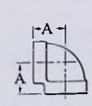
A	B	C
⅜ x ⅜ x ¼		
¼ x ¼ x ⅜		
½ x ½ x ⅜		
½ x ½ x ¼		
½ x ⅜ x ½		
½ x ¼ x ½		
⅜ x ⅜ x ½		
¾ x ¾ x ½		
¾ x ¾ x ⅜		
¾ x ¾ x ¼		
¾ x ½ x ¾		
¾ x ½ x ½		
¾ x ⅜ x ¾		
¾ x ¼ x ¾		
½ x ½ x ¾		
⅜ x ⅜ x ¾		
1	x 1	x ¾
1	x 1	x ½
1	x 1	x ⅜
1	x 1	x ¼
1	x ¾	x 1
1	x ¾	x ¾
1	x ¾	x ½
1	x ½	x 1
¾	x ¾	x 1
½	x ½	x 1
1¼	x 1¼	x 1
1¼	x 1¼	x ¾
1¼	x 1¼	x ½
1¼	x 1¼	x ⅜
1¼	x 1	x 1¼
1¼	x 1	x 1
1¼	x ¾	x 1¼
1¼	x ¾	x ½
1¼	x ½	x 1¼
1¼	x ⅜	x 1¼
1¼	x 1¼	x 1¼
1¼	x 1	x 1½
1¼	x ¾	x 1½
1¼	x ½	x 1½
1½	x 1½	x 1¼
1½	x 1½	x 1
1½	x 1½	x ¾
1½	x 1½	x ½
1½	x 1½	x ⅜
1½	x 1¼	x 1½
1½	x ¾	x 1½
1½	x ½	x 1½
1½	x ⅜	x 1½
1¼	x 1¼	x 1½
1	x 1	x 1½
2	x 1½	x 1¼
2	x 1¼	x 1¼
2	x 1	x 1¼
2	x ¾	x 1¼
2	x ½	x 1¼
2	x 2	x ½
2	x 2	x ⅜
2	x 2	x ¼
2	x 1½	x 2
2	x 1	x 2
2	x ½	x 2
1½	x 1½	x 2
1¼	x 1¼	x 2
2½	x 2½	x 2
2½	x 2½	x 1½
2½	x 2	x 2½
2	x 2	x 2½
3	x 3	x 2½
3	x 3	x 2
3	x 3	x 1½
3	x 2½	x 3
3	x 2	x 3
2½	x 2½	x 3

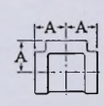
No. 267 E, Reducers

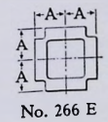
⅜ x ¼	1¼	x 1
½ x ⅜	1¼	x ¾
½ x ¼	1¼	x ½
¾ x ½	1¼	x ⅜
¾ x ⅜	1¼	x ¼
¾ x ¼	1½	x 1¼
1 x ¾	1½	x 1
1 x ½	1½	x ¾
1 x ⅜	1½	x ½
1 x ¼	2	x 1½
	2	x 1¼
	2	x 1
	2	x ¾
	2	x ½
	2½	x 2
	2½	x 1½
	2½	x 1¼
	2½	x 1
	3	x 2½
	3	x 1½
	3	x 1¼
	3	x 1

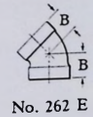
Dimensions, in Inches

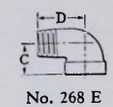
Dimensions of straight sizes, and of Reducers, are shown in the table below. Dimensions of reducing 90° Elbows and Tees will be furnished on request.

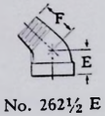

No. 260 E
90° Elbow

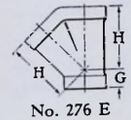

No. 264 E
Tee


No. 266 E
Cross


No. 262 E
45° Elbow

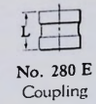

No. 268 E
90° Street Elbow


No. 262½ E
45° Street Elbow

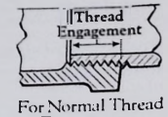

No. 276 E
45° Y-Bend


No. 267 E
Reducer


No. 278 E
Cap


No. 280 E
Coupling


No. 272 E
Return Bend



For Normal Thread Engagement, see page 367.

Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3
A—Center to end	15/16	11/16	1¼	17/16	1⅝	115/16	2⅛	2½	215/16	3⅜
B—Center to end, 45° Elbows	13/16	⅞	1	1⅛	15/16	1½	111/16	2	2¼	2½
C—Center to end, 90° Street Elbows	13/16	15/16	1¼	17/16	1⅝	115/16	2⅛	2½	3¼	3¾
D—Center to end, 90° Street Elbows	17/16	1⅝	2	23/16	2⅝	2⅞	3⅛	311/16	4½	5⅛
E—Center to end, 45° Street Elbows	¾	13/16	1	1⅛	15/16	1½	111/16	2		
F—Center to end, 45° Street Elbows	1⅛	1¼	1⅜	19/16	113/16	2⅛	25/16	211/16		
G—Center to end, 45° Y-Bends			¾	⅞	1	11/16	1¼	19/16	1¾	2
H—Center to end, 45° Y-Bends			2	2⅜	3¼	313/16	4½	53/16	6⅛	6⅞
J—End to end, Reducers		17/16	111/16	1¾	2⅛	2⅜	211/16	33/16	311/16	4⅛
K—Height, Caps			1⅜	1¾	2⅜	1½	111/16	113/16	2⅛	2¼
L—End to end, Couplings	¾	⅞	1 11/16	1¼	1⅜	1½	111/16	113/16	2⅛	2¼
	1¼	1⅜	1½	1¾	115/16	2¼	2½	213/16	3⅜	311/16

No. 272 E, Return Bends

Size	1	1	1	1¼	1¼	1¼	1¼	1¼	1½	1½	1½	1½	2	2	2	2	2	2
M—Center to center	1¾	2½	3	2¼	2½	3	3½	4	6	2½	3	3½	6	8	3	3½	4	4⅝	6	8
N—Height	2⅞	3¼	3½	39/16	311/16	315/16	43/16	47/16	5	3⅜	43/16	315/16	511/16	611/16	4⅝	4⅞	5⅛	57/16	6⅛	7⅛

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Heavy Malleable Iron Fittings

***WORKING PRESSURES**

3½ to 6-inch — **300** pounds steam or oil, **550°** F.
8 to 12-inch — **250** pounds steam or oil, **550°** F.
3½ and 4-inch — **1000** pounds cold water, oil, or gas, non-shock
5 to 10-inch — **800** pounds cold water, oil, or gas, non-shock
12-inch — **600** pounds cold water, oil, or gas, non-shock
14 and 16-inch fittings are recommended for large vapor lines



No. 260 E
90° Elbow



No. 262 E
45° Elbow



No. 264 E
Tee



No. 266 E
Cross



No. 267 E
Reducer



No. 268 E
90° Street Elbow

List Prices, Black

Size	Inches		3½	4	5	6	8	10	12	14	16	**5⅜16	**6⅝
No. 260 E, 90° Elbows	Each	For sizes ¼ to 3-inch, see page 182.	3.25	4.25	6.50	11.00	21.00	37.00	60.00	105.00	160.00	8.00	19.00
No. 262 E, 45° Elbows	Each		4.00	5.00	7.50	12.75	26.00	45.00	72.00				
No. 264 E, Tees	Each		5.00	6.50	9.75	16.50	32.00	55.00	90.00	158.00	240.00	12.00	28.50
No. 266 E, Crosses	Each		10.00	13.00	19.50	33.00							
No. 267 E, Reducers	Each		3.25	4.25		9.00	16.00	23.00	39.00				
No. 268 E, 90° Street Elbows	Each		4.25	5.60									

Reducing fittings: Reducing fittings are carried in stock in the sizes and types shown in the table on the opposite page. These sizes are furnished at the same prices as straight sizes.

Reducing sizes not carried in stock, and reducing 45° Elbows, Crosses, and 90° Street Elbows can be made to order by bushing in the sand. When so bushed, non-stock sizes use the same list prices as straight size fittings, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing 90° Street Elbows can be furnished reduced on the female end only.

Reducing fittings that require making a new pattern are entirely special. Prices on application.

***Working pressures:** The working pressures given above for cold water, oil, or gas, non-shock, do not apply to Street Elbows; these are recommended for 500 pounds cold water, oil, or gas working pressure, non-shock.

Rugged construction: These fittings are far superior to so-called heavy malleable fittings made from standard cast iron patterns. The ends are reinforced with heavy bands. The thread lengths are correct for use with Line Pipe; the threads are accurately cut to gauge.

The fittings are made of an excellent grade of malleable iron and are exceptionally tough, strong, and rugged.

Service recommendations: Crane Heavy Malleable Fittings are admirably suited for use on high pressure cold water, oil, and gas lines, non-shock, and will give much better satisfaction than extremely heavy cast iron fittings.

Note: The 14 and 16-inch fittings are threaded for use with O.D. Pipe.

****Casing sizes:** Orders for casing fittings must specify the outside diameter of the casing, the number of threads per inch, and the style of casing.

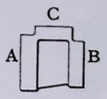
Galvanized fittings: Galvanized fittings are made to order only. Prices are 50% higher than the above list prices for black fittings.

Heavy Malleable Iron Fittings

Reducing Fittings Carried in Stock



No. 260 E
90° Elbow



No. 264 E
Tee



No. 267 E
Reducer

Reducing 90° Elbows, Tees, and Reducers are carried in stock in the sizes shown in the table below. These sizes are furnished at the same prices as straight size fittings.

For prices of reducing fittings not carried in stock, see the footnotes on the preceding page.

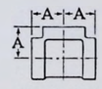
No. 260 E, 90° Elbows	No. 264 E, Tees			No. 267 E, Reducers		
	A B C	A B C	A B C			
4 x 3	4 x 4 x 3	6 x 6 x 4	10 x 10 x 8	3½ x 3	6 x 5	8 x 6
4 x 2	4 x 4 x 2½	6 x 6 x 3	10 x 10 x 6	3½ x 2	6 x 4	8 x 5
6 x 4	4 x 4 x 2	6 x 6 x 2	10 x 10 x 4	4 x 3	6 x 3	8 x 4
8 x 6	4 x 4 x 1½	6 x 4 x 6	10 x 10 x 3	4 x 2½	6 x 2½	8 x 3
10 x 8	4 x 4 x 1¼	6 x 3 x 6	10 x 8 x 10	4 x 2	6 x 2	8 x 2½
12 x 10	4 x 4 x 1	8 x 8 x 6	10 x 6 x 10	4 x 1½	6 x 1½	8 x 2
	4 x 4 x ¾	8 x 8 x 4	12 x 12 x 10	4 x 1¼	6 x 1	10 x 8
	4 x 3 x 4	8 x 8 x 3	12 x 12 x 8	4 x 1		10 x 6
	4 x 2 x 4	8 x 8 x 2½	12 x 12 x 6			12 x 10
	4 x 1 x 4	8 x 8 x 2	12 x 10 x 12			12 x 8
	5 x 5 x 4	8 x 6 x 8	12 x 8 x 12			
			12 x 6 x 12			

Dimensions, in Inches

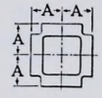
Dimensions of straight sizes, and of Reducers, are shown in the table below. Dimensions of reducing 90° Elbows and Tees will be furnished on request.



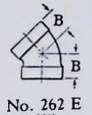
No. 260 E
90° Elbow



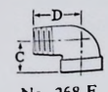
No. 264 E
Tee



No. 266 E
Cross



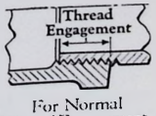
No. 262 E
45° Elbow



No. 268 E
90° Street Elbow



No. 267 E
Reducer



For Normal Thread Engagement, see page 367.

Size	3½	4	5	6	8	10	12	14	16	*5⅜16	*6⅝
A—Center to end	4⅛	4½	5½	6¼	7¾	9¼	11½	12¼	13¾	5½	†6⅞
B—Center to end, 45° Elbows	2⅝	2 13/16	3 3/16	3½	4 5/16	5 3/16	6				
C—Center to end, 90° Street Elbows	4⅛	4½									
D—Center to end, 90° Street Elbows	5 13/16	6⅜									
J—End to end, Reducers	4 9/16	4⅜		5¼	6¼	7⅛	8				

*These are casing sizes

†When 6⅝-inch fittings are threaded for 6⅝-inch A. P. I. Casing, dimension "A" will be 6¼ inches.

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A. A. R. Malleable Iron Fittings

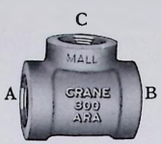
WORKING PRESSURE — 300 pounds steam, **550°** F.
Tested **300** pounds air under water



No. 260 E
90° Elbow



No. 262 E
45° Elbow



No. 264 E
Tee



No. 266 E
Cross



No. 267 E
Reducer



No. 278 E
Cap

List Prices, Black

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 260 E, 90° Elbows	Each	.20	.25	.30	.35	.40	.55	.70	.90	1.50	2.40
No. 262 E, 45° Elbows	Each	.25	.30	.35	.42	.50	.65	.85	1.10	1.85	2.85
No. 264 E, Tees	Each	.30	.40	.45	.50	.60	.80	1.05	1.35	2.25	3.60
No. 266 E, Crosses	Each	.60	.80	.90	1.00	1.20	1.60	2.10	2.70	4.50	7.20
No. 267 E, Reducers	Each		.25	.28	.30	.40	.45	.55	.70	1.30	2.25
No. 278 E, Caps	Each	.16	.17	.19	.23	.29	.38	.50	.65	1.00	1.35

A. A. R. Specifications: The line of fittings illustrated above complies with specifications of the Association of American Railroads (formerly known as the American Railway Association) for 300-pound screwed pipe fittings.

Reducing sizes: A. A. R. Reducing 90° Elbows, Tees, and Reducers are carried in stock in the sizes shown in the table below. These are furnished at the same prices as straight size fittings.

Additional types and sizes: Other types and sizes of 300-Pound Malleable Iron Fittings, not included in the A. A. R. Specifications, are shown on pages 182 and 183.

No. 260 E 90° Elbows

1/2 x 3/8
3/4 x 1/2
1 x 3/4
1 1/4 x 1
1 1/2 x 1 1/4
2 x 1 1/2
2 1/2 x 2
3 x 2 1/2

No. 264 E Tees

A	B	C
1/2	x 1/2	x 3/8
1/2	x 3/8	x 1/2
3/4	x 3/4	x 1/2
3/4	x 1/2	x 3/4
1	x 1	x 3/4
1	x 1	x 1/2
1	x 1	x 3/8
1	x 3/4	x 1
1 1/4	x 1 1/4	x 1
1 1/4	x 1 1/4	x 3/4
1 1/4	x 1 1/4	x 1/2
1 1/4	x 1	x 1 1/4
1 1/2	x 1 1/2	x 1 1/4
1 1/2	x 1 1/2	x 1
1 1/2	x 1 1/2	x 3/4
1 1/2	x 1 1/2	x 1/2
1 1/2	x 1 1/4	x 1 1/2
2	x 2	x 1 1/2
2	x 2	x 1 1/4
2	x 2	x 1
2	x 2	x 3/4
2	x 2	x 1/2
2	x 1 1/2	x 2
2 1/2	x 2 1/2	x 2
2 1/2	x 2 1/2	x 1 1/2
2 1/2	x 2	x 2 1/2
3	x 3	x 2 1/2
3	x 3	x 2
3	x 2 1/2	x 3

No. 267 E Reducers

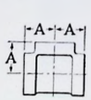
3/8 x 1/4	1 1/4 x 1	2 x 1 1/2	3 x 2 1/2
1/2 x 3/8	1 1/4 x 3/4	2 x 1 1/4	3 x 2
1/2 x 1/4	1 1/4 x 1/2	2 x 1	3 x 1 1/2
3/4 x 1/2	1 1/4 x 3/8	2 x 3/4	3 x 1 1/4
3/4 x 3/8	1 1/4 x 1/4	2 x 1/2	3 x 1
3/4 x 1/4	1 1/2 x 1 1/4	2 x 3/8	
1 x 3/4	1 1/2 x 1	2 x 1/4	
1 x 1/2	1 1/2 x 3/4	2 1/2 x 2	
1 x 3/8	1 1/2 x 1/2	2 1/2 x 1 1/2	
1 x 1/4	1 1/2 x 3/8	2 1/2 x 1 1/4	
	1 1/2 x 1/4	2 1/2 x 1	

Dimensions, in Inches

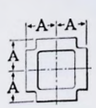
Dimensions of straight sizes, and of Reducers, are shown in the table below.
Dimensions of Reducing 90° Elbows and Tees will be furnished on request.



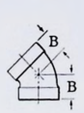
No. 260 E
90° Elbow



No. 264 E
Tee



No. 266 E
Cross



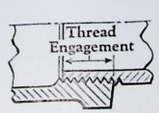
No. 262 E
45° Elbow



No. 267 E
Reducer



No. 278 E
Cap



For Normal
Thread Engagement,
see page 367.

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
A—Center to end	15/16	1 1/16	1 1/4	1 7/16	1 5/8	1 15/16	2 1/8	2 1/2	2 15/16	3 3/8
B—Center to end, 45° Elbows	13/16	7/8	1	1 1/8	1 5/16	1 1/2	1 11/16	2	2 1/4	2 1/2
J—End to end, Reducers		1 7/16	1 11/16	1 3/4	2 1/16	2 3/8	2 11/16	3 3/16	3 11/16	4 1/16
K—Height, Caps	3/4	7/8	1 1/16	1 1/4	1 3/8	1 1/2	1 11/16	1 13/16	2 1/8	2 1/4

Hydraulic Malleable Iron Fittings

WORKING PRESSURES
1/4 to 1-inch — **2000** pounds cold water, oil, or gas, non-shock
1 1/4 to 2-inch — **1500** pounds cold water, oil, or gas, non-shock
2 1/2 to 4-inch — **1000** pounds cold water, oil, or gas, non-shock
5 and 6-inch — **800** pounds cold water, oil, or gas, non-shock



No. 260 H
90° Elbow



No. 263 H
90° Long Sweep Elbow



No. 264 H
Tee



No. 266 H
Cross

List Prices, Black

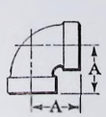
Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
No. 260 H, 90° Elbows	Each	.20	.25	.30	.35	.40	.55	.70	.90	1.50	2.40	3.25	4.25	6.50	9.50
No. 263 H, 90° Long Sweep Elbows	Each					.64	.80	1.10	1.60	2.40	4.50	6.50	7.00	13.00	17.50
No. 264 H, Tees	Each	.30	.40	.45	.50	.60	.80	1.05	1.35	2.25	3.60	5.00	6.50	9.75	14.25
No. 266 H, Crosses	Each	.60	.80	.90	1.00	1.20	1.60	2.10	2.70	4.50	7.20	10.00	13.00		

Service recommendations: These fittings are recommended especially for hydraulic pumping installations. In addition to being strong and rugged, they have a longer sweep than is usual with heavy malleable iron fittings.

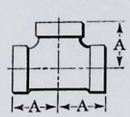
Additional types and sizes: For reducing fittings, and for types and sizes not listed above, we recommend the use of Crane 300-Pound or Crane Heavy Malleable Iron Fittings, shown on pages 182 to 185.

Galvanized fittings: These fittings can be furnished galvanized, to order, at an advance of 50% over the list prices of black fittings.

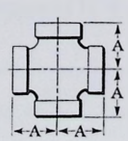
Dimensions, in Inches



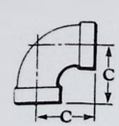
No. 260 H
90° Elbow



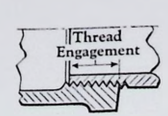
No. 264 H
Tee



No. 266 H
Cross



No. 263 H
90° Long Sweep Elbow



For Normal
Thread Engagement,
see page 367.

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
A	1 1/16	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	3	3 1/2	4 1/8	4 5/8	5 1/8	6 1/4	7 1/4
C					2 1/2	3	3 1/2	4	4 3/4	5 1/2	6 1/4	7	8 1/2	9 1/2

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Malleable Iron Fittings

Pages 172 to 187 do not show all the Malleable Iron Fittings manufactured by Crane Co. For greater convenience, the following fittings are shown in other sections of this catalogue:

Bushings....page 224
Plugs....page 226
Faced Couplings and Locknuts....page 230
One-Strap and Two-Strap Clamps....page 231
Screwed Unions and Union Fittings...pages 235 to 242
Flange Unions....pages 247 to 248
Railing Fittings....pages 264 to 268
Floor Flanges....page 288
Companion Flanges....page 290

Other Fittings

Other fittings, frequently used in installations of Malleable Iron Fittings, are shown on the following pages:

Steel Bushings....page 225
Steel Plugs....page 226
Wrought Couplings....page 227
Wrought Steel Nipples....pages 228 to 229
Steel Unions and Union Fittings....pages 244 to 245
Steel Flange Unions....pages 248 to 249

Steel Fittings

Where pressures or temperatures exceed the maximum for which Malleable Iron Fittings are recommended, Steel Fittings must be used. These are shown on the following pages:

Forged Steel Fittings....pages 328 to 329
Cast Steel Fittings....pages 330 to 331

Cast Iron Screwed Fittings

Standard Fittings....pages 191 to 196
Branch Tees....page 197
Standard Fittings with Casing Threads....page 198
Drainage Fittings....pages 199 to 211
Long Sweep Fittings....pages 212 to 213
Sprinkler Fittings....pages 214 to 217
175-Pound Fittings....pages 218 to 219
250-Pound Fittings....pages 220 to 221

The Crane line of Cast Iron Screwed Fittings includes fittings for steam working pressures up to 250 pounds and for water, oil, or gas working pressures up to 400 pounds. In addition, it includes a complete line of Drainage Fittings.

The uniformly superior quality that characterizes all Crane products is maintained in this line.

* * * * * * * * *

The list at the top of this page does not include all the Cast Iron Screwed Fittings manufactured by Crane Co. For greater convenience, the following fittings are shown in other sections of this catalogue:

Bushings....page 224
Plugs....page 226
Flange Unions....pages 246 and 248
Common Flanges....page 288
Floor Flanges....page 288
Companion Flanges....pages 289 to 294

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Other Fittings

Other fittings, frequently used in installations of Cast Iron Screwed Fittings, are shown on the following pages:

Steel Bushings.....page 225
Steel Plugs.....page 226
Wrought Couplings.....page 227
Wrought Steel Nipples.....pages 228 to 229
Unions and Union Fittings.....pages 235 to 250

Malleable Iron or Steel Fittings

Where pressures or temperatures exceed the maximum for which Cast Iron Fittings are recommended, Malleable Iron or Steel Fittings must be used. These are shown on the following pages:

Malleable Iron Fittings.....pages 182 to 187
Forged Steel Fittings.....pages 328 to 329
Cast Steel Fittings.....pages 330 to 331

Standard Cast Iron Fittings

WORKING PRESSURES
125 pounds steam
175 pounds cold water, oil, or gas, non-shock

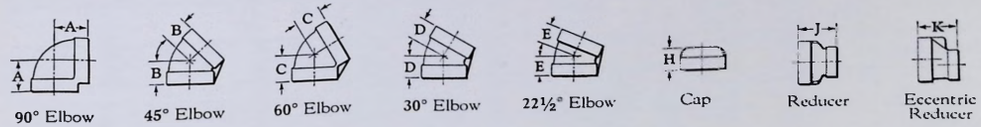
The Crane line of Standard Cast Iron Screwed Fittings, illustrated on pages 192 to 198 inclusive, consists of a wide variety of types of fittings, made in a large range of straight and reducing sizes. It meets the requirements of nearly every piping installation using this class of material.

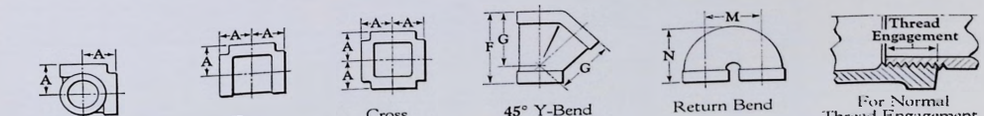
Rugged construction: The fittings are sturdy, rugged, and well proportioned. Heavy metal sections, amply reinforced at points subjected to greatest stress, assure a high factor of safety over the recommended working pressures.

Threading: All openings are carefully and accurately threaded to gauge and are in true alignment. To permit easy entrance of pipe, each opening is slightly chamfered.

Dimensions: The table of dimensions shown below covers the most current straight size fittings, and reducers. Dimensions of other types of fittings and of reducing sizes will be furnished upon request.

Dimensions, in Inches





Size	A	B	C	D	E	F	G	J	K	H
¼	13/16	¾								
⅜	15/16	13/16								
½	1⅛	⅞	1	1 3/16	¾	2½	1⅞			
¾	1 5/16	1	1 1/16	1 5/16	⅞	3	2¼	1½		
1	1½	1⅛	1¼	1	1	3½	2¾	*1⅞		
1¼	1¾	1 5/16	1 7/16	1 3/16	1⅛	4¼	3¼	2⅛	2⅛	
1½	1 15/16	1 7/16	1⅝	1 5/16	1¼	4⅞	3 13/16	2¼	2¼	
2	2¼	1 11/16	1⅞	1¾	1 7/16	5¾	4½	2 7/16	2 7/16	
2½	2 11/16	1 15/16	2 3/16	1 13/16	1¾	7⅛	6⅛	2⅞	2 11/16	
3	3⅛	2 3/16	2½	1 13/16		8⅞	6⅞	3⅛	3⅛	
3½	3 7/16	2⅜					6⅞	3⅛	3⅛	2 1/16
4	3¾	2⅝	3	2⅜	2 1/16	9¾	7⅝	3⅜	3⅜	2⅜
5	4½	3 1/16	3½	2⅝	2¼	11⅝	9¼	3⅞	3⅞	2⅝
6	5⅛	3 7/16	4 1/16	2⅞	2 7/16	13 7/16	10¾	4⅜	4⅜	3⅛
8	6 9/16	4¼				16 15/16	13⅝	5¼	5¼	3⅝
10	8 1/16	5 3/16				20 11/16	16¾	6 3/16		3⅝
12	9½	6				24⅛	19⅝	7⅛		4¼

Return Bends

Close Pattern Size	M	N	Open Pattern Size	M	N	Wide Pattern Size	M	N
½	1¼	1 23/32	¾	1⅞	2 7/32	1	3	3
¾	1½	2 1/32	1	2½	2 11/16	1	4	3½
1	1¾	2⅜	1¼	3	3 9/32	1	5	4
1¼	2¼	2 29/32	1½	3½	3¾	1	6	4½
1½	2½	3¼	2	4½	4 19/32	1	8	5½
2	3¼	3 31/32	2½	5½	5 7/16	1¼	4	3¾
2½	3¾	4 9/16	3	6½	6 5/16	1¼	6	4¾
3	4¼	5 3/16	4	7½	7 9/16	1¼	8	5¾
4	6	6 12/16				1½	4⅞	4 7/16
						1½	6	5
						1½	8	6
						2	4⅞	4¾
						2	6	5 5/16
						2	7	5 13/16
						2	8	6⅝
						4	11	9 5/16

*1 x ½-inch Reducers are 1 11/16 inches end to end.

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Standard Cast Iron Fittings


90° Elbow


45° Elbow


60° Elbow


30° Elbow


22½° Elbow


Side Outlet Elbow


Tee


Eccentric Reducing Tees
Prices on application

List Prices

Size			Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12
90° Elbows Straight	Right Hand	Black	Each	.05	.05	.06	.08	.10½	.16	.20	.28	.50	.75	1.05	1.20	2.00	2.75	6.75	13.50	20.00
		Galv.	Each	.10	.10	.12	.16	.21	.32	.40	.56	1.00	1.50	2.10	2.40	4.00	5.50	13.50	27.00	40.00
	Right & Left	Black	Each	.06	.06	.07	.09	.12	.18	.23	.32	.60	.85							
		Galv.	Each	.12	.12	.14	.18	.24	.36	.46	.64	1.20	1.70							
	Pitched	Black	Each			.08	.10	.13	.20	.25	.35	.65	1.00	1.30	1.50					
		Galv.	Each			.16	.20	.26	.40	.50	.70	1.30	2.00	2.60	3.00					
90° Elbows *Reducing	Right Hand	Black	Each		.06	.07	.09	.12	.18	.23	.32	.60	.85	1.20	1.40	2.30	3.15	7.75	15.50	23.00
		Galv.	Each		.12	.14	.18	.24	.36	.46	.64	1.20	1.70	2.40	2.80	4.60	6.30	15.50	31.00	46.00
	Pitched	Black	Each				.10	.13	.20	.25	.35	.65	1.00	1.30						
		Galv.	Each				.20	.26	.40	.50	.70	1.30	2.00	2.60						
45° Elbows		Black	Each	.06	.06	.07	.10	.12	.19	.24	.34	.60	.90	1.25	1.45	2.50	3.45	8.50	17.00	25.00
		Galv.	Each	.12	.12	.14	.20	.24	.38	.48	.68	1.20	1.80	2.50	2.90	5.00	6.90	17.00	34.00	50.00
60° Elbows		Black	Each			.25	.30	.35	.45	.50	.60	1.10	1.65		2.75	5.00	7.00			
		Galv.	Each			.50	.60	.70	.90	1.00	1.20	2.20	3.30		5.50	10.00	14.00			
30° Elbows		Black	Each			.25	.30	.35	.45	.50	.60	1.10	1.65		2.75	5.00	7.00			
		Galv.	Each			.50	.60	.70	.90	1.00	1.20	2.20	3.30		5.50	10.00	14.00			
22½° Elbows		Black	Each			.25	.30	.35	.45	.50	.60	1.10	1.65		2.75	5.00	7.00			
		Galv.	Each			.50	.60	.70	.90	1.00	1.20	2.20	3.30		5.50	10.00	14.00			
Side Outlet Elbows		Black	Each					.30	.48	.60	.84	1.50	2.25		3.60					
		Galv.	Each					.60	.96	1.20	1.68	3.00	4.50		7.20					
Tees, Straight		Black	Each	.08	.08	.09	.12	.15	.23	.29	.41	.73	1.10	1.50	1.75	3.00	4.00	9.75	19.50	29.00
		Galv.	Each	.16	.16	.18	.24	.30	.46	.58	.82	1.46	2.20	3.00	3.50	6.00	8.00	19.50	39.00	58.00
*Tees, Reducing		Black	Each	.09	.10	.14	.17	.27	.33	.47	.83	1.25	1.75	2.00	3.50	4.60	11.25	22.50	33.50	
		Galv.	Each	.18	.20	.28	.34	.54	.66	.94	1.66	2.50	3.50	4.00	7.00	9.20	22.50	45.00	67.00	

***Reducing fittings:** List prices of reducing 90° Elbows and Tees apply to reducing sizes carried in stock, shown in the tables at the right and on the opposite page. Other reductions can be made to order by bushing in the sand; when so bushed, non-stock sizes use the same list prices as stock reducing sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing 45° Elbows, 60° Elbows, 30° Elbows, 22½° Elbows, and Side Outlet Elbows can be made to order by bushing in the sand from straight sizes. When so bushed, reducing sizes use the same list prices as straight sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing fittings that require making a new pattern are entirely special. Prices on application.

Right & Left Elbows: Right and Left 90° Elbows have ribs cast on the left hand end.

Pitched Elbows: Pitched ¼-inch per foot.

Eccentric Tees: Eccentric Tees are made to order only; prices on application. Orders should be accompanied by a sketch showing the position and size of all openings.

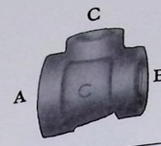
Description . . . page 191 *Dimensions . . . page 191*

Reducing Elbows Carried in Stock

90° Elbows						90° Elbows Pitched
⅜ x ¼	2 x 1½	4 x 3½				¾ x ½
½ x ⅜	2 x 1¼	4 x 3				1 x ¾
½ x ¼	2 x 1	4 x 2½				1¼ x 1
¾ x ½	2 x ¾	4 x 2				1½ x 1¼
¾ x ⅜	2 x ½	4 x 1½				1½ x 1
¾ x ¼	2½ x 2	5 x 4				2 x 1½
1 x ¾	2½ x 1½	5 x 3½				2½ x 2
1 x ½	2½ x 1¼	5 x 3				3 x 2½
1 x ⅜	2½ x 1	5 x 2½				3½ x 3
1¼ x 1	2½ x ¾	6 x 5				
1¼ x ¾	3 x 2½	6 x 4				
1¼ x ½	3 x 2	6 x 3½				
1¼ x ⅜	3 x 1½	6 x 3				
1½ x 1¼	3 x 1¼	6 x 2½				
1½ x 1	3 x 1	6 x 2				
1½ x ¾	3½ x 3	8 x 6				
1½ x ½	3½ x 2½	8 x 3				
	3½ x 2	10 x 8				
	3½ x 1½	12 x 10				
	3½ x 1¼	12 x 8				

Working pressures . . . page 191

Standard Cast Iron Fittings



Reducing Tees Carried in Stock

Reducing Tees are carried in stock in the sizes shown in the table below. These sizes are sold at the regular prices for Reducing Tees.

For prices of Reducing Tees not carried in stock, see the footnotes on the preceding page.

A	B	C
⅜	x ⅜	x ¼
⅜	x ¼	x ⅜
⅜	x ¼	x ¼
⅜	x ¼	x ⅜
¼	x ¼	x ⅜
½	x ½	x ⅜
½	x ½	x ¼
½	x ⅜	x ½
½	x ⅜	x ⅜
½	x ¼	x ½
½	x ¼	x ¼
⅜	x ⅜	x ½
¼	x ¼	x ½
¾	x ¾	x ½
¾	x ¾	x ⅜
¾	x ¾	x ½
¾	x ½	x ½
¾	x ½	x ⅜
¾	x ½	x ¼
¾	x ½	x ¾
¾	x ⅜	x ½
¾	x ⅜	x ⅜
¾	x ¼	x ½
¾	x ¼	x ¾
½	x ½	x ¾
⅜	x ⅜	x ¾
1	x 1	x ¾
1	x 1	x ½
1	x 1	x ⅜
1	x 1	x ¼
1	x ¾	x 1
1	x ¾	x ¾
1	x ¾	x ½
1	x ¾	x ¼
1	x ½	x ¾
1	x ½	x ½
1	x ⅜	x 1
1	x ¼	x 1
¾	x ¾	x 1
¾	x ½	x 1
½	x ½	x 1
1¼	x 1¼	x 1
1¼	x 1¼	x ¾
1¼	x 1¼	x ½
1¼	x 1¼	x ⅜
1¼	x 1¼	x ¼
1¼	x 1	x 1
1¼	x 1	x ¾
1¼	x 1	x ½
1¼	x ¾	x 1¼
1¼	x ¾	x 1
1¼	x ¾	x ¾
1¼	x ½	x 1¼
1¼	x ½	x 1
1¼	x ⅜	x ½
1¼	x ⅜	x ¼
1	x 1	x 1¼
1	x ¾	x 1¼
1	x ½	x 1¼
¾	x ¾	x 1¼
¾	x ½	x 1¼
1½	x 1½	x 1¼
1½	x 1½	x 1
1½	x 1½	x ¾

A	B	C
1½	x 1½	x 2
1½	x 1½	x ½
1½	x 1½	x ⅜
1½	x 1½	x ¼
1½	x 1¼	x 1½
1½	x 1¼	x 1¼
1½	x 1¼	x 1
1½	x 1¼	x ¾
1½	x 1¼	x ½
1½	x 1	x 1½
1½	x 1	x 1¼
1½	x 1	x 1
1½	x 1	x ¾
1½	x 1	x ½
1½	x ¾	x 1½
1½	x ¾	x 1¼
1½	x ¾	x 1
1½	x ¾	x ¾
1½	x ½	x 1½
1½	x ½	x 1¼
1½	x ½	x 1
1½	x ½	x ¾
1½	x ½	x ½
1½	x ⅜	x 1½
1½	x ¼	x 1½
1¼	x 1¼	x 1½
1¼	x 1	x 1½
1¼	x ¾	x 1½
1¼	x ½	x 1½
1	x 1	x 1½
1	x ¾	x 1½
¾	x ¾	x 1½
2	x 2	x 1½
2	x 2	x 1¼
2	x 2	x 1
2	x 2	x ¾
2	x 2	x ½
2	x 2	x ⅜
2	x 2	x ¼
2	x 1½	x 2
2	x 1½	x 1½
2	x 1½	x 1¼
2	x 1½	x 1
2	x 1¼	x 2
2	x 1¼	x 1¼
2	x 1¼	x 1
2	x 1¼	x ¾
2	x 1¼	x ½
2	x 1	x 2
2	x 1	x 1½
2	x 1	x 1¼
2	x 1	x 1
2	x ¾	x 2
2	x ¾	x 1½
2	x ¾	x 1¼
2	x ¾	x 1
2	x ¾	x ¾
2	x ¾	x ½
2	x ½	x 2
2	x ½	x 1½
2	x ½	x 1¼
2	x ½	x 1
2	x ½	x ½
2	x ⅜	x 2
2	x ¼	x 2

A	B	C
1½	x 1½	x 2½
1½	x 1¼	x 2
1½	x 1	x 2
1½	x ¾	x 2
1¼	x 1¼	x 2
1¼	x 1	x 2
1¼	x ¾	x 2
1	x 1	x 2
1	x ¾	x 2
¾	x ¾	x 2
2½	x 2½	x 2
2½	x 2½	x 1½
2½	x 2½	x 1¼
2½	x 2½	x 1
2½	x 2½	x ¾
2½	x 2½	x ½
2½	x 2	x 2½
2½	x 2	x 2
2½	x 2	x 1½
2½	x 2	x 1¼
2½	x 2	x 1
2½	x 1½	x 2½
2½	x 1½	x 2
2½	x 1½	x 1½
2½	x 1½	x 1¼
2½	x 1½	x 1
2½	x 1¼	x 2½
2½	x 1¼	x 2
2½	x 1¼	x 1½
2½	x 1¼	x 1¼
2½	x 1	x 2½
2½	x 1	x 2
2½	x 1	x 1½
2½	x 1	x 1
2½	x ¾	x 2½
2½	x ¾	x 2
2½	x ¾	x 1½
2½	x ½	x 2½
2½	x ½	x 2
2	x 2	x 2½
2	x 1½	x 2½
2	x 1¼	x 2½
2	x 1	x 2½
1½	x 1½	x 2½
1½	x 1¼	x 2½
1¼	x 1	x 2½
3	x 3	x 2½
3	x 3	x 2
3	x 3	x 1½
3	x 3	x 1¼
3	x 3	x 1
3	x 3	x ¾
3	x 3	x ½
3	x 2½	x 3
3	x 2½	x 2½
3	x 2½	x 2
3	x 2½	x 1½
3	x 2½	x 1¼
3	x 2½	x 1
3	x 2½	x ¾
3	x 2	x 3

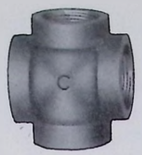
A	B	C
3	x 2	x 2½
3	x 2	x 2
3	x 2	x 1½
3	x 2	x 1¼
3	x 2	x 1
3	x 2	x ¾
3	x 1½	x 3
3	x 1½	x 2½
3	x 1½	x 2
3	x 1½	x 1½
3	x 1½	x 1¼
3	x 1¼	x 3
3	x 1¼	x 2½
3	x 1¼	x 2
3	x 1	x 3
3	x 1	x 2½
3	x ¾	x 3
3	x ½	x 3
2½	x 2½	x 3
2½	x 2	x 3
2½	x 1½	x 3
2½	x 1¼	x 3
2½	x 1	x 3
2	x 2	x 3
2	x 1½	x 3
1½	x 1½	x 3
3½	x 3½	x 3
3½	x 3½	x 2½
3½	x 3½	x 2
3½	x 3½	x 1½
3½	x 3½	x 1¼
3½	x 3½	x 1
3½	x 3½	x ¾
3½	x 3½	x ½
3½	x 3	x 3½
3½	x 3	x 3
3½	x 3	x 2½
3½	x 3	x 2
3½	x 3	x 1½
3½	x 3	x 1¼
3½	x 3	x 1
3½	x 3	x ¾
3½	x 2½	x 3½
3½	x 2½	x 3
3½	x 2½	x 2½
3½	x 2½	x 2
3½	x 2½	x 1½
3½	x 2	x 3
3½	x 2	x 2½
3½	x 2	x 2
3	x 3	x 3
3	x 2½	x 3
3	x 2	x 3
3	x 1½	x 3
2½	x 2½	x 3
2½	x 2	x 3
2	x 2	x 3
4	x 4	x 3½
4	x 4	x 3
4	x 4	x 2½

A	B	C
4	x 4	x 2
4	x 4	x 1½
4	x 4	x 1¼
4	x 4	x 1
4	x 4	x ¾
4	x 4	x ½
4	x 3½	x 4
4	x 3½	x 3½
4	x 3½	x 3
4	x 3½	x 2½
4	x 3½	x 2
4	x 3½	x 1½
4	x 3½	x 1¼
4	x 3½	x 1
4	x 3½	x ¾
4	x 3	x 4
4	x 3	x 3½
4	x 3	x 3
4	x 3	x 2½
4	x 3	x 2
4	x 3	x 1½
4	x 3	x 1¼
4	x 3	x 1
4	x 3	x ¾
4	x 2½	x 4
4	x 2½	x 3½
4	x 2½	x 3
4	x 2½	x 2½
4	x 2½	x 2
4	x 2½	x 1½
4	x 2½	x 1¼
4	x 2½	x 1
4	x 2	x 4
4	x 2	x 3½
4	x 2	x 3
4	x 2	x 2½
4	x 2	x 2
4	x 1½	x 4
4	x 1½	x 3½
4	x 1½	x 3
4	x 1¼	x 4
4	x 1	x 4
4	x ¾	x 4
4	x ½	x 4
3½	x 3½	x 4
3½	x 3	x 4
3½	x 2½	x 4
3½	x 2	x 4
3	x 3	x 4
3	x 2½	x 4
3	x 2	x 4
2½	x 2½	x 4
2½	x 2	x 4
2	x 2	x 4
5	x 5	x 4
5	x 5	x 3½
5	x 5	x 3
5	x 5	x 2½
5	x 5	x 2
5	x 5	x 1½
5	x 5	x 1¼
5	x 5	x 1
5	x 4	x ¾
5	x 4	x 2
5	x 4	x 1½
5	x 4	x 1¼
5	x 4	x 1
5	x 4	x ¾
5	x 3½	x 5
5	x 3½	x 4
5	x 3½	x 3½
5	x 3½	x 3
5	x 3½	x 2½
5	x 3½	x 2
5	x 3	x 5
5	x 3	x 4
5	x 3	x 3½
5	x 3	x 3
5	x 3	x 2½
5	x 3	x 2
5	x 2½	x 5
5	x 2½	x 4
5	x 2½	x 3
5	x 2½	x 2½
5	x 2	x 5
5	x 2	x 4
5	x 1½	x 5
5	x 1¼	x 5
5	x 1	x 5
4	x 4	x 5
4	x 3½	x 5
4	x 3	x 5
4	x 2½	x 5
4	x 2	x 5
3½	x 3½	x 5
3½	x 3	x 5
3	x 3	x 5
6	x 6	x 5
6	x 6	x 4
6	x 6	x 3½
6	x 6	x 3
6	x 6	x 2½
6	x 6	x 2
6	x 6	x 1½
6	x 6	x 1¼
6	x 6	x 1
6	x 6	x ¾
6	x 5	x 6
6	x 5	x 5
6	x 5	x 4
6	x 5	x 3½
6	x 5	x 3
6	x 5	x 2½
6	x 5	x 2
6	x 5	x 1½
6	x 5	x 1¼
6	x 5	x 1
6	x 5	x ¾
6	x 4	x 6
6	x 4	x 5
6	x 4	x 4
6	x 4	x 3½
6	x 4	x 3
6	x 4	x 2½
6	x 4	x 2
6	x 3½	x 6
6	x 3½	x 5
6	x 3½	x 4
6	x 3	x 6
6	x 3	x 5
6	x 3	x 4
6	x 3	x 3

A	B	C
6	x 2½	x 6
6	x 2	x 6
6	x 1½	x 6
6	x 1¼	x 6
6	x 1	x 6
5	x 5	x 6
5	x 4	x 6
5	x 3½	x 6
5	x 3	x 6
4	x 4	x 6
4	x 3½	x 6
8	x 8	x 6
8	x 8	x 5
8	x 8	x 4
8	x 8	x 3½
8	x 8	x 3
8	x 8	x 2½
8	x 8	x 2
8	x 8	x 1½
8	x 8	x 1¼
8	x 6	x 8
8	x 6	x 6
8	x 6	x 5
8	x 6	x 4
8	x 6	x 3
8	x 6	x 2½
8	x 6	x 2
8	x 6	x 1½
8	x 6	x 1¼
8	x 5	x 8
8	x 5	x 5
8	x 5	x 2
8	x 4	x 8
8	x 4	x 6
8	x 3	x 8
8	x 2	x 8
6	x 6	x 8
4	x 4	x 8
10	x 10	x 8
10	x 10	x 6
10	x 10	x 5
10	x 10	x 4
10	x 10	x 3
10	x 10	x 2
10	x 8	x 8
10	x 8	x 6
8	x 8	x 10
8	x 6	x 10
10	x 6	x 6
10	x 5	x 10
10	x 4	x 10
10	x 3	x 10
10	x 2	x 10
10	x 4	x 6
12	x 12	x 10
12	x 12	x 8
12	x 12	x 6
12	x 12	x 5
12	x 12	x 4
12	x 8	x 12
12	x 10	x 10
12	x 8	x 10
12	x 8	x 8
12	x 5	x 12
12	x 4	x 12
12	x 3	x 12
12	x 2	x 12
10	x 10	x 12

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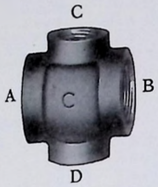
Standard Cast Iron Fittings



Cross

List Prices

Size		Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12
Crosses	Straight	Black	Each	.15	.15	.16	.22	.27	.42	.53	.75	1.30	2.00	2.70	3.15	5.50	7.25	17.50	35.00	52.50
		Galv.	Each	.30	.30	.32	.44	.54	.84	1.06	1.50	2.60	4.00	5.40	6.30	11.00	14.50	35.00	70.00	105.00
	*Reducing	Black	Each			.18	.25	.30	.46	.60	.83	1.45	2.20	3.00	3.50	6.00	8.00	19.25	38.50	58.00
		Galv.	Each			.36	.50	.60	.92	1.20	1.66	2.90	4.40	6.00	7.00	12.00	16.00	38.50	77.00	116.00



***Reducing Crosses:** List prices of Reducing Crosses apply to reducing sizes carried in stock, shown in the table below. Other reductions can be made to order by bushing in the sand; when so bushed, non-stock sizes use the same list prices as stock reducing sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing sizes that require making a new pattern are entirely special. Prices on application.

Reducing Crosses Carried in Stock

A	B	C	D
½	x ½	x ½	x ⅛
½	x ¼	x ½	x ⅛
¾	x ¾	x ½	x ½
¾	x ¾	x ½	x ¼
¾	x ½	x ½	x ½
1	x 1	x ¾	x ¾
1	x 1	x ½	x ½
1	x ¾	x ¾	x ¾
1	x ½	x ¾	x ¾
1¼	x 1¼	x 1	x 1
1¼	x 1¼	x ¾	x ¾
1¼	x 1¼	x ½	x ½
1¼	x 1	x 1	x 1
1¼	x 1	x ¾	x ¾
1¼	x ¾	x ¾	x ¾
1¼	x ½	x 1	x ¾
1¼	x ½	x ¾	x ¾
1½	x 1½	x 1¼	x 1¼
1½	x 1½	x 1	x 1
1½	x 1½	x ¾	x ¾
1½	x 1½	x ½	x ½
1½	x 1¼	x 1¼	x 1¼
1½	x 1¼	x ¾	x ¾
1½	x 1	x 1	x ¾
1½	x 1	x ¾	x ¾
1½	x 1	x ½	x ½
1½	x ¾	x 1	x ¾
1½	x ½	x 1¼	x 1¼
1½	x ½	x 1	x 1
1½	x ½	x ¾	x ¾
1½	x ½	x ½	x ½
2	x 2	x 1½	x 1½
2	x 2	x 1¼	x 1¼
2	x 2	x 1	x 1
2	x 2	x ¾	x ¾
2	x 2	x 1	x ¾
2	x 2	x ¾	x ¾
2	x 2	x ½	x ½
2	x 1½	x 1½	x 1½
2	x 1½	x 1¼	x 1¼

A	B	C	D
2	x 1½	x 1¼	x 1¼
2	x 1½	x 1¼	x 1
2	x 1½	x 1¼	x ¾
2	x 1½	x 1	x 1
2	x 1½	x ½	x ¾
2	x 1½	x ¾	x ¾
2	x 1¼	x 1	x ¾
2	x 1	x 2	x 1
2	x 1	x 1½	x 1
2	x ¾	x 2	x ½
2	x ½	x 1½	x 1½
2	x ½	x 1½	x 1¼
2	x ½	x 1½	x 1
2	x ½	x 1½	x ¾
2	x ½	x 1¼	x 1¼
2	x ½	x 1¼	x 1
2	x ½	x 1¼	x ¾
2½	x 2½	x 2	x 2
2½	x 2½	x 2	x 1½
2½	x 2½	x 2	x 1
2½	x 2½	x 1½	x 1½
2½	x 2½	x 1½	x 1¼
2½	x 2½	x 1¼	x 1¼
2½	x 2½	x 1¼	x 1
2½	x 2½	x 1¼	x ¾
2½	x 2½	x 1	x 1
2½	x 2½	x ¾	x ¾
2½	x 2½	x ½	x ½
2½	x 2	x 2½	x 2
2½	x 2	x 2	x 1½
2½	x 2	x 2	x 1¼
2½	x 2	x 2	x 1
2½	x 2	x 2	x ¾
2½	x 2	x 1½	x 1½
2½	x 2	x 1½	x 1
2½	x 2	x 1¼	x 1¼
2½	x 2	x 1¼	x ¾
2½	x 2	x 1	x 1
2½	x 1½	x 1½	x 1½

A	B	C	D
2½	x 2	x 1	x ¾
2½	x 2	x ¾	x ¾
2½	x 1½	x 2	x 1½
2½	x 1½	x 1¼	x 1¼
2½	x 1½	x 1¼	x 1
2½	x ½	x 2	x 2
2½	x ½	x 2	x 1½
2½	x ½	x 1½	x 1½
2½	x ½	x 1½	x 1¼
2½	x ½	x 1¼	x 1¼
3	x 3	x 2½	x 2½
3	x 3	x 2	x 2
3	x 3	x 2	x 1½
3	x 3	x 2	x 1
3	x 3	x 1½	x 1½
3	x 3	x 1½	x 1¼
3	x 3	x 1½	x 1
3	x 3	x 1½	x ¾
3	x 3	x 1¼	x 1¼
3	x 3	x 1¼	x 1
3	x 3	x 1¼	x ¾
3	x 3	x 1	x 1
3	x 3	x ¾	x ¾
3	x 2½	x 2½	x 2
3	x 2½	x 2	x 2
3	x 2½	x 2	x 1½
3	x 2½	x 2	x 1¼
3	x 2½	x 2	x 1
3	x 2½	x 2	x ¾
3	x 2½	x 1½	x 1½
3	x 2½	x 1½	x 1¼
3	x 2½	x 1½	x 1
3	x 2½	x 1¼	x 1¼
3	x 2½	x 1¼	x 1
3	x 2½	x 1¼	x ¾
3	x 2½	x 1	x 1
3	x 2	x 2	x 1½
3	x 2	x 2	x 1
3½	x 3½	x 3	x 3
3½	x 3½	x 2½	x 2
3½	x 3½	x 2	x 2
3½	x 3½	x 2	x 1½

A	B	C	D
3½	x 3½	x 1½	x 1¼
3½	x 3½	x 1½	x 1
3½	x 3½	x 1½	x ¾
3½	x 3½	x 1¼	x 1¼
3½	x 3½	x 1¼	x 1
3½	x 3½	x 1¼	x ¾
3½	x 3½	x 1	x 1
3½	x 3	x 2½	x 2½
3½	x 3	x 2½	x 2
3½	x 3	x 2½	x 1½
3½	x 3	x 2	x 2
3½	x 3	x 2	x 1½
3½	x 3	x 2	x 1¼
3½	x 3	x 1½	x 1½
3½	x 3	x 1½	x 1¼
3½	x 3	x 1½	x ¾
3½	x 3	x 1¼	x 1¼
3½	x 3	x 1¼	x 1
3½	x 3	x 1	x 1
4	x 4	x 3½	x 3½
4	x 4	x 3	x 3
4	x 4	x 2½	x 2½
4	x 4	x 2	x 2
4	x 4	x 2	x 1½
4	x 4	x 2	x 1
4	x 4	x 1½	x 1½
4	x 4	x 1½	x 1¼
4	x 4	x 1½	x 1
4	x 4	x 1½	x ¾
4	x 4	x 1¼	x 1
4	x 4	x 1¼	x ¾
4	x 4	x 1	x 1
4	x 3½	x 2½	x 2½
4	x 3½	x 2½	x 2
4	x 3½	x 2½	x 1
4	x 3½	x 2	x 2
4	x 3½	x 2	x 1½
4	x 3½	x 2	x 1¼
4	x 3½	x 2	x 1
4	x 3½	x 1½	x 1½
4	x 3½	x 1½	x 1¼
4	x 3½	x 1½	x 1

A	B	C	D
4	x 3½	x 1¼	x 1¼
4	x 3½	x 1¼	x 1
4	x 3	x 2½	x 2
5	x 5	x 4	x 4
5	x 5	x 3½	x 3½
5	x 5	x 3	x 3
5	x 5	x 2½	x 2½
5	x 5	x 2	x 2
5	x 5	x 2	x 1½
5	x 5	x 1½	x 1½
5	x 5	x 1½	x 1¼
5	x 5	x 1½	x ¾
5	x 5	x 1¼	x 1¼
5	x 5	x 1¼	x ¾
5	x 5	x 1	x 1
5	x 4	x 2½	x 2½
5	x 4	x 2½	x 2
5	x 4	x 2	x 2
5	x 4	x 2	x 1½
5	x 4	x 1½	x 1½
5	x 4	x 1¼	x 1
5	x 4	x 1	x 1
6	x 6	x 5	x 5
6	x 6	x 4	x 4
6	x 6	x 3½	x 3½
6	x 6	x 3	x 3
6	x 6	x 2½	x 2½
6	x 6	x 2	x 2
6	x 6	x 2	x 1½
6	x 6	x 1½	x 1½
6	x 6	x 1½	x ¾
6	x 6	x 1¼	x 1¼
6	x 5	x 3	x 3
6	x 5	x 2	x 2
6	x 5	x 2	x 1½
6	x 5	x 1½	x 1½
8	x 8	x 6	x 6
8	x 8	x 5	x 5
8	x 8	x 4	x 4
10	x 10	x 8	x 8
10	x 10	x 6	x 6
12	x 12	x 10	x 10
12	x 12	x 8	x 8

Description . . . page 191 *Dimensions . . . page 191* *Working pressures . . . page 191*

Standard Cast Iron Fittings



45° Y-Bend



Reducer



Eccentric Reducer



Cap



Locknut

List Prices

Size		Inches	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12
45° Y-Bends	Black	Each	.20	.28	.34	.54	.66	.94	1.66	2.50	3.50	4.00	7.00	9.20	22.50	45.00	67.00
	Galv.	Each	.40	.56	.68	1.08	1.32	1.88	3.32	5.00	7.00	8.00	14.00	18.40	45.00	90.00	134.00
*Reducers	Black	Each		.10	.16	.22	.28	.43	.60	.80	1.00	1.35	2.00	2.70	6.75	10.00	15.00
	Galv.	Each		.20	.32	.44	.56	.86	1.20	1.60	2.00	2.70	4.00	5.40	13.50	20.00	30.00
Eccentric *Reducers	Black	Each				.55	.72	1.00	1.50	2.40	3.00	4.00	6.00	8.00	11.00		
	Galv.	Each				1.10	1.44	2.00	3.00	4.80	6.00	8.00	12.00	16.00	22.00		
Caps	Black	Each	For ¼ to 3½-inch, use Malleable Iron. See page 177									.87	1.20	1.55	2.85	5.50	7.00
	Galv.	Each										1.74	2.40	3.10	5.70	11.00	14.00
Locknuts	Black	Each	For ¼ to 2-inch, use Malleable Iron. See page 177			.27	.34	.47	.64	.90	1.30	2.35	3.00	4.00			
	Galv.	Each				.54	.68	.94	1.28	1.80	2.60	4.70	6.00	8.00			

***Reducing fittings:** List prices of Reducers and Eccentric Reducers apply to sizes carried in stock, shown in the table below. Other reductions can be made to order by bushing in the sand; when so bushed, non-stock sizes use the same list prices as stock sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing 45° Y-Bends can be made to order by bushing in the sand from straight sizes. When so bushed, reducing sizes use the same list prices as straight sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing fittings that require making a new pattern are entirely special. Prices on application.

Reducers Carried in Stock

Reducers

¾ x ½	3 x 2½	5 x 4	8 x 6
1 x ¾	3 x 2	5 x 3½	8 x 4
1 x ½	3 x 1½	5 x 3	10 x 8
1¼ x 1	3 x 1¼	5 x 2½	10 x 6
1½ x 1¼	3 x 1	5 x 2	12 x 10
2 x 1½	3½ x 3	6 x 5	12 x 8
2 x 1¼	3½ x 2½	6 x 4	
2 x 1	3½ x 2	6 x 3½	
2½ x 2	4 x 3½	6 x 3	
2½ x 1½	4 x 3	6 x 2½	
2½ x 1¼	4 x 2½	6 x 2	
2½ x 1	4 x 2		
2½ x ¾	4 x 1½		

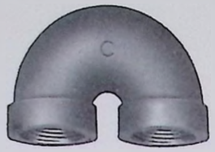
Eccentric Reducers

1¼ x 1	3 x 2½	4 x 3½	6 x 5
1¼ x ¾	3 x 2	4 x 3	6 x 4
1½ x 1¼	3 x 1½	4 x 2½	6 x 3½
1½ x 1	3 x 1¼	4 x 2	6 x 3
1½ x ¾	3 x 1	4 x 1½	6 x 2½
2 x 1½	3½ x 3	4 x 1¼	6 x 2
2 x 1¼	3½ x 2½	4 x 1	
2 x 1	3½ x 2	5 x 4	8 x 6
2½ x 2	3½ x 1½	5 x 3½	8 x 5
2½ x 1½	3½ x 1	5 x 3	
2½ x 1¼	4 x 3½	5 x 2½	
2½ x 1	4 x 3	5 x 2	
2½ x ¾	4 x 2½	5 x 1½	
	4 x 2		
	4 x 1½		

Description . . . page 191 *Dimensions . . . page 191* *Working pressures . . . page 191*

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Standard Cast Iron Return Bends



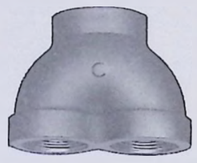
Return Bends							
Size	Center to Center	Right Hand		Right & Left		Left Hand	
		Black	Galv.	Black	Galv.	Black	Galv.
Inches	Inches	Each	Each	Each	Each	Each	Each
Close Pattern							
½	1¼	.18	.36	.21	.42	.21	.42
¾	1½	.20	.40	.23	.46	.23	.46
1	1¾	.22	.44	.26	.52	.26	.52
1¼	2¼	.28	.56	.33	.66	.33	.66
1½	2½	.40	.80	.46	.92	.46	.92
2	3¼	.57	1.14	.66	1.32	.66	1.32
2½	3¾	1.20	2.40	1.40	2.80	1.40	2.80
3	4¼	1.70	3.40	1.95	3.90	1.95	3.90
4	6	5.00	10.00	5.25	10.50	5.25	10.50
Open Pattern							
¾	1⅞	.26	.52	.30	.60		
1	2½	.30	.60	.35	.70		
1¼	3	.40	.80	.46	.92		
1½	3½	.55	1.10	.64	1.28		
2	4½	.80	1.60	.92	1.84		
2½	5½	1.35	2.70	1.55	3.10		
3	6½	2.20	4.40	2.50	5.00		
4	7½	6.50	10.00	7.00	14.00		
Special Wide Pattern							
1	3	.45	.80				
1	4	.50	.90				
1	5	.60	1.10				
1	6	.75	1.30				
1	8	1.00	1.60				
1¼	4	1.00	1.75				
1¼	6	1.25	2.00				
1¼	8	Use 250-Pound, page 220					
1½	4⅞	1.30	2.30				
1½	6	1.60	2.60				
1½	8	2.00	3.25				
2	4⅞	1.75	3.00				
2	6	2.00	3.25				
2	7	3.00	4.50				
2	8	3.50	5.00				
4	11	7.50	11.00				

Close Pattern Return Bends can not be used to make up parallel coils. The center to center dimension is so close that the bands of adjacent bends will not clear each other.



Close Pattern Pitched Return Bends				
Size	Center to Center	Length of pipe in coil	Right Hand	
			Black	Galv.
Inches	Inches	Feet	Each	Each
1	1¾	3	.26	.52
1	1¾	4	.26	.52
1	1¾	5	.26	.52
1	1¾	6	.26	.52
1	1¾	8	.26	.52
1¼	2¼	4	.33	.66
1¼	2¼	5	.33	.66
1¼	2¼	6	.33	.66

Pitched Return Bends are marked with the length of coil. 1-inch Return Bends for coils longer than 8 feet are not pitched. Right and Left Pitched Return Bends are made to order.



Back Outlet Return Bends						
Size	Center to Center	Size of Back Outlet	Right Hand		Right & Left	
			Black	Galv.	Black	Galv.
Inches	Inches	Inches	Each	Each	Each	Each
¾	1⅞	¾	.38	.76	.42	.84
1	2¼	1	.42	.84	.48	.96
1	4	1¼	*	*	*	*
1¼	2¼	1¼	.60	1.20	.70	1.40
1¼	3¼	1½	*	*	*	*
1½	2½	1½	.80	1.60	.95	1.90
1½	4	1½	*	*	*	*
2	3¼	2	1.15	2.30	1.30	2.60
2	4	1½	*	*	*	*
2½	3¾	2½	2.00	4.00	2.30	4.60
3	4¼	3	3.00	6.00	3.50	7.00

*Prices on application.
The back outlet of Right and Left Return Bends is threaded right hand.



Return Bend with Union Ends

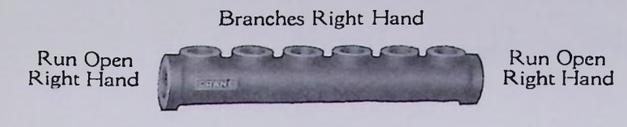
Return Bends with Union Ends		
Size	Center to Center	Black
Inches	Inches	Each
1¼	4⅝	1.60
2	6	3.00
3	8	*

*Price on application.
These Return Bends are equipped with No. 1218 Gasket Type ⅔ Unions and rubber gaskets. See page 235.

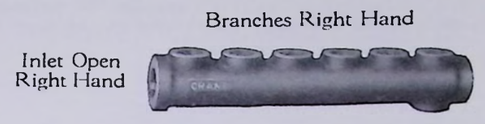
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Working pressures ..... *page 191*

Cast Iron Branch Tees

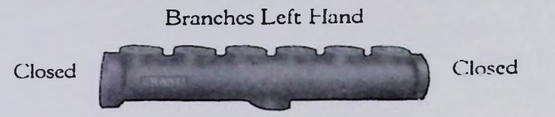
100 pounds steam working pressure



No. 1, Branch Tee



No. 2, Branch Tee Back Outlet Open, Right Hand



No. 3, Branch Tee

List Prices, Each

Branches	Size	1″			1¼″			1½″			2″		
	Center to center	2½″			3″			3½″			4½″		
Size of run, No. 1		1″			1¼″			1½″			2″	2½″	
Size of inlet and back outlet, No. 2		or	1½″	2″	or	2″	2½″	or	2½″	3″	2″	or	3½″
Size of back inlet, No. 3		1¼″			1½″			2″				3″	
Inside diameter of barrel		1¾″	2¼″	2¼″	2½″	2½″	2½″	2¾″	2¾″	2¾″	3½″	3½″	3½″
Number of Branches	No. 1	No. 2 or No. 3											
	2		.90	1.00	1.15	1.30			2.10			4.10		
	3	2	1.05	1.15	1.35	1.65	1.90	2.40	2.70	3.45	3.80	5.25	5.75	6.25
	4	3	1.15	1.30	1.60	2.00	2.40	2.85	3.35	4.15	4.60	6.40	7.00	7.75
	5	4	1.35	1.45	1.85	2.40	2.90	3.55	4.00	5.00	5.50	7.65	8.50	9.25
	6	5	1.60	1.75	2.10	2.80	3.30	3.95	4.65	5.75	6.25	8.80	9.75	10.75
	7	6	1.90	2.20	2.45	3.20	3.90	4.20	5.25	6.50	7.25	10.60	11.75	13.00
	8	7	2.20	2.45	2.75	3.60	4.50	4.95	5.85	7.00	7.75	11.50	12.75	14.00
	9	8	2.65	2.90	3.40	4.30	5.25	6.15	6.50	8.25	9.00	12.25	13.50	15.00
	10	9		3.30	4.00	4.80	5.85	6.85	7.60	9.25	10.00	13.50	15.00	16.50
	11	10		4.50	4.80	5.00	6.25	7.25	8.00	9.75	10.75			
	12	11		4.75	5.10	5.25	6.50	7.65	8.50	10.50	11.50			
	13	12		5.50	6.00	6.00	7.00	8.25						
	14	13		7.00	7.25	6.75	7.75	9.00						
	15	14		7.50	7.75	7.50	8.50	9.75						
	16	15		8.00	8.25	8.50	9.50	10.75						

A back outlet or a back inlet is charged as an additional branch. Therefore, the prices of No. 2 and No. 3 Branch Tees are the same as of No. 1 Branch Tees with one more branch, as indicated in the table above.

When ordering No. 1 Branch Tees, state the catalogue number, the size and number of branches, and the size of the run. If orders do not specify the size of the run, it will be tapped the same size as the branches.

When ordering No. 2 Branch Tees, state the catalogue number, the size and number of branches, and the size of the inlet and back outlet. If orders do not specify the size of the inlet and outlet, these openings will be tapped the same size as the branches.

When ordering No. 3 Branch Tees, state the catalogue number, the size and number of branches, and the size of the back inlet. If orders do not specify the size of the inlet, it will be tapped the same size as the branches.

No. 1 and No. 2 Branch Tees with branches tapped left hand, and No. 3 Branch Tees with branches tapped right hand, can be furnished at the above prices.

For steam working pressures from 100 to 150 pounds, malleable iron branch tees can be furnished. Prices on application.

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Standard Cast Iron Fittings
with Casing Threads

WORKING PRESSURE
175 pounds cold water, oil, or gas, non-shock

Orders for fittings with casing threads should specify the outside diameter of the casing, the number of threads per inch, and the style of the casing.

List Prices, Black

Size		Inches	2, 2¼ 2½ 2¾, 3	3¼	3½ 3¾	4	4¼	4½	4¾	5
90° Elbows	Straight	Each	1.10	1.35	1.80	2.50	2.50	3.00	3.00	3.50
	Reducing	Each	1.40	1.75	2.25	3.00	3.00	3.75	3.75	4.35
45° Elbows	Straight	Each	1.60	2.00	2.70	3.75	3.75	4.00	4.00	4.50
Tees	Straight	Each	1.50	2.00	2.50	3.50	3.50	4.00	4.25	5.00
	Reducing	Each	1.85	2.50	3.00	4.35	4.35	5.00	5.25	6.25
Crosses	Straight	Each	2.20	2.70	3.50	5.00	5.00	5.70	6.00	7.00
	Reducing	Each	2.75	3.30	4.35	6.25	6.25	7.00	7.50	8.75
Plugs		Each	.50	.75	.85	1.35	1.35	1.75	1.75	2.00
Bushings		Each	.60	.80	1.00	1.50	1.50	1.85	1.85	2.00
Flange Unions		Each	2.25	2.75	3.15	4.50	4.50	5.00	5.00	5.50
Locknuts		Each	.50	.70	.95	1.25	1.25	1.35	1.35	1.50
Return Bends	Close	Each	3.00	4.00	5.00	6.00	6.50			
	Open	Each	3.75	4.50	5.75	8.00	8.00			
Reducers		Each	1.20	1.50	2.00	2.75	2.75	3.00	3.00	3.50
Caps		Each	.80	1.10	1.30	1.60	1.60	2.00	2.00	2.15
45° Y-Bends		Each	3.25	4.50	6.00	8.00	8.00	9.00	9.00	10.00

Size		Inches	5 3/16 5⅝	6¼ 6⅝	7⅝	8¼ 8⅝	9⅝	10⅝	11⅝	12½
90° Elbows	Straight	Each	4.00	7.00	10.00	13.00	20.00	28.00	35.00	45.00
	Reducing	Each	5.00	8.75	12.50	16.00	25.00	35.00	45.00	60.00
45° Elbows	Straight	Each	5.50	9.00	13.00	16.00	25.00	35.00	45.00	60.00
Tees	Straight	Each	5.50	10.00	15.00	20.00	25.00	32.00	40.00	50.00
	Reducing	Each	6.75	12.50	18.75	25.00	30.00	35.00	50.00	70.00
Crosses	Straight	Each	7.80	14.00	20.00	26.00	40.00	55.00	70.00	90.00
	Reducing	Each	9.70	17.50	25.00	32.00	50.00	70.00	90.00	115.00
Plugs		Each	2.40	3.75	5.50	6.50	7.50	9.00	11.00	14.00
Bushings		Each	2.50	3.75	5.50	6.50	7.50	9.00	14.00	20.00
Flange Unions		Each	6.50	8.00	10.00	12.00	15.00	28.00	35.00	45.00
Locknuts		Each	1.90	2.50	3.50	4.00	4.50	6.25	12.50	20.00
Reducers		Each	4.00	8.00	10.00	12.00	15.00	22.00	30.00	40.00
Caps		Each	2.35	4.00	4.35	6.00	7.25	8.50	16.00	20.00
45° Y-Bends		Each	12.00	17.00	25.00	35.00	45.00	50.00	65.00	85.00

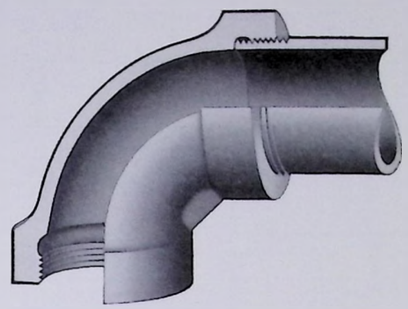
Fittings with iron pipe and casing threads: For Standard Cast Iron Casing Fittings with one or more openings tapped with regular iron pipe thread, add 25 per cent to the list prices shown above.

Galvanized fittings: Galvanized Standard Cast Iron Casing Fittings can be furnished at double the list prices shown above.

Other Crane products with casing threads: For cast iron casing fittings not listed above and for valves or cocks—brass, iron, or steel—with casing or special thread, see the Crane Discount Sheet for prices.

Orders should specify outside diameter of casing, number of threads per inch, and style of casing.

Cast Iron Drainage Fittings



Crane Cast Iron Drainage Fittings, shown on pages 200 to 211, are designed especially for drainage systems using wrought pipe. The inside diameter of the fitting is the same as that of wrought pipe. The fitting is provided with a shoulder so that the end of the pipe, when the joint is made, practically meets the shoulder, forming an unobstructed passage-way for foreign matter.

The openings are chamfered, to permit easy entrance of the pipe.

These fittings can be furnished Black or Galvanized. Black fittings are coated, except for communities requiring uncoated fittings.

90° fittings, except Street Elbows, are pitched ¼-inch per foot.

Vacuum cleaning: These fittings are well suited for vacuum cleaning installations. Regular pitched fittings will be furnished for this service unless orders specify unpitched.

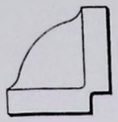
Other materials: Malleable Iron Drainage Fittings made from the Cast Iron patterns can be made to order. See the Crane Discount Sheet for prices.

Brass Drainage Fittings made from the Cast Iron patterns can be made to order. Prices on application.

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Cast Iron Drainage Fittings

List Prices, Each



No. 1000 90° Elbows		
Size Inches	Black Each	Galv. Each
1	.28	.49
1¼	.30	.52
1½	.38	.67
2	.57	1.00
2½	1.20	2.10
3	1.45	2.55
3½	1.90	3.35
4	2.30	4.00
5	4.25	7.40
6	6.25	11.00
8	15.00	26.25
10	31.00	54.00
12	47.50	83.00
14	65.00	114.00
1½ x 1¼	.57	1.00
2 x 1½ / 2 x 1¼	.85	1.50
5 x 4	4.25	7.40
6 x 5	6.50	11.35

These elbows are pitched ¼-inch per foot.



No. 1002½ 67½° Elbows		
Size Inches	Black Each	Galv. Each
1	.28	.49
1¼	.30	.52
1½	.38	.67
2	.57	1.00
3	1.45	2.55
4	2.30	4.00
5	4.25	7.40



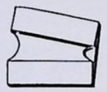
No. 1002 60° Elbows		
Size Inches	Black Each	Galv. Each
1	.28	.49
1¼	.30	.52
1½	.38	.67
2	.57	1.00
2½	1.20	2.10
3	1.45	2.55
3½	1.90	3.35
4	2.30	4.00
5	4.25	7.40
6	6.25	11.00
8	15.00	26.25
10	31.00	54.00



No. 1003 45° Elbows		
Size Inches	Black Each	Galv. Each
1	.28	.49
1¼	.30	.52
1½	.38	.67
2	.57	1.00
2½	1.20	2.10
3	1.45	2.55
3½	1.90	3.35
4	2.30	4.00
5	4.25	7.40
6	6.25	11.00
8	15.00	26.25
10	31.00	54.00
12	47.50	83.00
14	65.00	114.00



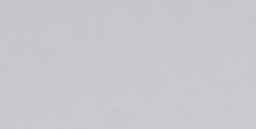
No. 1005 22½° Elbows		
Size Inches	Black Each	Galv. Each
1	.28	.49
1¼	.30	.52
1½	.38	.67
2	.57	1.00
2½	1.20	2.10
3	1.45	2.55
4	2.30	4.00
5	4.25	7.40
6	6.25	11.00
8	15.00	26.25
10	31.00	54.00
12	47.50	83.00



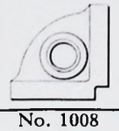
No. 1006 11¼° Elbows		
Size Inches	Black Each	Galv. Each
1	.28	.49
1¼	.30	.52
1½	.38	.67
2	.57	1.00
2½	1.20	2.10
3	1.45	2.55
4	2.30	4.00
5	4.25	7.40
6	6.25	11.00
8	15.00	26.25
10	31.00	54.00



No. 1007 5⅝° Elbows		
Size Inches	Black Each	Galv. Each
1	.28	.49
1¼	.30	.52
1½	.38	.67
2	.57	1.00
2½	1.20	2.10
3	1.45	2.55
4	2.30	4.00
5	4.25	7.40
6	6.25	11.00
8	15.00	26.25
10	31.00	54.00

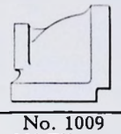


No. 1012 No. 1013
Closet Elbows
Prices on application



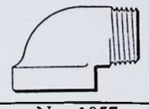
No. 1008 90° Elbows with 2-inch Side Outlet		
Size Inches	Black Each	Galv. Each
3	2.90	5.10
4	3.85	6.75

These elbows are pitched ¼-inch per foot.

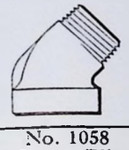


No. 1009 90° Elbows with 2-inch Heel Outlet		
Size Inches	Black Each	Galv. Each
3	2.90	5.10
4	3.85	6.75

These elbows are pitched ¼-inch per foot.



No. 1057 90° Street Elbows		
Size Inches	Black Each	Galv. Each
1¼	.35	.60
1½	.40	.70
2	.60	1.10



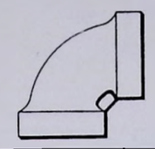
No. 1058 45° Street Elbows		
Size Inches	Black Each	Galv. Each
1¼	.35	.60
1½	.40	.70
2	.60	1.10

Malleable Iron: Malleable Iron Drainage Fittings made from the Cast Iron patterns can be furnished to order. They use the same list prices as the Cast Iron, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Dimensions . . . . page 208

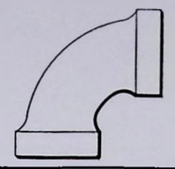
Cast Iron Drainage Fittings

List Prices, Each



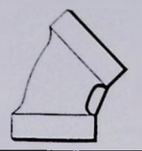
No. 1001 90° Elbows Long Turn		
Size Inches	Black Each	Galv. Each
1	.33	.57
1¼	.35	.60
1½	.42	.72
2	.65	1.15
2½	1.40	2.45
3	1.75	3.10
3½	2.30	4.05
4	2.75	4.80
5	5.25	9.20
6	7.50	13.15
8	19.00	33.25
10	38.00	66.50
12	57.50	100.00
14	75.00	130.00

These elbows are pitched ¼-inch per foot.

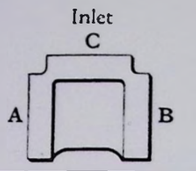


No. 1001½ 90° Elbows Extra Long Turn		
Size Inches	Black Each	Galv. Each
1¼	.35	.60
1½	.42	.72
2	.65	1.15
2½	1.40	2.45
3	1.75	3.10
4	2.75	4.80

These elbows are pitched ¼-inch per foot.



No. 1004 45° Elbows Long Turn		
Size Inches	Black Each	Galv. Each
1	.33	.57
1¼	.35	.60
1½	.42	.72
2	.65	1.15
2½	1.40	2.45
3	1.75	3.10
4	2.75	4.80
5	5.25	9.20
6	7.50	13.15
8	19.00	33.25
10	38.00	66.50
12	57.50	100.00
14	75.00	130.00



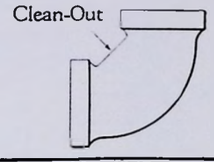
No. 1017 Tees		
Size Inches	Black Each	Galv. Each
1	.40	.70
1¼	.45	.80
1½	.55	1.00
2	.80	1.40
2½	1.50	2.50
3	2.00	3.50
4	3.25	5.70
5	6.00	10.50
6	8.75	15.25
8	21.00	37.00
10	43.00	75.00
12	60.00	100.00
14	79.00	133.00
A B C		
1½x1½x1¼	.60	1.10
2 x2 x1½ / 2 x2 x1¼	.90	1.60
2½x2½x2	1.65	2.75
3 x3 x2	2.20	3.85
3 x3 x1½		
3 x2 x3	Use No. 1009	
4 x4 x3	3.60	6.30
4 x4 x2		
4 x2 x4	Use No. 1009	
5 x5 x4	6.60	11.55
5 x5 x3		
5 x5 x2		
6 x6 x2	9.60	16.75
8 x8 x3	23.00	40.70
10 x10 x8	47.30	82.50
10 x10 x6		
12 x12 x10	65.00	110.00
12 x12 x8		
14 x14 x12	85.00	145.00
14 x14 x10		
14 x14 x8		

The inlet is pitched ¼-inch per foot.



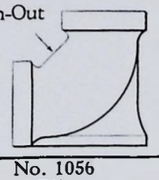
No. 1010 Three-Way Elbows		
Size Inches	Black Each	Galv. Each
1¼	.75	1.25
1½	.85	1.50
2	1.10	1.95
2½	2.25	3.90
3	3.00	5.25
4	5.00	8.75
5	7.50	13.15
6	13.50	23.50
A B C		
3 x 3 x 4	5.50	9.65
4 x 4 x 5	8.25	14.50
4 x 4 x 6 / 5 x 5 x 6	15.00	26.25

The inlets are pitched ¼-inch per foot.



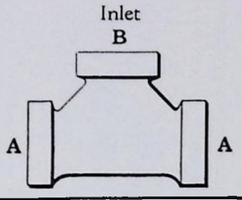
No. 1047 90° Elbows Long Turn with 2-inch Clean-out		
Size Inches	Black Each	Galv. Each
2	1.20	2.10
3	3.00	5.25
4	5.00	8.75
5	7.50	13.00
6	10.00	17.50

These elbows are pitched ¼-inch per foot.



No. 1056 90° Elbows Long Turn with 2-inch Clean-out and Base		
Size Inches	Black Each	Galv. Each
2	3.00	5.25
3	4.50	8.00
4	7.00	12.25
5	12.00	21.00
6	18.00	31.50

These elbows are pitched ¼-inch per foot.



No. 1018 Basin Tees		
Size Inches	Black Each	Galv. Each
1¼	.60	1.00
1½	.70	1.22
2	1.10	1.95
2½	1.75	3.00
A B		
1½ x 1¼	.77	1.35
2 x 1½ / 2 x 1¼	1.20	2.10

The inlet is pitched ¼-inch per foot.

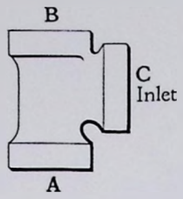
Malleable Iron: Malleable Iron Drainage Fittings made from the Cast Iron patterns can be furnished to order. They use the same list prices as the Cast Iron, but are sold at an advance in price; see the Crane Discount Sheet for prices.

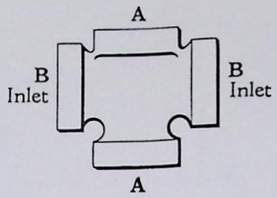
Dimensions . . . . page 209

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Cast Iron Drainage Fittings

List Prices, Each





No. 1020
90° Y-Branches
Tee Pattern

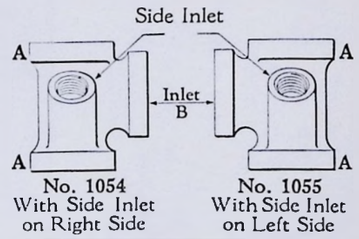
Size Inches	Black Each	Galv. Each
1	.40	.70
1¼	.45	.80
1½	.57	1.00
2	.85	1.50
2½	1.80	3.15
3	2.20	3.85
3½	2.90	5.10
4	3.50	6.15
5	6.50	11.35
6	9.50	16.50
8	23.00	40.00
10	47.00	82.00
12	70.00	124.00
A B C		
1¼ x 1¼ x 1	.50	.90
1½ x 1½ x 1¼ 1½ x 1¼ x 1¼ 1½ x 1½ x 1	.63	1.10
2 x 2 x 1½ 2 x 2 x 1¼ 2 x 1½ x 2 2 x 1½ x 1½	.95	1.65
2½ x 2½ x 2 2½ x 2½ x 1½ 2½ x 2½ x 1¼	2.00	3.50
3 x 3 x 2 3 x 3 x 1½ 3 x 3 x 1¼ 3 x 2 x 3	2.40	4.20
3½ x 3½ x 2	3.20	5.60
4 x 4 x 3 4 x 4 x 2½ 4 x 4 x 2 4 x 4 x 1½ 4 x 4 x 1¼ 3 x 3 x 4	3.85	6.75
5 x 5 x 4 5 x 5 x 3 5 x 5 x 2½ 5 x 5 x 2 5 x 5 x 1½	7.15	12.50
6 x 6 x 5 6 x 6 x 4 6 x 6 x 3 6 x 6 x 2 6 x 6 x 1½	10.50	18.50
8 x 8 x 6 8 x 8 x 5 8 x 8 x 4 8 x 8 x 3 8 x 8 x 2	25.50	44.50
10 x 10 x 5 10 x 10 x 4	52.00	88.00
12 x 12 x 5	80.00	145.00

The inlet is pitched ¼-inch per foot.

No. 1024
90° Double Y-Branches
Tee Pattern

Size Inches	Black Each	Galv. Each
1	.60	1.05
1¼	.70	1.22
1½	.85	1.50
2	1.30	2.30
2½	2.85	5.00
3	3.40	5.95
4	5.25	9.20
5	9.50	16.50
6	14.00	24.50
8	36.00	62.00
10	60.00	102.00
A B		
1¼ x 1	.77	1.35
1½ x 1¼	.95	1.65
2 x 1½ 2 x 1¼	1.50	2.60
A B		
2½ x 2 2½ x 1½	3.15	5.50
3 x 2 3 x 1½	3.75	6.55
4 x 2 4 x 1½	5.75	10.00
5 x 4 5 x 3 5 x 2 5 x 1½	10.50	18.50
6 x 5 6 x 4 6 x 2	15.50	27.00
8 x 6 8 x 4 8 x 3	40.00	68.00

The inlets are pitched ¼-inch per foot.



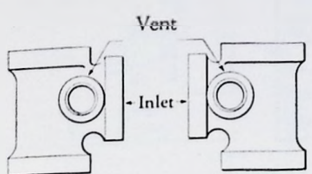
No. 1054
With Side Inlet
on Right Side

No. 1055
With Side Inlet
on Left Side

No. 1054 or No. 1055
90° Y-Branches
with 2-inch 45° Side Inlet
(Closet Tees)

Size Inches	Black Each	Galv. Each
4	6.35	11.00
A B		
5 x 4	11.50	20.00
6 x 4	17.00	29.50

The 4-inch inlet is pitched ¼-inch per foot.



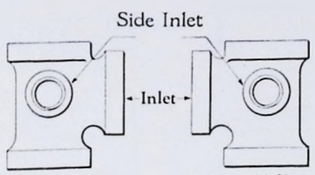
No. 1050
With Vent
on Right Side

No. 1051
With Vent
on Left Side

No. 1050 or No. 1051
90° Y-Branches
with 2-inch Vent on Branch
(Closet Tees)

Size Inches	Black Each	Galv. Each
4	5.75	10.00

The 4-inch inlet is pitched ¼-inch per foot.



No. 1052
With Side Inlet
on Right Side

No. 1053
With Side Inlet
on Left Side

No. 1052 or No. 1053
90° Y-Branches
with 2-inch Side Inlet
(Closet Tees)

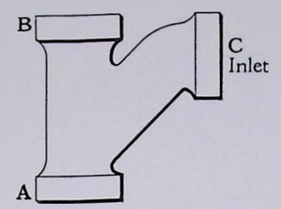
Size Inches	Black Each	Galv. Each
4	5.75	10.00

The 4-inch inlet is pitched ¼-inch per foot.

Malleable Iron: Malleable Iron Drainage Fittings made from the Cast Iron patterns can be furnished to order. They use the same list prices as the Cast Iron, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Dimensions . . . page 210

Cast Iron Drainage Fittings

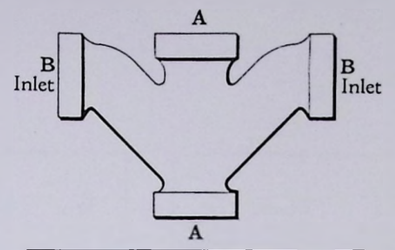


List Prices, Each

No. 1022
90° Y-Branches
Long Turn, Tee Pattern

Size Inches	Black Each	Galv. Each
1¼	.57	1.00
1½	.70	1.22
2	1.10	1.95
2½	2.40	4.20
3	3.35	5.85
4	6.00	10.50
5	9.50	16.50
6	20.00	35.00
8	40.00	70.00
10	55.00	90.00
12	80.00	140.00
A B C		
1¼ x 1¼ x 1	.63	1.10
1½ x 1½ x 1¼ 1½ x 1½ x 1	.80	1.40
2 x 2 x 1½ 2 x 2 x 1¼ 2 x 2 x 1 2 x 1½ x 2	1.20	2.10
2½ x 2½ x 2 2½ x 2½ x 1½ 2½ x 2½ x 1¼ 2½ x 2½ x 1	2.65	4.65
3 x 3 x 2½ 3 x 3 x 2 3 x 3 x 1½	3.75	6.55
4 x 4 x 3 4 x 4 x 2½ 4 x 4 x 2 4 x 4 x 1½ 3 x 3 x 4	6.60	11.55
5 x 5 x 4 5 x 5 x 3 5 x 5 x 2½ 5 x 5 x 2 5 x 5 x 1½	10.50	18.50
6 x 6 x 5 6 x 6 x 4 6 x 6 x 3 6 x 6 x 2	22.00	38.50
8 x 8 x 6 8 x 8 x 4 8 x 8 x 3	44.00	77.00
10 x 10 x 8 10 x 10 x 6 10 x 10 x 5 10 x 10 x 4	60.00	102.00
12 x 12 x 6 12 x 12 x 5	85.00	150.00

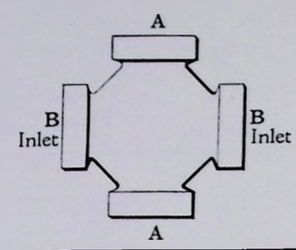
The inlet is pitched ¼-inch per foot.



No. 1026
Double 90° Y-Branches
Long Turn, Tee Pattern

Size Inches	Black Each	Galv. Each
1¼	1.00	1.75
1½	1.10	1.95
2	1.75	3.10
2½	3.60	6.30
3	5.00	8.75
4	9.00	15.75
5	14.00	24.50
6	30.00	52.50
8	60.00	105.00
10	70.00	119.00
A B		
1¼ x 1	1.10	1.90
1½ x 1¼ 1½ x 1	1.25	2.25
2 x 1½ 2 x 1¼	1.90	3.35
2½ x 2 2½ x 1½ 2½ x 1¼	4.00	7.00
3 x 2 3 x 1½	5.50	9.65
4 x 3 4 x 2 4 x 1½	10.00	17.50
5 x 4 5 x 3 5 x 2	15.50	27.00
6 x 5 6 x 4 6 x 3 6 x 2	33.00	58.00
8 x 6 8 x 4 8 x 3	66.00	116.00
10 x 8 10 x 5	77.00	131.00

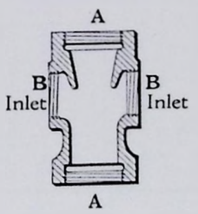
The inlets are pitched ¼-inch per foot.



No. 1019
Basin Crosses

Size Inches	Black Each	Galv. Each
1¼	1.25	2.25
1½	1.50	2.50
2	1.75	3.10
A B		
2 x 1½	1.95	3.40

The inlets are pitched ¼-inch per foot.



No. 1046
Partition Crosses

Size Inches	Black Each	Galv. Each
1¼	1.05	1.85
A B		
1½ x 1¼	1.25	2.20
2 x 1½ 2 x 1¼	1.65	2.90

These Crosses are convenient fittings, but their use may not be permitted in some localities.

The inlets are pitched ¼-inch per foot.

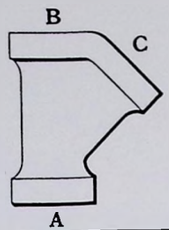
Malleable Iron: Malleable Iron Drainage Fittings made from the Cast Iron patterns can be furnished to order. They use the same list prices as the Cast Iron, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Dimensions . . . pages 209 and 210

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Cast Iron Drainage Fittings

List Prices, Each

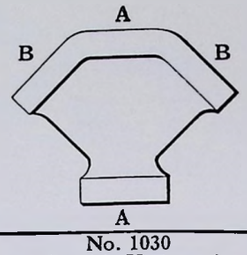


No. 1028
45° Y-Branches

Size Inches	Black Each	Galv. Each
1	.46	.80
1¼	.52	.90
1½	.65	1.15
2	.95	1.65
2½	2.10	3.70
3	2.65	4.65
4	3.85	6.75
5	7.10	12.50
6	10.50	18.50
8	25.00	44.00
10	52.00	91.00
12	75.00	130.00
14	95.00	165.00

A B C	Black Each	Galv. Each
1½ x 1½ x 1¼	.72	1.25
2 x 2 x 1½	1.05	1.85
2 x 2 x 1¼		
2 x 1½ x 1½		
2½ x 2½ x 2	2.30	4.00
2½ x 2½ x 1½		
2½ x 2½ x 1¼		
3 x 3 x 2½	2.90	5.10
3 x 3 x 2		
3 x 3 x 1½		
3 x 3 x 1¼		
3½ x 3½ x 2½	3.55	6.20
4 x 4 x 3	4.25	7.40
4 x 4 x 2½		

A B C	Black Each	Galv. Each
4 x 4 x 2	4.25	7.40
4 x 4 x 1½		
4 x 4 x 1¼		
5 x 5 x 4	7.80	13.65
5 x 5 x 3		
5 x 5 x 2		
5 x 5 x 1½		
6 x 6 x 5	11.50	20.00
6 x 6 x 4		
6 x 6 x 3		
6 x 6 x 2½		
6 x 6 x 2		
6 x 6 x 1½		
8 x 8 x 6	27.50	48.00
8 x 8 x 5		
8 x 8 x 4		
8 x 8 x 3		
10 x 10 x 6	57.00	97.00
10 x 10 x 5		
10 x 10 x 4		
12 x 12 x 8	80.00	140.00
12 x 12 x 6		
14 x 14 x 12	105.00	175.00
14 x 14 x 6		
14 x 14 x 5		
14 x 14 x 4		
14 x 14 x 3		

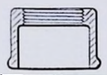


No. 1030
45° Double Y-Branches

Size Inches	Black Each	Galv. Each
1¼	.90	1.60
1½	1.00	1.75
2	1.45	2.55
2½	3.25	5.70
3	4.00	7.00
4	5.75	10.00
5	10.75	18.80
6	16.00	28.00
8	38.00	66.50
10	78.00	137.00
12	110.00	200.00

A B	Black Each	Galv. Each
1½ x 1¼	1.10	1.90
2 x 1½	1.60	2.80
2½ x 2	3.60	6.30
2½ x 1½		
2½ x 1¼		

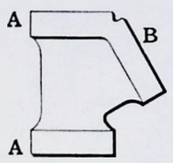
A B	Black Each	Galv. Each
3 x 2	4.40	7.70
3 x 1½		
4 x 3	6.35	11.00
4 x 2		
5 x 4	11.75	20.50
5 x 3		
5 x 2		
6 x 4	17.50	30.50
6 x 3		
6 x 2		
8 x 6	42.00	72.00
8 x 4		
10 x 6	86.00	146.00
12 x 8	121.00	215.00



No. 1034
Hub Connections

Size Inches	Black Each	Galv. Each
1½	1.10	1.90
2	1.15	2.00
3	1.20	2.10
4	1.50	2.60
5	2.00	3.50
6	4.25	7.40

These hub connections have straight threads.

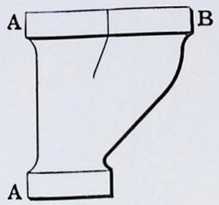


No. 1032
60° Y-Branches

Size Inches	Black Each	Galv. Each
1¼	.52	.90
1½	.65	1.15
2	.95	1.65
3	2.65	4.65
4	3.85	6.75
5	7.10	12.50
6	10.50	18.50

A B	Black Each	Galv. Each
2 x 1½	1.05	1.85
3 x 2	2.90	5.10

A B	Black Each	Galv. Each
4 x 3	4.25	7.40
4 x 2		
5 x 4	7.80	13.65
5 x 3		
5 x 2		
6 x 5	11.50	20.00
6 x 4		
6 x 2		
8 x 6	27.50	48.00
8 x 4		



No. 1049
Special Upright Y-Branches

Size Inches	Black Each	Galv. Each
1½	2.55	4.55
2	2.65	4.65
3	5.50	9.75
4	8.00	14.00
5	12.00	21.00

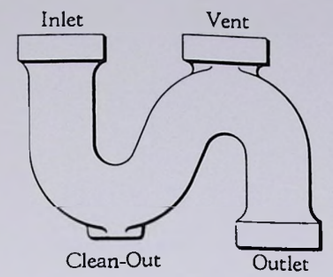
A B	Black Each	Galv. Each
2 x 1½	2.90	5.10
2½ x 1½	4.50	7.75
2½ x 2		
3 x 2	6.00	10.50
4 x 2	8.75	15.25
6 x 4	22.00	38.50

Malleable Iron: Malleable Iron Drainage Fittings made from the Cast Iron patterns can be furnished to order. They use the same list prices as the Cast Iron, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Dimensions . . . . page 210

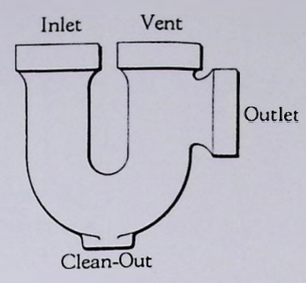
Cast Iron Drainage Fittings

List Prices, Each



No. 1036
S Traps

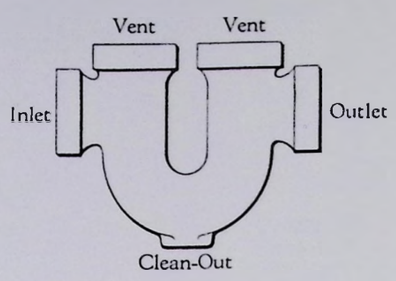
Size Inches	Black Each	Galv. Each
2	4.00	7.00
3	9.25	16.00
4	14.00	24.00
5	21.00	37.00
6	36.00	63.00



No. 1037
Half S Traps

Size Inches	Black Each	Galv. Each
1¼	1.55	2.70
1½	1.70	3.00
2	2.20	3.85
3	5.00	8.75
4	10.00	17.50
5	21.50	37.50
6	32.50	57.00
8	55.00	95.00
10	100.00	175.00

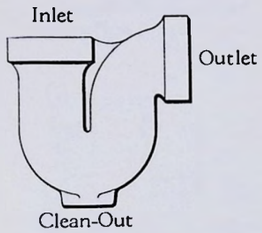
The outlet is pitched ¼-inch per foot.



No. 1038
Running Traps

Size Inches	Black Each	Galv. Each
1¼	2.40	4.20
1½	2.70	4.70
2	3.30	5.75
3	5.50	9.50
4	9.75	17.00
5	24.50	43.00
6	33.50	58.50
8	65.00	115.00
10	115.00	200.00
12	180.00	300.00
14	300.00	500.00

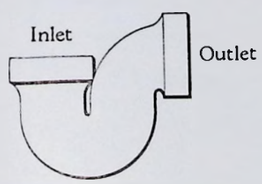
The inlet and outlet are pitched ¼-inch per foot.



No. 1059
P Traps

Size Inches	Black Each	Galv. Each
1¼	1.45	2.55
1½	1.55	2.70
2	2.00	3.50
3	4.70	8.25
4	9.50	16.60

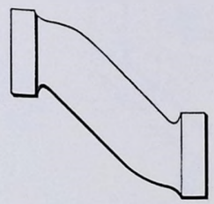
The outlet is pitched ¼-inch per foot.



No. 1059½
Bath P Trap

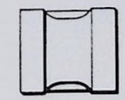
Size Inches	Black Each	Galv. Each
1½	1.30	2.30
2	1.85	3.25

The outlet is pitched ¼-inch per foot.



No. 1039
Offsets

Size Inches	Black Each	Galv. Each
2 x 4	2.15	3.75
2 x 6	2.40	4.20
2 x 8	2.60	4.55
2 x 10	2.85	5.00
3 x 4	3.35	5.85
3 x 6	4.00	7.00
3 x 8	4.75	8.30
3 x 10	5.50	9.65
4 x 4	5.00	8.75
4 x 6	5.75	10.00
4 x 8	6.50	11.35
4 x 10	7.50	13.15
4 x 12	8.50	15.00
5 x 6	9.00	15.75
5 x 8	10.00	17.50
5 x 10	11.00	19.25
5 x 12	12.00	21.00
6 x 6	12.50	22.00
6 x 8	13.50	23.50
6 x 10	14.50	25.50
6 x 12	15.50	27.00

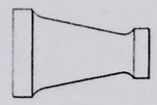


No. 1070
Couplings

Size Inches	Black Each	Galv. Each
1¼	.70	1.25
1½	.80	1.40
2	.90	1.60
2½	1.20	2.10
3	1.50	2.60
4	2.50	4.40
5	4.00	7.00
6	6.00	10.50
8	10.00	17.50
10	14.00	24.50
12	22.00	38.50

Malleable Iron: Malleable Iron Drainage Fittings made from the Cast Iron patterns can be furnished to order. They use the same list prices as the Cast Iron, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Dimensions . . . pages 209 and 211



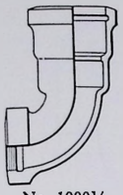
No. 1033
Increasers

Size Inches	Black Each	Galv. Each
2 x 1½	1.75	3.00
2½ x 2	2.00	3.50
3 x 2½	2.50	4.40
3 x 2		
3 x 1½		
3½ x 3	3.20	5.60
4 x 3½	3.75	6.55
4 x 3		
4 x 2		
5 x 4	5.50	9.65
5 x 3		
5 x 2		
6 x 5	6.50	11.35
6 x 4		
8 x 6	15.00	26.25
8 x 4		
10 x 8	20.00	35.00
12 x 10	40.00	70.00

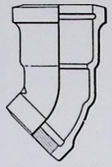
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Cast Iron Drainage Fittings

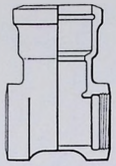
With Hubs for Vent Piping



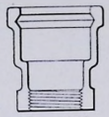
No. 1000½
90° Elbow
Long Turn



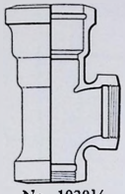
No. 1003½
45° Elbow
Short Turn



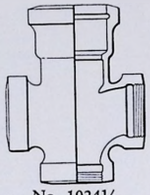
No. 1017½
Bath Vent Tee



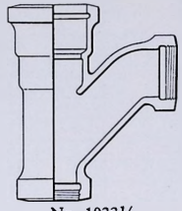
No. 1048
Tucker Connection



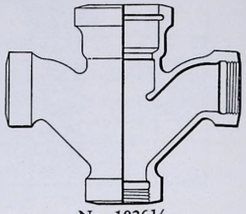
No. 1020½
90° Y-Branch
Tee Pattern



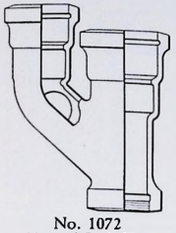
No. 1024½
90° Double Y-Branch
Tee Pattern



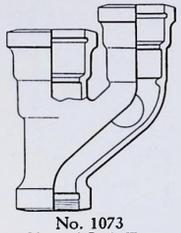
No. 1022½
90° Y-Branch
Long Turn, Tee Pattern



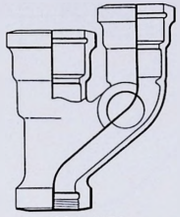
No. 1026½
90° Double Y-Branch
Long Turn, Tee Pattern



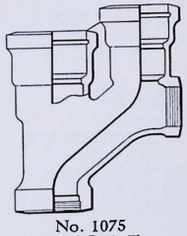
No. 1072
Vented Sink Tee
With Side Inlet
on Right Side



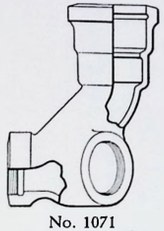
No. 1073
Vented Sink Tee
With Side Inlet
on Left Side



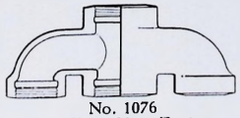
No. 1074
Vented Sink Cross



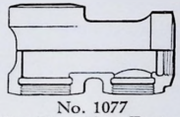
No. 1075
Vented Sink Tee
With End Inlet



No. 1071
Double Bath Vent Fitting



No. 1076
Top Floor Vent Fitting
Top Revent



No. 1077
Top Floor Vent Fitting
End Revent

Crane Co. offers a complete line of Cast Iron Drainage Fittings with combinations of screwed and hub ends for use in vent piping.

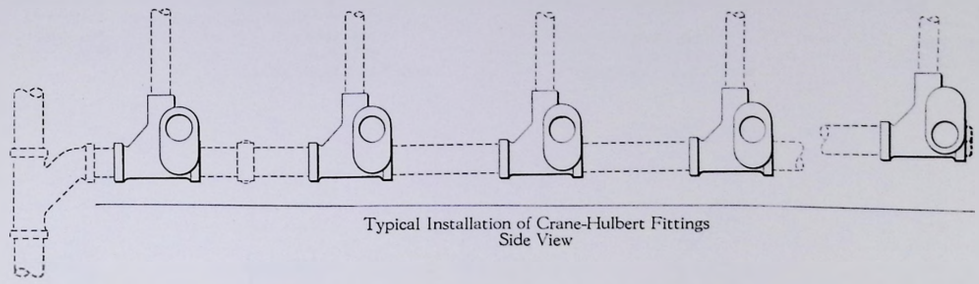
The hubs are suitable for Iron Pipe Size Wrought Pipe. The hub feature on the vent openings enables the installer to connect to the main vent line without the use of Long Screws or Right and Left Nipples. The caulked joint acts as a slip joint, and eliminates strain on the line.

The screwed openings have the shoulder that is characteristic of screwed Drainage Fittings.

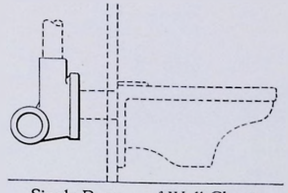
Prices will be quoted on application.

Crane-Hulbert Drainage Fittings

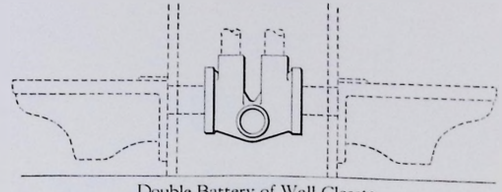
For Wall Closets



Typical Installation of Crane-Hulbert Fittings
Side View



Single Battery of Wall Closets
End View



Double Battery of Wall Closets
End View

Crane-Hulbert Drainage Fittings are especially designed to facilitate the installation of batteries of wall closets. The inlets from the closets are at progressively different distances from the center of the drain line, thus enabling pitching the drain line, while the outlets of all the closets in a battery are at the same level above the floor.

This line of fittings includes a liberal assortment of types and sizes. Complete information, prices, and dimensions will be furnished on request.

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Cast Iron Drainage Fittings

Dimensions, in Inches



No. 1000
90° Elbow



No. 1008
90° Elbow
with 2-inch Side Outlet



No. 1009
90° Elbow
with 2-inch Heel Outlet



No. 1002½
67½° Elbow



No. 1002
60° Elbow



No. 1003
45° Elbow



No. 1005
22½° Elbow



No. 1006
11¼° Elbow



No. 1007
5⅝° Elbow



No. 1057
90° Street Elbow



No. 1058
45° Street Elbow

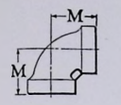
Dimensions shown in the table below apply to straight sizes only.
Dimensions of reducing sizes will be furnished on request.

Size	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14
A	1⅝	1¾	2 3/16	2⅜	2 13/16	3 3/16	3½	3 13/16	4½	5 3/16	6½	7¾	9	9¾
B	1 5/16	1 9/16	1¾	2		2⅞		3⅜	3⅞					
C	1¼	1 9/16	1¾	2	2½	2⅞	3⅛	3⅜	3⅞	4 3/16	5⅜	6¼		
D	1⅛	1⅜	1 7/16	1¾	2 1/16	2⅜	2 9/16	2¾	3 3/16	3½	4 3/16	5⅜	6 7/8	5½	5 7/8
E	1	1⅛	1¼	1 7/16	1¾	2		2 5/16	2⅝	2 15/16	3 9/16	3⅞	4 3/16		
F	1	1	1 7/32	1 13/32	1 21/32	1 13/16		2⅛	2⅜	2½	2¾	3			
G	1	1	1 5/16	1½	1⅝	1¾		2	2¼	2 5/16	2½	2¾			
H		2⅝	2 15/16	3 5/16											
J		1⅝	1 13/16	2⅛											
K		1⅞	2	2 7/16											
L		1 3/16	1¼	1¾											

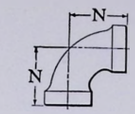
Thread Engagement . . . page 367

Cast Iron Drainage Fittings

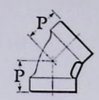
Dimensions, in Inches



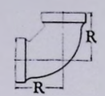
No. 1001
90° Elbow
Long Turn



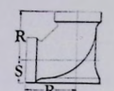
No. 1001½
90° Elbow
Extra Long Turn



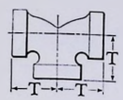
No. 1004
45° Elbow
Long Turn



No. 1047
90° Elbow
Long Turn
with 2-inch Clean-out



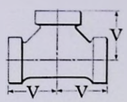
No. 1056
90° Elbow
Long Turn
with 2-inch Clean-out
and Base



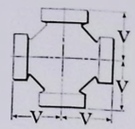
No. 1010
Three-Way Elbow



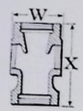
No. 1017
Tee



No. 1018
Basin Tee



No. 1019
Basin Cross



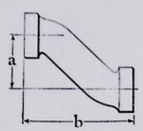
No. 1046
Partition Cross



No. 1070
Coupling



No. 1033
Increaser



No. 1039
Offset

Dimensions shown in the table below apply to straight sizes only.
Dimensions of reducing sizes will be furnished on request.

Size	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14
M	1 15/16	2¼	2½	3 1/16	3 11/16	4¼	4¾	5 3/16	6⅛	7⅛	9	11	13	14¼
N		3	3½	4	4½	5¼		6¼						
P	1½	1¾	1⅞	2¼	2⅝	2⅞		3 7/16	4⅛	4⅞	6	7½	8¾	9½
R				4		5¼		6¼	6⅛	7⅛				
S				1⅞		2 5/16		2⅞	3½	4⅛				
T		2¼	2⅝	3⅛	3 11/16	4 5/16		5 3/16	6⅛	7⅛				
U	1 7/16	1¾	2 3/16	2 5/16	2 13/16	3 3/16		4	4⅝	5 3/16	6½	7¾	9	9 3/4
V		2 5/16	2 11/16	3½	4¼									
W		3												
X		4⅝												
Y		3	3⅜	3¾	4	4¼		4½	4¾	5	5⅝	6¼	7	
Z				9	9	9		9	9	9	9	9	9	

No. 1039 Offsets

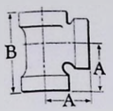
Size	2	2	2	2	3	3	3	3	4	4	4	4	4	5	5	5	5	6	6	6	6
a	4	6	8	10	4	6	8	10	4	6	8	10	12	6	8	10	12	6	8	10	12
b	7½	9½	11½	13½	8¾	10¾	12¾	14¾	9¾	11¾	13¾	15¾	17¾	12⅝	14⅝	16⅝	18⅝	13⅝	15⅝	17⅝	19⅝

Thread Engagement . . . page 367

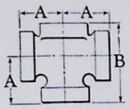
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Cast Iron Drainage Fittings

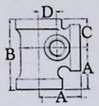
Dimensions, in Inches



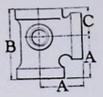
No. 1020
90° Y-Branch
Tee Pattern



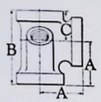
No. 1024
90° Double Y-Branch
Tee Pattern



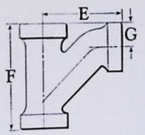
No. 1050 or No. 1051
90° Y-Branches
with 2-inch Vent on Branch
(Closet Tees)



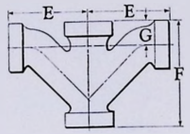
No. 1052 or No. 1053
90° Y-Branches
with 2-inch Side Inlet
(Closet Tees)



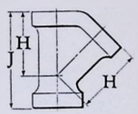
No. 1054 or No. 1055
90° Y-Branches
with 2-inch 45° Side Inlet
(Closet Tees)



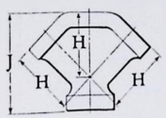
No. 1022
90° Y-Branch
Long Turn, Tee Pattern



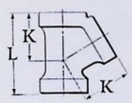
No. 1026
Double 90° Y-Branch
Long Turn, Tee Pattern



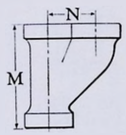
No. 1028
45° Y-Branch



No. 1030
45° Double Y-Branch



No. 1032
60° Y-Branch



No. 1049
Special Upright Y-Branch

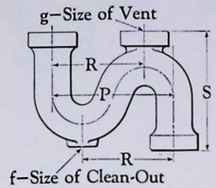
Dimensions shown in the table below apply to straight sizes only.
Dimensions of reducing sizes will be furnished on request.

Size	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14
A	1 15/16	2¼	2½	3 1/16	3 11/16	4¼	4 11/16	5 3/16	6⅛	7⅛	9	11 3/8	13¾	
B	3¼	3¾	4¼	5 3/16	6 5/16	7¼	8	8¾	10 5/16	11 15/16	15 1/16	20	24¼	
C								3 9/16						
D								2 5/16						
E		3⅝	4⅛	5 7/16	6¼	7½		9 7/8	12¼	14 9/16	19 5/16	24 3/16	28 5/8	
F		4¾	5 3/8	7 1/16	8¼	9 13/16		13¾	15¾	18 11/16	24 9/16	30 5/8	36	
G		1 3/16	1¼	1 5/8	2	2 5/16		2⅞	3½	4⅛	5¼	6 1/2	7¾	
H	2¾	3¼	3⅝	4 5/16	5⅜	6 3/16		7 11/16	9 3/16	10¾	13 9/16	16 1/8	19 5/8	21½
J	4 1/16	5	5½	6 7/16	7⅞	9		10 7/8	12 15/16	14¾	18 13/16	20	24¼	28
K		2 5/16	2⅝	3¼		4¾		5¾	6¾	7⅞				
L		4 3/16	4⅝	5½		7¾		9⅜	11⅛	13				
M			5 11/16	7		9 11/16		11¾	13¾					
N			2⅝	3¼		4⅝		5 13/16	7					

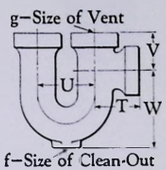
Thread Engagement . . . page 367

Cast Iron Drainage Fittings

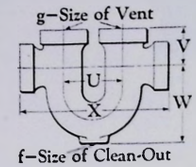
Dimensions, in Inches



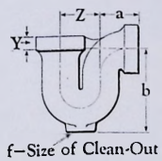
No. 1036
S Trap



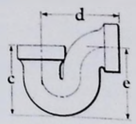
No. 1037
Half S Trap



No. 1038
Running Trap



No. 1059
P Trap



No. 1059½
Bath P Trap

Size	1¼	1½	2	3	4	5	6	8	10	12	14
P			8¼	10¾	14⅛	16¾	20¼				
R			6¼	8 1/16	10⅝	12 9/16	15 3/16				
S			8	11¼	13¾	16⅞	19¾				
T	2 5/16	2½	3 1/16	4 3/16	5⅛	6 1/16	6 9/16	8 15/16	10¾		
U	3⅛	3⅜	4	5⅜	7	8⅜	10⅛	12⅜	14¾	17	18½
V	2	2¼	2 9/16	3½	4 3/16	4¾	5 7/16	6¾	8¼	9½	10½
W	3¾	4⅜	5 3/16	7⅛	9⅜	11⅜	13½	17¼	20¾	24 5/8	
X	7¾	8⅜	10⅛	13¼	17¼	20½	23¼	30¼	36¼	41 7/8	45
Y	¾	⅞	⅞	1 3/16	1½						
Z	2	2¼	2¾	3¾	5						
a	1 15/16	2⅛	2 9/16	3⅜	4¼						
b	4½	5	5 11/16	7⅛	9 1/16						
c		4 1/16	4 13/16								
d		4½	5 5/16								
e		4 5/16	4 13/16								
f	¾	1	1	1¼	2	2	2	3	3	3	4
g	1¼	1½	2	3	4	4	4	6	6	6	8

Thread Engagement . . . page 367

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Long Sweep Cast Iron Fittings

WORKING PRESSURES
125 pounds steam
150 pounds cold water, oil, or gas, non-shock



No. 1 90° Elbow | No. 2 Double Branch Elbow | No. 3 Single Sweep Tee | No. 5 Double Sweep Tee | No. 4 Cross

List Prices, Black

Size		Inches	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12
No. 1, 90° Elbows	Straight	Each	.26	.32	.40	.55	.80	1.20	2.25	3.25	3.50	6.50	8.75	17.00	30.00	40.00
	*Reducing	Each	.40	.48	.60	.83	1.20	1.80	3.38	4.88	5.25	9.75	13.13	25.50	45.00	60.00
No. 2, Double Branch Elbows	Straight	Each		.64	.80	1.10	1.60	2.40	4.50	6.50	7.00	13.00	17.50	34.00	60.00	80.00
	*Reducing	Each		.96	1.20	1.65	2.40	3.60	6.75	9.75	10.50	19.50	26.25	51.00	90.00	120.00
No. 3, Single Sweep Tees	Straight	Each	.40	.48	.60	.82	1.20	1.80	3.40	4.90	5.25	9.75	13.25	25.50	45.00	60.00
	*Reducing	Each		.72	.90	1.23	1.80	2.70	5.10	7.35	7.88	14.63	19.88	38.25	67.50	90.00
No. 5, Double Sweep Tees	Straight	Each	.52	.64	.80	1.10	1.60	2.40	4.50	6.50	7.00	13.00	17.50	34.00	60.00	80.00
	*Reducing	Each		.96	1.20	1.65	2.40	3.60	6.75	9.75	10.50	19.50	26.25	51.00	90.00	120.00
No. 4, Crosses	Straight	Each		.85	1.10	1.50	2.15	3.20	6.00	8.75	9.50	17.50	24.00	45.00	80.00	107.00
	*Reducing	Each			1.65	2.25	3.23	4.80	9.00	13.13	14.25	26.25	36.00	67.50	120.00	160.50

***Reducing fittings:** List prices of reducing Double Branch Elbows, Single Sweep Tees, Double Sweep Tees, and Crosses apply to reducing sizes carried in stock, shown on the opposite page. Other reductions can be made to order by bushing in the sand; when so bushed, non-stock sizes use the same list prices as stock reducing sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

No. 1 Reducing 90° Elbows are made to order only. Reducing list prices apply to any reduction when bushed in the sand from straight sizes.

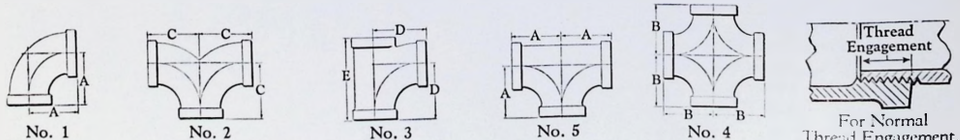
Reducing fittings that require making a new pattern are entirely special. Prices on application.

Galvanized fittings: These fittings can be furnished galvanized, at double the above list prices.

American Standard Sprinkler Fittings: American Standard Sprinkler Fittings for use in fire protection installations are shown on pages 214 to 215.

Dimensions: The dimensions of straight size fittings are shown in the table below. Dimensions of reducing sizes will be furnished on request.

Dimensions, in Inches

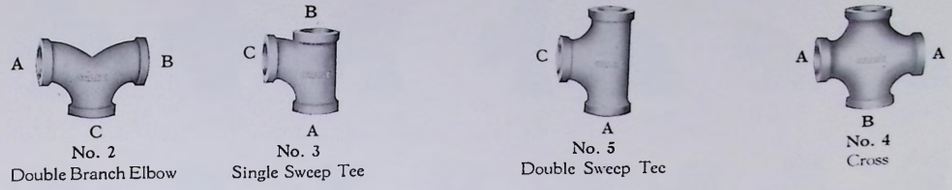


No. 1 90° Elbow | No. 2 Double Branch Elbow | No. 3 Single Sweep Tee | No. 5 Double Sweep Tee | No. 4 Cross | For Normal Thread Engagement, see page 367.

Size	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12
A	2	2½	3	3½	4	4½	5	5¾	6½	7½	9	11¾	14½	17
B		2½	3	3½	4	4½	5	5¾	6½	7½	9	11¾	14½	17
C		2½	3	3½	4	5¼	6	6⅝	6½	9	10⅝	11¾	14½	17
D	2	2½	3	3½	4	4¾	5½	5 13/16	7	8½	9¼	11¾	14½	17
E	3	3⅞	4½	5¼	6⅛	7	8⅛	8 13/16	10½	12¼	14¼	17⅜	21⅛	24¾

Long Sweep Cast Iron Fittings

Reducing Fittings Carried in Stock



No. 2 Double Branch Elbow | No. 3 Single Sweep Tee | No. 5 Double Sweep Tee | No. 4 Cross

Reducing Double Branch Elbows, Single Sweep Tees, Double Sweep Tees, and Crosses are carried in stock in the sizes shown below. These are sold at regular prices for reducing fittings. For prices of non-stock reducing sizes, see the footnotes on the preceding page.

No. 2 Double Branch Elbows			No. 3 Single Sweep Tees			No. 5 Double Sweep Tees			No. 4 Crosses	
A	B	C	A	B	C	A	B	C	A	B
¾	x ¾	x 1	1	x 1	x ¾	2	x 2	x 1	2½	x 1½
¾	x ¾	x 1¼	1	x ¾	x 1	2	x 1½	x 1½	3	x 1½
1	x 1	x 1¼	1	x ¾	x ¾	2	x 1½	x 1	4	x 2½
1¼	x 1¼	x 1½	1¼	x 1¼	x 1	2½	x 2½	x 2	5	x 4
1½	x 1½	x 2	1¼	x 1¼	x ¾	2½	x 2½	x 1½	5	x 3
2	x 2	x 2½	1¼	x 1	x 1	2½	x 2½	x 1	6	x 4
2½	x 2½	x 3	1¼	x 1	x ¾	2½	x 2	x 2	8	x 6
2	x 2	x 3	1¼	x ¾	x 1¼	2½	x 2	x 1½	8	x 4
3	x 3	x 4	1½	x 1½	x 1¼	2½	x 2	x 2½		
2½	x 2½	x 4	1½	x 1½	x 1	3	x 3	x 2½		
4	x 4	x 5	1½	x 1¼	x ¾	3	x 3	x 2		
5	x 5	x 6	1½	x 1¼	x 1	3	x 3	x 1½		
			1½	x 1¼	x ¾	3	x 3	x 1		
			2	x 2	x 1½	3	x 2½	x 3		
			2	x 2	x 1¼	3	x 2½	x 2½		
			2	x 2	x 1	3	x 2½	x 2		
			2	x 1½	x 1½	3	x 2	x 3		
			2	x 1½	x 1	3	x 2	x 2½		
			2½	x 2½	x 2	2½	x 2½	x 3		
			2½	x 2½	x 1½	2½	x 2	x 3		
			2½	x 2½	x 1¼	3½	x 3½	x 3		
			2½	x 2	x 2	3½	x 3	x 2½		
			2½	x 2	x 1½	3½	x 3	x 3		
			2½	x 2	x 1	3½	x 3	x 2½		
			3	x 3	x 2½	3½	x 3	x 2		
			3	x 3	x 2	3½	x 2½	x 3½		
			3	x 3	x 1½	3½	x 2½	x 3		
			3	x 3	x 1¼	3½	x 2½	x 2½		
			3	x 3	x 1	3½	x 2	x 3½		
			3	x 2½	x 2	3½	x 2	x 3		
			3	x 2½	x 1½	3½	x 3	x 3½		
			3½	x 3½	x 2	3½	x 3	x 2½		
			3½	x 3½	x 1½	3½	x 3	x 2		
			3½	x 3½	x 1¼	3½	x 2½	x 3½		
			3½	x 3	x 2	4	x 4	x 3½		
			3½	x 3	x 1½	4	x 4	x 3		
			4	x 4	x 3	4	x 4	x 2½		
			4	x 4	x 2½	4	x 3½	x 4		
			4	x 4	x 2	4	x 3½	x 3½		
			4	x 4	x 1½	4	x 3½	x 3		
			4	x 4	x 1¼	4	x 3½	x 2½		
			4	x 3½	x 1½	4	x 3	x 4		
			4	x 3	x 3	4	x 3	x 3½		
			5	x 5	x 3	4	x 3	x 3		
			5	x 5	x 2	4	x 3	x 2½		
			6	x 6	x 4	4	x 2½	x 3½		
			6	x 6	x 3	4	x 2½	x 3		
			6	x 6	x 2½	4	x 2½	x 2½		
			6	x 6	x 2	3½	x 3½	x 4		
			8	x 8	x 4	3½	x 3	x 3½		
						3½	x 3	x 2½		
						3½	x 2½	x 4		
						3½	x 2½	x 3½		
						3½	x 2½	x 3		
						3½	x 2½	x 2½		
						3½	x 2½	x 2		
						3½	x 2½	x 1½		
						3½	x 2½	x 1		
						3½	x 2	x 3½		
						3½	x 2	x 3		
						3½	x 2	x 2½		
						3½	x 2	x 2		
						3½	x 2	x 1½		
						3½	x 2	x 1		
						3½	x 1½	x 3½		
						3½	x 1½	x 3		
						3½	x 1½	x 2½		
						3½	x 1½	x 2		
						3½	x 1½	x 1½		
						3½	x 1½	x 1		
						4	x 4	x 3½		
						4	x 4	x 3		
						4	x 4	x 2½		
						4	x 3½	x 4		
						4	x 3½	x 3½		
						4	x 3½	x 3		
						4	x 3½	x 2½		
						4	x 3½	x 2		
						4	x 3½	x 1½		
						4	x 3	x 4		
						4	x 3	x 3½		
						4	x 3	x 3		
						4	x 3	x 2½		
						4	x 2½	x 4		
						4	x 2½	x 3½		
						3½	x 3½	x 4		
						3½	x 3	x 4		

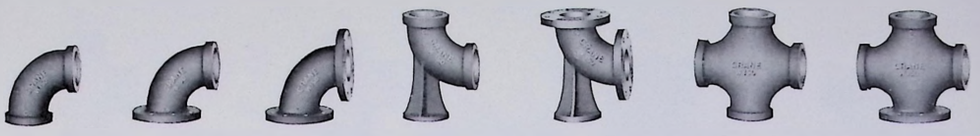
Use reducing list price corresponding to largest opening.

No. 5 Double Sweep Tees					
A	B	C	A	B	C
2	x 2	x 1	3½	x 2½	x 4
2	x 1½	x 1½	3	x 3	x 4
2	x 1½	x 1	3	x 2½	x 4
2½	x 2½	x 2	5	x 5	x 4
2½	x 2½	x 1½	5	x 5	x 3½
2½	x 2½	x 1	5	x 5	x 3
2½	x 2	x 2½	5	x 5	x 2½
2½	x 2	x 2	5	x 4	x 5
2½	x 2	x 1½	5	x 4	x 4
2	x 2	x 2½	5	x 4	x 3½
3	x 3	x 2½	5	x 4	x 3
3	x 3	x 2	5	x 4	x 2½
3	x 3	x 1½	5	x 3½	x 5
3	x 3	x 1	5	x 3½	x 4
3	x 2½	x 3	5	x 3½	x 3½
3	x 2½	x 2½	5	x 3	x 5
3	x 2½	x 2	5	x 3	x 4
3	x 2	x 3	5	x 3	x 3½
3	x 2	x 2½	5	x 2½	x 5
2½	x 2½	x 3	5	x 2½	x 4
2½	x 2	x 3	4	x 4	x 5
3½	x 3½	x 3	4	x 3½	x 5
3½	x 3½	x 2½	4	x 3	x 5
3½	x 3	x 3½	4	x 2½	x 5
3½	x 3	x 3	3½	x 3½	x 5
3½	x 3	x 2½	3½	x 3	x 5
3½	x 3	x 2	6	x 6	x 5
3½	x 2½	x 3½	6	x 6	x 4
3½	x 2½	x 3	6	x 6	x 3½
3½	x 2½	x 2½	6	x 6	x 3
3½	x 2	x 3½	6	x 6	x 6
3½	x 2	x 3	6	x 5	x 6
3	x 3	x 3½	6	x 5	x 5
3	x 2½	x 3½	6	x 5	x 4
3	x 2	x 3½	6	x 5	x 3½
2½	x 2½	x 3½	6	x 5	x 3
4	x 4	x 3½	6	x 4	x 6
4	x 4	x 3	6	x 4	x 5
4	x 4	x 2½	6	x 4	x 4
4	x 3½	x 4	6	x 3½	x 6
4	x 3½	x 3½	6	x 3½	x 5
4	x 3½	x 3	6	x 3	x 6
4	x 3½	x 2½	5	x 5	x 6
4	x 3	x 4	5	x 4	x 6
4	x 3	x 3½	5	x 3½	x 6
4	x 3	x 3	5	x 3	x 6
4	x 3	x 2½	4	x 4	x 6
4	x 2½	x 4	4	x 3½	x 6
4	x 2½	x 3½	8	x 8	x 6
3½	x 3½	x 4	8	x 8	x 4
3½	x 3	x 4			

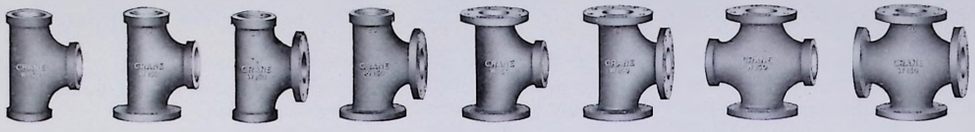
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American Standard Cast Iron Sprinkler Fittings

WORKING PRESSURES
150-Pound — 150 pounds cold water, non-shock
250-Pound — 250 pounds cold water, non-shock



Style A | Style B | Style C | Style D | Style E (Prices on application) | Style O | Style P



Style G | Style H | Style K | Style L | Style M | Style N | Style R | Style S

List Prices, Black, Each

Size		Inches	150-Pound 2½	3	3½	4	5	6	8	250-Pound 2½	3	3½	4	5	6
90° Elbows	Style A	Straight	1.20	2.25	3.25	3.50	6.50	8.75	17.00	2.40	4.50	6.50	7.00	13.00	17.50
	Style B	Straight	5.50	6.00	6.50	7.50	10.00	14.00	30.00	11.00	12.00	13.00	15.00	20.00	28.00
	Style C	Straight	6.75	7.50	8.50	10.00	12.50	17.50	35.00	13.50	15.00	17.00	20.00	25.00	35.00
	Style D	Straight		8.00		11.00	15.00	18.00	32.00						
Tees	Style G	Straight	2.40	4.50	6.50	7.00	13.00	17.50		4.80	9.00	13.00	14.00	26.00	35.00
		*Reducing	3.60	6.75	9.75	10.50	19.50	26.25							
	Style H	Straight	9.00	10.00	11.00	12.00	15.00	22.00		18.00	20.00	22.00	24.00	30.00	44.00
		*Reducing	9.00	10.00	11.00	12.00	15.00	22.00							
	Style K	Straight	9.00	10.00	11.00	12.00	15.00	22.00		18.00	20.00	22.00	24.00	30.00	44.00
		*Reducing	9.00	10.00	11.00	12.00	15.00	22.00							
	Style L	Straight	9.00	10.00	11.00	12.00	15.00	22.00		18.00	20.00	22.00	24.00	30.00	44.00
		*Reducing	9.00	10.00	11.00	12.00	15.00	22.00							
	Style M	Straight	9.00	10.00	11.00	12.00	15.00	22.00		18.00	20.00	22.00	24.00	30.00	44.00
	Style N	Straight	10.00	11.50	13.00	15.00	18.00	26.00		20.00	23.00	26.00	30.00	36.00	52.00
		*Reducing	10.00	11.50	13.00	15.00	18.00	26.00							
Crosses	Style O	Straight	3.20	6.00	8.75	9.50	17.50	24.00		6.40	12.00	17.50	19.00	35.00	48.00
		*Reducing					26.25	36.00							
	Style P	Straight	12.50	13.50	15.00	17.00	22.00	30.00		25.00	27.00	30.00	34.00	44.00	60.00
		*Reducing	12.50	13.50	15.00	17.00	22.00	30.00							
	Style R	Straight	12.50	13.50	15.00	17.00	22.00	30.00		25.00	27.00	30.00	34.00	44.00	60.00
	Style S	Straight	13.50	15.00	17.00	20.00	25.00	35.00		27.00	30.00	34.00	40.00	50.00	70.00

American Standard: These fittings conform to the American Standard for Cast Iron Long Turn Sprinkler Fittings (B16g–1929), except that the Crane line includes 8-inch Screwed Elbows and many Reducing Tees and Crosses, not defined by the Standard.

Underwriters' inspection: These fittings are listed as approved and inspected by the Associated Factory Mutual Fire Insurance Companies, Boston, and the Underwriters' Laboratories, Chicago.

Flange dimensions and facing: The dimensions and drilling of the flanges on 150-Pound Fittings conform to the 125-Pound American Cast Iron Flange Standard (B16a–1928). The flanges are plain faced, with a smooth finish.

The dimensions and drilling of the flanges on 250-Pound Fittings conform to the 250-Pound American Cast Iron Flange Standard (B16b–1928). The flanges have a raised face 1/16-inch high. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Drilling: List prices of fittings with flanges include facing and drilling to the American Standard. No deduction is made if fittings are ordered "faced only".

***Reducing sizes:** "Reducing" list prices apply to sizes carried in stock, shown on the opposite page. Other reductions can be made to order; prices on application.

Smaller sizes: For sizes smaller than 2½-inch, Standard or 250-Pound Cast Iron Fittings shown on pages 191 to 196 and 220 to 221 are permitted by Underwriters' Specifications.

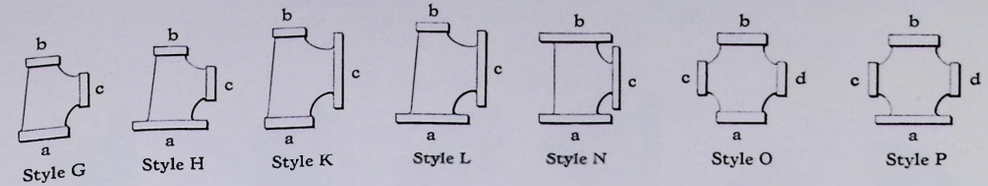
Galvanized fittings: Galvanized fittings can be made to order, at the following advances over the list prices of black:

150-Pound — 100% advance over Black
250-Pound — 50% advance over Black

Dimensions.....page 217

American Standard Cast Iron Sprinkler Fittings

150-Pound Reducing Fittings Carried in Stock



Style G | Style H | Style K | Style L | Style N | Style O | Style P

150-Pound Reducing Tees and Crosses are carried in stock in the sizes and types shown below. These are sold at the regular prices for Reducing Fittings.

Reducing sizes not carried in stock can be made to order. Prices on application.

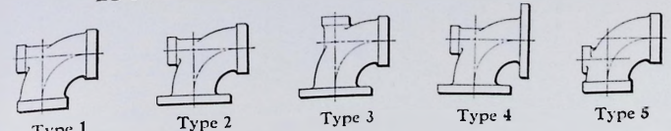
Tees

Size a	b	c	Style
2½	x 2½	x 2	G
2½	x 2	x 2½	G, H, K
2	x 2	x 2½	G, K
3	x 3	x 2½	G, H
3	x 2½	x 3	G, H, K
3	x 2½	x 2½	G, H
3	x 2	x 3	G, K
3	x 2	x 2½	G
2½	x 2½	x 3	G, K
2½	x 2	x 3	G, K
3½	x 3½	x 3	G, H, L
3½	x 3½	x 2½	G, H
3½	x 3	x 3½	G, H, K
3½	x 3	x 3	G, H
3½	x 3	x 2½	G, H
3½	x 2½	x 3½	G, H, K
3½	x 2½	x 3	G, H
3½	x 2½	x 2½	G, H
3½	x 2	x 3½	G
3½	x 2	x 3	G
3	x 3	x 3½	G, K
3	x 2½	x 3½	G, K
3	x 2	x 3½	G, K
2½	x 2½	x 3½	G, K
4	x 4	x 3½	G, H, L
4	x 4	x 3	G, H, L
4	x 4	x 2½	G, H
4	x 3½	x 4	G, H, L
4	x 3½	x 3½	G, H
4	x 3½	x 3	G, H
4	x 3	x 4	G, H
4	x 3	x 3½	G, H
4	x 3	x 3	G, H
4	x 3	x 2½	G
4	x 2½	x 4	G, H, K
4	x 2½	x 3½	G, H
4	x 2½	x 3	G, K
3½	x 3½	x 4	G, K
3½	x 3	x 4	G, K
3½	x 2½	x 4	G, K
3	x 3	x 4	G, K
3	x 2½	x 4	G, K
5	x 5	x 4	G, H, L, N
5	x 5	x 3½	G, H
5	x 5	x 3	G, H
5	x 5	x 2½	G, H
5	x 4	x 5	G, H, K, L
5	x 4	x 4	G, H
5	x 4	x 3½	G, H
5	x 4	x 3	G, H
5	x 4	x 2½	G
5	x 3½	x 5	G, H, K, L
5	x 3½	x 4	G, H
5	x 3½	x 3½	G, H
5	x 3	x 5	G, H, K
5	x 3	x 4	G, H
5	x 3	x 3½	G
5	x 2½	x 5	G, H
5	x 2½	x 4	G, H
5	x 2½	x 3½	G, H
5	x 2½	x 3	G, H
5	x 2½	x 2½	G
6	x 6	x 5	G, H, L, N
6	x 6	x 4	G, H, L, N
6	x 6	x 3½	G, H
6	x 6	x 3	G, H
6	x 5	x 6	G, H, K, L
6	x 5	x 5	G, H
6	x 5	x 4	G, H
6	x 5	x 3½	G
6	x 5	x 3	G, H
6	x 4	x 6	G, H, K, L
6	x 4	x 5	G, H
6	x 4	x 4	G, H
6	x 3½	x 6	G, H, K
6	x 3½	x 5	G, H, K
6	x 3	x 6	G, K
5	x 5	x 6	G, K
5	x 4	x 6	G, K
5	x 3½	x 6	G, K
5	x 3	x 6	G, K
4	x 4	x 6	G, K
4	x 3½	x 6	G, K

Crosses

Size a	b	c	d	Style
2½	x 2½	x 2½	x 2	P
3	x 3	x 3	x 2½	P
3	x 3	x 2½	x 2½	P
3½	x 3½	x 3½	x 3	P
3½	x 3½	x 3½	x 2½	P
3½	x 3½	x 3	x 3	P
3½	x 3½	x 3	x 2½	P
3½	x 3½	x 2½	x 2½	P
3½	x 2½	x 2½	x 2½	P
4	x 4	x 4	x 3½	P
4	x 4	x 4	x 3	P
4	x 4	x 3½	x 3½	P
4	x 4	x 3½	x 3	P
4	x 4	x 3½	x 2½	P
4	x 4	x 3	x 3	P
4	x 4	x 3	x 2½	P
4	x 3	x 2½	x 2½	P
4	x 2½	x 2½	x 2½	P
5	x 5	x 5	x 4	P
5	x 5	x 5	x 3½	P
5	x 5	x 5	x 3	P
5	x 5	x 4	x 4	O, P
5	x 5	x 4	x 3½	P
5	x 5	x 4	x 3	P
5	x 5	x 4	x 2½	P
5	x 5	x 3½	x 3½	P
5	x 5	x 3½	x 3	P
5	x 4	x 3	x 3	P
5	x 3	x 2½	x 2½	P
6	x 6	x 5	x 5	P
6	x 6	x 5	x 4	P
6	x 6	x 5	x 3½	P
6	x 6	x 5	x 3	P
6	x 6	x 4	x 4	O, P
6	x 6	x 4	x 3½	P
6	x 5	x 4	x 4	P
6	x 4	x 4	x 4	P

150-Pound and 250-Pound Bossed Elbows



Type 1 | Type 2 | Type 3 | Type 4 | Type 5

Extra List Prices for Bosses

Size of Fitting	2½"	3"	3½"	4"	5"	6"	Extra List Price *Each
Screwed Boss tapped for	1½"	1½"	1½"	2"	2"	2"	1.50
Slip Boss for pipe	2"	2"	2"	2"	2½"	2½"	1.50
Solid Boss (largest tapping)	1½"	1½"	1½"	2"	2"	2"	1.00

*The extra list price for the boss must be added to the list price of the Elbow.



Screwed Boss | Slip Boss | Solid Boss

Solid Bosses can be tapped for the sizes given in the table, and smaller. Slip Bosses have a blind hole to serve as a socket for a supporting pipe. 2½ to 6-inch fittings can be tapped 1¼-inch without a boss. 8-inch can be tapped ¾-inch without a boss.

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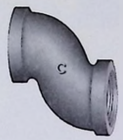
Cast Iron Sprinkler Fittings

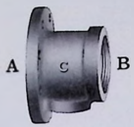
WORKING PRESSURES
175-Pound — 125 pounds steam
— 175 pounds cold water, non-shock
250-Pound — 250 pounds cold water, non-shock


No. 674
175-Pound
90° Elbow

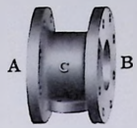

No. 673
175-Pound
45° Elbow


No. 675
175-Pound
45° Y-Bend


No. 677
175-Pound
Offset



C
No. 679, 175-Pound
No. 679 E, 250-Pound
Drip or Drain Tee



C
No. 681, 175-Pound
No. 681 E, 250-Pound
Drip or Drain Tee

List Prices, Black

Size			Inches	2½	3	3½	4	5	6	8
175-Pound	No. 673, 45° Elbows		Each	1.70	2.15	2.80	3.25	4.55	5.95	12.30
	No. 674, 90° Elbows		Each	1.60	2.00	2.60	3.00	4.05	5.25	10.55
	No. 675, 45° Y-Bends		Each	2.76	3.75	5.05	5.80	9.05	11.70	26.30
	No. 677, Offsets	With 4-inch offset	Each	3.00	4.00	5.00	6.00	8.00	10.00	20.00
		With 6-inch offset	Each	4.50	6.00	7.50	9.00	12.00	15.00	25.00
	No. 679, Drip or Drain Tees		Each	2.83	3.50	4.25	5.00	7.15	8.60	17.75
	No. 681, Drip or Drain Tees		Each	4.83	5.75	6.75	8.00	10.80	12.60	24.25
250-Pound	No. 679 E, Drip or Drain Tees		Each	5.65	7.00	8.50	10.00	14.30	17.20	35.50
	No. 681 E, Drip or Drain Tees		Each	9.65	11.50	13.50	16.00	21.60	25.20	48.50

Drip or Drain Tees Carried in Stock

No. 679			No. 679 E			No. 681			No. 681 E		
A	B	C	A	B	C	A	B	C	A	B	C
2½	2½	1½	5	5	2	2½	2½	1¼	3	3	1½
2½	2½	1¼	5	5	1½	2½	2½	1	3½	3½	1½
2½	2½	1	5	5	1¼	3	3	1¼	3½	3½	1¼
3	3	1½	5	5	1	3	3	1	4	4	2
3	3	1¼	6	6	2½	3½	3½	1½	4	4	1½
3	3	1	6	6	2	3½	3½	1¼	5	5	2
3½	3½	2	6	6	1½	4	4	2	5	5	1½
3½	3½	1½	6	6	1¼	4	4	1½	6	6	2
3½	3½	1¼	6	6	1	4	4	1¼	6	6	1½
4	4	2	8	8	3	5	5	2	8	8	2½
4	4	1½	8	8	2½	5	5	1½	8	8	2
4	4	1¼	8	8	2	6	6	2			
4	4	1				6	6	1½			
4	4	¾				8	8	2½			
						8	8	2			

Cast Iron Sprinkler Fittings: While these fittings are not included in the "American Standard", they are frequently used in sprinkler installations.

Flange dimensions and facing: The dimensions and drilling of the flanges on 175-Pound Fittings conform to the 125-Pound American Cast Iron Flange Standard (B16a–1928). The flanges are plain faced, with a smooth finish.

The dimensions and drilling of the flanges on 250-Pound Fittings conform to the 250-Pound American Cast Iron Flange Standard (B16b–1928). The flanges have a raised face 1/16-inch high. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Drilling: List prices of fittings with flanges include facing and drilling to the American Standard. No deduction is made if fittings are ordered "faced only".

Galvanized fittings: Galvanized fittings can be made to order, at the following advances over the list prices of black:

175-Pound — 100% advance over Black
250-Pound — 50% advance over Black

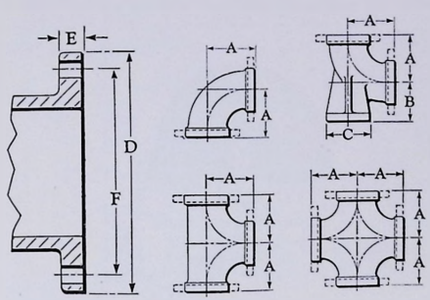
Dimensions on application

Templates for drilling . . . pages 370 and 371

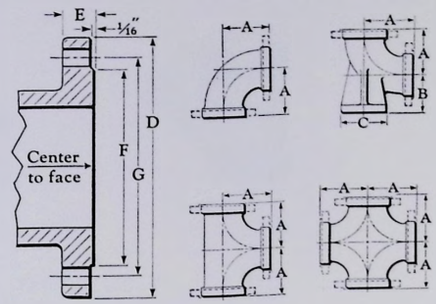
American Standard Cast Iron Sprinkler Fittings

Dimensions, in Inches

150-Pound Fittings



250-Pound Fittings



Dimensions shown in the table below apply to straight sizes only.
Dimensions of reducing sizes will be furnished on request.

Size	150-Pound								250-Pound								
	A	B	C	D	E	F	No. of bolts	Dia. of bolts	A	B	C	D	E	F	G	No. of bolts	Dia. of bolts
2½	4½	4½	4½	7	11/16	5½	4	5/8	5¼	4¾	6½	7½	1	4 15/16	5⅞	8	¾
3	5	4⅞	5	7½	¾	6	4	5/8	5¾	5¼	6½	8¼	1⅛	5 11/16	6⅝	8	¾
3½	5¾	5¼	5	8½	13/16	7	8	5/8	6½	5⅝	6½	9	1 13/16	6 5/16	7¼	8	¾
4	6½	5½	6	9	15/16	7½	8	5/8	7¼	6	6½	10	1¼	6 15/16	7⅞	8	¾
5	7½	6¼	7	10	15/16	8½	8	¾	8⅜	6¾	7½	11	1⅜	8 5/16	9¼	8	¾
6	9	7	7	11	1	9½	8	¾	9⅞	7½	7½	12½	1 7/16	9 11/16	10⅝	12	¾
8	9	8⅜	9	13½	1⅛	11¾	8	¾	10	9	10	15	1⅝	11 5/16	13	12	⅞

Thread Engagement . . . page 367

Templates for drilling . . . pages 370 and 371

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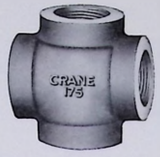
175-Pound Cast Iron Fittings

WORKING PRESSURES
175 pounds steam
300 pounds cold water, oil, or gas, non-shock


90° Elbow


45° Elbow


Tee


Cross


45° Y-Bend


Reducer


Return Bend
Prices on application
See dimension table for list of sizes.

List Prices, Black

Size		Inches	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12
90° Elbows	Straight	Each	.09	.11	.15	.21	.28	.45	1.00	1.50	2.10	2.40	3.60	5.50	9.50	16.50	29.00
	*Reducing	Each		.13	.17	.23	.32	.52	1.15	1.70		2.75		6.25	11.00	19.00	33.00
45° Elbows	Straight	Each	.10	.12	.17	.22	.30	.50	1.10	1.65	2.30	2.65	4.00	6.00	10.50	18.25	32.00
Tees	Straight	Each	.13	.16	.21	.28	.40	.63	1.40	2.20	2.90	3.35	5.25	8.00	13.25	23.00	42.00
	*Reducing	Each			.24	.33	.46	.72	1.60	2.50		3.85	6.00	9.25	15.25	26.50	48.00
Crosses	Straight	Each	.28	.35	.45	.55	.75	1.00	2.20	3.30	4.60	5.25	8.00	12.00	21.00	36.50	64.00
	*Reducing	Each						1.15		3.80		6.00		13.75	24.00	42.00	74.00
45° Y-Bends	Straight	Each							2.60	4.00		6.25	10.00	14.00	26.00	45.00	
Reducers		Each			.40	.50	.60	.70	1.10	1.50	2.00	2.25		4.50	9.00	13.50	20.00

***Reducing fittings:** List prices of Reducing 90° Elbows, Tees, Crosses, and Reducers apply to reducing sizes carried in stock, shown on the opposite page. Other reductions can be made to order by bushing in the sand; when so bushed, non-stock sizes use the same list prices as stock reducing sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing 45° Elbows and 45° Y-Bends can be made to order by bushing in the sand from straight sizes. When so bushed, reducing sizes use the same list prices as straight sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing fittings that require making a new pattern are entirely special. Prices on application.

Service recommendations: Crane 175-Pound Cast Iron Fittings are recommended for services that are too severe for Standard Cast Iron Fittings but not severe enough to require 250-Pound Cast Iron Fittings. They are suitable for all general service on steam, water, oil, or gas lines.

Rugged construction: The fittings are ruggedly constructed, being liberally reinforced at points subjected to greatest stress. They have a high safety factor; pressures required to break the fittings are far in excess of those for which they are recommended.

Threading: Crane 175-Pound Cast Iron Fittings are uniformly and accurately threaded to gauge. All openings are in true alignment and are slightly chamfered to assure easy entrance of the pipe.

Galvanized fittings: Galvanized fittings can be made to order, at double the list prices of black fittings.

175-Pound Cast Iron Fittings

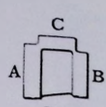
Reducing Fittings Carried in Stock

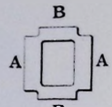

90° Elbow


Reducer

Reducing 90° Elbows, Tees, Crosses, and Reducers are carried in stock in the sizes shown in the table below. These sizes are sold at the regular prices for reducing fittings.

For prices of reducing fittings not carried in stock, see the footnotes on the preceding page.

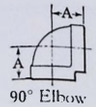

Tee

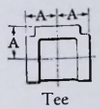

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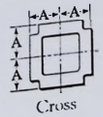
90° Elbows	Reducers	Tees									Crosses
		A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B
¾ x ½	1 x ¾	1 x 1 x ¾	2 x 2 x 1½	3 x 3 x 2½	5 x 5 x 3	8 x 8 x 6	10 x 10 x 8	12 x 12 x 10			2 x 1½
1 x ¾	1¼ x 1	1 x 1 x ½	2 x 2 x 1	3 x 3 x 2	5 x 5 x 2	8 x 8 x 4	10 x 10 x 6	12 x 12 x 8			3 x 2
1¼ x 1	1½ x 1¼	1 x ¾ x ¾	2 x 2 x ¾	3 x 3 x 1½	5 x 4 x 4	8 x 8 x 3	10 x 10 x 4	12 x 12 x 6			4 x 2½
1½ x 1¼	1½ x ¾	1 x ¾ x ½	2 x 1½ x 1½	3 x 3 x 1	5 x 3 x 5	8 x 8 x 2	10 x 10 x 3	12 x 12 x 4			4 x 2
1½ x 1	2 x 1½	1 x ½ x 1	2 x 1½ x 1¼	3 x 2½ x 3	5 x 2 x 5	8 x 6 x 8	10 x 8 x 10	12 x 10 x 12			6 x 4
2 x 1½	2½ x 2	½ x ½ x 1	2 x 1½ x 1	3 x 2½ x 2½	6 x 6 x 5	8 x 6 x 6	10 x 8 x 8	12 x 10 x 10			6 x 2
2 x 1	3 x 2½	1¼ x 1¼ x ¾	2 x 1½ x ¾	3 x 2 x 3	6 x 6 x 4	8 x 4 x 8	10 x 8 x 6	12 x 8 x 10			8 x 6
2½ x 2	3 x 2	1¼ x 1 x 1	2 x 1 x 2	3 x 2 x 2	6 x 6 x 3	6 x 6 x 8	10 x 6 x 8	12 x 8 x 8			10 x 6
2½ x 1½	3 x 1	1¼ x 1 x ¾	2 x 1 x 1½	3 x 1½ x 3	6 x 6 x 2½	8 x 8 x 4	10 x 6 x 6	12 x 8 x 6			12 x 8
2½ x 1	3½ x 3	1¼ x ¾ x 1¼	2 x ½ x 2	3 x 1½ x 1½	6 x 6 x 2	8 x 8 x 3	10 x 6 x 4	12 x 8 x 4			
3 x 2½	4 x 3½	1¼ x ¾ x 1	1½ x 1½ x 2	3 x 1 x 3	6 x 6 x 1	8 x 8 x 2	10 x 6 x 3	12 x 8 x 12			
3 x 2	4 x 3	1¼ x ¾ x ¾	1 x 1 x 2	2½ x 2½ x 3	6 x 4 x 6	8 x 6 x 8	10 x 4 x 6				
3 x 1½	4 x 2	1½ x 1½ x 1¼	2½ x 2½ x 2	2 x 2 x 3	6 x 4 x 4	8 x 6 x 6	10 x 4 x 4				
3 x 1	4 x 1	1½ x 1½ x 1	2½ x 2½ x 1½	4 x 4 x 3	6 x 3 x 6	8 x 4 x 6	10 x 3 x 6				
4 x 3	6 x 5	1½ x 1½ x ¾	2½ x 2½ x 1¼	4 x 4 x 2½	6 x 3 x 3	8 x 4 x 4	10 x 3 x 4				
4 x 2½	6 x 4	1½ x 1½ x ½	2½ x 2½ x 1	4 x 4 x 2	6 x 2 x 6	8 x 3 x 8	10 x 3 x 3				
4 x 2	6 x 3	1½ x 1¼ x 1¼	2½ x 2½ x ¾	4 x 4 x 1½	4 x 4 x 6	8 x 3 x 6	10 x 2 x 8				
4 x 1½	6 x 2	1½ x 1¼ x 1	2½ x 2 x 2½	4 x 4 x 1	3 x 3 x 6	8 x 3 x 4	10 x 2 x 6				
4 x 1	8 x 6	1½ x 1¼ x ¾	2½ x 2 x 1½	4 x 3 x 4		8 x 2 x 8	8 x 8 x 10				
6 x 4	8 x 4	1½ x 1 x 1	2½ x 2 x 1	4 x 3 x 3		8 x 2 x 6	10 x 6 x 10				
6 x 3	10 x 8	1½ x ¾ x 1½	2½ x 1½ x 2½	4 x 2½ x 4		8 x 2 x 4	10 x 4 x 10				
6 x 2½	10 x 6	1½ x ¾ x 1¼	2½ x 1½ x 1½	4 x 2½ x 2½		6 x 6 x 8	10 x 4 x 8				
6 x 2	10 x 3	1 x 1 x 1½	2½ x 1 x 2½	4 x 2 x 4		6 x 6 x 6	8 x 8 x 10				
8 x 6	12 x 10		2½ x ¾ x 2½	4 x 2 x 2		6 x 6 x 4	8 x 6 x 10				
8 x 4	12 x 8		2 x 2 x 2½	4 x 1½ x 4		6 x 6 x 3	8 x 4 x 10				
10 x 8	12 x 6			4 x 1 x 4		6 x 4 x 6					
10 x 6				3 x 3 x 4		6 x 4 x 4					
10 x 4				2½ x 2½ x 4		6 x 3 x 6					
12 x 10						6 x 3 x 4					
12 x 8						6 x 2 x 6					
12 x 6						4 x 4 x 6					
						3 x 3 x 6					

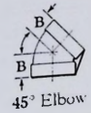
Dimensions, in Inches

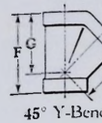
Dimensions apply only to straight sizes and to Reducers; dimensions of reducing sizes will be furnished on application.

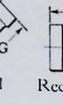

90° Elbow

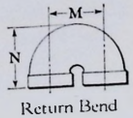

Tee

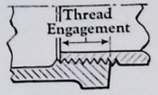

Cross


45° Elbow


45° Y-Bend


Reducer


Return Bend



For Normal Thread Engagement, see page 367

Size	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12
A	1¼	1 7/16	1 5/8	1 7/8	2 1/8	2 1/2	3 1/4	3 3/4	4 1/8	4 1/2	5 1/2	6 1/4	7 3/4	9 1/4	11 1/2
B	15/16	1 1/16	1 3/16	1 3/8	1 9/16	1 13/16	2	2 5/16	2 1/2	2 11/16	3 1/8	3 1/2	4 5/16	5 3/16	6
F							6 1/4	7 7/8		9 3/4	11 5/8	13 7/16	16 15/16	20 11/16	
G							5 3/16	6 1/8		7 5/8	9 1/4	10 3/4	13 5/8	16 3/4	
J			2	2 1/8	2 1/4	2 7/16	2 11/16	3	3 1/8	3 3/8		4 3/8	5 1/4	6 3/16	7 1/8

Return Bends

Size	½	¾	¾	¾	1	1	1¼	1½	1½	1½	1½	2	2	2	2	2	2
M	1¾	2	3	4½	2 3/8	3	3	2½	2 7/8	3¼	3½	6	3¼	4	4½	5	6	6½
N	2	2 5/16	2 13/16	3 9/16	2 3/4	3	3 5/16	3 5/16	3½	3 11/16	3 13/16	5 1/16	4	4 3/8	4 5/8	4 7/8	5 3/8	5 5/8
Size	2½	2½	2½	2½	3	3	3	3	3	4	4	4	4	4	4	4	6	6
M	4½	4 7/8	6	7	5	6 1/4	8	9	11	6	7	7½	8	9	11	12	10	13
N	5 5/16	5½	6 1/16	6 9/16	6	6 5/8	7½	8	9	7 3/16	7 11/16	7 15/16	8 3/16	8 11/16	9 11/16	10 3/16	10 5/8	12 1/8

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250-Pound Cast Iron Fittings

Short Pattern

WORKING PRESSURES
250 pounds steam
400 pounds cold water, oil, or gas, non-shock



90° Elbow
No. 182 E, Straight
No. 184 E, Reducing



45° Elbow
No. 186 E, Straight



Tee
No. 188 E, Straight
No. 190 E, Reducing



Cross
No. 192 E, Straight



45° Y-Bend
No. 194 E, Straight



Coupling
No. 195 E, Right Hand
No. 196 E, Right & Left



Return Bend
No. 187 E, Right Hand
No. 189 E, Right & Left

List Prices, Black

Size			Inches	¼	⅜	½	¾	1	1¼	1½	2	2½
90° Elbows	No. 182 E Straight	Right Hand	Each	.20	.20	.25	.30	.35	.45	.60	.75	1.25
		Right and Left	Each			.30	.36	.42	.54	.72	.90	
	No. 184 E, Reducing (*)		Each			.35	.40	.45	.55	.75	.95	1.55
45° Elbows	No. 186 E, Straight		Each			.35	.40	.44	.55	.70	.90	1.50
Tees	No. 188 E, Straight		Each	.35	.35	.40	.45	.55	.70	.90	1.15	1.80
	No. 190 E, Reducing (*)		Each			.55	.60	.70	.90	1.15	1.40	2.25
Crosses	No. 192 E, Straight		Each			.60	.65	.70	.90	1.20	1.50	2.50
45° Y-Bends	No. 194 E, Straight		Each					1.10	1.35	1.80	2.25	3.75
Couplings	No. 195 E, Right Hand		Each					.39	.50	.66	.83	
	No. 196 E, Right and Left		Each					.48	.60	.80	1.00	

Size		Inches	3	3½	4	5	6	8	10	12
90° Elbows	No. 182 E, Straight	Each	2.00	2.75	3.50	5.50	8.00	17.00	28.00	40.00
	No. 184 E, Reducing (*)	Each	2.50	3.40	4.40	6.80	10.00	21.00	35.00	50.00
45° Elbows	No. 186 E, Straight	Each	2.50	3.50	4.50	6.75	9.75	21.00	34.00	48.00
Tees	No. 188 E, Straight	Each	3.00	4.25	5.50	8.25	12.00	25.00	42.00	60.00
	No. 190 E, Reducing (*)	Each	3.75	5.30	6.85	10.25	15.00	31.00	52.00	75.00
Crosses	No. 192 E, Straight	Each	4.00	5.50	7.00	11.00	16.00	34.00		
45° Y-Bends	No. 194 E, Straight	Each	6.00		11.00	16.50	24.00	50.00		

List Prices, No. 187 E and No. 189 E Return Bends, Black

Size	Inches	1	1¼	1¼	1¼	1¼	1¼	1¼	1½	1½	2	2	2
Center to center	Inches	2⅜	2½	3	4	5	6	8	2½	3½	3¼	4½	6
No. 187 E, Right Hand	Each	.70	.70	.80	.95	1.10	1.35	1.75	1.25	1.95	1.60	2.70	3.25
No. 189 E, Right & Left	Each	.80	.80						1.40	2.25	1.80		

(*)**Reducing fittings:** List prices of reducing 90° Elbows and Tees apply to reducing sizes carried in stock, shown on the opposite page. Other reductions can be made to order by bushing in the sand; when so bushed, non-stock sizes use the same list prices as stock reducing sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing 45° Elbows, Crosses, and 45° Y-Bends can be made to order by bushing in the sand from straight sizes. When so bushed, reducing sizes use the same list prices as straight sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing fittings that require making a new pattern are entirely special. Prices on application.

Rugged Construction: Crane 250-Pound Cast Iron Fittings are of the Short Pattern. They are unusually rugged and have a high factor of safety above the recommended working pressure.

Threading: The thread lengths are longer than those found in standard weight fittings, and are correct for use with Line Pipe. All openings are slightly chamfered to insure easy entrance of the pipe, and are in true alignment.

Galvanized fittings: Galvanized fittings can be made to order at double the list prices of black fittings.

250-Pound Cast Iron Fittings

Short Pattern

Reducing Fittings Carried in Stock



90° Elbow
No. 184 E

Reducing 90° Elbows and Tees are carried in stock in the sizes shown in the table below. These sizes are sold at the regular prices for reducing fittings.

For prices of reducing fittings not carried in stock, see the footnotes on the preceding page.



Tee
No. 190 E

No. 184 E 90° Elbows

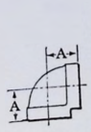
	A	B	C
½ x ⅜			
½ x ¼			
¾ x ½			
¾ x ⅜			
1 x ¾			
1¼ x 1			
1¼ x ¾			
1½ x 1¼			
1½ x 1			
1½ x ¾			
2 x 1½			
2 x 1¼			
2 x 1			
2½ x 2			
2½ x 1½			
3 x 2½			
3 x 2			
4 x 3			
5 x 4			
6 x 2½			
6 x 4			
8 x 3			
12 x 8			

No. 190 E Tees

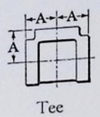
A	B	C
½	x ½	x ⅜
½	x ½	x ¼
¾	x ¾	x ½
¾	x ¾	x ⅜
¾	x ¾	x ¼
¾	x ½	x ¾
¾	x ½	x ½
1	x 1	x ¾
1	x 1	x ½
1	x 1	x ¼
1	x ¾	x 1
1	x ¾	x ¾
1	x ¾	x ½
1	x ½	x 1
1	x ½	x ¾
1	x ¼	x 1
¾	x ¾	x 1
1¼	x 1¼	x 1
1¼	x 1¼	x ¾
1¼	x 1¼	x ½
1¼	x 1	x ¾
1¼	x 1	x ½
1¼	x ¾	x 1¼
1¼	x ½	x 1¼
1¼	x 1	x 1
1¼	x ¾	x 1
1¼	x ½	x 1
1½	x 1½	x 1¼
1½	x 1½	x 1
1½	x 1½	x ¾
1½	x 1½	x ½
1½	x 1¼	x 1½
1½	x 1¼	x 1¼
1½	x 1¼	x 1
1½	x 1¼	x ¾
1½	x 1¼	x ½
1½	x 1	x 1½
1½	x 1	x 1¼
1½	x ¾	x 1½
1½	x ¾	x 1¼
1½	x ½	x 1½
1½	x ¼	x 1½
1¼	x 1	x 1½
1¼	x ¾	x 1½
1	x 1	x 1½
2	x 2	x 1½
2	x 2	x 1¼
2	x 2	x 1
2	x 2	x ¾
2	x 2	x ½
2	x 2	x ¼
2	x 1½	x 2
2	x 1½	x 1½
2	x 1½	x 1¼
2	x 1½	x 1
2	x 1½	x ¾
2	x 1½	x ½
2	x 1¼	x 2
2	x 1¼	x 1¼
2	x 1	x 2
2	x 1	x 1½
2	x ¾	x 2
2	x ¾	x 1½
2	x ½	x 2
1½	x 1½	x 2
1½	x 1¼	x 2
1½	x 1	x 2
1½	x ¾	x 2
1¼	x 1¼	x 2
2½	x 2½	x 2
2½	x 2½	x 1½
2½	x 2½	x 1¼
2½	x 2	x 3
2½	x 2	x 2
2½	x 2	x 1½
2½	x 2	x 1¼
2½	x 2	x 1
2½	x 2	x ¾
2½	x 2	x ½
2½	x 1½	x 2½
2½	x 1½	x 2
2½	x 1½	x 1½
2½	x 1	x 2½
2½	x ¾	x 2½
2	x 2	x 2½
2	x 1½	x 2½
2	x 1¼	x 2½
2	x 1	x 2½
1½	x 1½	x 2½
3	x 3	x 2½
3	x 3	x 2
3	x 3	x 1½
3	x 3	x 1¼
3	x 3	x 1
3	x 3	x ¾
3	x 2½	x 3
3	x 2½	x 2½
3	x 2½	x 2
3	x 2½	x 1½
3	x 2½	x 1¼
3	x 2½	x 1
3	x 2	x 3
3	x 2	x 2½
3	x 2	x 2
3	x 2	x 1½
3	x 2	x 1¼
3	x 1½	x 2
3	x 1	x 3
2½	x 2½	x 3
2	x 2	x 3
3½	x 3½	x 3
3½	x 3½	x 2½
3½	x 3½	x 2
3½	x 3½	x 1½
3½	x 3½	x 1¼
3½	x 3½	x 1
3½	x 3	x 2½
3½	x 3	x 2
3½	x 3	x 1½
3½	x 3	x 1¼
3½	x 2½	x 2½
4	x 4	x 3
4	x 4	x 2½
4	x 4	x 2
4	x 4	x 1½
4	x 4	x 1¼
4	x 4	x 1
4	x 4	x ¾
4	x 3½	x 2½
4	x 3½	x 2
4	x 3½	x 1½
4	x 3	x 4
4	x 3	x 3
4	x 2½	x 4
4	x 2½	x 2½
4	x 2	x 4
3	x 3	x 4
5	x 5	x 4
5	x 5	x 3
5	x 5	x 2½
5	x 5	x 2
5	x 5	x 1½
5	x 5	x 1¼
5	x 5	x 1
5	x 4	x 3½
5	x 4	x 3
5	x 4	x 2
5	x 3	x 5
5	x 2	x 5
6	x 5	
6	x 4	
6	x 3½	
6	x 3	
6	x 2½	
6	x 2	
6	x 1½	
6	x 1¼	
6	x 1	
6	x 4	
6	x 4	
5	x 5	
8	x 6	
8	x 5	
8	x 4	
8	x 3	
8	x 2½	
8	x 6	
8	x 4	
10	x 10 x 8	
10	x 10 x 6	
10	x 10 x 4	
12	x 12 x 10	
12	x 12 x 8	
12	x 12 x 6	

Dimensions, in Inches

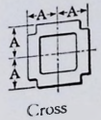
Dimensions apply only to straight sizes; dimensions of reducing sizes will be furnished on request.



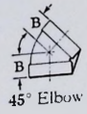
90° Elbow



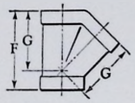
Tee



Cross



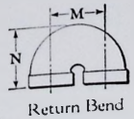
45° Elbow



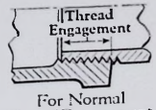
45° Y-Bend



Coupling



Return Bend



For Normal Thread Engagement, see page 367.

Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12
A	1¼	1⅜	1	1⅛	1⅜	1½	1⅝	2	2¼	2½	2⅝	3	3½	4	5	6	7
B					4¼	4⅞	5¾	6¾	7⅞	8⅞		10⅝	13⅞	15¼	18⅛		
F					3¼	3 13/16	4½	5 3/16	6⅛	6⅞		8½	10¾	12¼	14		
G					2 9/16	2 15/16	3 3/16	3⅝									
H																	

Size	1	1¼	1¼	1¼	1¼	1¼	1½	1½	2	2	2
M — Center to center	2⅜	2½	3	4	5	6	8	2½	3½	3¼	4½	6
N — Face to back	2 15/16	3¼	3 7/16	4 1/16	4 11/16	5 1/16	6 1/16	3 9/16	4	4⅛	5 1/16	6

Return Bends

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Malleable Iron or Steel Fittings

Where pressures or temperatures exceed the maximum for which Cast Iron Fittings are recommended, Malleable Iron or Steel Fittings must be used. These are shown on the following pages:

Malleable Iron Fittings ..... pages 182 to 187
Forged Steel Fittings ..... pages 328 to 329
Cast Steel Fittings ..... pages 330 to 331

Miscellaneous Iron and Steel Fittings

Iron Bushings ..... page 224
Steel Bushings ..... page 225
Iron Plugs ..... page 226
Steel Plugs ..... page 226
Wrought Couplings ..... page 227
Wrought Steel Nipples ..... pages 228 to 229
Long Screws ..... page 230
Faced Couplings and Locknuts ..... page 230
Small Pipe Bends ..... page 230
One-Strap and Two-Strap Clamps ..... page 231

The fittings mentioned above have been grouped together in this section of the catalogue because they are used generally with Malleable Iron, Cast Iron, or Steel fittings.

For greater convenience, the following fittings are shown in another section of this catalogue:

Hydrant Clamps ..... page 59
Wood Rod Couplings ..... page 59
Street Washer Keys ..... page 59
Hydrant Handles ..... page 59

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Iron Bushings



Outside Hexagon



Inside Hexagon



Face



Eccentric



Double Tapped

List Prices, Each

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12
Hexagon	Black	.04	.04	.04	.05	.06	.07	.09	.14	.21	.30	.40	.50	.93	1.25	2.75	3.75	5.00
	Galv.	.08	.08	.08	.10	.12	.14	.18	.28	.42	.60	.80	1.00	1.85	2.50	5.50	7.50	10.00
Face	Black	.08	.08	.09	.11	.13	.17	.22	.32	.48	.70	1.20	1.50	2.60	3.75	9.00	14.00	20.00
	Galv.	.12	.12	.14	.17	.20	.25	.33	.48	.72	1.05	1.80	2.25	3.90	5.60	13.50	21.00	30.00
Eccentric	Black						.22	.25	.27	.42	.60	.80	1.00	1.85	2.50	Prices on application		
	Galv.						.44	.50	.54	.84	1.20	1.60	2.00	3.70	5.00			
Double Tapped	Black								.50	.70	1.00	1.25	2.40		4.00			
	Galv.								1.00	1.40	2.00	2.50	4.80		8.00			

List prices shown above apply only to sizes carried in stock, shown in the table below. Other sizes are special; prices on application.

Bushings Carried in Stock

Hexagon

b 1/4 x 1/8
b 3/8 x 1/4
b 3/8 x 1/8
b 1/2 x 3/8
b 1/2 x 1/4
b 1/2 x 1/8
b 3/4 x 1/2
b 3/4 x 3/8
3/4 x 1/4
3/4 x 1/8
b 1 x 3/4
1 x 1/2
a 1 x 3/8
a 1 x 1/4
a 1 x 1/8
b 1 1/4 x 1
1 1/4 x 3/4
a 1 1/4 x 1/2
a 1 1/4 x 3/8
a 1 1/4 x 1/4

b 1 1/2 x 1 1/4
1 1/2 x 1
a 1 1/2 x 3/4
a 1 1/2 x 1/2
a 1 1/2 x 3/8
a 1 1/2 x 1/4
b 2 x 1 1/2
2 x 1 1/4
a 2 x 1
a 2 x 3/4
a 2 x 1/2
a 2 x 3/8
a 2 x 1/4
b 2 1/2 x 2
2 1/2 x 1 1/2
a 2 1/2 x 1 1/4
a 2 1/2 x 1
a 2 1/2 x 3/4
a 2 1/2 x 1/2
3 x 2 1/2
3 x 2
3 x 1 1/2
a 3 x 1 1/4
a 3 x 1
a 3 x 3/4
a 3 x 1/2

3 1/2 x 3
3 1/2 x 2 1/2
a 3 1/2 x 2
a 3 1/2 x 1 1/2
a 3 1/2 x 1 1/4
a 3 1/2 x 1
a 3 1/2 x 3/4
4 x 3 1/2
4 x 3
4 x 2 1/2
a 4 x 2
a 4 x 1 1/2
a 4 x 1 1/4
a 4 x 1
a 4 x 3/4
a 4 x 1/2
5 x 4
a 5 x 3 1/2
a 5 x 3
a 5 x 2 1/2
a 5 x 2
a 5 x 1 1/2
a 5 x 1 1/4
a 5 x 1

6 x 5
a 6 x 4
a 6 x 3 1/2
a 6 x 3
a 6 x 2 1/2
a 6 x 2
a 6 x 1 1/2
6 x 1 1/4
6 x 1
8 x 6
a 8 x 5
a 8 x 4
a 8 x 3
a 8 x 2 1/2
a 8 x 2
a 10 x 8
a 10 x 6
a 10 x 5
a 10 x 4
12 x 10
a 12 x 8
a 12 x 6

Face

c 1/4 x 1/8
c 3/8 x 1/4
c 3/8 x 1/8
c 1/2 x 3/8
c 1/2 x 1/4
c 1/2 x 1/8
c 3/4 x 1/2
c 3/4 x 3/8
c 3/4 x 1/4
b 1 x 3/4
b 1 x 1/2
b 1 x 3/8
b 1 x 1/4
b 1 1/4 x 1
b 1 1/4 x 3/4
b 1 1/4 x 1/2
b 1 1/2 x 1 1/4
b 1 1/2 x 1
b 1 1/2 x 3/4
b 1 1/2 x 1/2
b 2 x 1 1/2
b 2 x 1 1/4
b 2 x 1
b 2 x 3/4

b 2 1/2 x 2
b 2 1/2 x 1 1/2
b 2 1/2 x 1 1/4
b 3 x 2 1/2
b 3 x 2
b 3 x 1 1/2
b 3 1/2 x 3
b 3 1/2 x 2 1/2
b 3 1/2 x 2
b 4 x 3 1/2
b 4 x 3
b 4 x 2 1/2
4 x 2
b 5 x 4
5 x 3
b 6 x 5
6 x 4
6 x 3
b 8 x 6
b 10 x 8
b 12 x 10

Eccentric

1 1/4 x 3/4
1 1/4 x 1/2
1 1/2 x 3/4
1 1/2 x 1/2
2 x 1 1/4
2 x 1
2 x 3/4
2 x 1/2
2 1/2 x 1 1/2
2 1/2 x 1 1/4
2 1/2 x 1
2 1/2 x 3/4
2 1/2 x 1/2
3 x 2
3 x 1 1/2
3 x 1 1/4
3 x 1
3 x 3/4

3 1/2 x 2 1/2
3 1/2 x 2
3 1/2 x 1 1/2
3 1/2 x 1 1/4
4 x 3
4 x 2 1/2
4 x 2
4 x 1 1/2
4 x 1 1/4
4 x 1
5 x 4
5 x 3 1/2
5 x 3
5 x 2 1/2
5 x 2
6 x 4
6 x 3
6 x 2 1/2
6 x 2

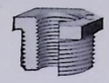
Double Tapped

b 2 x 1 1/2 x 1 1/2
2 x 1 1/4 x 1 1/4
2 x 3/4 x 3/4
2 x 1/2 x 1/2
b 2 1/2 x 2 x 2
2 1/2 x 1 1/2 x 1 1/2
3 x 2 x 2
3 x 1 1/2 x 1 1/2
3 x 1 1/4 x 1 1/4
3 x 1 x 1
3 1/2 x 3 x 3
3 1/2 x 2 1/2 x 2 1/2
3 1/2 x 2 x 2
3 1/2 x 1 1/2 x 1 1/2
3 1/2 x 1 1/4 x 1 1/4
3 1/2 x 1 x 1
4 x 3 x 3
4 x 2 1/2 x 2 1/2
4 x 2 x 2
4 x 1 1/2 x 1 1/2
6 x 4 x 4

a — Indicates sizes made with inside hexagon; other sizes have outside hexagon.
b — Indicates sizes made of malleable iron.
c — Indicates sizes made of steel.
Sizes not indicated by "b" or "c" are made of cast iron.

Double Tapped Bushings: Double Tapped Bushings are used to reduce threaded tank openings to suction pipe sizes. They permit the passage of a foot valve or strainer through the tank opening, and then close the opening down to suction pipe size. All Double Tapped Bushings are recessed between the tappings.

Steel Bushings



No. 326 D
Hexagon Bushing



No. 327 D
Face Bushing



No. 347 D
Hexagon Bushing
Long Pattern

List Prices

Size Inches	No. 326 D Hexagon Each	No. 327 D Face Each	No. 347 D Hexagon Each
1/4 x 1/8	.30	Use Regular Face Bushings shown on page 224.	
3/8 x 1/4	.33		.80
3/8 x 1/8	.33		
1/2 x 3/8	.42		1.05
1/2 x 1/4	.42		
1/2 x 1/8	.42		
3/4 x 1/2	.53		1.45
3/4 x 3/8	.53		
3/4 x 1/4	.53		
3/4 x 1/8	.53		
1 x 3/4	.70	.80	2.05
1 x 1/2	.70	.80	
1 x 3/8	.70	.80	
1 x 1/4	.70	.80	
1 x 1/8	.70		
1 1/4 x 1	.95	1.05	3.10
1 1/4 x 3/4	.95	1.05	
1 1/4 x 1/2	.95	1.05	
1 1/4 x 3/8	.95		
1 1/4 x 1/4	.95		
1 1/2 x 1 1/4	1.25	1.35	4.50
1 1/2 x 1	1.25	1.35	
1 1/2 x 3/4	1.25	1.35	
1 1/2 x 1/2	1.25	1.35	
1 1/2 x 3/8	1.25		
1 1/2 x 1/4	1.25		
2 x 1 1/2	3.30	3.60	11.00
2 x 1 1/4	3.30	3.60	
2 x 1	2.65	2.90	
2 x 3/4	2.65	2.90	
2 x 1/2	2.20		
2 x 3/8	2.20		
2 x 1/4	2.20		
2 1/2 x 2	7.75	8.50	25.00
2 1/2 x 1 1/2	7.10	7.80	
2 1/2 x 1 1/4	7.10	7.80	
2 1/2 x 1	6.45		
2 1/2 x 3/4	6.45		
2 1/2 x 1/2	6.00		

Size Inches	No. 326 D Hexagon Each	No. 327 D Face Each	No. 347 D Hexagon Each
3 x 2 1/2	8.75	9.60	29.00
3 x 2	8.75	9.60	
3 x 1 1/2	8.10	8.90	
3 x 1 1/4	8.10		
3 x 1	7.45		
3 x 3/4	7.45		
3 x 1/2	7.00		
3 1/2 x 3	12.35	13.60	40.00
3 1/2 x 2 1/2	11.55	12.70	
3 1/2 x 2	11.55	12.70	
3 1/2 x 1 1/2	10.90		
3 1/2 x 1 1/4	10.90		
3 1/2 x 1	10.25		
3 1/2 x 3/4	10.25		
4 x 3 1/2	14.10	15.50	50.00
4 x 3	14.10	15.50	
4 x 2 1/2	13.30	14.70	
4 x 2	13.30	14.70	
4 x 1 1/2	12.65		
4 x 1 1/4	12.65		
4 x 1	12.00		
4 x 3/4	12.00		
4 x 1/2	12.00		
5 x 4	18.20	18.20	
5 x 3 1/2	18.20		
5 x 3	18.20	18.20	
5 x 2 1/2	17.30		
5 x 2	17.30		
5 x 1 1/2	16.00		
5 x 1 1/4	16.00		
5 x 1	16.00		
6 x 5	22.50	22.50	
6 x 4	22.50	22.50	
6 x 3 1/2	22.50		
6 x 3	22.50	22.50	
6 x 2 1/2	21.50		
6 x 2	21.50		
6 x 1 1/2	20.85		
6 x 1 1/4	20.85		
6 x 1	20.85		

Note: The No. 347 D are long pattern bushings, reducing one size only. They are especially suitable for the severe and high-pressure services where regular hexagon bushings reduced one size are not entirely satisfactory.

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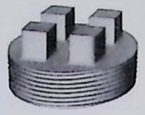
Iron Plugs


Square Head


Square Head Tapped ⅛-inch for Air Cock


Solid (Square Head)


Countersunk


Bar Plug (Solid)


Barrel Plug

List Prices, Each

Size		Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12
Square Head	Right Hand	Black	.02	.02	.02	.02	.03	.04	.05	.07	.10	.18	.25	.38	.42	.88	1.20	2.75	3.75	5.00
		Galv.	.04	.04	.04	.04	.06	.08	.10	.14	.20	.36	.50	.76	.84	1.75	2.40	5.50	7.50	10.00
	Left Hand	Black				.04	.06	.08	.09	.11	.15	.27	.38							
		Galv.				.08	.12	.16	.18	.22	.30	.54	.76							
	Tapped ⅛-inch for Air Cock	Black					.12	.15	.20	.25	.30									
		Galv.					.24	.30	.40	.50	.60									
Solid, Right Hand		Black	.02	.02	.02	.04	.06	.08	.09	.11	.15	.27	.38	.57	.63	1.35				
		Galv.	.04	.04	.04	.08	.12	.16	.18	.22	.30	.54	.76	1.14	1.26	2.70				
Countersunk, Right Hand		Black		.04	.04	.04	.06	.08	.09	.11	.15	.30	.40	.92	1.10	2.00	3.50			
		Galv.		.08	.08	.08	.12	.16	.18	.22	.30	.60	.80	1.84	2.20	4.00	7.00			
Bar Plugs, Right Hand		Black													.63	1.35	1.80	4.15	5.75	7.50
		Galv.													1.26	2.70	3.60	8.30	11.50	15.00
Barrel Plugs, Right Hand		Black					.25			.35	.45									
		Galv.					.50			.70	.90									

Service suggestions: Square Head and Countersunk Plugs are generally used with:

Standard Cast Iron Fittings
Standard Malleable Iron Fittings

Solid Plugs and Bar Plugs are generally used with:

175-Pound Cast Iron Fittings
250-Pound Cast Iron Fittings
300-Pound Malleable Iron Fittings
Heavy Malleable Iron Fittings
Hydraulic Malleable Iron Fittings

Materials: These plugs are made of the materials indicated in the following table:

Style	Steel	Malleable	Cast Iron
Square Head	⅛, ¼, ⅜"		½" and larger
Solid	⅛, ¼, ⅜"		½" and larger
Countersunk	¼"	⅜ to 1¼"	1½" and larger
Bar			All sizes
Barrel			All sizes

Note: Square Head Plugs sizes ½-inch and larger are cored, as shown in the illustration. ⅛, ¼, and ⅜-inch sizes are solid, being the same as the Solid Plugs.

Steel Plugs


No. 320 D
Square Head
3000-Pound

WORKING PRESSURES, Pounds per Square Inch

	Steam or hot oil				Cold water, oil, or gas, non-shock
	500° F.	750° F.	850° F.	Ratings at higher temperatures on application.	
No. 320 D	1750	1250	950		3000
No. 321 D	3500	2500	1900		6000


No. 321 D
Hexagon Head
6000-Pound

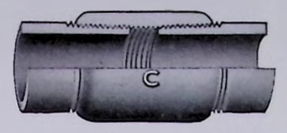
List Prices

Size	Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
No. 320 D, 3000-Pound	Each	*See Note			.40	.48	.60	.80	1.05	1.70	2.40	3.40	4.25	5.00
No. 321 D, 6000-Pound	Each		.32	.36	.42	.55	.70	1.00	1.40	2.30	3.75	5.50		

*Note: Use ⅛, ¼, and ⅜-inch Square Head or Solid Plugs listed above; they are made of steel.

Wrought Couplings


Standard


Coupling With Plain Ends
Extra Heavy
XX Hydraulic
Car Heater


Coupling With Recessed Ends
Extra Heavy
XX Hydraulic


Half Coupling With Plain End
Extra Heavy

List Prices, Standard

Size		Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Right Hand	Black	Each	.05	.05	.06	.07	.10	.13	.17	.21	.28	.40	.60	.80	1.00
	Galv.	Each	.06	.06	.08	.10	.13	.18	.25	.32	.40	.55	.80	1.05	1.40
Right and Left	Black	Each		.07	.08	.11	.15	.20	.25	.30	.50	.85	1.20	1.60	2.00

Sizes 4½ to 12-inch can be furnished to order. Prices on application.

List Prices, Extra Heavy, XX Hydraulic, and Half Couplings

Size				Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Extra Heavy	Plain Ends	R. H.	Black	Each	.12	.12	.14	.14	.20	.26	.34	.42	.56	.80	1.20	1.60	2.00
			Galv.	Each	.17	.17	.20	.20	.25	.32	.42	.55	.75	1.05	1.50	1.90	3.00
		R. & L.	Black	Each				.20	.30	.40	.45	.55	.70				
	Recessed Ends	R. H.	Black	Each	.22	.22	.25	.25	.30	.35	.45	.55	.70	.95	1.40	1.85	2.25
			Galv.	Each	.27	.27	.30	.30	.35	.40	.55	.70	.90	1.20	1.70	2.15	3.25
XX Hydraulic	Plain Ends	R. H.	Black	Each					.40	.55	.70	.85	1.15	1.60			
	Recessed Ends	R. H.	Black	Each					.50	.65	.85	1.00	1.30	1.85			
Half Coupling, Plain End		R. H.	Black	Each				.08	.12	.16	.20	.25	.34	.48	.72	.96	1.20

List Prices, Car Heater

Size		Inches	½	¾	1	*1¼	1½	2
Right Hand	Black	Each	.14	.20	.26	.34	.42	.56
	Galv.	Each	.20	.25	.32	.42	.55	.75
Right and Left	Black	Each	.20	.30	.40	.45	.55	.70

*Special short pattern.

Standard Seamless Steel Couplings: Standard Seamless Steel Couplings can be furnished to order. Prices on application.

Seamless Steel Line Pipe Couplings: Seamless Steel Line Pipe Couplings can be furnished to order. Prices on application.

Casing Couplings: Couplings for Merchant Casing for Water Wells and Irrigation purposes can be furnished to order. Prices on application.

Couplings for Large O.D. Pipe: Couplings for Large O.D. Pipe can be furnished to order. Prices on application.

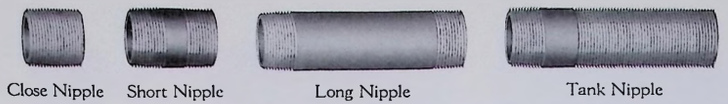
Dimensions, in Inches

Size		⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Outside Diameter	*Standard	.594	.750	.906	1.063	1.297	1.563	1.969	2.234	2.719	3.313	3.938	4.438	4.938
	Extra Heavy	.59	.75	.95	1.13	1.44	1.70	2.07	2.31	2.81	3.31	4.00	4.63	5.13
	XX Hydraulic					1.66	1.90	2.22	2.44	3.19	3.62			
	Car Heater			.95	1.13	1.44	1.70	2.07	2.31	2.81				
	Half	.59	.75	.95	1.13	1.44	1.70	2.07	2.31	2.81	3.31	4.00	4.63	5.13
Length	*Standard	7/8	1	1 1/8	1 3/8	1 1/2	1 3/4	2 1/8	2 5/16	2 9/16	2 7/8	3 1/16	3 7/16	3 7/16
	Extra Heavy	1 1/8	1 3/8	1 5/8	1 7/8	2 1/8	2 3/8	2 7/8	2 7/8	3 1/8	3 1/2	3 11/16	4 1/4	4 1/4
	XX Hydraulic					2 5/16	2 5/8	2 7/8	3 1/8	3 3/8	3 5/8			
	Car Heater				1 7/8	2 1/8	2 3/8	2 1/8	2 7/8	3 1/8				
	Half	9/16	11/16	13/16	15/16	1 1/16	1 3/16	1 7/16	1 7/16	1 9/16	1 3/4	1 7/8	2 1/8	2 1/8

*Dimensions of Standard Couplings, sizes 4½ to 12-inch, will be furnished on request.

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Black Wrought Steel Nipples



Close Nipple | Short Nipple | Long Nipple | Tank Nipple

Tank Nipples are 6 inches long and use the list prices of the 6-inch length. They have a Standard Taper Pipe Thread on one end; the other end has a Standard Taper Pipe Thread running into an American Standard Locknut Thread for a total thread length of 4 inches.

Black Right Hand Nipples

Size Inches	Length Inches		List Prices, Each																	
	Close	Short	Close	Short	Long															
					2	2½	3	3½	4	4½	5	5½	6	7	8	9	10	11	12	
⅛	¾	1½	.05	.06	.07	.08	.08	.09	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.20	
¼	⅞	1½	.05	.06	.07	.08	.08	.09	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.20	
⅜	1	1½	.05	.06	.07	.08	.08	.09	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.20	
½	1⅛	1½	.06	.07	.08	.09	.09	.10	.10	.11	.12	.13	.14	.15	.17	.19	.21	.23	.25	
¾	1⅜	2	.08	.09		.10	.11	.12	.13	.14	.15	.16	.17	.19	.21	.23	.25	.27	.29	
1	1½	2	.10	.11		.13	.14	.15	.16	.17	.18	.19	.20	.24	.27	.30	.32	.35	.38	
1¼	1⅝	2½	.13	.15			.16	.18	.20	.22	.24	.26	.28	.32	.36	.40	.44	.48	.52	
1½	1¾	2½	.16	.18			.20	.22	.25	.27	.29	.31	.34	.38	.43	.47	.52	.56	.60	
2	2	2½	.21	.24			.28	.31	.34	.37	.40	.44	.48	.53	.59	.66	.78	.80	.87	
2½	2½	3	.39	.45				.58	.63	.68	.73	.78	.85	.94	1.03	1.12	1.22	1.31	1.40	
3	2⅝	3	.54	.59				.65	.73	.81	.89	.96	1.04	1.19	1.34	1.50	1.65	1.80	1.95	
3½	2¾	4	.72	.98						1.06	1.14	1.21	1.29	1.45	1.61	1.76	1.92	2.08	2.24	
4	2⅞	4	.92	1.12						1.28	1.38	1.48	1.60	1.80	2.00	2.20	2.40	2.60	2.80	
4½	2⅞	4	1.35	1.60						1.75	1.90	2.10	2.25	2.50	2.75	3.00	3.25	3.50	3.75	
5	3	4½	1.60	2.00							2.05	2.17	2.29	2.61	2.91	3.15	3.39	3.64	3.88	
6	3⅛	4½	2.00	2.45							2.58	2.73	2.90	3.36	3.68	4.08	4.31	4.60	4.94	
7	3¼	5	3.30	4.00								4.20	4.45	4.85	5.25	5.65	6.05	6.45	6.85	
8	3½	5	4.30	4.87								5.00	5.44	5.71	6.10	6.48	6.85	7.25	7.65	
9	3⅝	5	5.25	5.85											7.45	8.05	8.65	9.25	9.85	
10	3⅞	5	5.88	6.50											8.00	8.55	9.10	9.65	10.20	
12	4½	6	7.40	8.70											10.00	10.90	11.80	12.70	13.60	

Standard: The list prices given above apply to wrought steel close, short, and long nipples, and to tank nipples, made from Standard Weight Pipe.

Extra Strong: For list prices of black nipples made from Extra Strong Pipe, double the list prices of Standard black nipples.

Double Extra Strong: For list prices of black nipples made from Double Extra Strong Pipe, multiply the list prices of Standard black nipples by four.

Seamless nipples: Standard or Extra Strong Seamless Steel Nipples use the same list prices as Standard or Extra Strong nipples made from welded steel pipe, but are sold at an advance in price. See the Crane Discount Sheet for prices.

Butt nipples: For net prices of butt nipples, add 20 per cent to the net prices of short nipples.

Lengths not listed: For lengths not listed (under 12 inches), use the list price of the next longer length.

Lengths over 12 inches: For list prices of lengths over 12 inches and up to 24 inches, add the list prices of the two nearest equal lengths.

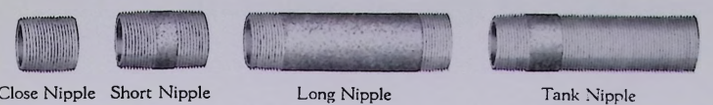
Nipples made from Copper Bearing Pipe or Genuine Wrought Iron Pipe—Prices on application.

Black Right and Left Nipples

Size Inches	Length Inches		List Prices, Each																	
	Close	Short	Close	Short	Long															
					2	2½	3	3½	4	4½	5	5½	6	7	8	9	10	11	12	
⅛	¾	1½	.07	.08	.10	.11	.11	.12	.12	.13	.15	.16	.17	.19	.20	.21	.23	.24	.26	
¼	⅞	1½	.07	.08	.10	.11	.11	.12	.12	.13	.15	.16	.17	.19	.20	.21	.23	.24	.26	
⅜	1	1½	.07	.08	.10	.11	.11	.12	.12	.13	.15	.16	.17	.19	.20	.21	.23	.24	.26	
½	1⅛	1½	.08	.10	.11	.12	.12	.13	.13	.15	.16	.17	.19	.20	.23	.25	.28	.30	.33	
¾	1⅜	2	.11	.12		.13	.15	.16	.17	.19	.20	.21	.23	.25	.28	.30	.33	.36	.38	
1	1½	2	.13	.15		.17	.19	.20	.21	.23	.24	.25	.26	.32	.36	.39	.42	.46	.50	
1¼	1⅝	2½	.17	.20			.21	.24	.26	.29	.32	.34	.37	.42	.47	.52	.58	.63	.68	
1½	1¾	2½	.21	.24			.26	.29	.33	.36	.38	.41	.45	.50	.56	.62	.68	.73	.78	
2	2	2½	.28	.32			.37	.41	.45	.49	.52	.58	.63	.69	.77	.86	.95	1.04	1.14	
2½	2½	3	.51	.59				.76	.82	.89	.95	1.02	1.11	1.23	1.34	1.46	1.59	1.71	1.82	
3	2⅝	3	.71	.77				.85	.95	1.06	1.16	1.25	1.36	1.55	1.75	1.95	2.15	2.34	2.54	
3½	2¾	4	.94	1.28						1.38	1.49	1.58	1.68	1.89	2.10	2.29	2.48	2.71	2.92	
4	2⅞	4	1.20	1.46						1.67	1.80	1.93	2.08	2.34	2.60	2.86	3.12	3.38	3.64	

Malleable Iron Right and Left Hexagon Nipples . . . page 178

Galvanized Wrought Steel Nipples



Close Nipple | Short Nipple | Long Nipple | Tank Nipple

Tank Nipples are 6 inches long and use the list prices of the 6-inch length. They have a Standard Taper Pipe Thread on one end; the other end has a Standard Taper Pipe Thread running into an American Standard Locknut Thread for a total thread length of 4 inches.

Galvanized Right Hand Nipples

Size Inches	Length Inches		List Prices, Each																	
	Close	Short	Close	Short	Long															
					2	2½	3	3½	4	4½	5	5½	6	7	8	9	10	11	12	
⅛	¾	1½	.07	.08	.10	.11	.12	.13	.14	.15	.16	.17	.19	.22	.25	.28	.30	.33	.36	
¼	⅞	1½	.07	.08	.10	.11	.12	.13	.14	.15	.16	.17	.19	.22	.25	.28	.30	.33	.36	
⅜	1	1½	.07	.08	.10	.11	.12	.13	.14	.15	.16	.17	.19	.22	.25	.28	.30	.33	.36	
½	1⅛	1½	.08	.09	.11	.12	.13	.14	.15	.16	.17	.18	.20	.23	.26	.29	.32	.35	.38	
¾	1⅜	2	.10	.12		.13	.14	.16	.18	.20	.22	.24	.26	.29	.32	.35	.39	.42	.45	
1	1½	2	.13	.15		.18	.20	.22	.24	.26	.28	.30	.34	.38	.42	.46	.50	.54	.58	
1¼	1⅝	2½	.17	.22			.26	.28	.30	.34	.37	.40	.44	.48	.56	.62	.68	.74	.80	
1½	1¾	2½	.22	.26			.30	.34	.38	.42	.45	.48	.52	.58	.65	.73	.80	.87	.94	
2	2	2½	.30	.35			.40	.45	.50	.55	.60	.65	.70	.79	.88	.97	1.06	1.15	1.24	
2½	2½	3	.60	.66				.75	.83	.90	.98	1.06	1.14	1.28	1.44	1.60	1.76	1.92	2.08	
3	2⅝	3	.80	.87				1.01	1.10	1.20	1.30	1.40	1.50	1.70	1.90	2.10	2.30	2.50	2.70	
3½	2¾	4	1.15	1.40						1.53	1.65	1.78	1.91	2.16	2.41	2.66	2.91	3.16	3.41	
4	2⅞	4	1.27	1.60						1.85	2.00	2.15	2.30	2.60	2.90	3.20	3.50	3.80	4.10	
4½	2⅞	4	1.75	2.15						2.35	2.55	2.75	3.00	3.40	3.80	4.20	4.60	5.00	5.40	
5	3	4½	2.29	2.87							3.01	3.21	3.40	3.95	4.35	4.73	5.12	5.52	5.90	
6	3⅛	4½	2.86	3.56							3.79	4.03	4.30	5.00	5.52	6.03	6.53	7.05	7.54	
7	3¼	5	4.10	5.35								5.70	6.05	6.75	7.45	8.15	8.85	9.55	10.25	
8	3½	5	5.52	6.37								6.65	6.95	7.55	8.15	8.75	9.35	9.95	10.60	

Standard: The list prices given above apply to wrought steel close, short, and long nipples, and to tank nipples, made from Standard Weight Pipe.

Extra Strong: For list prices of galvanized nipples made from Extra Strong Pipe, add the list prices of Standard black nipples and Standard galvanized nipples.

Seamless nipples: Standard or Extra Strong Seamless Steel Nipples use the same list prices as Standard or Extra Strong nipples made from welded steel pipe, but are sold at an advance in price. See the Crane Discount Sheet for prices.

Butt nipples: For net prices of butt nipples, add 20 per cent to the net prices of short nipples.

Lengths not listed: For lengths not listed (under 12 inches), use the list price of the next longer length.

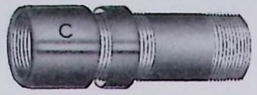
Lengths over 12 inches: For list prices of lengths over 12 inches and up to 24 inches, add the list prices of the two nearest equal lengths.

Galvanized Right and Left Nipples

Size Inches	Length Inches		List Prices, Each																	
	Close	Short	Close	Short	Long															
					2	2½	3	3½	4	4½	5	5½	6	7	8	9	10	11	12	
⅛	¾	1½	.12	.13	.16	.18	.18	.20	.20	.21	.24	.26	.28	.31	.32	.34	.35	.39	.42	
¼	⅞	1½	.12	.13	.16	.18	.18	.20	.20	.21	.24	.26	.28	.31	.32	.34	.35	.39	.42	
⅜	1	1½	.12	.13	.16	.18	.18	.20	.20	.21	.24	.26	.28	.31	.32	.34	.35	.39	.42	
½	1⅛	1½	.13	.16	.18	.20	.20	.21	.21	.24	.26	.28	.31	.32	.35	.40	.45	.48	.53	
¾	1⅜	2	.18	.20		.21	.24	.26	.28	.31	.32	.34	.35	.40	.45	.48	.53	.58	.61	
1	1½	2	.21	.24		.28	.31	.32	.34	.35	.39	.40	.42	.52	.58	.63	.68	.74	.80	
1¼	1⅝	2½	.28	.32			.34	.39	.42	.47	.52	.55	.60	.68	.76	.84	.93	1.01	1.09	
1½	1¾	2½	.34	.39			.42	.47	.53	.58	.61	.66	.72	.80	.90	1.00	1.09	1.17	1.25	
2	2	2½	.45	.52			.60	.66	.72	.79	.84	.93	1.01	1.11	1.24	1.38	1.52	1.67	1.83	
2½	2½	3	.82	.95				1.22	1.32	1.43	1.52	1.64	1.78	1.97	2.15	2.34	2.55	2.74	2.92	
3	2⅝	3	1.14	1.24				1.36	1.52	1.70	1.86	2.00	2.18	2.48	2.80	3.12	3.44	3.75	4.07	
3½	2¾	4	1.51	2.05						2.19	2.39	2.53	2.69	3.03	3.36	3.67	3.97	4.34	4.68	
4	2⅞	4	1.92	2.34						2.68	2.88	3.09	3.33	3.75	4.16	4.48	5.00	5.41	5.83	

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Long Screws, Faced Locknuts, and Faced Couplings



Long Screw
Complete, with Locknut and Coupling



Faced Locknut



Faced Coupling



Tank Nipple
See pages 228 and 229

List Prices

Size		Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Long Screws, Complete	Standard Length	Inches	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6	7	8	8 1/2	9
	Black	Each	.30	.35	.40	.55	.75	1.00	1.30	1.70	2.70	3.70	5.40	6.60
	Galv.	Each	.35	.40	.50	.66	1.00	1.25	1.60	2.10	3.10	4.70	6.50	7.75
Faced Locknuts	Black	Each	.08	.09	.10	.12	.15	.20	.25	.30	.35	.45	.95	1.35
	Galv.	Each	.11	.13	.15	.18	.22	.30	.35	.45	.50	.65	1.25	1.80
Faced Couplings	Black	Each	.09	.10	.12	.16	.22	.30	.40	.50	.70	.90	1.20	1.50
	Galv.	Each	.14	.15	.18	.24	.33	.45	.60	.75	1.00	1.35	1.80	2.25

Long Screws: The prices of Long Screws include one Faced Locknut and one Faced Coupling.

Long Screws longer than standard are made to order and charged as CUT PIPE with threads, locknuts, and couplings extra. When ordering, always specify the length of the straight thread.

Extra Heavy Long Screws are made to order of Extra Strong Pipe; prices on application.

Faced Locknuts and Faced Couplings: Faced Locknuts and Faced Couplings sizes 3-inch and smaller are malleable iron. Sizes 3 1/2 and 4-inch are wrought iron.

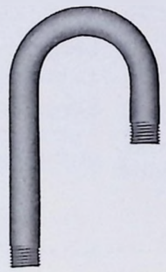
Small Pipe Bends



Quarter Bend



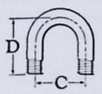
Return Bend



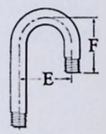
*Goose Neck
3/4, 1, and 1 1/4" sizes



Quarter Bend



Return Bend



Goose Neck

List Prices and Dimensions

Size			Inches	1/2	3/4	1	1 1/4	1 1/2	2
Quarter Bends, Black			Each	.45	.55	.75	1.25	2.00	3.25
Return Bends, Black			Each	.90	1.10	1.25	1.75	2.75	4.00
Dimensions in Inches	Quarter Bends	A Radius		2 1/16	2 1/4	2 1/2	4 3/4	6 3/4	6 3/4
		B Center to end		3 1/2	3 3/4	4 1/4	6 1/2	8 1/2	9 1/2
	Return Bends	C Center to center		4 1/8	4 1/2	4 1/2	6	8	8
		D Center to end		3 1/2	3 3/4	5	6	8	8
	Goose Necks	E Minimum center to center			4	4 1/2	6		
		F Minimum center to end			3 3/4	4 1/4	6		

Materials: Quarter Bends, Return Bends, and Goose Necks are made of Extra Strong Wrought Steel Pipe.

***Goose Necks:** Goose Necks are made to order; prices on application. The table shown above gives the minimum center to center and the minimum center to end. Orders should specify dimensions.

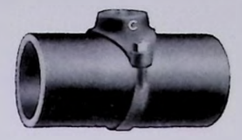
Special bends: Bends having dimensions other than those shown above, or bends of other shapes can be made to order. Prices on application; specify size of pipe, dimensions, and quantity required.

Single Strap and Double Strap Clamps

Malleable Iron with Wrought Iron Straps



Single Strap Clamp



Showing Application of Single Strap Clamp



Double Strap Clamp

When ordering Single Strap or Double Strap Clamps, specify the catalogue number of the Clamp and the size of the pipe tapping.

Single Strap Clamps							Double Strap Clamps						
Cat. No.	Clamp will fit: Wrought Pipe Size Inches	O.D. Casing Size Inches	Cast Iron Pipe Size Inches	O.D. of Circle Inches	Size of Pipe Tapping in Clamp Inches	List Prices Black Each	Cat. No.	Clamp will fit: Wrought Pipe Size Inches	O.D. Casing Size Inches	Cast Iron Pipe Size Inches	O.D. of Circle Inches	Size of Pipe Tapping in Clamp Inches	List Prices Black Each
0	1 1/2			1 7/8	1/2 or 3/4	1.00	40	1 1/2			1 7/8	1/2 or 3/4	.90
1	2	2 1/2		2 3/8	1/2 to 1	1.00	41	2	2 1/2		2 3/8	1/2 to 1 1/2	1.00
2	2 1/2	2 3/4 & 3	2	2 7/8	1/2 to 1 1/4	1.25	42	2 1/2	2 3/4 & 3	2	2 7/8	3/4 to 1 1/2	1.25
3	3	3 1/2		3 1/2	1/2 to 1	1.25	43	3	3 1/2		3 1/2	3/4 to 2	1.25
4	3	3 1/2		3 1/2	1 1/4 to 2	1.50	44	3 1/2	4	3	4	3/4 to 2	1.40
5	3 1/2	4	3	4	1/2 to 1	1.50	45	4	4 1/2		4 1/2	3/4 to 2	1.50
6	3 1/2	4	3	4	1 1/4 to 2	1.75	46	4 1/2	5	4	5	3/4 to 2	2.50
7	4	4 1/2		4 1/2	1/2 to 1 1/2	1.75	47	5	5 1/2		5 9/16	3/4 to 2	2.75
8	4	4 1/2		4 1/2	2	2.00	48	5	5 1/2		5 9/16	2 1/2 or 3	2.75
9	4	4 1/2		4 1/2	2 1/2 or 3	4.00	49	6	6 5/8		6 5/8	3/4 to 2	2.75
10	4 1/2	5	4	5	3/4 to 1 1/2	1.80	50	6	6 5/8		6 5/8	2 1/2 to 4	5.75
11	4 1/2	5	4	5	2	2.15	51	8	8 5/8		8 5/8	1 to 4	6.50
12	4 1/2	5	4	5	2 1/2 or 3	4.00	52	10	10 3/4		10 3/4	1 1/2 to 4	10.00
13	5	5 1/2		5 9/16	3/4 to 1 1/2	1.80	53	10	10 3/4		10 3/4	5 or 6	10.00
14	5	5 1/2		5 9/16	2	2.15	54	12			12 3/4	1 1/2 to 4	14.00
15	5	5 1/2		5 9/16	2 1/2 or 3	4.00	55	12			12 3/4	5 or 6	14.00
16		6	5	6	1/2 to 1 1/2	2.00							
17		6	5	6	2	2.40							
18		6	5	6	2 1/2 or 3	4.50							
19	6	6 5/8		6 5/8	3/4 to 1 1/2	2.25							
20	6	6 5/8		6 5/8	2	2.50							
21	6	6 5/8		6 5/8	2 1/2 or 3	5.00							
22		7	6	7	3/4 to 1 1/2	2.50							
23		7	6	7	2	2.70							
24		7	6	7	2 1/2 or 3	5.00							
28		8	7	8	3/4 to 1 1/2	4.50							
29		8	7	8	2	5.00							
30		8	7	8	2 1/2 or 3	5.50							
30 1/2	8	8 5/8		8 5/8	3/4 to 1 1/2	5.50							
31	8	8 5/8		8 5/8	2 to 3	5.50							
32	8	8 5/8		8 5/8	4	6.00							
35	10	10 3/4		10 3/4	3/4 to 2	9.00							
36	12			12 3/4	3/4 to 2	10.00							

Galvanized Single Strap or Double Strap Clamps are made to order at an advance of 50 per cent over the prices of Black Clamps.

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Miscellaneous Iron and Steel Fittings

For greater convenience, the following fittings are shown in another section of this catalogue:

Hydrant Clamps.....page 59
Wood Rod Couplings.....page 59
Street Washer Keys.....page 59
Hydrant Handles.....page 59

Unions and Union Fittings

Malleable Iron "Gem" Unions.....page 235
Standard Gasket Type Unions and Union Fittings.....page 235
Railroad Unions and Union Fittings.....pages 236 to 237
250-Pound Railroad Union Fittings.....page 238
300-Pound Malleable Iron Unions.....page 239
A.A.R. Unions and Union Fittings.....pages 240 to 242
Forged Steel Unions and Union Fittings.....pages 244 to 245

Cast Iron Flange Unions.....pages 246 and 248
Malleable Iron Flange Unions.....pages 247 to 248
Tongue and Groove Flange Unions.....page 248
Forged Steel Combination Elbows.....page 248
Forged Steel Flange Unions.....pages 248 to 249

Saving Material and Labor with Unions and Union Fittings...page 234
Unions and Union Fittings Applied to Air Brake Piping.....page 243
Large Size Flange Unions Made from Screwed Flanges.....page 250

Crane Co. manufactures an unusually diversified line of unions and union fittings. Whether it be a nickel-plated brass union for a restaurant steam table, an inexpensive ground joint malleable iron union for a domestic water line, a massive steel union for a central power station—a union for any service—, it can be purchased from Crane Co.

The line includes brass, malleable iron, and forged steel unions and union fittings, and brass, cast iron, malleable iron, and forged steel flange unions.

Crane Unions are exceptionally strong, tough, and durable. Each part is liberally proportioned and amply reinforced at points subjected to greatest stress. Especial attention has been given to interchangeability of parts.

* * * * * * * * *

For greater convenience, several lines of unions and union fittings are included with allied material in other sections of this catalogue. See the pages referred to below:

Brass Unions and Union Elbows....pages 260 to 261
Brass Flange Unions.....page 261
Brass Radiator Union Elbows.....page 48
Circulating Boiler Fittings.....page 179

Brass Solder-Joint Unions are shown in the section of this catalogue devoted to Solder-Joint Valves and Fittings.

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Saving Material and Labor With Crane Unions and Union Fittings

Although female unions are extremely popular and are a valuable fitting, many users fail to take advantage of male and female unions and of union fittings. In almost every piping installation there are connections that can be made at lower cost, in less time, with fewer joints (resulting in fewer chances for leaks), and, where desired, in a smaller space, by using male and female unions and union fittings in place of female unions and ordinary screwed fittings.

The typical pipe line connections illustrated below clearly indicate the economy of material and labor. By reducing the number of fittings and the space required for the installation, especially as shown in Figures A-4 and B-4, the amount of material is appreciably reduced; by reducing the number of threads to be cut on pipe and the number of joints that must be assembled, the length of time it will take to make the connection is materially shortened. Both are worthwhile savings.

Steamfitters, piping contractors, and manufacturers of equipment on which piping is used as a part of the unit, will find it advantageous to study every screwed piping layout so that an economical use of unions and union fittings is secured. Crane engineers will be glad to offer assistance.

Elbow Connections with Union Joint

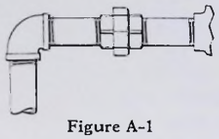


Figure A-1
3 Pieces of Pipe
2 Fittings
5 Pipe Threads
6 Joints Assembled

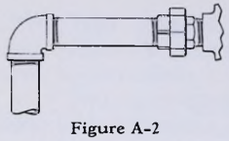


Figure A-2
2 Pieces of Pipe
2 Fittings
3 Pipe Threads
5 Joints Assembled

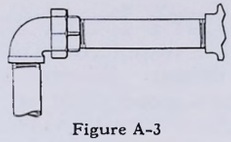


Figure A-3
2 Pieces of Pipe
1 Fitting
3 Pipe Threads
4 Joints Assembled

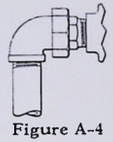


Figure A-4
1 Piece of Pipe
1 Fitting
1 Pipe Thread
3 Joints Assembled

Figure A-1 shows an ordinary elbow connection made by using a female union and a screwed elbow.

Figure A-2 shows the connection when a male and female union has been substituted for the female union.

Figure A-3 shows the connection after it has been further simplified by using a union elbow with a female tail-piece in place of the female union and the elbow shown in Figure A-1.

Figure A-4 shows the connection in its simplest form, a union elbow with a male tail-piece being used instead of the male and female union and the elbow shown in Figure A-2.

Tee Connections with Union Joints

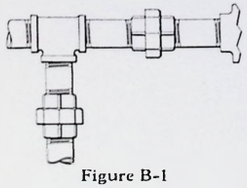


Figure B-1
5 Pieces of Pipe
3 Fittings
8 Pipe Threads
10 Joints Assembled

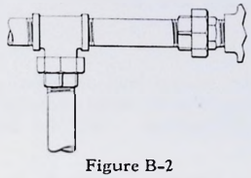


Figure B-2
3 Pieces of Pipe
2 Fittings
4 Pipe Threads
7 Joints Assembled

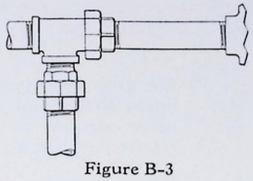


Figure B-3
3 Pieces of Pipe
2 Fittings
4 Pipe Threads
7 Joints Assembled

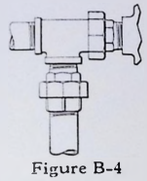


Figure B-4
2 Pieces of Pipe
2 Fittings
2 Pipe Threads
6 Joints Assembled

Figure B-1 shows an ordinary tee connection made with two female unions and a tee.

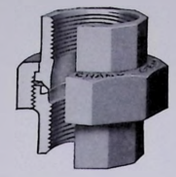
Figure B-2 shows the connection when a union tee (female union on outlet) and a male and female union are substituted for the two female unions and the tee.

Figure B-3 shows the connection made with a union tee (female union on run) and a male and female union. The same number of joints, threads, fittings, and pieces of pipe as used in Figure B-2, are required.

Figure B-4 shows the connection in its simplest form, a union tee (male union on run) being used in combination with a male and female union.

Malleable Iron "Gem" Unions

Brass to Iron Seat—Ground Joint



No. 512
Gem Union

Registered, United States Patent Office

WORKING PRESSURES
150 pounds steam
150 pounds water, 200° F.

Gem Unions, light in weight and inexpensive, are recommended for general service on steam or water. They are also recommended for domestic fuel oil or domestic gas installations.

List Prices and Dimensions

Size		Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 512	Black	Each	Use No. 519 Page 236	.30	.40	.50	.60	.80	1.20	1.60	2.00	3.20	4.80
	Galv.	Each		.45	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	7.20
End to end		Inches		1 9/16	1 5/8	1 13/16	2 1/16	2 1/4	2 1/2	2 5/8	3	3 9/16	3 15/16

Standard

Malleable Iron Unions and Union Fittings

Gasket Type

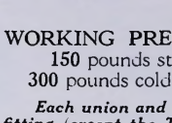
WORKING PRESSURES
150 pounds steam
300 pounds cold water

Each union and union fitting (except the Two-Third Unions) is equipped with a rubber gasket.

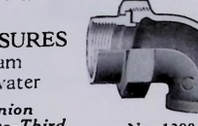
No. 1219
Union
Female



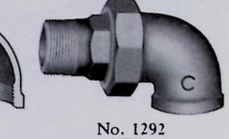
No. 1219½
Union
Male and Female



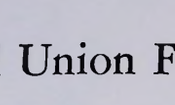
No. 1218
Two-Third Union
Female



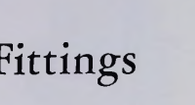
No. 1294
Tee
Female Union on Run



No. 1296
Tee
Male Union on Run



No. 1290
90° Elbow
Female Union



No. 1292
90° Elbow
Male Union

List Prices

Size		Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
No. 1219, Unions, Female	Black	Each	.18	.18	.20	.22	.27	.33	.46	.58	.75	1.55	2.10	3.65	4.35
	Galv.	Each	.27	.27	.30	.33	.40	.50	.70	.90	1.15	2.35	3.15	5.50	6.50
No. 1218, Two-Third Unions, Female	Black	Each		.12	.14	.16	.19	.22	.30	.40	.50	1.00			
	Galv.	Each		.18	.20	.22	.25	.35	.50	.60	.75	1.60			
No. 1219½, Unions, Male and Female	Black	Each		.23	.25	.28	.33	.40	.57	.72	.95	1.95	2.70		
	Galv.	Each		.32	.35	.39	.46	.57	.81	1.04	1.35	2.75	3.75		
No. 1290, 90° Elbows, Female Union	Black	Each		.38	.40	.42	.54	.63	.90	1.05	1.55	2.85	4.50		
	Galv.	Each		.57	.60	.63	.81	.95	1.35	1.58	2.35	4.30	6.75		
No. 1292, 90° Elbows, Male Union	Black	Each		.43	.45	.48	.62	.72	1.05	1.20	1.80	3.30	5.25		
	Galv.	Each		.65	.70	.72	.93	1.08	1.60	1.80	2.70	4.95	7.90		
No. 1294, Tees, Female Union	Black	Each		.40	.43	.45	.57	.70	.95	1.15	1.70	3.20	5.15		
	Galv.	Each		.60	.65	.68	.86	1.05	1.45	1.75	2.55	4.80	7.75		
No. 1296, Tees, Male Union	Black	Each		.48	.50	.52	.65	.80	1.10	1.30	1.95	3.70	6.00		
	Galv.	Each		.72	.75	.78	1.00	1.20	1.65	1.95	2.95	5.55	9.00		

Dimensions, in Inches

Size	Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
End to end, No. 1219		1½	1 5/8	1¾	1 7/8	2 1/8	2 3/8	2 5/8	2 15/16	3¼	3 9/16	3 15/16	4 5/16	4 5/8
End to end, No. 1219½			2¼	2 7/16	2 11/16	3 1/16	3 5/16	3 11/16	4	4 5/16	4 11/16	5 5/16		
Center to female end, Nos. 1290, 1292, 1294, 1296			1 3/16	1 5/16	1⅛	1 5/16	1 7/16	1¾	1 15/16	2¼	2 11/16	3⅛		
Center to union end, Nos. 1290, 1294			1 13/16	2 1/16	2 5/16	2⅝	3	3 7/16	3 13/16	4⅜	4⅞	5⅝		
Center to union end, Nos. 1292, 1296			2 7/16	2¾	3 1/16	3½	3 15/16	4 7/16	4¾	5⅜	6	6 15/16		

Extra Gaskets . . . page 362

Thread Engagement . . . page 367

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asbestosclaims.law/library/21275/136

Railroad Unions

Malleable Iron

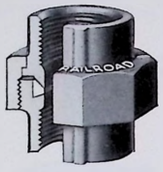
WORKING PRESSURES

3-inch and smaller — **250** pounds steam
— **500** pounds cold water, oil, gas, or gasoline, non-shock

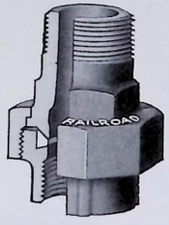
3½ and 4-inch — **200** pounds steam
— **300** pounds cold water, oil, gas, or gasoline, non-shock

FEATURES

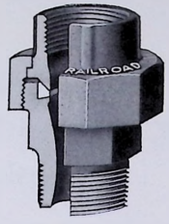
Brass to Iron Seat — Ground Joint
Air Tested



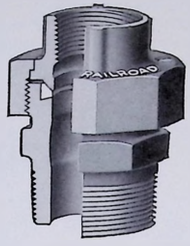
No. 519
Union
Female



No. 519½
Union
Male and Female



No. 517½
Straight Air Pump Union
(Both Ends Are Same Size)



No. 517
Reducing Air Pump Union
(Male End Is Larger)

List Prices, Unions

Size		Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
No. 519, Female	Black	Each	.30	.30	.40	.50	.60	.80	1.20	1.60	2.00	3.20	4.80	8.00	10.00
	Galv.	Each	.45	.45	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	7.20	12.00	15.00
No. 519½, Male and Female	Black	Each		.38	.50	.62	.75	1.00	1.50	2.00	2.50	4.00	6.00		
	Galv.	Each		.53	.70	.87	1.05	1.40	2.10	2.80	3.50	5.60	8.40		

List Prices, Air Pump Unions

Size		Inches	1¼	1½	2	1 x ¾	1¼ x 1	1½ x 1¼	2 x 1	2 x 1¼	2 x 1½
No. 517½, Straight	Black	Each	1.65	2.25	2.75						
	Galv.	Each	2.30	3.10	3.85						
No. 517, Reducing	Black	Each				.90	1.20	1.80	2.40	2.40	2.40
	Galv.	Each				1.20	1.60	2.40	3.20	3.20	3.20

Service recommendations: Crane Railroad Unions and Union Fittings are recommended for exacting service on pipe lines carrying steam, water, oil, air, gas, gasoline, or other fluids. They are especially suitable for railroad work and are used on general locomotive, car, shop, and yard service.

Dependable construction: All parts are heavy and ruggedly constructed and will withstand strains resulting from making up joints, expansion and contraction, vibration, etc.

Brass to iron seat, ground joint: No gasket is necessary. The brass to iron ground joint is non-corrosive and makes a tight seat very easily. It can be taken apart and reassembled repeatedly without affecting its strength or tightness. The brass ring is forced in under high pressure; it will not loosen in service.

Test: Each union and union fitting is given an air-under-water test.

Interchangeability: Tail-pieces and union rings are interchangeable with similar parts of the union fittings shown on the following page.

Listed by Underwriters' Laboratories: Crane Railroad Unions and Union Fittings have been inspected and are listed by the Underwriters' Laboratories (National Board of Fire Underwriters), Chicago, for use on hazardous liquids.

Dimensions, in Inches



No. 519 No. 519½ 517½ or 517

Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
A No. 519	1½	1⅝	1¾	1⅞	2⅛	2⅜	2⅝	2 15/16	3¼	3⅞	4½	4 5/16	4⅝
B No. 519½		2¼	2 7/16	2 11/16	3 1/16	3 5/16	3 11/16	4	4 5/16	4⅞	5⅜		

Size	1¼	1½	2	1 x ¾	1¼ x 1	1½ x 1¼	2 x 1	2 x 1¼	2 x 1½
B No. 517½	3⅝	3 15/16	4¼						
B No. 517				3⅛	3 7/16	3 11/16	3 13/16	3 15/16	4 1/16

Thread Engagement . . . . page 367

Railroad Union Fittings

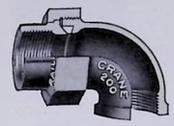
Malleable Iron

WORKING PRESSURES

200 pounds steam
400 pounds cold water, oil, gas, or gasoline, non-shock

FEATURES

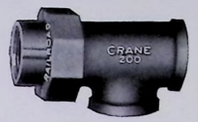
Brass to Iron Seat — Ground Joint
Air Tested



No. 590
90° Elbow
Female Union



No. 591
45° Elbow
Female Union



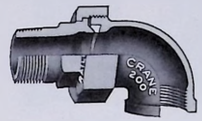
No. 594
Tee
Female Union on Run



No. 595
Reducing Tee
Female Union on Run



No. 598
Tee
Female Union on Outlet



No. 592
90° Elbow
Male Union



No. 593
45° Elbow
Male Union



No. 596
Tee
Male Union on Run



No. 597
Reducing Tee
Male Union on Run



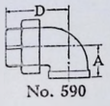
No. 598½
Tee
Male Union on Outlet

List Prices, Straight Fittings

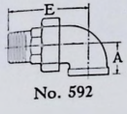
Size		Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 590 or No. 592, 90° Elbows	Black	Each	.45	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	7.50
	Galv.	Each	.60	.80	1.00	1.20	1.60	2.40	3.20	4.00	6.40	10.00
No. 591 or No. 593, 45° Elbows	Black	Each	.45	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	7.50
	Galv.	Each	.60	.80	1.00	1.20	1.60	2.40	3.20	4.00	6.40	10.00
No. 594 or No. 596, Tees	Black	Each	.50	.66	.82	1.00	1.32	1.98	2.64	3.30	5.30	8.25
	Galv.	Each	.67	.88	1.10	1.32	1.75	2.65	3.50	4.40	7.10	11.00
No. 598 or No. 598½, Tees	Black	Each	.70	.75	.82	1.00	1.32	1.98	2.64	3.30		
	Galv.	Each	.90	1.00	1.10	1.32	1.75	2.65	3.50	4.40		

List Prices, Reducing Tees

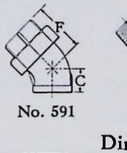
Size		Inches	1 x ⅜	1 x ½	1 x ¾
No. 595 or No. 597, Reducing Tees	Black	Each	1.45	1.45	1.45
	Galv.	Each	1.95	1.95	1.95



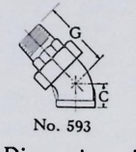
No. 590



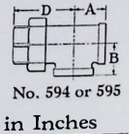
No. 592



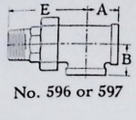
No. 591



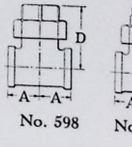
No. 593



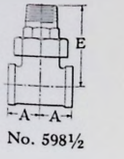
No. 594 or 595



No. 596 or 597



No. 598



No. 598½

Dimensions, in Inches

Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3	1 x ⅜	1 x ½	1 x ¾
A	13/16	15/16	1⅛	15/16	1 7/16	1¾	1 15/16	2¼	2 11/16	3⅛	13/16	1¼	15/16
B	13/16	15/16	1⅛	15/16	1 7/16	1¾	1 15/16	2¼	2 11/16	3⅛	15/16	15/16	1⅜
C	¾	13/16	⅞	1	1⅛	15/16	1 7/16	1 11/16	1 15/16	2 3/16			
D	1 13/16	2 1/16	2 5/16	2⅝	3	3 7/16	3 13/16	4⅜	5⅛	5 15/16	2⅝	2 11/16	2 13/16
E	2 7/16	2¾	3 1/16	3½	3 15/16	4 7/16	4¾	5⅜	6⅛	7 1/16	3 9/16	3⅝	3¾
F	1 9/16	1 11/16	1⅞	2⅛	2 7/16	2¾	3 1/16	3½	4 1/16	4¾			
G	2 3/16	2⅜	2 11/16	3	3⅜	3¾	4	4½	5 1/16	5⅞			

Description . . . . page 236

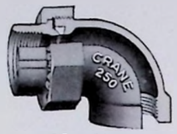
Thread Engagement . . . . page 367

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ACL Doc 21275 · Page 137 of 402
Published by AsbestosClaims.Law
asbestosclaims.law/library/21275/137

250-Pound
Railroad Union Fittings
Malleable Iron

WORKING PRESSURES
250 pounds steam
500 pounds cold water, oil, or gas, non-shock

FEATURES
Brass to Iron Seat — Ground Joint
Air Tested



No. 690
90° Elbow
Female Union



No. 691
45° Elbow
Female Union



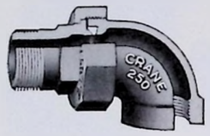
No. 694
Tee
Female Union on Run



No. 695
Reducing Tee
Female Union on Run



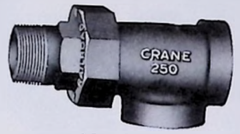
No. 698
Tee
Female Union on Outlet



No. 692
90° Elbow
Male Union



No. 693
45° Elbow
Male Union



No. 696
Tee
Male Union on Run



No. 697
Reducing Tee
Male Union on Run



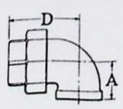
No. 698½
Tee
Male Union on Outlet

List Prices, Straight Fittings

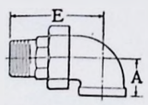
Size		Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 690 or No. 692, 90° Elbows	Black	Each	.45	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	7.50
	Galv.	Each	.60	.80	1.00	1.20	1.60	2.40	3.20	4.00	6.40	10.00
No. 691 or No. 693, 45° Elbows	Black	Each	.45	.60	.75	.90	1.20	1.80	2.40	3.00		
	Galv.	Each	.60	.80	1.00	1.20	1.60	2.40	3.20	4.00		
No. 694 or No. 696, Tees	Black	Each	.50	.66	.82	1.00	1.32	1.98	2.64	3.30	5.30	
	Galv.	Each	.67	.88	1.10	1.32	1.75	2.65	3.50	4.40	7.10	
No. 698 or No. 698½, Tees	Black	Each	.70	.75	.82	1.00	1.32	1.98	2.64	3.30		
	Galv.	Each	.90	1.00	1.10	1.32	1.75	2.65	3.50	4.40		

List Prices, Reducing Tees

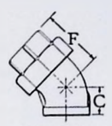
Size		Inches	1 x ⅜	1 x ½	1 x ¾
No. 695 or No. 697, Reducing Tees	Black	Each	1.45	1.45	1.45
	Galv.	Each	1.95	1.95	1.95



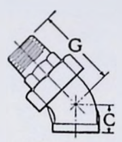
No. 690



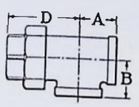
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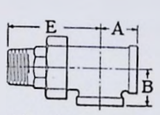
No. 691



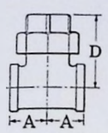
No. 693



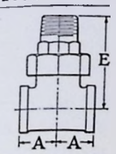
No. 694 or 695



No. 696 or 697



No 698



No. 698½

Dimensions, in Inches

Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3	1 x ⅜	1 x ½	1 x ¾
A	13/16	15/16	1⅛	15/16	17/16	1¾	115/16	2¼	211/16	3⅛	13/16	1¼	15/16
B	13/16	15/16	1⅛	15/16	17/16	1¾	115/16	2¼	211/16		15/16	15/16	1⅜
C	¾	13/16	⅞	1	1⅛	15/16	17/16	111/16					
D	113/16	21/16	25/16	2⅝	3	37/16	313/16	4⅜	5⅛	515/16	2⅝	211/16	213/16
E	27/16	2¾	31/16	3½	315/16	47/16	4¾	5⅜	6⅛	71/16	39/16	3⅝	3¾
F	19/16	111/16	1⅞	2⅛	27/16	2¾	31/16	3½					
G	23/16	2⅜	211/16	3	3⅜	3¾	4	4½					

The fittings shown on this page are made to order only.

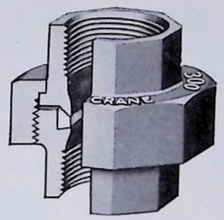
Thread Engagement . . . page 367

300-Pound
Malleable Iron Unions

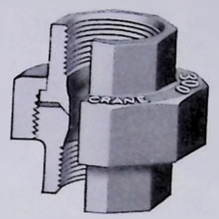
WORKING PRESSURES
No. 198 E and No. 198½ E—300 pounds steam, 550° F.
No. 197 E —300 pounds saturated steam
All types—600 pounds cold water, oil, or gas, non-shock

TEST PRESSURE—150 pounds air under water

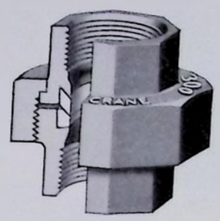
FEATURES
Brass to Iron, All-Iron, or Brass to Brass Seat
Ground Joint Octagon Ends



No. 198 E
Female Union
Brass to Iron Seat



No. 198½ E
Female Union
All-Iron Seat



No. 197 E
Female Union
Brass to Brass Seat

List Prices

Size			Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Brass to Iron Seat	No. 198 E	Black	Each	.30	.40	.50	.60	.80	1.20	1.60	2.00	3.20	4.80	8.00	10.00
		Galv.	Each	.45	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	7.20	12.00	15.00
All-Iron Seat	No. 198½ E	Black	Each	.30	.40	.50	.60	.80	1.20	1.60	2.00	3.20	4.80		
		Galv.	Each	.45	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	7.20		
Brass to Brass Seat	No. 197 E	Black	Each	.30	.40	.50	.60	.80	1.20	1.60	2.00	3.20	4.80		
		Galv.	Each	.45	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	7.20		

Service recommendations: Crane 300-Pound Malleable Iron Unions are recommended where long life and dependability are desired on lines conveying steam, water, oil, air, gas, or similar fluids. Their sturdy construction makes them especially suitable for severe services.

Unusually rugged: All parts are massive and rugged. The malleable iron from which they are made has a high tensile strength and is exceptionally tough.

Choice of seat construction: The unions are made with three types of seat construction.
Brass to Iron Seat—No. 198 E
All-Iron Seat—No. 198½ E
Brass to Brass Seat—No. 197 E

Brass seat unions: Brass seat unions have durable, non-corrosive seating surfaces. The large brass rings are forced into the retaining grooves under high pressure; they will not loosen in service.

All-iron unions: All-iron unions have seating surfaces integral with the end-pieces. They are suitable for steam, oil, air, or gas lines where a non-corrosive seat is not desired, and for acid lines where all-iron material is satisfactory.

Ground joint: All of these unions have a ground joint seat that holds pressure easily; no gasket is needed. The unions can be taken apart and reassembled repeatedly without affecting their strength or tightness.

Interchangeability: The corresponding parts of these unions are interchangeable.

Identification of seat:
Brass to iron seat unions are black.
All-iron unions have the union ring japanned green.
Brass to brass seat unions have the union ring japanned maroon.
Galvanized unions are all-galvanized, with no outside distinguishing color.

Federal Specification: The No. 198 E Brass to Iron Seat Unions and the No. 198½ E All-Iron Seat Unions, sizes ¼ to 3-inch inclusive, conform to Federal Specification No. WW-U-536, dated March 1, 1932.



Dimensions, in Inches

Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
A	15/8	113/16	115/16	2¼	27/16	213/16	3	3⅜	4	45/16	411/16	5

Thread Engagement . . . page 367

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asbestosclaims.law/library/21275/138

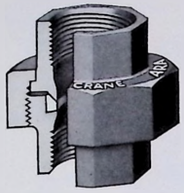
A. A. R. Unions

Malleable Iron

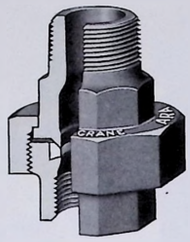
WORKING PRESSURES
300 pounds steam, **550°** F.
600 pounds cold water, oil, gas, or gasoline, non-shock

TEST PRESSURE — 150 pounds air under water

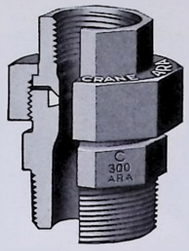
FEATURES
Brass to Iron Seat — Ground Joint
Octagon Ends



No. 819 E
Union
Female



No. 819½ E
Union
Male and Female



No. 817 E
Reducing Air Pump Union
(Male End Is Larger)

For Straight size Air Pump Unions, use either the **No. 819½ E** or the **No. 919½ E** shown on page 242

List Prices, Unions

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 819 E, Female	Black Each	.30	.40	.50	.60	.80	1.20	1.60	2.00	3.20	4.80
	Galv. Each	.45	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	7.20
No. 819½ E, Male and Female	Black Each	.38	.50	.62	.75	1.00	1.50	2.00	2.50	4.00	6.00
	Galv. Each	.53	.70	.87	1.05	1.40	2.10	2.80	3.50	5.60	8.40

List Prices, Air Pump Unions

Size	Inches	1¼ x 1	1½ x 1	1½ x 1¼	2 x 1	2 x 1¼	2 x 1½
No. 817 E, Reducing	Black Each	1.20	1.80	1.80	2.40	2.40	2.40
	Galv. Each	1.60	2.40	2.40	3.20	3.20	3.20

Service recommendations: Crane A. A. R. Unions and Union Fittings are ideal for service where long life and dependability are desired. They are especially suited for railroad work because they easily withstand abuse, piping strains, vibration, expansion, and contraction.

Unusually rugged construction: All parts are of massive, sturdy construction. The malleable iron from which they are made is exceptionally strong and tough.

Brass to iron seat, ground joint: The brass to iron ground joint seat is non-corrosive and holds pressure easily; no gasket is needed. It can be taken apart and reassembled repeatedly without affecting its strength or tightness. The brass seat ring is forced in under high pressure, and it will not loosen in service.

Interchangeability: Tail-pieces and union rings are interchangeable with similar parts of the union fittings shown on the following page.

Listed by Underwriters' Laboratories: Crane A. A. R. Unions and Union Fittings have been inspected and are listed by the Underwriters' Laboratories (National Board of Fire Underwriters), Chicago, for use on hazardous liquids.

Association of American Railroads Specifications: These Unions and Union Fittings comply with the 300-pound union and union fitting specifications developed by the Association of American Railroads (formerly known as the American Railway Association), adopted 1930, revised 1932 and 1934. When subjected to tensile tests, their breaking strengths exceed those required by the specifications.

Dimensions, in Inches



No. 819 E



No. 819½ E or No. 817 E

Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3
A No. 819 E	1⅝	1 13/16	1 15/16	2¼	2 7/16	2 13/16	3	3 3/8	4	4 5/16
B No. 819½ E	2¼	2½	2 11/16	3⅛	3⅜	3¾	3 15/16	4 5/16	5 1/16	5½

Size	1¼ x 1	1½ x 1	1½ x 1¼	2 x 1	2 x 1¼	2 x 1½
B No. 817 E	3½	3⅝	3 13/16	3¾	4	4⅛

A. A. R. Unions and Union Fittings with FORGED STEEL male tail-piece . . . . page 242
Thread Engagement . . . . page 367

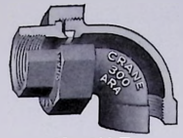
A. A. R. Union Fittings

Malleable Iron

WORKING PRESSURES
300 pounds steam, **550°** F.
600 pounds cold water, oil, gas, or gasoline, non-shock

TEST PRESSURE — 150 pounds air under water

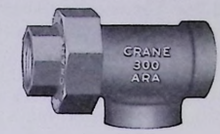
FEATURES
Brass to Iron Seat — Ground Joint
Octagon Ends



No. 890 E
90° Elbow
Female Union



No. 891½ E
45° Elbow
Female Union



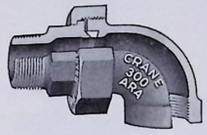
No. 894 E
Tee
Female Union on Run



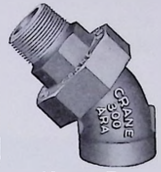
No. 895 E
Reducing Tee
Female Union on Run



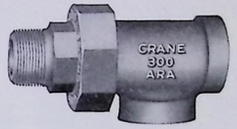
No. 898 E
Tee
Female Union on Outlet



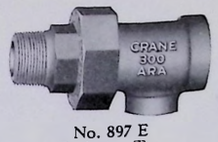
No. 892 E
90° Elbow
Male Union



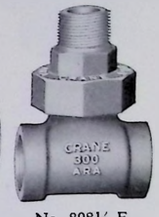
No. 893 E
45° Elbow
Male Union



No. 896 E
Tee
Male Union on Run



No. 897 E
Reducing Tee
Male Union on Run



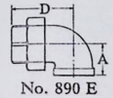
No. 898½ E
Tee
Male Union on Outlet

List Prices, Straight Fittings

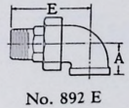
Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 890 E or No. 892 E, 90° Elbows	Black Each	.45	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	7.50
	Galv. Each	.60	.80	1.00	1.20	1.60	2.40	3.20	4.00	6.40	10.00
No. 891½ E or No. 893 E, 45° Elbows	Black Each	.45	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	
	Galv. Each	.60	.80	1.00	1.20	1.60	2.40	3.20	4.00	6.40	
No. 894 E or No. 896 E, Tees	Black Each	.50	.66	.82	1.00	1.32	1.98	2.64	3.30	5.30	8.25
	Galv. Each	.67	.88	1.10	1.32	1.75	2.65	3.50	4.40	7.10	11.00
No. 898 E or No. 898½ E, Tees	Black Each	.70	.75	.82	1.00	1.32	1.98	2.64	3.30	5.30	
	Galv. Each	.90	1.00	1.10	1.32	1.75	2.65	3.50	4.40	7.10	

List Prices, Reducing Tees

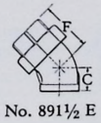
Size	Inches	1 x ⅜	1 x ½	1 x ¾
No. 895 E or 897 E, Reducing Tees	Black Each	1.45	1.45	1.45
	Galv. Each	1.95	1.95	1.95



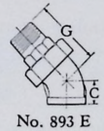
No. 890 E



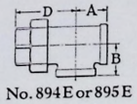
No. 892 E



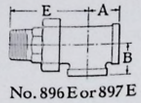
No. 891½ E



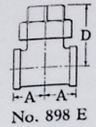
No. 893 E



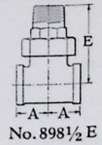
No. 894 E or 895 E



No. 896 E or 897 E



No. 898 E



No. 898½ E

Dimensions, in Inches

Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3	1 x ⅜	1 x ½	1 x ¾
A	15/16	1 1/16	1¼	1 7/16	1⅝	1 15/16	2⅛	2½	2 15/16	3⅜	1⅜	1 7/16	1½
B	15/16	1 1/16	1¼	1 7/16	1⅝	1 15/16	2⅛	2½	2 15/16	3⅜	1⅜	1½	1 9/16
C	13/16	⅞	1	1⅛	1 5/16	1½	1 11/16	2	2¼				
D	2	2¼	2 7/16	2⅞	3 3/16	3 11/16	3 15/16	4½	5 7/16	5 15/16	2¾	2⅞	3
E	2 9/16	2⅞	3 3/16	3¾	4 1/16	4⅝	1⅞	5 3/8	6 7/16	7 3/16	3 11/16	3 13/16	3 15/16
F	1⅝	1¾	1 15/16	2 3/16	2½	2⅞	3 3/16	3 11/16	4 3/16				
G	2 3/16	2 7/16	2 11/16	3 1/16	3 7/16	3 13/16	4⅛	4 9/16	5 3/16				

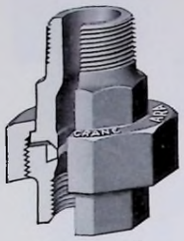
Description . . . page 240
Thread Engagement . . . . page 367

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 139 of 402
Published by AsbestosClaims.Law
asbestosclaims.law/library/21275/139

Malleable Iron
A. A. R. Unions and Union Fittings
with Forged Steel Male Tail-Piece

WORKING PRESSURES
300 pounds steam, 550° F.
600 pounds cold water, oil, or gas, non-shock

TEST PRESSURE — 150 pounds air under water



No. 919½ E
Union

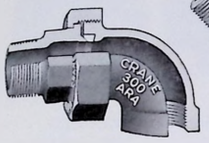
Recommended for Unusually Severe Service

Malleable iron male tail-pieces occasionally break when subjected to excessive vibration or to unusual piping strains. To provide liberal strength in this part and to avoid the danger of breakage, the unions and union fittings shown here are made with steel male tail-pieces.

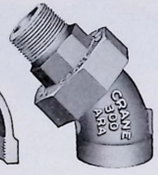
The forged steel tail-piece is tougher, stronger, and more rugged than the malleable iron. It will easily withstand abuse and the many strains resulting from high pressures, piping, and vibration.

FEATURES
Brass to Steel Seat
Ground Joint
Octagon Ends

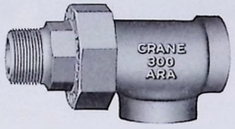
Patent Pending



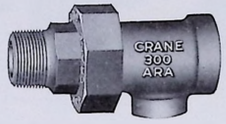
No. 992 E
90° Elbow



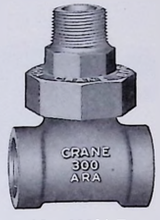
No. 993 E
45° Elbow



No. 996 E
Tee
Union on Run



No. 997 E
Reducing Tee
Union on Run



No. 998½ E
Tee
Union on Outlet

List Prices, Unions and Straight Fittings

Size		Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 919½ E, Unions	Black	Each	.38	.50	.62	.75	1.00	1.50	2.00	2.50	4.00	6.00
	Galv.	Each	.53	.70	.87	1.05	1.40	2.10	2.80	3.50	5.60	8.40
No. 992 E, 90° Elbows	Black	Each	.45	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	7.50
	Galv.	Each	.60	.80	1.00	1.20	1.60	2.40	3.20	4.00	6.40	10.00
No. 993 E, 45° Elbows	Black	Each	.45	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	
	Galv.	Each	.60	.80	1.00	1.20	1.60	2.40	3.20	4.00	6.40	
No. 996 E, Tees	Black	Each	.50	.66	.82	1.00	1.32	1.98	2.64	3.30	5.30	8.25
	Galv.	Each	.67	.88	1.10	1.32	1.75	2.65	3.50	4.40	7.10	11.00
No. 998½ E, Tees	Black	Each	.70	.75	.82	1.00	1.32	1.98	2.64	3.30	5.30	
	Galv.	Each	.90	1.00	1.10	1.32	1.75	2.65	3.50	4.40	7.10	

List Prices, Reducing Tees

Size		Inches	1 x ⅜	1 x ½	1 x ¾
No. 997 E, Reducing Tees	Black	Each	1.45	1.45	1.45
	Galv.	Each	1.95	1.95	1.95

Materials: The unions and union fittings shown on this page are furnished with forged steel male tail-pieces. Their union rings and thread-pieces or bodies are made of malleable iron.

Brass to steel seat, ground joint: The brass to steel ground joint is non-corrosive and holds pressure easily. It can be taken apart and reassembled repeatedly without affecting its strength or tightness. The brass seat is forced in under high pressure; it will not loosen.

Interchangeability: Malleable iron parts interchange with those of the Crane A. A. R. line, pages 240 and 241; steel tail-pieces interchange with those on the No. 253 H Unions, page 244.

Association of American Railroads Specifications: These unions and union fittings, like those of the regular Crane A. A. R. line, pages 240 and 241, comply with the specifications of the Association of American Railroads (formerly known as the American Railway Association).

Dimensions (same as regular A. A. R. line) . . . pages 240 and 241

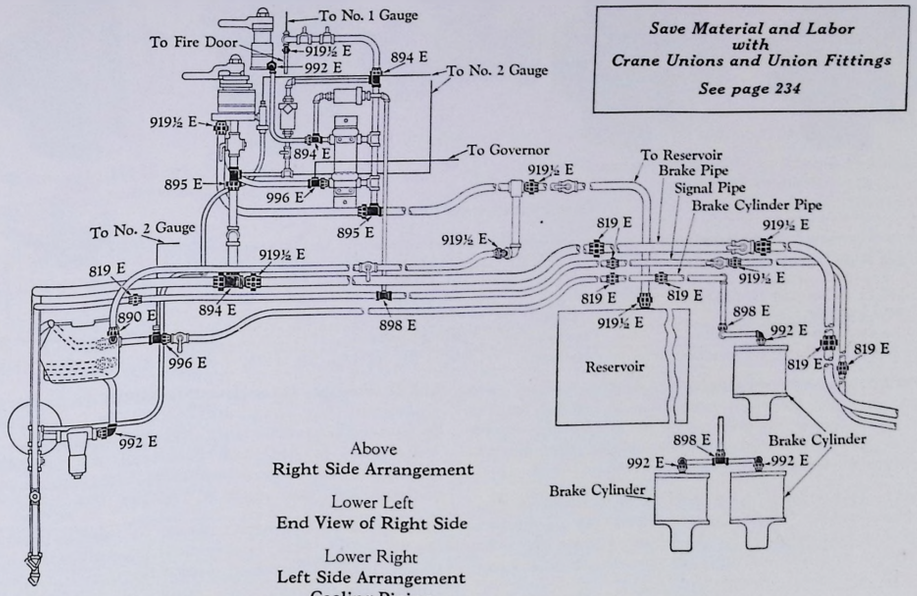
Crane Unions and Union Fittings
Applied to the
Air Brake Piping of a Locomotive

The illustrations on this page show the application of Crane A.A.R. Unions and Union Fittings to the air brake piping of a locomotive.

Such an installation, compared with one using ordinary screwed fittings, nipples, and female unions, eliminates from 25 to 50 per cent of the threaded joints. The possibility of leaks is correspondingly reduced, and a substantial saving in the labor cost of the installation is made.

The male end unions and union fittings indicated in the illustrations are the Crane A.A.R. line shown on the preceding page. Their steel male tail-pieces assure liberal strength and unusual ruggedness. If desired, however, the unions and union fittings with malleable iron tail-pieces, shown on pages 240 and 241, may be used.

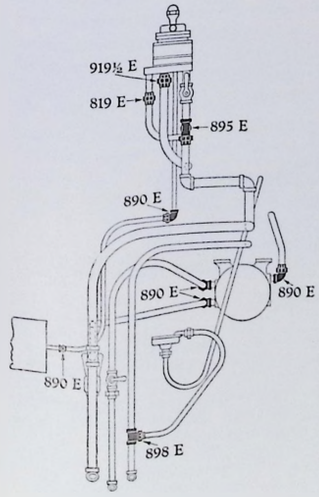
Save Material and Labor with Crane Unions and Union Fittings
See page 234

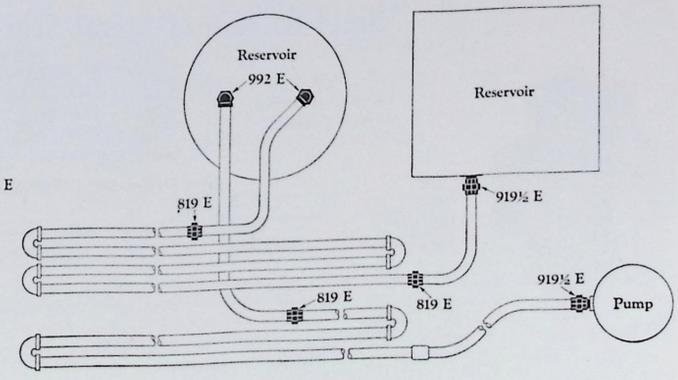


Above
Right Side Arrangement

Lower Left
End View of Right Side

Lower Right
Left Side Arrangement
Cooling Piping





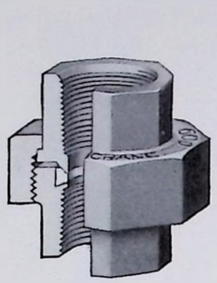
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asbestosclaims.law/library/21275/140

Forged Steel Unions

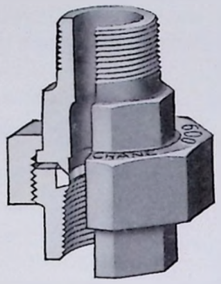
Ground Joint

WORKING PRESSURES, Pounds per Square Inch

	Steam or hot oil				Cold water, oil, or gas, non-shock
	500° F.	750° F.	850° F.	Pressure ratings at higher temperatures are furnished on application.	
Brass to Steel Seat	1150				2000
Steel to Steel Seat	1150	830	630		2000



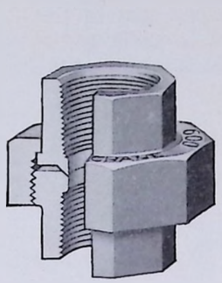
No. 250 H, Female



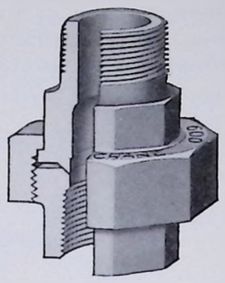
No. 253 H, Male and Female

Brass to Steel Seat

Tested 300 pounds air under water



No. 252 H, Female



No. 254 H, Male and Female

Steel to Steel Seat

List Prices and Dimensions

Size		Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 250 H or No. 252 H, Female	Black	Each	.30	.30	.40	.50	.60	.80	1.20	1.60	2.00	3.20	4.80
	Galv.	Each	.45	.45	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	7.20
No. 253 H or No. 254 H, Male and Female	Black	Each		.38	.50	.62	.75	1.00	1.50	2.00	2.50	4.00	6.00
	Galv.	Each		.53	.70	.87	1.05	1.40	2.10	2.80	3.50	5.60	8.40
End to end, Female		Inches	1 1/2	1 5/8	1 13/16	1 15/16	2 1/4	2 7/16	2 13/16	3	3 3/8	4	4 5/16
End to end, Male and Female		Inches		2 1/4	2 1/2	2 11/16	3 1/8	3 3/8	3 3/4	3 15/16	4 5/16	5 1/16	5 1/2

Service recommendations: These unions are recommended for high pressures and temperatures or for unusually severe service on steam, oil, water, air, or gas. Although light in weight, they are exceptionally tough and rugged.

Seat: The unions have steel to steel seats or steel to brass seats. In the former, the seats are integral with the end pieces. In the latter, a large brass ring is rolled under high pressure into the thread-piece; it will not loosen in service.

A.A.R. design; interchangeability: In design and dimensions, No. 250 H and No. 253 H Unions, sizes 1/4 to 3-inch, comply with the specifications of the Association of American Railroads for 300-pound unions. Their parts interchange with similar parts of the A.A.R. line, pages 240 to 242.

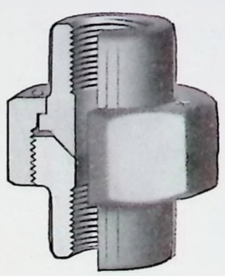
Identification of seat: Brass to steel seat unions are all-black. Steel to steel seat unions have a green union ring. Galvanized unions have no outside distinguishing marks.

Forged Unions

Steel to Monel Metal Seat

Ground Joint
Air Tested

WORKING PRESSURES
1500 pounds steam, 750° F.
1250 pounds steam, 800° F.
1000 pounds steam, 850° F.
6000 pounds cold water, oil, or gas, non-shock



No. 246 H
Female Union

List Prices and Dimensions

Size	Inches	1/4	3/8	1/2	3/4	1
No. 246 H	Each	3.30	4.00	4.80	6.00	9.50
End to end	Inches	1 13/16	2 1/8	2 7/16	2 13/16	3 9/16

For larger sizes, use No. 330 D or No. 331 D Flange Unions, page 249.

This is a heavy, superior quality union, made for very high pressures and temperatures. The thread-piece is forged monel metal; the tail-piece and union ring are forged steel. The monel metal part makes both the seat and the ring thread joint non-corrosive.

Thread Engagement . . . . page 367

Forged Steel Union Fittings

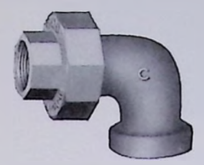
Ground Joint

WORKING PRESSURES, Pounds per Square Inch

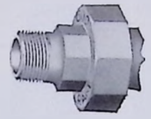
	Steam or hot oil			Cold water, oil, or gas, non-shock
	500° F.	750° F.	850° F.	
Brass to Steel Seat	1150			2000
Steel to Steel Seat	1150	830	630	2000

Pressure ratings at higher temperatures are furnished on application.

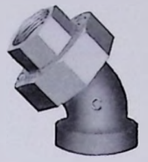
Tested 300 pounds air under water



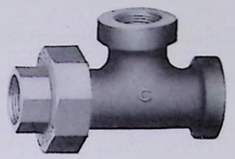
90° Elbow
Female Union
No. 290 H
Brass to Steel Seat
No. 390 H
Steel to Steel Seat



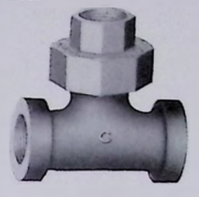
Male Union End



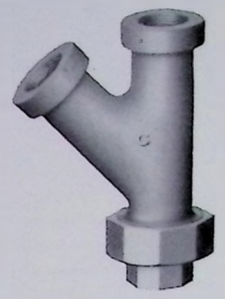
45° Elbow
Female Union
No. 291½ H
Brass to Steel Seat
No. 391½ H
Steel to Steel Seat



Tee
Female Union on Run
No. 294 H
Brass to Steel Seat
No. 394 H
Steel to Steel Seat



Tee
Female Union on Outlet
No. 298 H
Brass to Steel Seat
No. 398 H
Steel to Steel Seat



45° Y-Bend
Female Union on Run
No. 299 H
Brass to Steel Seat
No. 399 H
Steel to Steel Seat

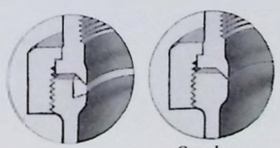
The union fittings illustrated above also are furnished with a male union end, as shown in the small illustration at the left. Catalogue numbers and list prices for both types are shown in the table below.

List Prices, Each

Type of Fitting	Style of Union	Brass to Steel Seat: Catalogue Number	Size, Inches 1/4	3/8	1/2	3/4	1	Steel to Steel Seat: Catalogue Number	Size, Inches 1/4	3/8	1/2	3/4	1
90° Elbows	Female	No. 290 H	1.80	2.00	2.25	2.60	3.25	No. 390 H	1.65	1.80	2.00	2.30	2.90
	Male	No. 292 H	2.05	2.30	2.65	3.10	3.85	No. 392 H	1.90	2.10	2.40	2.80	3.50
45° Elbows	Female	No. 291½ H	1.95	2.15	2.40	2.75	3.40	No. 391½ H	1.80	1.95	2.15	2.45	3.05
	Male	No. 293 H	2.20	2.45	2.80	3.25	4.00	No. 393 H	2.05	2.25	2.55	2.95	3.65
Tees with Union on Run	Female	No. 294 H	2.15	2.35	2.65	3.05	3.85	No. 394 H	2.00	2.15	2.40	2.75	3.50
	Male	No. 296 H	2.40	2.65	3.05	3.55	4.45	No. 396 H	2.25	2.45	2.80	3.25	4.10
Tees with Union on Outlet	Female	No. 298 H	2.15	2.35	2.65	3.05	3.85	No. 398 H	2.00	2.15	2.40	2.75	3.50
	Male	No. 298½ H	2.40	2.65	3.05	3.55	4.45	No. 398½ H	2.25	2.45	2.80	3.25	4.10
45° Y-Bends	Female	No. 299 H	2.40	2.65	3.05	3.55	4.45	No. 399 H	2.25	2.45	2.80	3.25	4.10
	Male	No. 299½ H	2.65	2.95	3.45	4.05	5.05	No. 399½ H	2.50	2.75	3.20	3.75	4.70

Service recommendations: Although light weight, these union fittings are exceptionally tough and rugged. They are recommended for high pressures and temperatures or for unusually severe service.

Seat: These union fittings have brass to steel or steel to steel ground joint seats. In the former, a large brass seat ring is rolled into the body under high pressure; it will not loosen in service. In the latter, the seats are integral.

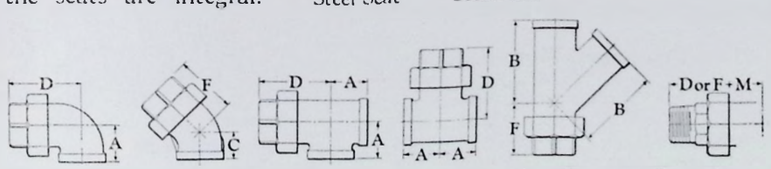


Brass to Steel Seat — Steel to Steel Seat

Interchangeability: The tail-pieces and union rings of these fittings interchange with those on the Nos. 250 H, 252 H, 253 H, and 254 H Forged Steel Unions shown on page 244.

Identification of seat: Brass to steel seat union fittings are all-black. Steel to steel seat union fittings have a green union ring.

Special union fittings: Forged Steel Ground Joint Union Fittings with unions on any or all ends can be made to order. Prices and dimensions are furnished on application.



For center-to-union-end dimension of fittings with male union, add dimension "M" to the center-to-union-end dimension ("D" or "F") of the fitting with female union. Other dimensions are alike.

Dimensions, in Inches

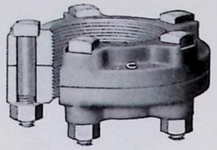
Size	1/4	3/8	1/2	3/4	1
A	1 3/16	1 3/8	1 1/2	1 13/16	2 1/16
B	2 7/16	2 13/16	3	3 3/4	4 1/4
C	3/4	7/8	15/16	1 1/8	1 1/4
D	2	2 1/4	2 7/16	2 7/8	3 1/4
F	1 9/16	1 3/4	1 7/8	2 3/16	2 7/16
M	5/8	11/16	3/4	7/8	15/16

Thread Engagement . . . page 367

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Cast Iron Flange Unions

Standard—Gasket Type



Standard
Faced, Plain Face

WORKING PRESSURES
125 pounds steam
175 pounds cold water or gas, non-shock

When sizes 14-inch and larger are required use two No. 553 Standard Cast Iron Companion Flanges (page 290) bolted together.

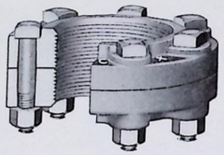
Each union is equipped with a rubber gasket.

Galvanized unions have galvanized bolts.

List Prices and Dimensions

Size	Inches	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12
Black	Each	.40	.46	.52	.64	.78	1.00	1.25	1.50	1.80	2.10	3.15	3.95	7.00	11.50	16.00
Galvanized	Each	.80	.92	1.04	1.28	1.56	2.00	2.50	3.00	3.60	4.20	6.30	7.90	14.00	23.00	32.00
End to end	Inches	1 3/16	1 5/16	1 7/16	1 9/16	1 11/16	1 13/16	2 5/16	2 7/16	2 9/16	2 11/16	2 15/16	3 1/16	3 9/16	3 15/16	4 5/16
Dia. of flanges	Inches	2¾	3⅜	3⅝	4⅛	4½	5⅛	5⅞	6⅝	7¼	7¾	9⅛	10⅜	12¾	15½	17⅞
No. and dia. of bolts		3-⅜	3-7/16	3-7/16	4-7/16	4-½	4-½	4-⅝	4-⅝	4-⅝	5-⅝	5-⅝	6-⅝	8-⅝	10-¾	12-¾

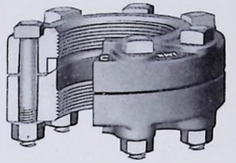
250-Pound Gasket Type or Ground Joint



No. 97 E
Gasket Type
Faced, Plain Face

WORKING PRESSURES
250 pounds steam
400 pounds cold water, oil, or gas, non-shock

Galvanized unions have galvanized bolts.



No. 99 E
Ground Joint—Brass to Iron Seat
Navy Pattern

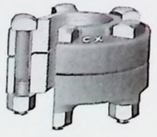
The No. 97 E Unions are equipped with a rubber gasket, suitable for steam, water, or gas service. For oil service, a Cranite gasket should be used. It is furnished only when ordered and is charged extra; see page 362 for list prices.

The No. 99 E Unions have a non-corrosive brass-to-iron ground joint seat; no gasket is needed. They can be taken apart and reassembled repeatedly without affecting their strength or tightness.

List Prices and Dimensions

Size		Inches	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
No. 97 E	Black	Each	.70	.70	.80	1.00	1.15	1.50	1.90	2.25	2.70	3.15	4.75	6.00	10.50
	Galvanized	Each	1.40	1.40	1.60	2.00	2.30	3.00	3.80	4.50	5.40	6.30	9.50	12.00	21.00
No. 99 E	Black	Each		.60	.80	1.20	1.60	2.00	3.20	4.80	6.00	7.50	10.00	12.50	18.00
	Galvanized	Each		.90	1.20	1.80	2.40	3.00	4.80	7.20	9.00	11.25	15.00	18.75	27.00
End to end, No. 97 E		Inches	1 5/16	1 5/16	1 7/16	1 11/16	1 13/16	2 1/16	2 3/16	2 7/16	2 11/16	2 13/16	2 15/16	3 1/16	3 9/16
End to end, No. 99 E		Inches		1 9/16	1¾	1 15/16	2⅛	2½	2⅝	2⅞	3⅛	3⅜	3⅜	3⅞	4½
Dia. of flanges		Inches	3¼	3¼	3⅝	4⅛	4⅝	5⅜	6	6¾	7½	8	9⅜	10⅞	13¼
No. and dia. of bolts			4-7/16	4-7/16	4-7/16	4-½	4-½	5-9/16	5-⅝	6-⅝	6-⅝	7-⅞	8-¾	9-¾	10-¾

5-Bolt Oil Country Pattern—Gasket Type



5-Bolt Oil Country Pattern
Not Faced.
Corrugated Face for Gasket

WORKING PRESSURE
600 pounds cold water, oil, or gas, non-shock

List Prices and Dimensions

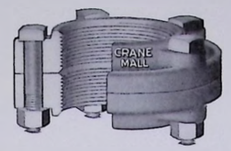
Size	Inches	2
Black	Each	1.85
End to end	Inches	2⅝
Dia. of flanges	Inches	5⅜
No. and dia. of bolts		5-⅝

The flanges of this union are rough, not faced. To afford a stronger grip on the gasket, the bearing surfaces are corrugated. Each union is equipped with a rubber gasket. For extra gaskets, see page 362.

Extra Gaskets . . . page 362

Malleable Iron Flange Unions

Standard—Gasket Type



Standard

Faced, Plain Face
Long Thread Type

WORKING PRESSURES
150 pounds steam
225 pounds cold water, oil, or gas, non-shock

Galvanized unions have galvanized bolts

Each union is equipped with a rubber gasket, suitable for steam, water, or gas service. For oil service, a Cranite gasket should be used. It is furnished only when ordered and is charged extra; see page 362 for list prices.

List Prices and Dimensions

Size	Inches	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12
Black	Each	1.40	1.60	2.00	2.50	3.00	3.50	4.40	5.25	6.00	8.00	9.00	18.00	33.00	46.00
Galvanized	Each	2.80	3.20	4.00	5.00	6.00	7.00	8.80	10.50	12.00	16.00	18.00	36.00	66.00	92.00
End to end	Inches	1⅛	1 7/16	1 9/16	1 13/16	2⅜	2⅞	2 15/16	3 1/16	3 3/16	3 3/8	3 3/16	4	4 7/16	4 13/16
Diameter of flanges	Inches	2⅞	3¼	3¾	4⅝	5⅛	5⅞	6⅝	7½	7¾	9⅜	10⅜	12¾	15½	17⅞
No. and dia. of bolts		3-⅜	4-⅜	4-7/16	4-½	4-½	4-⅝	4-⅝	4-⅝	5-⅝	5-⅝	6-⅝	8-⅝	10-¾	12-¾

These unions are heavier and have longer thread lengths than the ordinary commercial flange unions of this type. They have ample bolting and are sturdily constructed of a good quality malleable iron. Crane Standard Malleable Iron Flange Unions are recommended for all general steam, water, oil, or gas service. Because of the extra safety factor resulting from their greater weight and longer threads, they are especially suitable where ordinary unions are not entirely satisfactory, as in oil refineries.

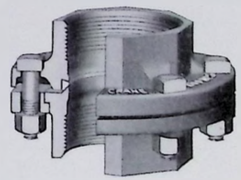
Extra Gaskets . . . page 362

Three Part—Ground Joint

Brass to Iron Seat
Ground Joint

Loose ring makes it easy to line up bolt holes.

WORKING PRESSURES
600 pounds cold water, oil, or gas, non-shock
Sizes 4-inch and smaller, 300 pounds steam
Sizes 5-inch and larger, 200 pounds steam



No. 775

List Prices and Dimensions

Size	Inches	2	2½	3	3½	4	5	6	8	10
No. 775, Black	Each	4.00	6.40	9.60	12.00	15.00	20.00	25.00	36.00	57.60
End to end	Inches	3 11/16	4⅛	4½	4 11/16	5	5⅜	5⅞	6⅞	8 3/16
Diameter of flanges	Inches	5¼	6 3/16	7 3/16	7¾	8⅜	9¾	11	14⅛	16⅞
No. and dia. of bolts		5-½	5-9/16	5-⅝	5-⅝	6-⅝	6-⅝	8-¾	10-⅝	12-1

Advantages of the three-part construction: The No. 775 Union has three major parts: flange-piece, tail-piece, and loose ring. The ring combined with the ball type seat assures tightness even when the pipe line is slightly out of alignment. In addition, being loose, the ring can be conveniently swiveled to any desired position to line up the bolt holes.

Brass to iron seat, ground joint: The brass to iron seat is non-corrosive, and the ground joint eliminates the need for a gasket. The brass seat ring is forced into the tail-piece under high pressure and will not loosen in service. The union can be taken apart and reassembled repeatedly without injuring its strength or seating qualities.

Loose ring painted yellow: The loose ring is painted yellow so that the union can be easily identified.

Test: Each union is given a thorough hydrostatic test.

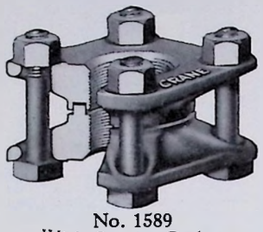
Additional sizes: In addition to the sizes listed above, 1, 1¼, and 1½-inch No. 775 Unions can be made to order; these are recommended for 200 pounds cold water, oil, or gas working pressure.

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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Tongue and Groove Flange Unions

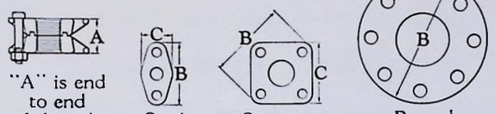
WORKING PRESSURES, Pounds per Square Inch

	Sizes	Steam or oil 500° F.	Ammonia	Cold water, oil, or gas, non-shock
No. 1589, No. 1591½, or No. 1529	¼ to 3-inch	300	300	1000
	3½ to 6-inch	300	300	600
	8 to 12-inch	250	300	500



No. 1589
With Cranite Gasket

¼ to 3-inch are forged steel;
3½ to 6-inch are malleable iron;
8 to 12-inch are Ferrosteel.

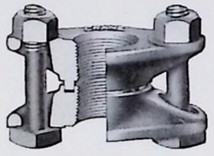


These are rugged, serviceable unions. They are made by bolting together a No. 1547 Tongue Flange and a No. 1545 Groove Flange. Each union is equipped with a Cranite gasket.

Reducing sizes are made to order; prices on application.

List Prices and Dimensions

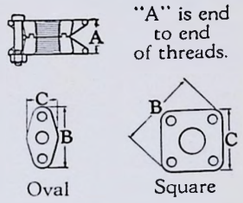
Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12
No. 1589	Each	.90	1.00	1.20	1.55	2.15	2.25	2.70	3.10	5.50	6.75	7.75	9.25	11.00	13.75	20.00	28.00	40.00
Style of flanges		Oval				Square					Round							
A	Inches	15/16	1½	111/16	113/16	2	2⅛	23/16	2¼	213/16	3	3¼	3⅜	3⅝	3⅞	3¾	43/16	49/16
B	Inches	3⅝	313/16	4	4¾	4½	5	6	6½	7½	8¼	9	10	11	12½	15	17½	20½
C	Inches	1⅝	1¾	2	2¼	39/16	315/16	411/16	51/16	513/16								
No. of bolts		2	2	2	2	4	4	4	4	4	8	8	8	8	12	12	16	16
Dia. of bolts	Inches	½	½	½	⅝	½	½	⅝	⅝	¾	¾	¾	¾	¾	¾	⅞	1	1⅛



No. 1591½
Forged Steel
With Cranite Gasket

List Prices and Dimensions

Size	Inches	1	1¼	2
No. 1591½	Each	1.50	1.75	2.80
Style of flanges		Oval		Square
A	Inches	2	2⅛	211/16
B	Inches	4¾	5¼	513/16
C	Inches	2⅝	3	4½
No. and dia. of bolts	Inches	2-⅝	2-⅝	4-⅝



These are unusually compact unions, equipped with a Cranite gasket. They are ideal for making up pipe coils with close centers and for other services where a good union joint must be made in a small space.

Forged Steel Combination Elbows

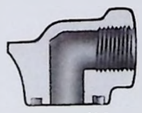


No. 1529, Complete
With Flange, Bolts,
and Cranite Gasket

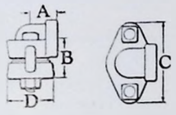
Furnished complete unless otherwise ordered

List Prices and Dimensions

Size	Inches	¼	⅜	½	¾	1	1¼
No. 1529, Complete	Each	1.40	1.55	1.85	2.20	2.60	3.90
No. 1529, Elbow only	Each	.85	.95	1.05	1.20	1.40	2.60
A	Inches	13/16	15/16	1⅛	15/16	17/16	1¾
B	Inches	1½	111/16	115/16	2⅛	2⅜	211/16
C	Inches	3⅝	313/16	4	4¾	4¾	5¼
D	Inches	1⅝	1¾	2	2¼	2⅝	3
No. and dia. of bolts	Inches	2-½	2-½	2-½	2-⅝	2-⅝	2-⅝



No. 1529
Elbow Only



Strong, compact connections are made conveniently and economically with these elbows. They are ideal where a union angle joint is needed in close quarters and for making meter, small by-pass, and similar connections.

When used in place of ordinary screwed fittings, the No. 1529 replaces an elbow, a nipple, and a flange, eliminating two joints. When used in place of a flanged elbow, it eliminates one gasket joint. In both cases, the No. 1529 takes up less space.

The flange portion is the No. 1547 on sizes ¾-inch and smaller and the tongue half of the No. 1591½ Union (shown above) on larger sizes.

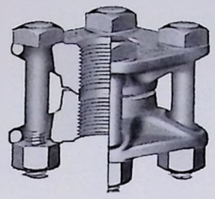
Extra Gaskets . . . page 362

2000, 6000, and 9000-Pound W.O.G.

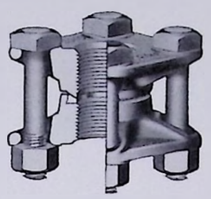
Forged Steel Ground Joint Flange Unions

WORKING PRESSURES, Pounds per Square Inch

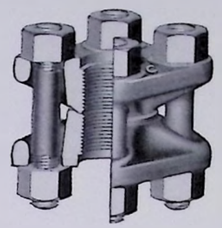
		Steam or hot oil				Cold water, oil, or gas, non-shock
		500°F.	750°F.	850°F.		
No. 328 D or No. 329 D, 2000-Pound		1150			Ratings at higher temperatures are furnished on application.	2000
No. 340 D, 2000-Pound		1150	830	630		2000
No. 330 D, 6000-Pound		3500				6000
No. 331 D	¼ to 2½", 9000-Pound	5250	3750	2850		9000
	3 to 6", 6000-Pound	3500	2500	1900		6000



Steel to Steel Seat
No. 328 D, 2000-Pound
No. 340 D, 2000-Pound
*Triplex Steel Bolt-Studs

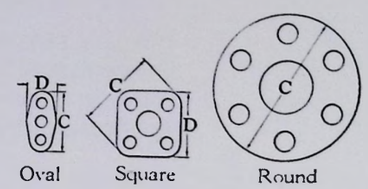


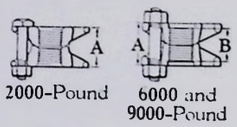
Brass to Steel Seat
No. 329 D, 2000-Pound



Steel to Steel Seat
No. 330 D, 6000-Pound
Cold Rolled Steel Bolt-Studs
No. 331 D
6000 and 9000-Pound
*Triplex Steel Bolt-Studs

*Triplex Steel Bolt-Studs are threaded full length and are fitted with a nut on each end.





List Prices and Dimensions

Size	List Prices					Dimensions, in Inches									
	2000-Pound			6000 and 9000-Pound		Nos. 328 D, 329 D, and 340 D					Nos. 330 D and 331 D				
Inches	No. 328 D Each	No. 329 D Each	No. 340 D Each	No. 330 D Each	No. 331 D Each	Style of flange	A	C	D	No. and dia. of bolts	Style of flange	A	B	C	D	No. and dia. of bolts
¼	1.60	1.85	2.05	6.00	7.50	Oval	1¾	3⅝	1⅝	2-½	Oval	2¼	111/16	3⅞	2	2-⅝
⅜	1.80	2.10	2.30	6.00	7.50		1⅞	313/16	1¾	2-½		2¼	111/16	3⅞	2	2-⅝
½	2.05	2.40	2.60	6.00	7.50		2	4	2	2-9/16		2¼	111/16	3⅞	2	2-⅝
¾	2.45	2.85	3.10	7.00	8.75		2⅛	4¾	2¼	2-¾	Square	2⅜	113/16	3⅝	3	4-9/16
1	2.90	3.35	3.70	8.00	10.00		2⅜	4¾	2⅝	2-¾		2½	2	4½	3⅝	4-⅝
1¼	3.40	3.90	4.35	9.00	11.25	Square	2⅝	5	315/16	4-⅝		2¾	23/16	5¼	4¼	4-¾
1½	3.90	4.50	5.00	10.00	12.50		2¾	6	411/16	4-⅝		2⅞	25/16	5⅞	4¾	4-⅞
2	4.40	5.10	5.70	16.00	20.00		2¾	6½	51/16	4-¾		311/16	3	6⅞	5½	4-1⅛
2½	7.70	8.90	9.90	29.00	36.25		3⅜	7½	513/16	4-⅞		315/16	3⅛	713/16	6¼	4-1¼
3	11.70	13.50	15.00	47.00	58.75	Round	3⅜	8¼		6-⅞	Round	4⅝	3⅞	9½		6-1¼
3½	14.30	16.50	19.00				3⅜	9		8-⅞						
4	17.60	20.25	23.50	72.00	90.00		3⅝	10		8-1		511/16	4⅝	11½		8-1⅜
5	21.00	24.25	28.25	110.00	138.00		3⅞	11		8-1⅛		6⅜	5⅜	13¾		10-1⅜
6	30.00	34.50	41.00	147.00	184.00		4	12½		10-1¼		6⅞	6	15		10-1⅝
8	45.00	52.00	61.00				4¾	15		10-1⅜						
10	65.00	75.00	87.00				5⅛	17½		12-1½						
12	86.00	100.00	115.00				5⅝	20½		14-1½						

Service recommendations: The 2000-Pound Unions are compact, yet amply strong. They are recommended especially for hydraulic lines. In addition, the No. 340 D, having Triplex Steel bolting, are suitable for high pressure-temperature service.

The 6000 and 9000-Pound Unions are made for the extreme pressures and temperatures encountered in some steam plants and oil refineries, and for very high hydraulic pressures. They are unusually massive and rugged, and they have liberal bolting.

Construction: These unions are forged from a high grade steel, especially selected for its strength and toughness. They have long thread lengths, and their ground joint holds pressure exceptionally well.

Bolting: The Nos. 328 D and 329 D sizes 6-inch and smaller have commercial bolts; larger sizes have cold rolled steel bolt-studs. The No. 330 D Unions have cold rolled steel bolt-studs.

Nos. 340 D and 331 D Unions have Triplex Steel bolt-studs, threaded full length, and fitted with medium carbon oil-quenched semi-finished hexagon steel nuts. Triplex Steel has excellent physical properties, its tensile strength being at least 130,000 pounds per square inch.

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Large Size Flange Unions
Made from Screwed Flanges

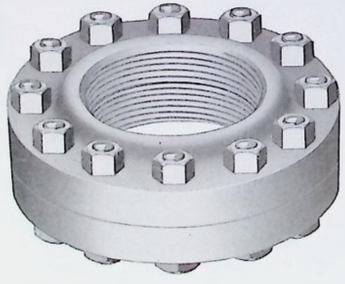
Although the Crane line of Flange Unions, shown on pages 246 to 249, is exceptionally complete, very large pipe lines may sometimes require sizes larger than those that are regularly listed. These can be conveniently and economically made by bolting together two screwed companion flanges.

For this purpose, the user can make an excellent selection from the complete line of Crane Screwed Flanges. It includes flanges made in a variety of metals, in a full range of sizes, and for every service requirement. See the pages referred to below:

25-Pound Cast Iron Flanges.....page 289
125-Pound Cast Iron, Ferrosteel, or Malleable Iron Flanges...pages 290 to 291
250-Pound Cast Iron or Ferrosteel Flanges.....pages 292 to 293
800-Pound Hydraulic Ferrosteel Flanges.....page 294
150-Pound Forged Steel Flanges.....page 332
300-Pound Forged Steel Flanges.....page 333
400-Pound Forged Steel Flanges.....page 334
600-Pound Forged Steel Flanges.....page 335

Machine Bolts.....page 354
Triplex Steel Bolt-Studs.....page 355

Gaskets.....pages 356 to 359



A Large Size Flange Union
Made by bolting together
two Crane Cast Iron Screwed Flanges
Complete with Bolts and Gasket

Brass Fittings

Standard Screwed Fittings.....pages 252 to 255
Nipples.....page 255
250-Pound Screwed Fittings.....pages 256 to 258
Plugs.....page 259
Bushings.....page 259
Screwed Unions and Union Fittings...pages 260 to 261
Flange Unions.....page 261
150-Pound Flanged Fittings.....page 262
150-Pound Companion Flanges.....page 262
300-Pound Flanged Fittings.....page 262
300-Pound Companion Flanges.....page 262

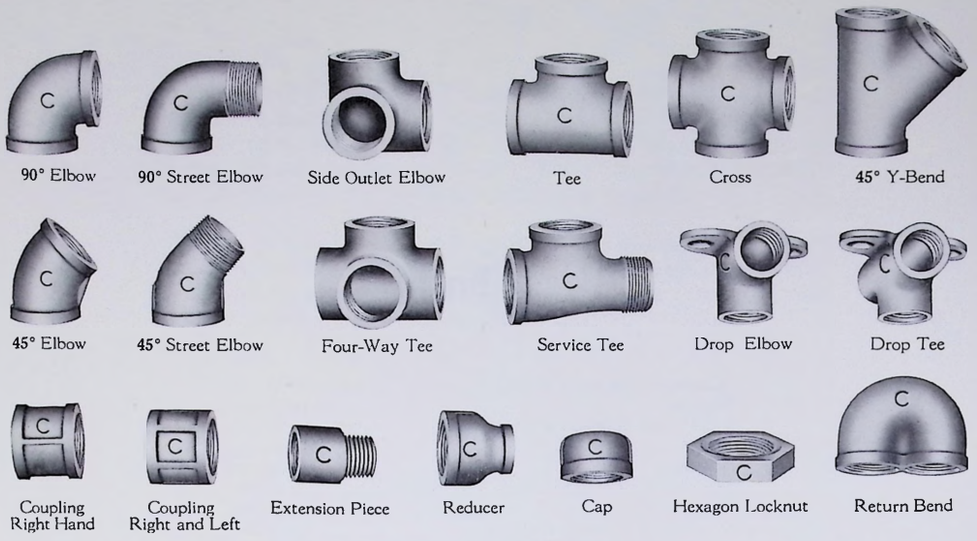
The fittings mentioned above constitute an exceptionally complete line for threaded or flanged joints.

In addition to these, Crane Co. offers a complete line of brass fittings with solder-joint ends for use with copper tubing. These are shown in the section of this catalogue devoted to Solder-Joint Valves and Fittings.

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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asbestosclaims.law/library/21275/144

Standard Brass Fittings

125 pounds steam working pressure



List Prices, Each, Rough

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
Elbows	90°, Straight	.12	.15	.20	.28	.40	.63	.90	1.20	2.00	3.50	6.00	8.00	10.00	25.00	40.00	80.00
	90°, Reducing (*)		.19	.25	.35	.50	.80	1.10	1.50	2.50	4.25	7.50	10.00	12.50	31.00	50.00	100.00
	90° Street	.25	.27	.33	.48	.63	.85	1.50	2.00	3.25	6.00	10.00	14.00	17.50			
	45°	.16	.20	.25	.31	.40	.63	.90	1.20	2.00	3.50	6.00	8.00	10.00	25.00	40.00	80.00
	45° Street	.25	.32	.38	.51	.63	.85	1.50	2.00	3.25							
	Side Outlet (Plain)		.45	.60	.85	1.20	1.90	2.75	3.60	6.00	10.50	18.00					
	Drop (Plain)			.35	.45	.65	1.05										
Tees	Straight	.17	.21	.28	.40	.55	.85	1.25	1.70	2.80	5.00	8.50	11.00	14.00	35.00	55.00	110.00
	Reducing (*)		.25	.35	.50	.70	1.05	1.55	2.10	3.50	6.25	10.50	14.00	17.50	44.00	70.00	140.00
	Service			.45	.65	.90	1.35	1.95	2.65	4.40							
	Four-Way (Plain)		.75	.90	1.20	1.65	2.50	3.75	5.00	8.50							
	Drop (Plain)			.43	.57	.80	1.25										
Crosses	Straight	.25	.30	.40	.55	.80	1.25	1.80	2.40	4.00	7.00	12.00	16.00	20.00	50.00	80.00	160.00
	Reducing (*)		.38	.50	.70	1.00	1.55	2.25	3.00	5.00	8.75	15.00	20.00	25.00	63.00	100.00	200.00
Couplings	Right Hand	.10	.13	.17	.25	.37	.55	.80	1.00	1.60	2.50	3.50	5.25	7.00	15.00	23.00	48.00
	Right & Left	.13	.17	.22	.30	.45	.70	1.00	1.30	2.00	3.10	4.50					
45° Y-Bends				.60	.75	1.10	1.65	2.50	3.30	5.50	9.50	16.00		26.00			
Reducers (*)			.15	.20	.28	.40	.60	.90	1.10	1.75	2.75	4.00	6.00	8.00	19.00	29.00	60.00
Extension Pieces (Plain)				.40	.55	.80	1.20	1.80	2.40	3.25							
Caps		.10	.13	.16	.20	.30	.42	.60	.80	1.25	2.50	3.50	5.50	7.00	15.00	23.00	48.00
Hexagon Locknuts		.10	.10	.12	.15	.20	.28	.40	.55	.80	1.75	2.75	4.00	5.00	8.00	12.00	30.00

Return Bends		Close Pattern						Open Pattern							
Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Center to center	Inches	1	1 1/4	1 1/2	1 3/4	2 3/16	2 5/8	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5
Price		.70	1.00	1.25	1.80	2.50	4.25	.80	1.10	1.40	2.15	3.00	4.75	8.25	11.00

*Reducing sizes: Rough Brass Reducing 90° Elbows, Reducing Tees, Reducing Crosses, and Reducers are carried in stock in the sizes shown on the opposite page; these sizes are furnished at the "Reducing" list prices shown above.

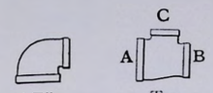
Rough Brass Reducing 90° Elbows, Reducing Tees, Reducing Crosses, and Reducers not carried in stock can be made to order, at an advance of 25 per cent over "Reducing" list prices.

Right and Left: Right and Left 90° Elbows and Right and Left Return Bends will be furnished at an advance of 25 per cent over the above list prices.

Brass Plugs ..... *page 259*
Brass Bushings ..... *page 259*
Brass Nipples ..... *page 255*
Brass Unions ..... *pages 260 and 261*

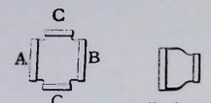
Standard Brass Fittings

Rough Brass Reducing Fittings Carried in Stock



Rough Brass Reducing 90° Elbows, Reducing Tees, Reducing Crosses, and Reducers are carried in stock in the sizes shown in the table below; these sizes are furnished at the "Reducing" list prices shown on the preceding page.

Rough Brass Reducing 90° Elbows, Reducing Tees, Reducing Crosses, and Reducers not carried in stock can be made to order, at an advance of 25 per cent over "Reducing" list prices.



90° Elbows
1/4 x 1/8
3/8 x 1/4
3/8 x 1/8
1/2 x 3/8
1/2 x 1/4
3/4 x 1/2
3/4 x 3/8
3/4 x 1/4
1 x 3/4
1 x 1/2
1 x 3/8
1 1/4 x 1
1 1/4 x 3/4
1 1/4 x 1/2
1 1/2 x 1 1/4
1 1/2 x 1
1 1/2 x 3/4
2 x 1 1/2
2 x 1 1/4
2 x 1
2 x 3/4
2 1/2 x 2
2 1/2 x 1 1/2
3 x 2 1/2
3 x 2
3 x 1
3 1/2 x 3
4 x 3 1/2
4 x 3
4 x 2
4 x 1 1/2
5 x 4
5 x 3
6 x 5
6 x 4
6 x 2 1/2
8 x 6

Tees									
A	B	C	A	B	C	A	B	C
1/4	x 1/4	x 1/8	1 1/4	x 1/2	x 1 1/4	2 1/2	x 2 1/2	x 2
1/8	x 1/8	x 1/4	1 1/4	x 1/2	x 1	2 1/2	x 2 1/2	x 1 1/2
3/8	x 3/8	x 1/4	1 1/4	x 3/8	x 1 1/4	2 1/2	x 2 1/2	x 1 1/4
3/8	x 3/8	x 1/8	1	x 1	x 1 1/4	2 1/2	x 2 1/2	x 1
3/8	x 1/4	x 3/8	1	x 3/4	x 1 1/4	2 1/2	x 2 1/2	x 3/4
3/8	x 1/4	x 1/4	3/4	x 3/4	x 1 1/4	2 1/2	x 2	x 2 1/2
1/4	x 1/4	x 3/8	1 1/2	x 1 1/2	x 1 1/4	2 1/2	x 2	x 2
1/2	x 1/2	x 3/8	1 1/2	x 1 1/2	x 1	2 1/2	x 2	x 1 1/2
1/2	x 1/2	x 1/4	1 1/2	x 1 1/2	x 3/4	2 1/2	x 1 1/2	x 2 1/2
1/2	x 1/2	x 1/8	1 1/2	x 1 1/2	x 1/2	2 1/2	x 1 1/4	x 1 1/4
1/2	x 3/8	x 1/2	1 1/2	x 1 1/2	x 3/8	2 1/2	x 1 1/4	x 1
1/2	x 3/8	x 3/8	1 1/2	x 1 1/4	x 1 1/2	2	x 2	x 2 1/2
1/2	x 3/8	x 1/4	1 1/2	x 1 1/4	x 1 1/4	3	x 3	x 2 1/2
1/2	x 1/4	x 1/2	1 1/2	x 1 1/4	x 1	3	x 3	x 2
1/2	x 1/4	x 1/4	1 1/2	x 1 1/4	x 3/4	3	x 3	x 1 1/2
3/8	x 3/8	x 1/2	1 1/2	x 1 1/4	x 1/2	3	x 3	x 1 1/4
3/4	x 3/4	x 1/2	1 1/2	x 1	x 1 1/2	3	x 3	x 1
3/4	x 3/4	x 3/8	1 1/2	x 1	x 1 1/4	3	x 3	x 3/4
3/4	x 3/4	x 1/4	1 1/2	x 1	x 1	3	x 2 1/2	x 3
3/4	x 1/2	x 3/4	1 1/2	x 1	x 3/4	3	x 2 1/2	x 2 1/2
3/4	x 1/2	x 1/2	1 1/2	x 3/4	x 1 1/2	3	x 2	x 2
3/4	x 1/2	x 3/8	1 1/2	x 3/4	x 1 1/4	3	x 2	x 3
3/4	x 3/8	x 3/4	1 1/2	x 3/4	x 1	3	x 2	x 2 1/2
3/4	x 3/8	x 1/2	1 1/2	x 3/4	x 3/4	3	x 2	x 2
3/4	x 3/8	x 3/8	1 1/2	x 1/2	x 1 1/2	3	x 1	x 3
3/4	x 1/4	x 3/4	1 1/2	x 3/8	x 1 1/2	2 1/2	x 2 1/2	x 3
1/2	x 1/2	x 3/4	1 1/4	x 1 1/2	x 1 1/2	2	x 2	x 3
1/2	x 3/8	x 3/4	1 1/4	x 1	x 1 1/2	3 1/2	x 3 1/2	x 3
3/8	x 3/8	x 3/4	1	x 1	x 1 1/2	3 1/2	x 3 1/2	x 2 1/2
1	x 1	x 3/4	2	x 2	x 1 1/2	4	x 4	x 3 1/2
1	x 1	x 1/2	2	x 2	x 1 1/4	4	x 4	x 3
1	x 1	x 3/8	2	x 2	x 1	4	x 4	x 2 1/2
1	x 1	x 1/4	2	x 2	x 3/4	4	x 4	x 2
1	x 3/4	x 1	2	x 2	x 1/2	4	x 4	x 1 1/2
1	x 3/4	x 3/4	2	x 2	x 3/8	4	x 4	x 1 1/4
1	x 3/4	x 1/2	2	x 1 1/2	x 2	4	x 4	x 1
1	x 3/4	x 3/8	2	x 1 1/2	x 1 1/2	4	x 3	x 4
1	x 1/2	x 1	2	x 1 1/2	x 1 1/4	4	x 3	x 3
1	x 1/2	x 3/4	2	x 1 1/2	x 1	3	x 3	x 4
1	x 1/2	x 1/2	2	x 1 1/4	x 2	5	x 5	x 4
1	x 3/8	x 1	2	x 1 1/4	x 1 1/2	5	x 5	x 3
3/4	x 3/4	x 1	2	x 1 1/4	x 1 1/4	5	x 5	x 2
3/4	x 1/2	x 1	2	x 1 1/4	x 1/2	6	x 6	x 5
1/2	x 1/2	x 1	2	x 1	x 2	6	x 6	x 4
1 1/4	x 1 1/4	x 1	2	x 1	x 1 1/2	6	x 6	x 3
1 1/4	x 1 1/4	x 3/4	2	x 1	x 1 1/4	6	x 6	x 2 1/2
1 1/4	x 1 1/4	x 1/2	2	x 1	x 1	6	x 6	x 2
1 1/4	x 1 1/4	x 3/8	2	x 3/4	x 2	6	x 4	x 6
1 1/4	x 1	x 1 1/4	2	x 1/2	x 2	8	x 8	x 6
1 1/4	x 1	x 1	2	x 3/8	x 2	8	x 8	x 4
1 1/4	x 1	x 3/4	1 1/2	x 1 1/2	x 2	8	x 8	x 3
1 1/4	x 1	x 1/2	1 1/2	x 1 1/4	x 2			
1 1/4	x 3/4	x 1 1/4	1 1/4	x 1 1/4	x 2			
1 1/4	x 3/4	x 1	1	x 1	x 2			
1 1/4	x 3/4	x 3/4	3/4	x 3/4	x 2			

Crosses		
A	B	C
1/4	x 1/4	x 1/8
3/8	x 3/8	x 1/4
1/2	x 1/2	x 3/8
1/2	x 1/2	x 1/4
3/4	x 3/4	x 1/2
3/4	x 3/4	x 3/8
1	x 1	x 3/4
1	x 1	x 1/2
1	x 1	x 3/8
1 1/4	x 1 1/4	x 1
1 1/4	x 1 1/4	x 3/4
1 1/4	x 1 1/4	x 1/2
1 1/4	x 1 1/4	x 3/8
1 1/4	x 1	x 1
1 1/4	x 1	x 3/4
1 1/2	x 1 1/2	x 1 1/4
1 1/2	x 1 1/2	x 1
1 1/2	x 1 1/2	x 3/4
1 1/2	x 1 1/2	x 1/2
1 1/2	x 1 1/4	x 1 1/2
2	x 2	x 1 1/2
2	x 2	x 1 1/4
2	x 2	x 1
2	x 2	x 3/4
2	x 2	x 1/2
2	x 1 1/2	x 2
2	x 1 1/2	x 1 1/2
2	x 1 1/2	x 1 1/4
2	x 1 1/4	x 2
2	x 1 1/4	x 1 1/2
2	x 1 1/4	x 1 1/4
2	x 1 1/4	x 1/2
2	x 1	x 2
2	x 1	x 1 1/2
2	x 1	x 1 1/4
2	x 1	x 1
2	x 3/4	x 2
2	x 1/2	x 2
2	x 3/8	x 2
1 1/2	x 1 1/2	x 2
1 1/2	x 1 1/4	x 2
1 1/4	x 1 1/4	x 2
1	x 1	x 2
3/4	x 3/4	x 2

Reducers
1/4 x 1/8
3/8 x 1/4
3/8 x 1/8
1/2 x 3/8
1/2 x 1/4
3/4 x 1/2
3/4 x 3/8
3/4 x 1/4
3/4 x 1/8
1 x 3/4
1 x 1/2
1 x 3/8
1 x 1/4
1 1/4 x 1
1 1/4 x 3/4
1 1/4 x 1/2
1 1/4 x 3/8
1 1/4 x 1/4
1 1/2 x 1 1/4
1 1/2 x 1
1 1/2 x 3/4
1 1/2 x 1/2
1 1/2 x 3/8
1 1/2 x 1/4
2 x 1 1/2
2 x 1 1/4
2 x 1
2 x 3/4
2 x 1/2
2 x 3/8
2 x 1/4
2 1/2 x 2
2 1/2 x 1 1/2
2 1/2 x 1 1/4
2 1/2 x 1
3 x 2 1/2
3 x 2
3 x 1 1/2
3 x 1 1/4
3 x 1
3 1/2 x 3
3 1/2 x 2 1/2
4 x 3 1/2
4 x 3
4 x 2 1/2
4 x 2
4 x 1 1/2
4 x 1 1/4
4 x 1
5 x 4
5 x 3
5 x 2
6 x 5
6 x 4
6 x 3
6 x 2
8 x 6

Special finishes: Sizes 4-inch and smaller in the above table can be furnished Polished, Polished and Nickel-Plated, Polished and Chromium-Plated, or Rough Tinned. See pages 254 and 255 for prices.

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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Standard Brass Fittings

List Prices, Each, Polished

Size — Inches		⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Elbows	90°, Straight	.30	.35	.45	.56	.75	1.10	1.55	2.00	3.00	5.50	9.00	14.00	17.50
	90°, Reducing (*)		.44	.55	.70	.95	1.40	1.90	2.50	3.75	6.75	11.25	17.50	22.00
	90° Street	.47	.52	.63	.83	1.08	1.45	2.30	3.00	4.50	8.50	13.75	18.00	22.00
	45°	.38	.45	.55	.66	.85	1.23	1.70	2.20	3.25	6.00	9.75	15.50	19.50
	45° Street	.47	.57	.68	.86	1.08	1.45	2.30	3.00	4.50				
	Side Outlet (Plain)		1.05	1.35	1.70	2.25	3.30	4.70	6.00	9.00	16.50	27.00		
	Drop (Plain)			.85	1.05	1.40	2.00							
Tees	Straight	.42	.49	.63	.80	1.05	1.50	2.15	2.80	4.20	7.75	12.75	19.50	24.50
	Reducing (*)		.60	.77	1.00	1.30	1.85	2.65	3.50	5.25	9.75	15.80	24.50	30.50
	Service			.95	1.30	1.80	2.45	3.60	4.50	6.60				
	Four-Way (Plain)		1.40	1.65	2.05	2.70	3.90	5.70	7.40	11.50				
	Drop (Plain)			1.13	1.37	1.80	2.55							
Crosses	Straight	.60	.70	.90	1.10	1.50	2.20	3.10	4.00	6.00	11.00	18.00	28.00	35.00
	Reducing (*)		.88	1.10	1.40	1.85	2.75	3.85	5.00	7.50	13.75	22.50	35.00	44.00
Couplings	Right Hand	.24	.28	.36	.46	.63	.90	1.30	1.60	2.35	4.00	5.75	9.75	12.50
	Right & Left	.31	.37	.47	.58	.80	1.15	1.65	2.10	3.00	5.10	7.50		
45° Y-Bends				1.35	1.60	2.15	3.05	4.45	5.70	8.50	15.50	25.00		41.00
Reducers (*)			.35	.45	.56	.75	1.05	1.55	1.90	2.75	4.75	7.00	12.00	15.50
Extension Pieces (Plain)				.65	.85	1.15	1.65	2.35	3.05	4.00				
Caps		.20	.25	.31	.40	.55	.77	1.10	1.50	2.25	4.00	5.50	8.00	10.00
Hexagon Locknuts		.24	.25	.32	.40	.50	.65	.85	1.10	1.60	3.25	4.75	6.50	8.00

Return Bends	Size — Inches	Close Pattern ½	¾	1	1¼	1½	2	Open Pattern ½	¾	1	1¼	1½	2	2½	3
	Center to center — Inches	1	1¼	1½	1¾	2 3/16	2⅝	1½	2	2½	3	3½	4	4½	5
	Price	1.55	2.05	2.65	3.75	4.90	7.25	1.65	2.15	2.80	4.10	5.40	7.75	14.25	20.00

List Prices, Each, Polished and Nickel-Plated

Size — Inches		⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Elbows	90°, Straight	.36	.42	.53	.65	.87	1.25	1.75	2.25	3.35	6.15	10.00	16.00	20.00
	90°, Reducing (*)		.52	.65	.82	1.10	1.60	2.15	2.85	4.15	7.60	12.50	20.00	25.00
	90° Street	.54	.60	.73	.95	1.23	1.65	2.55	3.35	4.90	9.35	15.00	21.00	26.00
	45°	.45	.53	.65	.78	1.00	1.43	1.95	2.55	3.65	6.85	11.00	18.00	22.50
	45° Street	.54	.65	.78	.98	1.23	1.65	2.55	3.35	4.90				
	Side Outlet (Plain)		1.25	1.60	2.00	2.60	3.75	5.35	6.80	10.00	18.50	30.00		
	Drop (Plain)			1.00	1.25	1.65	2.30							
Tees	Straight	.50	.58	.75	.93	1.22	1.70	2.45	3.15	4.65	8.65	14.00	22.30	28.00
	Reducing (*)		.72	.90	1.15	1.50	2.10	3.00	3.95	5.85	10.90	17.50	28.00	35.00
	Service			1.20	1.65	2.25	3.05	4.50	5.65	8.25				
	Four-Way (Plain)		1.60	1.90	2.35	3.05	4.35	6.35	8.20	12.50				
	Drop (Plain)			1.33	1.62	2.15	2.95							
Crosses	Straight	.72	.84	1.05	1.30	1.75	2.50	3.50	4.50	6.70	12.30	20.00	32.00	40.00
	Reducing (*)		1.05	1.30	1.65	2.15	3.15	4.35	5.70	8.30	15.40	25.00	40.00	50.00
Couplings	Right Hand	.29	.33	.42	.53	.72	1.00	1.45	1.80	2.60	4.50	6.50	11.25	14.25
	Right & Left	.37	.44	.55	.67	.92	1.30	1.85	2.35	3.35	5.75	8.50		
45° Y-Bends				1.60	1.90	2.50	3.50	5.10	6.50	9.50	17.50	28.00		46.00
Reducers (*)			.42	.53	.65	.87	1.20	1.75	2.15	3.10	5.40	8.00	14.00	18.00
Extension Pieces (Plain)				.75	.95	1.30	1.85	2.60	3.50	4.50				
Caps		.23	.29	.36	.47	.63	.89	1.25	1.75	2.60	4.50	6.15	8.85	11.00
Hexagon Locknuts		.29	.30	.39	.48	.60	.77	1.00	1.30	1.85	3.75	5.40	7.35	9.00

Return Bends	Size — Inches	Close Pattern ½	¾	1	1¼	1½	2	Open Pattern ½	¾	1	1¼	1½	2	2½	3
	Center to center — Inches	1	1¼	1½	1¾	2 3/16	2⅝	1½	2	2½	3	3½	4	4½	5
	Price	1.85	2.40	3.10	4.40	5.70	8.25	1.95	2.50	3.25	4.75	6.20	8.75	16.25	23.00

***Reducing sizes:** Polished, or Polished and Nickel-Plated Reducing 90° Elbows, Reducing Tees, Reducing Crosses, and Reducers, 4-inch and smaller, are regularly furnished in the sizes listed on page 253, at the "Reducing" list prices; other reductions can be made to order, at an advance of 25 per cent over "Reducing" list prices.

Right and Left: Right and Left 90° Elbows and Right and Left Return Bends will be furnished at an advance of 25 per cent over the above list prices.

Chromium-Plated fittings: Polished and Chromium-Plated fittings can be made to order, at an advance in price over Polished and Nickel-Plated. See the Crane Discount Sheet for prices.

Brass Plugs ..... *page 259* *Brass Bushings* ... *page 259* *Brass Unions* ... *pages 260 and 261*

Standard Brass Fittings

List Prices, Each, Rough Tinned

Size — Inches		⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Elbows	90°, Straight	.22	.25	.33	.43	.60	.93	1.25	1.60	2.60	4.30	7.50	10.00	12.50
	90°, Reducing (*)		.29	.38	.50	.70	1.10	1.45	1.90	3.10	5.00	9.00	12.00	15.00
	90° Street	.35	.37	.46	.63	.83	1.15	1.85	2.40	3.85	6.80	11.50	16.00	20.00
	45°	.26	.30	.38	.46	.60	.93	1.25	1.60	2.60	4.30	7.50	10.00	12.50
	45° Street	.35	.42	.51	.66	.83	1.15	1.85	2.40	3.85				
	Side Outlet (Plain)		.60	.75	1.05	1.45	2.25	3.20	4.10	6.75	11.50	19.85		
	Drop (Plain)			.50	.65	.90	1.40							
Tees	Straight	.29	.33	.43	.60	.80	1.20	1.70	2.20	3.55	6.00	10.35	13.50	17.00
	Reducing (*)		.37	.50	.70	.95	1.40	2.00	2.60	4.25	7.25	12.35	16.50	20.50
	Service			.65	.90	1.25	1.85	2.60	3.50	5.50				
	Four-Way (Plain)		.90	1.10	1.45	1.95	2.95	4.30	5.60	9.40				
	Drop (Plain)			.63	.82	1.10	1.70							
Crosses	Straight	.40	.45	.60	.80	1.10	1.70	2.35	3.00	4.90	8.20	14.25	19.00	23.75
	Reducing (*)		.53	.70	.95	1.30	2.00	2.80	3.60	5.90	10.00	17.25	23.00	28.75
Couplings	Right Hand	.20	.23	.30	.40	.57	.85	1.15	1.40	2.20	3.30	5.00	7.25	9.50
	Right & Left	.23	.27	.35	.45	.65	1.00	1.35	1.70	2.60	3.90	6.00		
45° Y-Bends				.85	1.05	1.50	2.25	3.20	4.10	6.70	11.00	19.00		31.00
Reducers (*)			.25	.33	.43	.60	.90	1.25	1.50	2.35	3.55	5.50	8.00	10.50
Extension Pieces (Plain)				.55	.70	1.00	1.45	2.10	2.75	3.65				
Caps		.15	.18	.22	.28	.40	.57	.80	1.00	1.55	2.90	4.25	6.50	8.25
Hexagon Locknuts		.15	.15	.18	.23	.30	.43	.60	.75	1.10	2.15	3.50	5.00	6.25

Return Bends	Size — Inches	Close Pattern ½	¾	1	1¼	1½	2	Open Pattern ½	¾	1	1¼	1½	2	2½	3
	Center to center — Inches	1	1¼	1½	1¾	2 3/16	2⅝	1½	2	2½	3	3½	4	4½	5
	Price	1.00	1.40	1.85	2.50	3.30	5.45	1.10	1.50	2.00	2.85	3.80	5.95	9.85	14.00

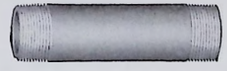
***Reducing sizes:** Rough Tinned Reducing 90° Elbows, Reducing Tees, Reducing Crosses, and Reducers, 4-inch and smaller, are regularly furnished in the sizes listed on page 253, at the "Reducing" list prices; other reductions can be made to order, at an advance of 25 per cent over "Reducing" list prices.

Right and Left: Right and Left 90° Elbows and Right and Left Return Bends will be furnished at an advance of 25 per cent over the above list prices.

Brass Nipples



Close Nipple



Long Nipple

List Prices

Size	Length Close	Close Each	Length of Long Nipples, Inches 1½	2	2½	3	3½	4	4½	5	5½	6	6½ to 12
⅛	¾	.11	.13	.15	.17	.19	.21	.23	.25	.27	.29	.31	
¼	⅞	.13	.16	.19	.22	.25	.28	.31	.34	.37	.40	.43	
⅜	1	.15	.19	.23	.27	.31	.35	.39	.43	.47	.51	.55	
½	1⅛	.23	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	
¾	1⅜	.28		.35	.42	.49	.56	.63	.70	.77	.84	.91	
1	1½	.37		.44	.53	.62	.71	.80	.89	.98	1.07	1.16	
1¼	1⅝	.60			.75	.88	1.01	1.14	1.27	1.40	1.53	1.66	
1½	1¾	.70			.90	1.05	1.20	1.35	1.50	1.65	1.80	1.95	
2	2	1.00			1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	
2½	2½	1.70				2.00	2.30	2.60	2.90	3.20	3.50	3.80	
3	2⅝	2.50				2.90	3.30	3.70	4.10	4.50	4.90	5.30	
3½	2¾	4.00						5.40	6.00	6.60	7.20	7.80	
4	2⅞	4.75						6.15	6.85	7.55	8.25	8.95	
5	3	8.50							10.60	11.65	12.70	13.75	
6	3⅛	11.50							14.10	15.40	16.70	18.00	

Add the proportionate advance per inch.

For special nipples, add the following advances to the list prices shown in the table:

Right & Left	50%
Extra Strong	100%
Polished	50%
Copper	25%
Red Brass	25%
Nickel-plated	75%
Chromium-plated	100%
Tinned	75%

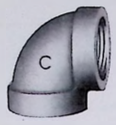
Brass Plugs ..... *page 259*
Brass Bushings ..... *page 259*
Brass Unions ..... *pages 260 and 261*

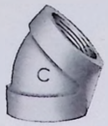
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asbestosclaims.law/library/21275/146

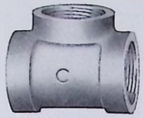
250-Pound Brass Fittings

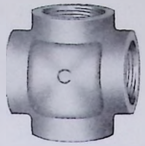
WORKING PRESSURES
250 pounds saturated steam
400 pounds cold water, oil, or gas, non-shock

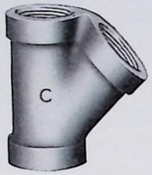
Air Tested


90° Elbow


45° Elbow


Tee

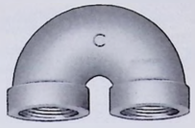

Cross


45° Y-Bend


Coupling


Reducer


Cap


Return Bend

List Prices, Each, Rough

Size		Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
Elbows	90°, Straight		.33	.45	.65	1.00	1.50	2.25	3.00	4.50	8.00	11.25	16.00	22.00	40.00	55.00	110.00
	90°, Reducing (*)				.75	1.20	1.80	2.60	3.50	5.25	9.00	13.00	19.00	25.00	45.00	65.00	130.00
	45°		.45	.55	.75	1.10	1.65	2.50	3.25	4.50	8.00	11.25	16.00	22.00	40.00	55.00	110.00
Tees	Straight		.45	.60	.90	1.35	2.00	3.00	4.00	6.00	10.75	15.00	22.00	30.00	53.00	75.00	150.00
	Reducing (*)				1.05	1.55	2.30	3.50	4.50	6.75	12.00	17.00	25.00	35.00	65.00	90.00	180.00
Crosses	Straight		.70	.90	1.30	2.00	3.00	4.50	6.00	9.00	16.00	22.50	28.00	37.00	68.00	100.00	200.00
	Reducing (*)					2.40	3.60	5.25	7.00	10.50	18.00	26.00	32.00	42.00	80.00	120.00	240.00
45° Y-Bends					1.50	2.50	3.50	5.50	7.25	11.00	19.00	27.00	33.00	45.00	70.00	90.00	
Couplings			.40	.50	.70	1.10	1.65	2.25	3.00	4.50	7.00	10.00	13.00	17.00	27.00	40.00	75.00
Reducers (*)						1.35	2.00	2.70	3.60	5.50	8.50	12.00	16.00	20.00	32.00	48.00	80.00
Caps										4.50	7.00	10.00	13.00	17.00	27.00	35.00	66.00

List Prices, Return Bends, Rough

Size		Inches	½	¾	1	1¼	1½	2	2½	3	4
Close Pattern	Center to center	Inches	1¼	1½	1¾	2¼	2½	3¼	3¾	4¼	6
	Price	Each	1.65	2.50	3.50	5.00	7.00	10.00	16.00	22.00	40.00
Open Pattern	Center to center	Inches		1⅞	2½	3	3½	4½	5½	6½	7½
	Price	Each		2.75	4.00	5.50	8.00	11.00	18.00	25.00	45.00

***Reducing sizes:** Rough Brass Reducing 90° Elbows, Reducing Tees, Reducing Crosses, and Reducers are carried in stock in the sizes shown on the opposite page; these sizes are furnished at the "Reducing" list prices shown above.

Rough Brass Reducing 90° Elbows, Reducing Tees, and Reducing Crosses not carried in stock can be made to order, at an advance of 25 per cent over "Reducing" list prices.

Rough Brass Reducers not carried in stock can be made to order at an advance of 16⅔ per cent over above list prices.

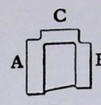
Right and Left: Right and Left 90° Elbows and Right and Left Return Bends will be furnished at an advance of 20 per cent over the above list prices.

Brass Plugs ..... *page 259*
Brass Bushings ..... *page 259*
Brass Locknuts ..... *page 252*
Brass Nipples ..... *page 255*
Brass Unions ..... *pages 260 and 261*

250-Pound Brass Fittings

Rough Brass Reducing Fittings Carried in Stock

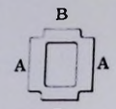

90° Elbow



Tee

Rough Brass Reducing 90° Elbows, Reducing Tees, Reducing Crosses, and Reducers are carried in stock in the sizes shown in the following table. Sizes not carried in stock can be made to order.

See the preceding page for prices.



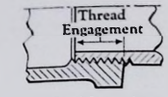
Cross


Reducer

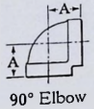
90° Elbows	Tees				Crosses	Reducers
	A B C	A B C	A B C	A B C	A B	
½ x ⅜	½ x ½ x ⅜	1¼ x 1¼ x 1	2 x 2 x 1½	3 x 3 x 2½	¾ x ½	¾ x ½
¾ x ½	½ x ⅝ x ½	1¼ x 1¼ x ¾	2 x 2 x 1¼	3 x 3 x 2	1 x ¾	¾ x ⅜
1 x ¾	½ x ⅜ x ⅜	1¼ x 1¼ x ½	2 x 2 x 1	3 x 3 x 1½	1¼ x 1	1 x ¾
1 x ½	⅜ x ⅜ x ½	1¼ x 1 x 1¼	2 x 2 x ¾	3 x 3 x 1¼	1¼ x ¾	1 x ½
1¼ x 1	¾ x ¾ x ½	1¼ x 1 x 1	2 x 2 x ½	3 x 3 x 1	1½ x 1¼	1¼ x 1
1¼ x ¾	¾ x ¾ x ⅜	1¼ x 1 x ¾	2 x 1½ x 2	3 x 2½ x 3	1½ x 1	1½ x 1¼
1½ x 1¼	¾ x ½ x ¾	1¼ x 1 x ½	2 x 1½ x 1½	3 x 2 x 3	1½ x ¾	1½ x 1
1½ x 1	¾ x ½ x ½	1¼ x ¾ x 1¼	2 x 1½ x 1¼	3 x 2 x 2	2 x 1½	2 x 1¼
2 x 1½	¾ x ⅜ x ¾	1¼ x ¾ x 1	2 x 1½ x 1	2½ x 2½ x 3	2 x 1¼	2 x ¾
2 x 1¼	½ x ½ x ¾	1¼ x ½ x 1¼	2 x 1¼ x 2	3½ x 3½ x 3	2 x 1	2½ x 2
2 x 1	1 x 1 x ¾	1 x 1 x 1¼	2 x 1¼ x 1½	3½ x 3½ x 2½	2 x ¾	2½ x 1½
2½ x 2	1 x ½ x ½	1½ x 1½ x 1¼	2 x 1¼ x 1¼	4 x 4 x 3	2½ x 2	3 x 2½
2½ x 1½	1 x ¾ x ½	1½ x 1½ x 1	2 x 1 x 2	4 x 4 x 2½	3 x 2	3 x 2
3 x 2½	1 x ¾ x ⅜	1½ x 1½ x ¾	2 x ¾ x 2	4 x 4 x 2	4 x 2	3½ x 3
3 x 2	1 x ¾ x 1	1½ x 1½ x ½	1½ x 1½ x 2	4 x 4 x 1½	5 x 4	3½ x 2½
4 x 3	1 x ¾ x ¾	1½ x 1¼ x 1½	1¼ x 1¼ x 2	5 x 5 x 4	5 x 3	4 x 3½
5 x 4	1 x ¾ x ½	1½ x 1¼ x 1¼	2½ x 2½ x 2	5 x 5 x 3	5 x 2	4 x 3
5 x 3	1 x ½ x 1	1½ x 1¼ x 1	2½ x 2½ x 1½	5 x 5 x 2	6 x 4	5 x 4
6 x 5	1 x ½ x ¾	1½ x 1¼ x ¾	2½ x 2½ x 1¼	6 x 6 x 5	6 x 3	5 x 3½
6 x 4	1 x ⅜ x 1	1½ x 1 x 1½	2½ x 2½ x 1	6 x 6 x 4	6 x 2	6 x 5
6 x 2½	¾ x ¾ x 1	1½ x 1 x 1¼	2½ x 2½ x ¾	6 x 6 x 3	8 x 6	6 x 4
8 x 6		1½ x 1 x 1	2½ x 2 x 2½	6 x 6 x 2½		8 x 6
		1½ x ¾ x 1½	2½ x 2 x 2	6 x 6 x 2		8 x 5
		1½ x ½ x 1½	2½ x 1½ x 2½	8 x 8 x 6		
		1¼ x 1¼ x 1½	2 x 2 x 2½	8 x 8 x 4		
		1 x 1 x 1½		8 x 8 x 3		

Dimensions, in Inches

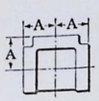
Dimensions of 90° Elbows, Tees, and Crosses apply only to straight sizes; dimensions of reducing sizes will be furnished on request.



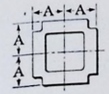
For Normal Thread Engagement, see page 367.



90° Elbow



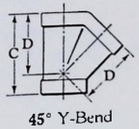
Tee



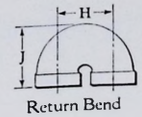
Cross



45° Elbow



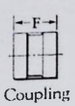
45° Y-Bend



Return Bend



Cap



Coupling



Reducer

Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
A	13/16	15/16	1⅛	15/16	1½	1¾	115/16	2¼	211/16	3⅛	37/16	3¾	4½	5⅛	69/16
B	¾	13/16	⅞	1	1⅛	15/16	17/16	111/16	115/16	23/16	2⅜	2⅝	3 1/16	37/16	4¼
C			2½	3	3½	4¼	4⅞	5¾	6¾	7⅞	8⅞	9¾	11⅝	137/16	
D			1⅞	2¼	2¾	3¼	313/16	4½	53/16	6⅛	6⅞	7⅝	9¼	103/4	
E								1½	113/16	1⅞	2	2 1/16	2⅜	2⅝	3⅛
F	15/16	1½	111/16	115/16	23/16	27/16	2⅝	215/16	33/16	3⅜	49/16	47/16	5¼	6⅛	613/16
G				1½	1⅞	2⅛	2¼	27/16	2⅝	27/8	3⅛	3⅜	3 7/8	4⅜	5¼

Close Pattern Return Bends									Open Pattern Return Bends						
Size	½	¾	1	1¼	1½	2	2½	3	4	¾	1	1¼	1½	2	2½	3	4
H	1¼	1½	1¾	2¼	2½	3¼	3¾	4¼	6	1⅞	2½	3	3½	4½	5½	6½	7½
J	1¾	2 1/16	2⅜	215/16	3¼	4	49/16	53/16	613/16	2¼	211/16	35/16	3¾	4⅝	57/16	65/16	79/16

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250-Pound Brass Fittings

List Prices, Each, Polished

Size		Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Elbows	90°, Straight		.73	.95	1.25	1.75	2.50	3.50	4.50	6.25	10.50	14.75	23.50	31.00
	90°, Reducing (*)				1.50	2.10	3.00	4.10	5.35	7.50	12.00	17.25	28.00	36.00
	45°		.95	1.15	1.50	2.00	2.85	4.00	5.10	6.75	11.00	15.50	25.00	33.00
Tees	Straight		1.00	1.25	1.70	2.35	3.35	4.65	6.00	8.35	14.00	19.75	32.00	42.00
	Reducing (*)				2.05	2.80	4.00	5.50	7.00	9.75	16.00	23.00	37.00	50.00
Crosses	Straight		1.50	1.90	2.50	3.50	5.00	7.00	9.00	12.50	21.00	29.50	43.00	55.00
	Reducing (*)					4.25	6.00	8.25	10.75	15.00	24.00	35.00	50.00	64.00
45° Y-Bends					2.70	4.00	5.50	8.00	10.25	14.50	24.00	34.00	48.00	63.00
Couplings			.75	.90	1.15	1.70	2.40	3.20	4.15	5.85	9.00	13.00	18.50	24.00
Reducers (*)						2.05	2.90	3.85	5.00	7.00	11.00	15.50	22.00	29.00
Caps										5.85	9.00	13.00	18.50	24.00

List Prices, Return Bends, Polished

Size		Inches	½	¾	1	1¼	1½	2	2½	3	4
Close Pattern	Center to center	Inches	1¼	1½	1¾	2¼	2½	3¼	3¾	4¼	6
	Price	Each	2.85	4.00	5.50	7.50	10.00	13.50	21.00	29.00	58.00
Open Pattern	Center to center	Inches		1⅞	2½	3	3½	4½	5½	6½	7½
	Price	Each		4.25	6.00	8.00	11.00	14.50	23.00	32.00	63.00

List Prices, Each, Rough Tinned

Size		Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Elbows	90°, Straight		.48	.65	.90	1.30	1.95	2.75	3.65	5.40	9.50	13.25	18.75	25.50
	90°, Reducing (*)				1.00	1.50	2.25	3.10	4.15	6.15	10.50	15.00	21.75	28.50
	45°		.60	.75	1.00	1.40	2.10	3.00	3.90	5.40	9.50	13.25	18.75	25.50
Tees	Straight		.65	.85	1.25	1.75	2.60	3.70	4.85	7.25	12.75	17.75	26.00	34.50
	Reducing (*)				1.40	1.95	2.90	4.20	5.35	8.00	14.00	19.75	29.00	39.50
Crosses	Straight		.95	1.25	1.75	2.50	3.75	5.35	7.00	10.50	18.25	25.75	33.00	43.00
	Reducing (*)					2.90	4.35	6.10	8.00	12.00	20.25	29.25	37.00	48.00
45° Y-Bends					2.00	3.10	4.35	6.50	8.50	12.75	21.75	31.00	38.00	52.00
Couplings			.50	.65	.90	1.35	2.00	2.65	3.50	5.25	8.00	11.50	15.00	19.50
Reducers (*)						1.65	2.40	3.20	4.20	6.30	9.60	13.50	18.00	23.00
Caps										5.25	8.00	11.50	15.00	19.50

List Prices, Return Bends, Rough Tinned

Size		Inches	½	¾	1	1¼	1½	2	2½	3	4
Close Pattern	Center to center	Inches	1¼	1½	1¾	2¼	2½	3¼	3¾	4¼	6
	Price	Each	2.15	3.10	4.40	6.00	8.25	11.75	18.75	26.00	47.00
Open Pattern	Center to center	Inches		1⅞	2½	3	3½	4½	5½	6½	7½
	Price	Each		3.35	4.90	6.50	9.25	12.75	20.75	29.00	52.00

***Reducing sizes:** Polished or Rough Tinned Reducing 90° Elbows, Reducing Tees, Reducing Crosses, and Reducers, 4-inch and smaller, are regularly furnished in the sizes listed on page 257, at the "Reducing" list prices shown above.

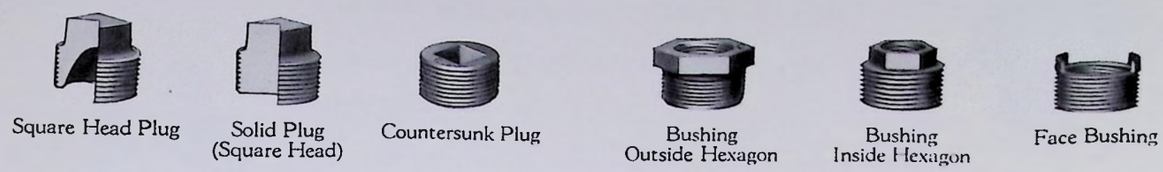
Reducing sizes of Polished or Rough Tinned 90° Elbows, Tees, and Crosses not shown on page 257 can be made to order, at an advance of 25 per cent over "Reducing" list prices.

Polished or Rough Tinned Reducers not shown on page 257 can be made to order at an advance of 16⅔ per cent over the above list prices.

Right and Left: Right and Left 90° Elbows and Right and Left Return Bends will be furnished at an advance of 20 per cent over the above list prices.

Brass Nipples . . . . page 255 *Brass Unions . . . . pages 260 and 261* *Brass Locknuts . . . . pages 254 and 255*

Brass Plugs and Bushings



Square Head Plug — Solid Plug (Square Head) — Countersunk Plug — Bushing Outside Hexagon — Bushing Inside Hexagon — Face Bushing

List Prices, Each

Size		Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
Rough Brass	Square Head Plugs		.08	.10	.12	.15	.20	.30	.45	.60	.95	1.50	2.25	3.75	5.00	8.00	12.00	30.00
	Solid Plugs		.08	.10	.12	.22	.30	.45	.80	1.20	1.90	3.00	4.50	7.50	10.00	15.00	23.00	60.00
	Countersunk Plugs					.22	.30	.45	.65	.90	1.40	2.25	4.00	5.00	7.00			
	Hexagon Bushings			.10	.12	.15	.22	.35	.50	.70	1.00	1.50	2.50	3.75	5.00	12.00	18.00	35.00
	Face Bushings			.12	.15	.19	.27	.44	.62	.87	1.25	1.85	3.10	4.75	6.25			
Polished Brass	Square Head Plugs		.23	.30	.37	.43	.55	.75	1.00	1.30	1.95	3.00	4.25	6.25	8.00			
	Solid Plugs		.23	.30	.37	.50	.65	.90	1.35	1.90	2.90	4.50	6.50	10.00	13.00			
	Countersunk Plugs					.42	.55	.80	1.15	1.55	2.25	3.50	6.00	7.50	10.00			
	Hexagon Bushings			.22	.27	.35	.47	.70	1.00	1.40	2.00	3.00	4.50	6.25	8.00			
Polished and Nickel Plated	Square Head Plugs		.28	.37	.45	.52	.67	.90	1.20	1.55	2.30	3.50	4.90	7.10	9.00			
	Solid Plugs		.28	.37	.45	.59	.77	1.05	1.55	2.15	3.25	5.00	7.15	10.85	14.00			
	Countersunk Plugs					.49	.63	.92	1.30	1.75	2.55	4.00	6.75	8.25	11.00			
	Hexagon Bushings			.26	.32	.42	.55	.82	1.15	1.65	2.35	3.50	5.15	7.10	9.00			
Rough Tinned	Square Head Plugs		.13	.15	.18	.23	.30	.45	.63	.80	1.25	1.90	3.00	4.75	6.25			
	Solid Plugs		.13	.15	.18	.30	.40	.60	1.00	1.40	2.20	3.40	5.25	8.50	11.25			
	Countersunk Plugs					.30	.40	.60	.85	1.10	1.70	2.75	4.75	6.00	8.25			
	Hexagon Bushings			.15	.18	.23	.32	.50	.68	.90	1.30	1.90	3.25	4.75	6.25			

Bushings: List prices of Hexagon Bushings and Face Bushings apply only to sizes shown in the table below. For reductions not listed in the table, add 25 per cent to the above list prices.

Chromium-Plating: Plugs and Bushings can be furnished Polished and Chromium-Plated at an advance in price over Polished and Nickel-Plated. See the Crane Discount Sheet for prices.

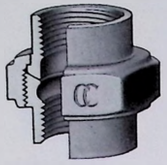
Hexagon Bushings						Face Bushings		
*¼ x ⅛	*1¼ x 1	*2 x 1½	*3 x 2½	*4 x 3½	*6 x 5	¼ x ⅛	1¼ x 1	3 x 2½
*⅜ x ¼	*1¼ x ¾	*2 x 1¼	*3 x 2	*4 x 3	6 x 4	⅜ x ¼	1¼ x ¾	3 x 2
*⅜ x ⅛	1¼ x ½	2 x 1	*3 x 1½	4 x 2½	6 x 3½	⅜ x ⅛	1¼ x ½	3 x 1½
*½ x ⅜	1¼ x ⅜	2 x ¾	*3 x 1¼	4 x 2	6 x 3	½ x ⅜	1½ x 1¼	3½ x 3
*½ x ¼	1¼ x ¼	2 x ½	3 x 1	4 x 1½	6 x 2½	½ x ¼	1½ x 1	3½ x 2½
*½ x ⅛	*1½ x 1¼	2 x ⅜	3 x ¾	4 x 1¼	6 x 2	½ x ⅛	1½ x ¾	3½ x 2
*¾ x ½	*1½ x 1	2 x ¼	3 x ½	4 x 1	6 x 1½	¾ x ½	1½ x ½	4 x 3½
*¾ x ⅜	1½ x ¾	*2½ x 2	*3½ x 3	4 x ¾	*6 x 1¼	¾ x ⅜	2 x 1½	4 x 3
*¾ x ¼	1½ x ½	*2½ x 1½	*3½ x 2½	4 x ½	*6 x 1	¾ x ¼	2 x 1¼	4 x 2½
*¾ x ⅛	1½ x ⅜	2½ x 1¼	3½ x 2	*5 x 4	*8 x 6	1 x ¾	2 x 1	4 x 2
*1 x ¾	1½ x ¼	2½ x 1	3½ x 1½	5 x 3½	8 x 5	1 x ½	2 x ¾	
*1 x ½		2½ x ¾	3½ x 1¼	5 x 3	8 x 4	1 x ⅜		
1 x ⅜		2½ x ½	3½ x 1	5 x 2½	8 x 3	1 x ¼	2½ x 2	
1 x ¼			3½ x ¾	5 x 2	8 x 2½		2½ x 1½	
1 x ⅛				5 x 1½	8 x 2		2½ x 1¼	
				5 x 1¼				
				5 x 1				

**Sizes indicated with an asterisk (*) have outside hexagon; other sizes have inside hexagon.*

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Brass Unions and Union Elbows

Rough



No. 521½ Rough

Ground Joint—No Gasket Required

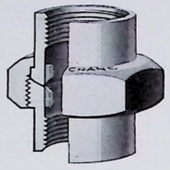
WORKING PRESSURES
150 pounds steam
300 pounds cold water, oil, or gas, non-shock

Air Tested

List Prices and Dimensions

Size	Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
No. 521½, Rough	Each	Use	.50	.65	.85	1.15	1.60	2.25	2.70	4.00	7.50	11.50	20.00	27.00
End to end	Inches	No. 522	17/16	1 5/8	1 7/8	1 15/16	2 3/16	2 3/8	2 1/2	2 13/16	3 9/16	4 1/8	4 5/16	4 5/8

Semi-Finished or Polished

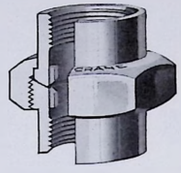


No. 522 Semi-Finished

Ground Joint—No Gasket Required

WORKING PRESSURES
200 pounds steam
400 pounds cold water, oil, or gas, non-shock

Air Tested



No. 523 Polished

List Prices and Dimensions

Size	Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 522, Semi-finished	Each	.45	.55	.75	.95	1.30	1.75	2.50	3.00	4.50	8.25	12.75
*No. 523, Polished	Each	.50	.60	.85	1.05	1.40	1.90	2.75	3.25	5.00		
*No. 523, Polished and nickel-plated	Each	.60	.70	1.00	1.25	1.65	2.25					
End to end	Inches	1⅜	1½	1⅝	1¾	2⅛	2⅜	2⅝	2 13/16	3⅛	3 9/16	4

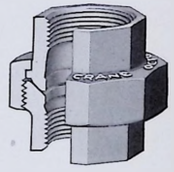
**No. 523 Unions can be furnished polished and chromium-plated; see the Crane Discount Sheet for prices.*

Government Pattern

Air Tested

Ground Joint—No Gasket Required

WORKING PRESSURES
200 pounds steam
400 pounds cold water, oil, or gas, non-shock



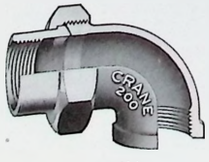
No. 523½ Octagon Ends Rough

List Prices and Dimensions

Size	Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 523½, Rough	Each	Use	.65	.85	1.10	1.50	2.00	2.80	3.60	5.25	9.00	14.00
End to end	Inches	No. 522	1⅜	1 13/16	1 15/16	2 3/16	2 7/16	2⅝	2¾	3⅛	3 9/16	3¾

The No. 523½ Unions, when cast in the required composition, comply with U. S. Navy Department Specifications.

Brass Union Elbows



No. 524½ 90° Union Elbow

Ground Joint—No Gasket Required

WORKING PRESSURES
200 pounds steam
400 pounds cold water, oil, or gas, non-shock

Air Tested

The union ring and tail-piece are semi-finished. The elbow portion is rough.

List Prices and Dimensions

Size	Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2
No. 524½, 90° Elbow	Each	.55	.65	.85	1.15	1.55	2.25	3.15	3.90	6.00
Center to end	Inches	9/16	13/16	15/16	1⅛	1 5/16	1 7/16	1¾	1 15/16	2¼
Center to union end	Inches	1½	1¾	1 15/16	2 3/16	2⅝	3	3 7/16	3¾	4¼

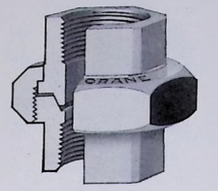
Radiator Union Elbows . . . page 48

Brass Unions

250-Pound Brass Unions

Crane Special Brass

Ground Tapered Joint—No Gasket Required



No. 96 E

WORKING PRESSURES
250 pounds steam, 500° F.
500 pounds cold water, oil, or gas, non-shock

Air Tested

No. 96 E Unions have hexagon ends. The union rings are semi-finished; the end-pieces are rough.

List Prices and Dimensions

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 96 E	Each	1.10	1.40	1.60	1.85	3.00	4.00	5.25	7.50	10.00	15.00
End to end	Inches	1⅝	1¾	2 1/16	2⅜	2 9/16	2 15/16	3	3 5/16	3⅝	4 1/16

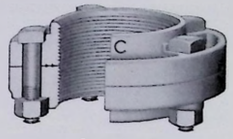
Standard Brass Flange Unions

Gasket Type

These unions have steel bolts and nuts.

Each union is equipped with a rubber gasket.

WORKING PRESSURES
150 pounds steam
225 pounds cold water or gas, non-shock



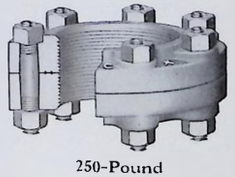
Standard

Each flange is plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

List Prices and Dimensions

Size	Inches	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
Price, Rough	Each	4.00	4.50	5.00	5.50	7.00	9.00	11.50	15.00	18.00	22.00	35.00	45.00	80.00
End to end	Inches	1⅛	1⅛	1 7/16	1 9/16	1 13/16	2⅜	2⅞	3	3 1/16	3 3/16	3⅜	3 9/16	4
Diameter of flanges	Inches	2 13/16	2⅞	3¼	3¾	4⅝	5⅜	6	6 11/16	7½	8	9⅜	10⅜	12¾
No. and dia. of bolts		3-⅜	3-⅜	4-⅜	4-7/16	4-½	4-9/16	4-⅝	4-⅝	4-⅝	5-⅝	5-⅝	6-⅝	8-⅝

250-Pound Brass Flange Unions



250-Pound

Crane Special Brass

Gasket Type

Each flange is plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

WORKING PRESSURES
250 pounds steam, 500° F.
375 pounds cold water or gas, non-shock

These unions have cold rolled steel bolt-studs with cold pressed semi-finished nuts.

Each union is equipped with a rubber gasket, suitable for saturated steam, water, or gas service. For superheated steam, a Cranite gasket should be used. Cranite gaskets are furnished only when ordered and are charged extra; see page 362 for list prices.

List Prices and Dimensions

Size	Inches	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
Price, Rough	Each	7.50	8.50	11.00	13.00	16.00	18.00	24.00	27.00	30.00	48.00	60.00	100.00
End to end	Inches	1 5/16	1 7/16	1 11/16	1 13/16	2 1/16	2 3/16	2 7/16	2 11/16	2 13/16	2 15/16	3 1/16	3 9/16
Diameter of flanges	Inches	3¼	3⅝	4⅛	4⅝	5⅜	6	6¾	7½	8	9⅜	10⅞	13¼
No. and dia. of bolts		4-7/16	4-7/16	4-½	4-½	5-9/16	5-⅝	6-⅝	6-⅝	7-⅝	8-¾	9-¾	10-¾

Extra Gaskets . . . page 362

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150 and 300-Pound
Brass Flanged Fittings and Flanges

WORKING PRESSURES

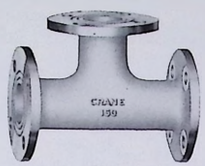
150-Pound — **150** pounds saturated steam
— **225** pounds cold water, oil, or gas, non-shock
300-Pound — **300** pounds steam, **550°** F.
— **500** pounds cold water, oil, or gas, non-shock



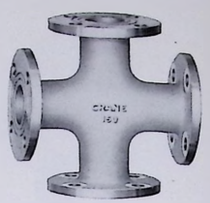
90° Elbow
No. 2100, 150-Pound
No. 2105, 300-Pound



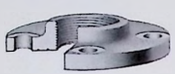
45° Elbow
No. 2101, 150-Pound
No. 2106, 300-Pound



Tee
No. 2102, 150-Pound
No. 2107, 300-Pound



Cross
No. 2103, 150-Pound
No. 2108, 300-Pound



Brass Companion Flange
No. 2104, 150-Pound
No. 2109, 300-Pound



Forged Steel Companion Flange
No. 300 E, 300-Pound
For Use with Brass Valves and Fittings

List Prices, Faced and Drilled

Size	Inches	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
No. 2100 or No. 2105, 90° Elbows	Each	13.00	14.00	16.00	21.00	26.00	35.00	45.00	60.00	70.00	95.00	125.00	214.00
No. 2101 or No 2106, 45° Elbows	Each	14.00	15.00	17.00	23.00	28.50	38.50	49.00	65.00	75.00	100.00	135.00	229.00
No. 2102 or No. 2107, Tees	Each	19.50	21.00	24.00	31.50	39.00	52.50	67.50	90.00	105.00	140.00	190.00	321.00
No. 2103 or No. 2108, Crosses	Each	26.00	28.00	32.00	42.00	52.00	70.00	90.00	120.00	140.00	190.00	250.00	428.00
No. 2104 or No. 2109, Flanges	Each	5.25	6.00	7.00	9.00	11.00	13.00	16.00	20.00	25.00	30.00	37.50	55.00
No. 300 E, Forged Steel Flanges	Each	8.00	8.00	9.00	10.00	11.00	13.00	15.00	19.00	20.00	24.00	27.00	35.00

150-Pound: The 150-Pound line is made of red brass. Flange dimensions conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2a-1930). Sizes 1-inch and larger interchange with 125-Pound American Cast Iron Flanged Fittings and Flanges, differing only in flange thickness and in facing.

300-Pound: The 300-Pound line, except the No. 300 E, is made of Crane Special Brass, a high grade steam metal. Flange dimensions conform to the Crane 300-Pound Brass Flange Standard. Sizes 1-inch and larger interchange with 250-Pound American Cast Iron Flanged Fittings and Flanges, differing only in flange thickness and in facing.

The No. 300-E Flanges are made of forged steel, and are for use with 300-Pound brass flanged valves and fittings. Flange dimensions and facing are alike.

Facing: Flanges are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Full face gaskets should be used.

Drilling: These fittings and flanges are furnished faced and drilled unless ordered faced only. Prices include facing and drilling to the MSS 150-Pound Standard on the 150-Pound line and to the Crane 300-Pound Standard on the 300-Pound line. No deduction is made when ordered "faced only".

Bolting to iron or steel material: When brass flanged fittings and flanges are bolted to iron or steel material which normally has a raised face, the raised face should be removed to provide a full face bearing for the gasket. Brass flanged material should not be bolted to Cranelap Flanged Pipe Joints.

Additional sizes and types: Other sizes and types, reducing sizes, and brass fittings and flanges made from regular 125 and 250-pound cast iron patterns are made to order; prices on application.

Dimensions, in Inches

Size		¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
150 Pound	Center to face, 90° Elbows, Tees, Crosses	3¼	3½	3¾	4	4½	5	5½	6	6½	7½	8	9
	Center to face, 45° Elbows	1¾	1¾	2	2¼	2½	3	3	3½	4	4½	5	5½
	Diameter of flanges	3⅞	4¼	4⅝	5	6	7	7½	8½	9	10	11	13½
	Thickness of flanges	11/32	3/8	13/32	7/16	½	9/16	5/8	11/16	11/16	¾	13/16	15/16
300 Pound	Center to face, 90° Elbows, Tees, Crosses	3½	4	4¼	4½	5	5½	6	6½	7	8	8½	10
	Center to face, 45° Elbows	2	2	2½	2¾	3	3½	3½	4	4½	5	5½	6
	Diameter of flanges	4⅝	4⅞	5¼	6⅛	6½	7½	8¼	9	10	11	12½	15
	Thickness of flanges	17/32	19/32	5/8	11/16	¾	13/16	29/32	31/32	1 1/16	1 1/8	1 3/16	1 3/8

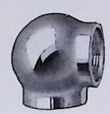
Templates for drilling . . . page 369

Railing Fittings

The Crane line of Railing Fittings, shown on pages 263 to 268, is unusually complete, including brass fittings for horizontal railings and malleable iron fittings for horizontal and stair railings.

The threaded female openings of all screwed railing fittings are recessed sufficiently to cover the last threads on the pipe. To take advantage of this feature, a short thread should be cut on the pipe; see pages 367 and 368 for complete information.

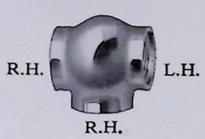
Brass Railing Fittings



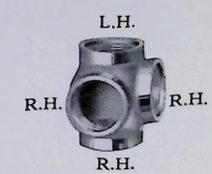
90° Elbow
No. 1, Right Hand



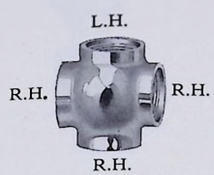
90° Side Outlet Elbow
No. 2, Right Hand



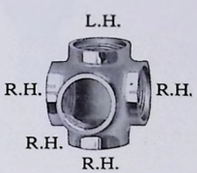
Tee
No. 3, Tapped as shown
No. 3½, Right Hand



Side Outlet Tee
No. 4, Tapped as shown
No. 4½, Right Hand



Cross
No. 5, Tapped as shown
No. 5½, Right Hand



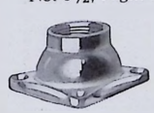
Side Outlet Cross
No. 6, Right Hand
No. 6½, Tapped as shown



Male Ball Ornament
No. 8, Left Hand
No. 8½, Right Hand



Female Ball Ornament
No. 13, Right Hand



Square Floor Flange
No. 7, Right Hand

Threading: Fittings threaded other than shown can be made to order, at an advance over regular list prices. See the Crane Discount Sheet for prices. Orders should be accompanied by a sketch.



Round Floor Flange
Right Hand

List Prices and Dimensions

Size	Inches	Polished ½	¾	1	1¼	1½	2	Polished and Nickel-Plated ½	¾	1	1¼	1½	2
No. 1	Each	.40	.60	.80	1.20	1.60	2.50	.50	.75	1.00	1.50	2.00	3.00
No. 2	Each	.75	1.00	1.10	1.70	2.00	3.00	.90	1.20	1.35	2.05	2.40	3.60
No. 3 or No. 3½	Each	.60	.85	1.10	1.70	2.00	3.00	.75	1.05	1.35	2.05	2.40	3.60
No. 4 or No. 4½	Each	1.05	1.25	1.50	2.00	2.40	3.50	1.30	1.50	1.80	2.40	2.90	4.20
No. 5 or No. 5½	Each	1.05	1.25	1.50	2.00	2.40	3.50	1.30	1.50	1.80	2.40	2.90	4.20
No. 6 or No. 6½	Each	1.20	1.45	1.70	2.25	3.00	4.00	1.45	1.75	2.05	2.70	3.60	4.80
No. 7	Each	.75	.90	1.00	1.35	1.75	2.50	.90	1.10	1.25	1.60	2.10	3.00
No. 8 or No. 8½	Each	.75	.90	1.00	1.35	1.75	2.50	.90	1.10	1.25	1.60	2.10	3.00
No. 13	Each	.75	.90	1.00	1.35	1.75	2.50	.90	1.10	1.25	1.60	2.10	3.00
Center to end	Inches	1 1/16	1¼	1 5/16	1 9/16	1¾	2⅛	1 1/16	1¼	1 5/16	1 9/16	1¾	2⅛
Height of No. 7 Flange	Inches	1⅛	1 7/16	1⅝	1 13/16	2 1/16	2 9/16	1⅛	1 7/16	1⅝	1 13/16	2 1/16	2 9/16

Polished and chromium-plated, see the Crane Discount Sheet for prices.

List Prices of Round Floor Flanges

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2
Diameter	Inches	2½	2¾	3	3¼	3⅝	4	4⅜	5
Rough	Each	.45	.53	.62	.75	1.00	1.17	1.50	1.80
Polished	Each	.90	1.06	1.24	1.50	2.00	2.34	3.00	3.60
Polished and nickel-plated	Each	1.05	1.20	1.40	1.75	2.25	2.75	3.50	4.25

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Malleable Iron Ball Pattern Railing Fittings



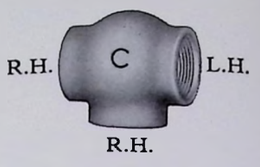
90° Elbow
No. 1, Right Hand



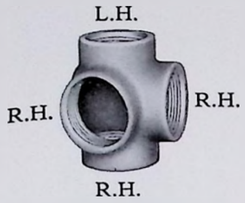
90° Side Outlet Elbow
No. 2, Right Hand



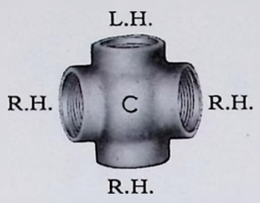
45° Side Outlet Elbow
No. 11, Right Hand



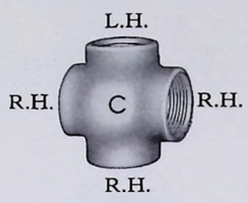
Tee
No. 3, Tapped as shown
No. 3½, Right Hand



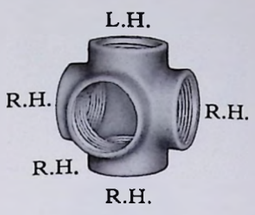
Side Outlet Tee
No. 4, Tapped as shown
No. 4½, Right Hand



45° Side Outlet Tee
No. 12, Tapped as shown
No. 12½, Right Hand



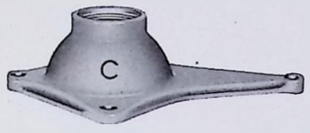
Cross
No. 5, Tapped as shown
No. 5½, Right Hand



Side Outlet Cross
No. 6, Right Hand
No. 6½, Tapped as shown



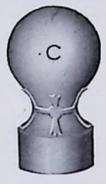
Square Floor Flange
No. 7, Right Hand



Floor Flange with Long Base
No. 10, Right Hand



Male Ball Ornament
No. 8, Left Hand
No. 8½, Right Hand



Female Ball Ornament
No. 13, Right Hand

List Prices, Straight Sizes

Size		Inches	½	¾	1	1¼	1½	2	2½	3	4
No. 1, 90° Elbows	Black	Each	.10	.12	.14	.22	.30	.44	1.00	2.00	3.75
	Galv.	Each	.13	.15	.18	.29	.39	.57	1.30	2.60	4.90
No. 2, 90° Side Outlet Elbows	Black	Each	.19	.23	.28	.44	.60	.88	2.00	3.35	6.10
	Galv.	Each	.25	.30	.36	.57	.78	1.15	2.60	4.35	8.00
No. 3 or No. 3½, Tees	Black	Each	.13	.16	.19	.28	.40	.57	1.30	2.60	4.90
	Galv.	Each	.17	.21	.25	.36	.52	.75	1.70	3.40	6.40
No. 4 or No. 4½, Side Outlet Tees	Black	Each	.25	.31	.37	.57	.80	1.15	2.60	5.00	8.25
	Galv.	Each	.33	.40	.48	.75	1.05	1.50	3.40	6.50	10.75
No. 5 or No. 5½, Crosses	Black	Each	.18	.21	.25	.38	.53	.77	1.75	3.40	6.30
	Galv.	Each	.23	.27	.33	.49	.70	1.00	2.30	4.45	8.20
No. 6 or No. 6½, Side Outlet Crosses	Black	Each	.32	.38	.46	.70	1.00	1.45	3.15	6.00	10.00
	Galv.	Each	.42	.50	.60	.91	1.30	1.90	4.10	7.80	13.00
No. 7, Square Floor Flanges	Black	Each	.12	.16	.20	.34	.50	.80	1.55	2.75	5.00
	Galv.	Each	.16	.21	.26	.44	.65	1.05	2.00	3.60	6.50
No. 8 or No. 8½, Male Ball Ornaments	Black	Each	.12	.16	.20	.28	.38	.60	1.25	2.15	4.35
	Galv.	Each	.16	.21	.26	.36	.50	.78	1.65	2.80	5.65
No. 10, Floor Flanges with Long Base	Black	Each			.37	.52	.70	1.10			
	Galv.	Each			.48	.68	.90	1.45			
No. 11, 45° Side Outlet Elbows	Black	Each			.40	.60	.80	1.20			
	Galv.	Each			.52	.78	1.05	1.55			
No. 12 or No. 12½, 45° Side Outlet Tees	Black	Each			.55	.80	1.05	1.60			
	Galv.	Each			.72	1.05	1.38	2.10			
No. 13, Female Ball Ornaments	Black	Each	.12	.16	.20	.28	.38	.60			
	Galv.	Each	.16	.21	.26	.36	.50	.78			

Threading: Fittings threaded other than shown above can be made to order, at an advance over regular list prices. See the Crane Discount Sheet for prices. Orders should be accompanied by a sketch.

Reamed fittings: Fittings with one or more openings reamed for slip joint, or with one or more openings reamed for slip joint and drilled for rivets, can be made to order at an advance over regular list prices. See the Crane Discount Sheet for prices. Orders should be accompanied by a sketch.

Round Floor Flanges . . . page 288

Malleable Iron Ball Pattern Railing Fittings

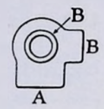
List Prices, Reducing Sizes

Size		Inches	1¼	1½	2	2½	3
No. 1, 90° Elbows	Black	Each	.25	.35	.51	1.15	2.30
	Galv.	Each	.32	.45	.66	1.50	3.00
No. 2, 90° Side Outlet Elbows	Black	Each	.51	.70	1.05	2.30	3.85
	Galv.	Each	.66	.90	1.35	3.00	5.00
No. 3 or No. 3½, Tees	Black	Each	.32	.46	.66	1.50	3.00
	Galv.	Each	.42	.60	.86	1.95	3.90
No. 4 or No. 4½, Side Outlet Tees	Black	Each	.66	.92	1.32	3.00	5.75
	Galv.	Each	.86	1.20	1.70	3.90	7.45
No. 5 or No. 5½, Crosses	Black	Each	.45	.62	.90	2.05	3.90
	Galv.	Each	.58	.80	1.15	2.65	5.05
No. 6 or No. 6½, Side Outlet Crosses	Black	Each			1.67		
	Galv.	Each			2.15		

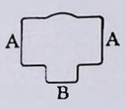
The above list prices apply to reducing sizes carried in stock, shown in the table below. Other reductions can be made to order; prices on application.

Threading: Fittings threaded other than shown on the preceding page can be made to order, at an advance over regular list prices. See the Crane Discount Sheet for prices. Orders should be accompanied by a sketch.

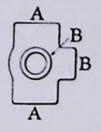
Reamed fittings: Fittings with one or more openings reamed for slip joint, or with one or more openings reamed for slip joint and drilled for rivets, can be made to order at an advance over regular list prices. See the Crane Discount Sheet for prices. Orders should be accompanied by a sketch.



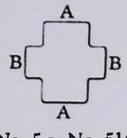
No. 2
90° Side Outlet Elbow



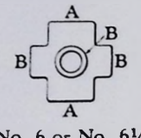
No. 3 or No. 3½
Tee



No. 4 or No. 4½
Side Outlet Tee



No. 5 or No. 5½
Cross



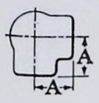
No. 6 or No. 6½
Side Outlet Cross

Reducing Fittings Carried in Stock

No. 1	No. 2	No. 3 or No. 3½		No. 4 or No. 4½	No. 5 or No. 5½	No. 6 or No. 6½
	A B	A B	A B	A B	A B	A B
1¼ x 1	1¼ x 1	1¼ x 1	1½ x 2	1¼ x 1	1¼ x 1	2 x 1½
1½ x 1¼	1½ x 1¼	1 x 1¼	1¼ x 2	1½ x 1¼	1½ x 1¼	
2 x 1½	2 x 1¼	1½ x 1¼	2½ x 2	2 x 1½	2 x 1½	
2 x 1¼	2 x 1½	1¼ x 1½	2 x 2½	2 x 1¼	2 x 1¼	
2½ x 2	2½ x 2	2 x 1½	3 x 2½	2½ x 2	2½ x 2	
3 x 2½	3 x 2½	2 x 1¼	2½ x 3	3 x 2½	3 x 2½	

Dimensions, in Inches

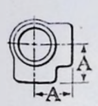
Dimensions of straight sizes are shown in the table below.
Dimensions of reducing sizes will be furnished on request.



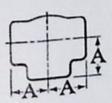
No. 1



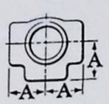
No. 11



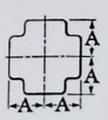
No. 2



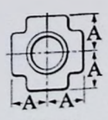
No. 3
or
No. 3½



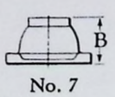
No. 4
or
No. 4½



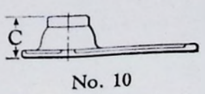
No. 5
or
No. 5½



No. 6
or
No. 6½



No. 7



No. 10



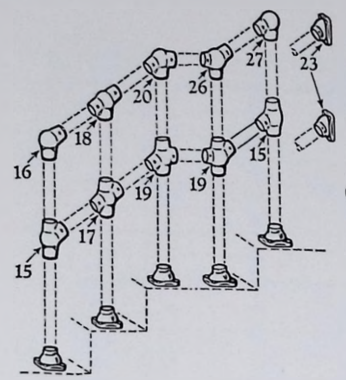
No. 12
or
No. 12½

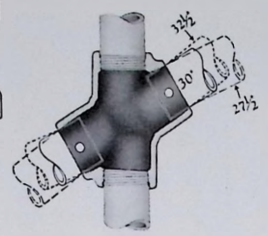
Size	½	¾	1	1¼	1½	2	2½	3	4
A — Center to end	1⅛	15/16	1½	1¾	115/16	2¼	211/16	3⅛	315/16
B — Height of No. 7 Flange	13/16	1½	1¾	23/16	2½	215/16	37/16	3⅞	45/16
C — Height of No. 10 Flange			111/16	115/16	2⅛	2⅝	33/16		

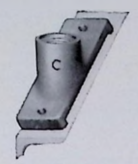
Thread Engagement . . . page 367

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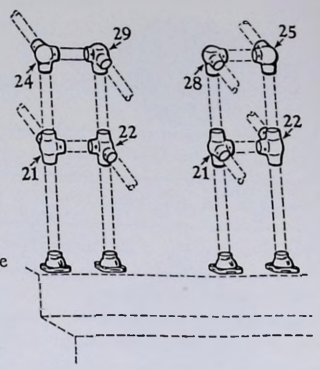
Malleable Iron Stair Railing Fittings







No. 30
Angle Floor Flange



30° Fittings — For Railings 27½° to 32½°
35° Fittings — For Railings 32½° to 37½°
40° Fittings — For Railings 37½° to 42½°
45° Fittings — For Railings 42½° to 47½°

List Prices, Black

Size	Inches	1	1¼	1½	2
No. 15, Tees	Each	1.30	1.50	2.00	2.50
No. 16, Elbows	Each	1.10	1.25	1.70	2.25
No. 17, Crosses	Each	1.50	1.75	2.35	2.75
No. 18, Tees	Each	1.30	1.50	2.00	2.50
No. 19, Stair Landing Crosses	Each	1.50	1.75	2.35	2.75
No. 20, Stair Landing Tees	Each	1.30	1.50	2.00	2.50
No. 21, Side Outlet Tees	Each	1.85	2.20	3.00	3.60
No. 22, Side Outlet Tees	Each	1.85	2.20	3.00	3.60
No. 23, Wall Flanges	Each	1.50	1.75	1.90	2.25
No. 24, Side Outlet Elbows	Each	1.65	1.95	2.70	3.35
No. 25, Side Outlet Elbows	Each	1.65	1.95	2.70	3.35
No. 26, Stair Landing Tees	Each	1.30	1.50	2.00	2.50
No. 27, Elbows	Each	1.10	1.25	1.70	2.25
No. 28, Side Outlet Elbows	Each	1.65	1.95	2.70	3.35
No. 29, Side Outlet Elbows	Each	1.65	1.95	2.70	3.35
No. 30, Angle Floor Flanges	Each	1.80	2.10	2.40	2.95

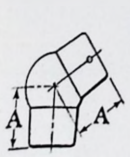
Galvanized fittings, add 30 per cent to list prices of Black.

As indicated in the illustration above, these fittings are threaded in the openings used for the vertical posts, thereby providing rigidity to the railing. The ends used for inclined or horizontal rails are slip-joint, and are drilled for rivets. This construction enables assembling the railing conveniently.

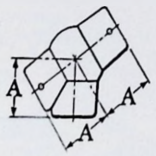
The fittings can be supplied in 30°, 35°, 40°, or 45° angles. The construction of the slip-joint openings provides for swinging the pipe 2½° on either side of the center line. Therefore, a 30° fitting may be used for angles from 27½° to 32½°. To take advantage of this variation in angles, the pipe must not extend through the fitting but merely into it.

No. 30 Angle Floor Flanges are very convenient for mounting railings to structural steel. They can be supplied in 30°, 35°, 40°, or 45° angles. The bottom of the flange is provided with a raised pad at each end, enabling the installer to grind off the bottom to secure the exact angle required.

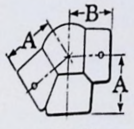
Dimensions, in Inches



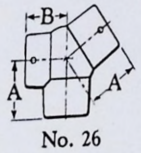
No. 16



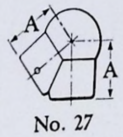
No. 18



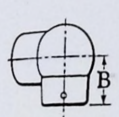
No. 20



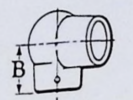
No. 26



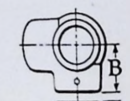
No. 27



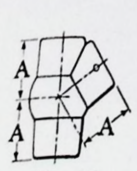
No. 28 or No. 29



No. 24 or No. 25



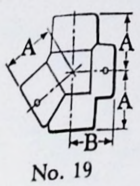
No. 21 or No. 22



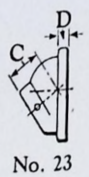
No. 15



No. 17



No. 19

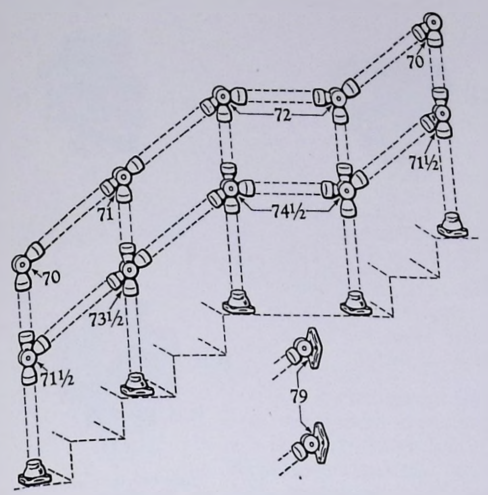


No. 23

Size	30°				35°				40°				45°			
	1	1¼	1½	2	1	1¼	1½	2	1	1¼	1½	2	1	1¼	1½	2
A	1⅞	2¼	2⁹⁄₁₆	2¾	2	2¹³⁄₃₂	2¾	3¹⁄₁₆	2⁵⁄₃₂	2⁹⁄₁₆	3	3⅜	2⁵⁄₁₆	2¹³⁄₁₆	3¼	3¹¹⁄₁₆
B	1⅝	1⅞	2³⁄₁₆	2⁵⁄₁₆	1¹¹⁄₁₆	2	2¼	2⁹⁄₁₆	1¹³⁄₁₆	2⅛	2⅜	2¹³⁄₁₆	1¹⁵⁄₁₆	2⅜	2½	3⅛
C	1⁹⁄₁₆	1⁹⁄₁₆	1¹³⁄₁₆	2¹⁄₁₆	1⁹⁄₁₆	1⁹⁄₁₆	1¹³⁄₁₆	2¹⁄₁₆	1⁹⁄₁₆	1⁹⁄₁₆	1¹³⁄₁₆	2¹⁄₁₆	1⁹⁄₁₆	1⁹⁄₁₆	1¹³⁄₁₆	2¹⁄₁₆
D	⅜	⅜	⅜	½	⅜	⅜	⅜	½	⅜	⅜	⅜	½	⅜	⅜	⅜	½

Thread Engagement . . . . page 367

Malleable Iron Adjustable Rail Fittings

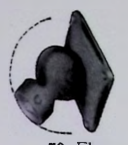




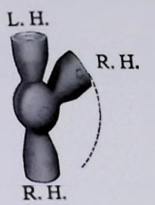
No. 70, Elbow
Female
Right Hand



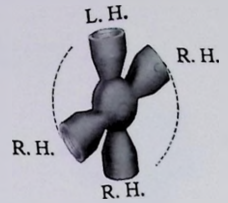
No. 70½, Elbow
Male and Female
Right Hand



No. 79, Flange
Right Hand



Tee
No. 71, Right Hand
No. 71½, Tapped as shown



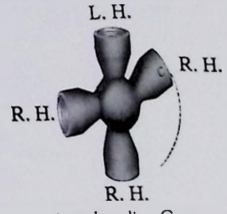
Cross
No. 73, Right Hand
No. 73½, Tapped as shown

List Prices, Black

Size	Inches	1	1¼	1½	2
No. 70	Each	1.10	1.25	1.70	2.25
No. 70½	Each	.80	.90	1.20	1.65
No. 71 or No. 71½	Each	1.30	1.50	2.00	2.50
No. 72	Each	1.30	1.60	2.15	2.50
No. 73 or No. 73½	Each	1.50	1.75	2.35	2.75
No. 74 or No. 74½	Each	1.50	1.85	2.50	2.75
No. 79	Each	1.65	1.75	1.90	2.50



Stair Landing Tee
No. 72, Right Hand

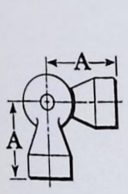


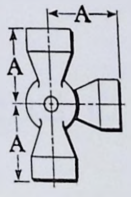
Stair Landing Cross
No. 74, Right Hand
No. 74½, Tapped as shown

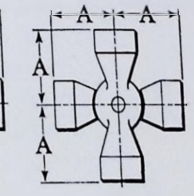
These fittings are adjustable as shown in the illustrations, and may be used in railings of any angle from horizontal to 45 degrees. All openings are threaded, to afford rigidity to the railing.

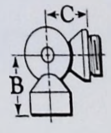
No. 70½ Male and Female Elbows may be used in combination with Ball Pattern or Plain Pattern Railing Fittings shown on pages 264 and 268. Such combinations provide for corner fittings, and enable erecting railings of a steeper angle than 45 degrees.

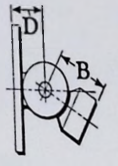
Galvanized fittings, add 50 per cent to list prices of Black.









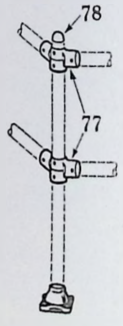


Dimensions, in Inches

Size	1	1¼	1½	2
A	2¾	3¼	3¾	4¼
B	2³⁄₁₆	2½	2¹³⁄₁₆	3¼
C	1¹¹⁄₁₆	2⅛	2⅜	2¹⁵⁄₁₆
D	1¹¹⁄₁₆	1¹¹⁄₁₆	1⅞	2¼

Thread Engagement . . . . page 367

Malleable Iron Enclosure Railing Fittings





List Prices and Dimensions

Size	Inches	1	1¼	1½	2
No. 77	Black Each	1.25	1.40	1.65	2.25
	Galv. Each	1.50	1.75	2.10	2.85
No. 78	Black Each	.40	.45	.50	.60
	Galv. Each	.50	.55	.65	.80
E	Inches	2¼	2¾	3¹⁄₁₆	3¾



No. 78, Cap

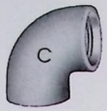
These fittings enable making enclosure railings conveniently. The posts can be made of single pieces of pipe; the cross is designed to slip over the post and be riveted to it. The outlets of the cross are slip-joint, and are adjustable from 90 to 180 degrees. The cap is designed to be driven into the top end of the post. An extra charge is made when No. 77 Crosses are drilled for rivets.



No. 77, Cross

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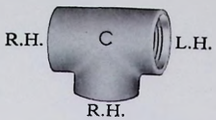
Malleable Iron Plain Pattern Railing Fittings



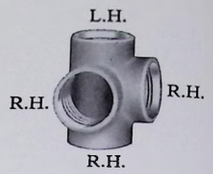
90° Elbow
No. 61, Right Hand



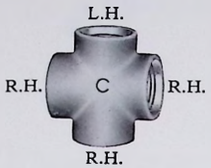
90° Side Outlet Elbow
No. 62, Right Hand



Tee
No. 63, Tapped as shown
No. 63½, Right Hand



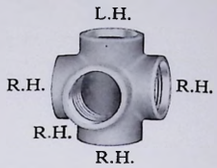
Side Outlet Tee
No. 64, Tapped as shown
No. 64½, Right Hand



Cross
No. 65, Tapped as shown
No. 65½, Right Hand

Threading: Fittings threaded other than shown can be made to order, at an advance over regular list prices. See the Crane Discount Sheet for prices. Orders should be accompanied by a sketch.

Reamed fittings: Fittings with one or more openings reamed for slip joint, or with one or more openings reamed for slip joint and drilled for rivets, can be made to order at an advance over regular list prices. See the Crane Discount Sheet for prices. Orders should be accompanied by a sketch.



Side Outlet Cross
No. 66, Right Hand
No. 66½, Tapped as shown

List Prices and Dimensions

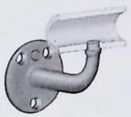
Size		Inches	½	¾	1	1¼	1½	2	2½	3
No. 61	Black	Each	.08	.11	.14	.22	.27	.44	.80	1.10
	Galv.	Each	.10	.14	.18	.29	.35	.57	1.05	1.45
No. 62	Black	Each	.16	.22	.28	.44	.55	.88	1.60	2.20
	Galv.	Each	.22	.29	.36	.57	.72	1.15	2.10	2.85
No. 63 or No. 63½	Black	Each	.10	.14	.19	.28	.36	.57	1.00	1.45
	Galv.	Each	.13	.18	.25	.36	.47	.75	1.30	1.90
No. 64 or No. 64½	Black	Each	.20	.28	.37	.57	.72	1.15	2.00	2.90
	Galv.	Each	.26	.36	.48	.75	.95	1.50	2.60	3.80
No. 65 or No. 65½	Black	Each	.15	.20	.25	.38	.48	.77	1.40	1.95
	Galv.	Each	.20	.26	.33	.49	.62	1.00	1.85	2.55
No. 66 or No. 66½	Black	Each	.25	.35	.46	.70	.90	1.45	2.50	3.65
	Galv.	Each	.33	.45	.60	.91	1.17	1.90	3.25	4.75
Center to end		Inches	1⅛	1 5/16	1½	1¾	1 15/16	2¼	2 11/16	3⅛

Thread Engagement . . . page 367

Malleable Iron Auxiliary Railing Fittings



No. 50
Stair Rail Bracket



No. 51
Stair Rail Bracket



No. 56
Hitching Post Cap
Male



No. 57
Hitching Post Cap
Female



No. 52
Stair Rail Bracket
Flush Joint

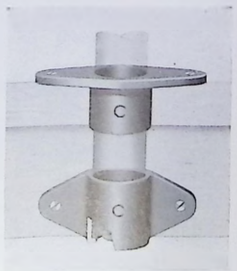


No. 55
Loafer Rail
18 inches long
Cast Iron

List Prices, Black

Size	Inches	1	1¼	1½	2
No. 50	Each	.35	.35	.35	.35
No. 51	Each	.45	.45	.45	.45
No. 52	Each		1.10	1.30	
No. 55	Each	.30	.30	.30	.30
No. 56	Each			.35	
No. 57	Each			.40	.90
No. 58	Each	.35	.40	.50	.65
No. 59	Each	.35	.40	.50	.65

Galvanized fittings, add 50 per cent to list prices of Black.



No. 58, Board Walk Flange
No. 59, Board Walk Bracket

Iron Flanged Fittings and Flanges

25-Pound Fittings . . . . . pages 270 to 271
125-Pound Fittings . . . . . pages 272 to 278
Special Fittings . . . . . page 279
250-Pound Fittings . . . . . pages 280 to 286
800-Pound Hydraulic Fittings . . . . . page 287
Common Flanges . . . . . page 288
Floor Flanges . . . . . page 288
25-Pound Flanges . . . . . page 289
125-Pound Flanges . . . . . pages 290 to 291
250-Pound Flanges . . . . . pages 292 to 293
800-Pound Hydraulic Flanges . . . . . page 294
Galvanized Fittings and Flanges . . . . . page 295

The fittings and flanges mentioned above constitute the Crane line of Cast Iron or Ferrosteel Flanged Fittings and of Cast Iron, Ferrosteel, or Malleable Iron Flanges.

For the higher pressures and temperatures, Steel Flanged Fittings and Flanges are recommended. These are shown in the section of this catalogue devoted to Steel Valves and Fittings.

Flanges for welding are shown in the section devoted to Steel Valves and Fittings.

Cranelap Pipe Joints are shown in the section devoted to Fabricated Piping.

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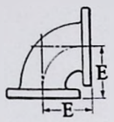
25-Pound Cast Iron Flanged Fittings

WORKING PRESSURES
4 to 36-inch — **25** pounds steam or cold gas
4 to 36-inch — **43** pounds cold water, non-shock

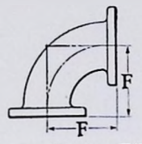
Crane 25-Pound Cast Iron Flanged Fittings, listed on the opposite page, conform to the 25-Pound American Tentative Cast Iron Flanged Fitting Standard (B16b2-1931), except that this Standard does not include Base Elbows nor Reducers.

Although the American Standard rates fittings 4 to 72-inch for 25 pounds steam or gas working pressure, 25-Pound fittings larger than 36-inch are made to order of a design suitable for the pressure intended, retaining American Standard center to face dimensions, flange dimensions, and drilling.

Dimensions, in Inches



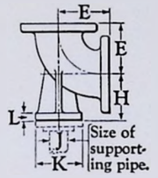
90° Elbow



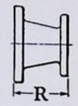
90° Long Radius Elbow



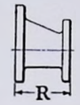
45° Elbow



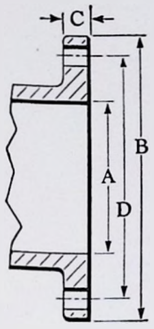
90° Base Elbow Square Base or Round Base

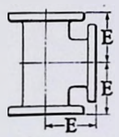


Taper Reducer

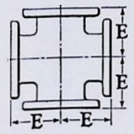


Eccentric Reducer

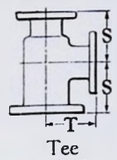




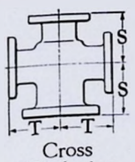
Tee



Cross



Tee *Reducing



Cross *Reducing

Dimensions of reducing fittings:** The center to face dimensions of Reducing Elbows, Tees, and Crosses are the same as for the straight size corresponding to the size of the largest opening, ***with the following exception:

Exception: In sizes 18-inch and larger, if the outlet of a Reducing Tee or Cross is the size given in the table below, or is smaller, use the "Short Body" dimensions shown below.

The face to face dimension of Reducers is governed by the size of the larger opening, regardless of the size of the smaller opening.

Size	A	B	C	D	E	EE	F	G	H	J	K	L	R	No. of bolts	Dia. of bolts
4	4	9	3/4	7 1/2	6 1/2	13	9	4	5 1/2	2	6	5/8	7	8	5/8
5	5	10	3/4	8 1/2	7 1/2	15	10 1/4	4 1/2	6 1/4	2 1/2	7	11/16	8	8	5/8
6	6	11	3/4	9 1/2	8	16	11 1/2	5	7	2 1/2	7	11/16	9	8	5/8
8	8	13 1/2	3/4	11 3/4	9	18	14	5 1/2	8 3/8	4	9	15/16	11	8	5/8
10	10	16	7/8	14 1/4	11	22	16 1/2	6 1/2	9 3/4	4	9	15/16	12	12	5/8
12	12	19	1	17	12	24	19	7 1/2	11 1/4	6	11	1	14	12	5/8
14	14	21	1 1/8	18 3/4	14	28	21 1/2	7 1/2	12 1/2	6	11	1	16	12	3/4
16	16	23 1/2	1 1/8	21 1/4	15	30	24	8	13 3/4	6	11	1	18	16	3/4
18	18	25	1 1/4	22 3/4	16 1/2	33	26 1/2	8 1/2	15	8	13 1/2	1 1/8	19	16	3/4
20	20	27 1/2	1 1/4	25	18	36	29	9 1/2	16	8	13 1/2	1 1/8	20	20	3/4
24	24	32	1 3/8	29 1/2	22	44	34	11	18 1/2	8	13 1/2	1 1/8	24	20	3/4
30	30	38 3/4	1 1/2	36	25	50	41 1/2	15					30	28	7/8
36	36	46	1 5/8	42 3/4	28	56	49	18					36	32	7/8
42	42	53	1 3/4	49 1/2	31	62	56 1/2	21					42	36	1
48	48	59 1/2	2	56	34	68	64	24					48	44	1
54	54	66 1/4	2 1/4	62 3/4	39	78	71 1/2	27						44	1
60	60	73	2 1/4	69 1/4	44	88	79	30						52	1 1/8
72	72	86 1/2	2 1/2	82 1/2	53	106	94	36						60	1 1/8

Short Body Reducing Tees and Crosses

Size	Size of outlet and smaller	S	SS	T
18	12	13	26	15 1/2
20	14	14	28	17
24	16	15	30	19
30	20	18	36	23
36	24	20	40	26
42	24	23	46	30
48	30	26	52	34
54	36	29	58	37
60	40	33	66	41
72	48	40	80	48

Templates for drilling . . . . page 370

25-Pound Cast Iron Flanged Fittings

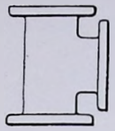

90° Elbow
No. 567
Straight

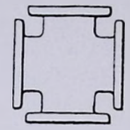

90° Long Radius Elbow
No. 578
Straight

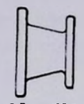
For working pressures, see the preceding page.

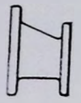

45° Elbow
No. 569
Straight


90° Base Elbow
No. 579, Square Base
No. 580, Round Base


Tee
No. 571, Straight
No. 573, Reducing


Cross
No. 575, Straight
No. 577, Reducing


No. 581
Taper Reducer


No. 582
Eccentric Reducer

Prices on application

List Prices

Size	90° Elbows No. 567 Straight		90° Long Radius Elbows No. 578 Straight		45° Elbows No. 569 Straight		90° Base Elbows No. 579, Square Base No. 580, Round Base		
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced except Base Flange	Faced and Drilled except Base Flange	Facing and Drilling Base Flange
Inches	Each	Each	Each	Each	Each	Each	Each	Each	Each
16	52.00	57.00	86.00	93.50	52.00	57.00	85.00	90.00	7.50
18	67.50	73.50	113.00	122.00	67.50	73.50	100.00	106.00	12.00
20	85.50	92.50	143.00	153.00	85.50	92.50	114.00	121.00	12.00
24	133.00	143.00	222.00	237.00	133.00	143.00	180.00	190.00	12.00
30	225.00	245.00			225.00	245.00			
36	360.00	385.00			360.00	385.00			

Size	Tees: No. 571 Straight		Tees: No. 573 Reducing		Crosses: No. 575 Straight		Crosses: No. 577 Reducing	
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled
Inches	Each	Each	Each	Each	Each	Each	Each	Each
16	75.00	82.50	86.00	93.50	114.00	124.00	130.00	140.00
18	98.00	107.00	113.00	122.00	150.00	162.00	172.00	184.00
20	123.00	133.00	143.00	153.00	188.00	202.00	217.00	231.00
24	193.00	208.00	222.00	237.00	290.00	310.00	335.00	355.00
30	325.00	355.00	375.00	405.00	495.00	535.00	565.00	605.00
36	520.00	560.00	598.00	638.00	790.00	840.00	910.00	960.00

Size	Taper Reducers No. 581	
	Faced	Faced and Drilled
Inches	Each	Each
16 x 14	85.00	90.00
16 x 12		
18 x 16	100.00	106.00
18 x 14		
18 x 12		
20 x 18	114.00	121.00
20 x 16		
20 x 14		
24 x 20	180.00	190.00
24 x 18		
24 x 16		

Reducing Tees and Crosses: No. 573 Reducing Tees and No. 577 Reducing Crosses are made to order only, at the above list prices.

Eccentric Reducers: No. 582 Eccentric Reducers are made to order only; prices on application.

Smaller or larger sizes: Sizes smaller than 16-inch or larger than 36-inch can be made to order; prices on application.

Drilling: These fittings are furnished "faced only", unless ordered "faced and drilled".

When ordered drilled, they will be drilled to the 25-Pound American Tentative Standard, unless otherwise specified.

They can be furnished drilled to the 125-Pound Standard, but, when 25-Pound Fittings are so drilled, full face gaskets should be used to avoid distorting the flanges.

Facing: The flanges on 25-Pound Fittings are plain faced, with a smooth finish.

Bolting on Companion Flanges . . . . page 352
Templates for drilling . . . . . page 370

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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Published by AsbestosClaims.Law
asbestosclaims.law/library/21275/154

125-Pound Cast Iron Flanged Fittings

WORKING PRESSURES

1 to 24-inch — **125** pounds steam
1 to 12-inch — **175** pounds cold water, oil, or gas, non-shock
14 to 24-inch — **150** pounds cold water, oil, or gas, non-shock

Pages 273 to 278 illustrate Crane 125-Pound Cast Iron Flanged Fittings. This line offers the user an unusually complete selection of types and sizes. In addition, special fittings of any design can be made to order on receipt of drawings.

American Standard: The dimensions and drilling of these fittings conform to the 125-Pound American Cast Iron Flanged Fitting Standard (B16a-1928).

Although the American Standard rates fittings 1 to 48-inch for 125 pounds steam working pressure, 125-Pound fittings larger than 24-inch are made to order of a design suitable for the pressure intended, retaining American Standard center to face dimensions, flange dimensions, and drilling.

Facing and drilling: The flanges are plain faced, with a smooth finish. They are not drilled, unless so ordered.

The bolt holes on drilled fittings straddle the center lines unless otherwise ordered, in which case a sketch should accompany the order.

For bolts smaller than 1¾-inch diameter, the bolt holes are drilled ⅛-inch larger than the diameter of the bolts; for bolts 1¾-inch diameter and larger, ¼-inch larger than the diameter of the bolts.

Side Outlet Elbows: All openings are on the intersecting center lines.

Reducing Side Outlet Elbows are regularly made reduced only on the side outlet. Other reductions are made to order only; orders should be accompanied by a sketch showing the size and location of all openings; prices on application.

Double Branch Elbows: In describing Double Branch Elbows, the branches are named first, then the outlet.

Reducing Double Branch Elbows are regularly made reduced only on the branches, with both branches the same size. Other reductions are made to order only; orders should be accompanied by a sketch showing the size and location of all openings; prices on application.

Base Elbows: The base on Base Elbows is not faced nor drilled unless so ordered.

Round bases, when drilled, will be drilled to the template of the flange corresponding to the size of the supporting pipe.

Special Angle Elbows: Elbows from 1° to 45° have the same center to face dimensions as 45° Elbows; 46° to 90°, the same center to face dimensions as 90° Elbows. These fittings are made to order only.

Single Sweep Tees: Single Sweep Tees with the outlet larger than the run are made to order only. Prices and dimensions on application.

Double Sweep Tees: Double Sweep Tees reduced on the run are made to order only. Prices and dimensions on application.

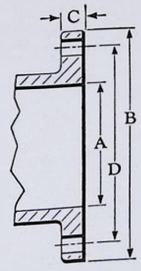
Double Sweep Tees with the outlet larger than the run can be made with only a reasonable increase in the size of the outlet.

Side Outlet Tees: Orders for Reducing Side Outlet Tees should be accompanied by a sketch showing the size and location of all openings.

Base Tees: Base Tees are made to order only; prices on application. The dimensions of the base are the same as for Base Elbows.

45° Laterals: Reducing 45° Laterals with the outlet larger than the run are entirely special. Prices and dimensions on application.

Dimensions of Flanges, in Inches



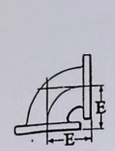
Size	A	B	C	D	No. of bolts	Dia. of bolts
1	1	4¼	7/16	3⅛	4	½
1¼	1¼	4⅝	½	3½	4	½
1½	1½	5	9/16	3⅞	4	½
2	2	6	⅝	4¾	4	⅝
2½	2½	7	11/16	5½	4	⅝
3	3	7½	¾	6	4	⅝
3½	3½	8½	13/16	7	8	⅝
4	4	9	15/16	7½	8	⅝
5	5	10	15/16	8½	8	¾
6	6	11	1	9½	8	¾
8	8	13½	1⅛	11¾	8	¾
10	10	16	13/16	14¼	12	⅞
12	12	19	1¼	17	12	⅞
14	14	21	1⅜	18¾	12	1
16	16	23½	1⅜	21¼	16	1
18	18	25	1 9/16	22¾	16	1⅛
20	20	27½	1 11/16	25	20	1⅛
24	24	32	1⅞	29½	20	1¼
30	30	38¾	2⅛	36	28	1¼
36	36	46	2⅜	42¾	32	1½
42	42	53	2⅝	49½	36	1½
48	48	59½	2¾	56	44	1½

List prices . . . . pages 274 to 278

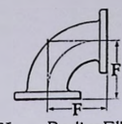
Templates for drilling . . . . page 370

125-Pound Cast Iron Flanged Fittings

Dimensions, in Inches



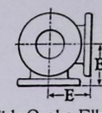
90° Elbow



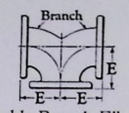
90° Long Radius Elbow



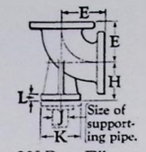
45° Elbow



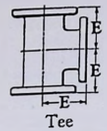
Side Outlet Elbow



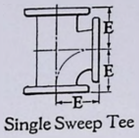
Double Branch Elbow



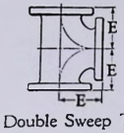
90° Base Elbow Square Base or Round Base



Tee



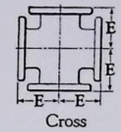
Single Sweep Tee



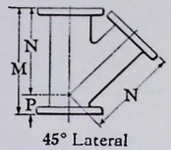
Double Sweep Tee



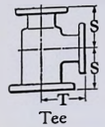
Side Outlet Tee



Cross



45° Lateral



Tee *Reducing



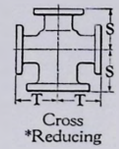
Single Sweep Tee *Reducing



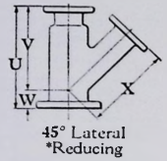
Double Sweep Tee *Reducing



Side Outlet Tee *Reducing



Cross *Reducing



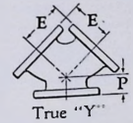
45° Lateral *Reducing



Taper Reducer



Eccentric Reducer



True "Y"

Size	E	EE	F	G	H	J	K	L	M	N	P	R
1	3½	7	5	1¾	3½	¾	3½	7/16	7½	5¾	1¾	
1¼	3¾	7½	5½	2	3⅝	¾	3½	7/16	8	6¼	1¾	
1½	4	8	6	2¼	3¾	1	4¼	7/16	9	7	2	
2	4½	9	6½	2½	4⅛	1¼	4⅝	½	10½	8	2½	5
2½	5	10	7	3	4½	1¼	4⅝	½	12	9½	2½	5½
3	5½	11	7¾	3	4⅞	1½	5	9/16	13	10	3	6
3½	6	12	8½	3½	5¼	1½	5	9/16	14½	11½	3	6½
4	6½	13	9	4	5½	2	6	⅝	15	12	3	7
5	7½	15	10¼	4½	6¼	2½	7	11/16	17	13½	3½	8
6	8	16	11½	5	7	2½	7	11/16	18	14½	3½	9
8	9	18	14	5½	8⅜	4	9	15/16	22	17½	4½	11
10	11	22	16½	6½	9¾	4	9	15/16	25½	20½	5	12
12	12	24	19	7½	11¼	6	11	1	30	24½	5½	14
14	14	28	21½	7½	12½	6	11	1	33	27	6	16
16	15	30	24	8	13¾	6	11	1	36½	30	6½	18
18	16½	33	26½	8½	15	8	13½	1⅛	39	32	7	19
20	18	36	29	9½	16	8	13½	1⅛	43	35	8	20
24	22	44	34	11	18½	8	13½	1⅛	49½	40½	9	24
30	25	50	41½	15					59	49	10	30
36	28	56	49	18								36
42	31	62	56½	21								
48	34	68	64	24								

Dimensions of reducing fittings:** The center to face dimensions of Reducing Elbows, Tees, Crosses, and 45° Laterals are the same as for the straight size corresponding to the size of the largest opening, ***with the following exception:

Exception: In sizes 18-inch and larger, if the outlet of a Reducing Tee, Cross, or 45° Lateral is the size given in the table below, or is smaller, use the "Short Body" dimensions shown below.

The face to face dimension of Reducers is governed by the size of the larger opening, regardless of the size of the smaller opening.

Short Body Reducing Fittings

Size	Tees and Crosses: Size of outlet and smaller	S	SS	T	45° Laterals: Size of outlet and smaller	U	V	W	X
18	12	13	26	15½	8	26	25	1	27½
20	14	14	28	17	10	28	27	1	29½
24	16	15	30	19	12	32	31½	½	34½
30	20	18	36	23	14	39	39	0	42
36	24	20	40	26					
42	Dimensions 42 and 48" on application								
48									

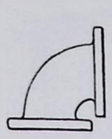
List prices . . . . pages 274 to 278

Templates for drilling . . . . page 370

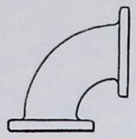
Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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asbestosclaims.law/library/21275/155

125-Pound Cast Iron Flanged Fittings

For working pressures, see page 272.



90° Elbow
No. 525
Straight



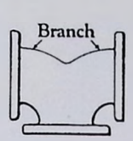
90° Long Radius Elbow
No. 551
Straight



45° Elbow
No. 527
Straight



Side Outlet Elbow
No. 526, Straight
*No. 528, Reducing



Double Branch Elbow
No. 538, Straight
*No. 540, Reducing



90° Base Elbow
No. 549, Square Base
No. 550, Round Base

List Prices

Size	90° Elbows No. 525 Straight		90° Long Radius Elbows No. 551 Straight		45° Elbows No. 527 Straight		90° Base Elbows No. 549, with Square Base No. 550, with Round Base		
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced except Base Flange	Faced and Drilled except Flange Base	Facing and Drilling Base Flange
Inches	Each	Each	Each	Each	Each	Each	Each	Each	Each
1	3.00	3.60	5.00	5.90	3.30	3.90			
1¼	3.00	3.60	5.00	5.90	3.30	3.90			
1½	3.00	3.60	5.00	5.90	3.30	3.90			
2	3.00	3.60	5.00	5.90	3.30	3.90			
2½	3.15	3.75	5.25	6.15	3.50	4.10			
3	3.45	4.15	5.75	6.85	3.80	4.50			
3½	4.05	4.90	6.75	8.00	4.50	5.35			
4	4.50	5.50	7.50	9.00	5.00	6.00	9.00	10.00	3.00
5	6.25	7.25	10.50	12.00	6.90	7.90	12.50	13.50	3.50
6	7.60	8.90	12.65	14.60	8.35	9.65	15.25	16.55	3.50
8	12.00	13.60	20.00	22.40	12.60	14.20	24.00	25.60	5.00
10	19.00	21.70	31.50	35.50	20.00	22.70	38.00	40.70	5.00
12	28.00	31.00	46.50	51.00	29.50	32.50	56.00	59.00	7.50
14	41.50	45.25	69.00	74.50	41.50	45.25	70.00	73.75	7.50
16	54.50	59.50	91.00	98.50	54.50	59.50	90.00	95.00	7.50
18	71.00	77.00	118.00	127.00	71.00	77.00	105.00	111.00	12.00
20	90.00	97.00	150.00	160.00	90.00	97.00	120.00	127.00	12.00
24	140.00	150.00	235.00	250.00	140.00	150.00	190.00	200.00	12.00

Size	Side Outlet Elbows No. 526 Straight		Side Outlet Elbows No. 528 *Reducing		Double Branch Elbows No. 538 Straight		Double Branch Elbows No. 540 *Reducing	
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled
Inches	Each	Each	Each	Each	Each	Each	Each	Each
4	26.50	28.00	29.50	31.00	28.50	30.00	31.50	33.00
5	28.50	30.00	31.50	33.00	36.00	37.50	39.50	41.00
6	33.00	35.00	36.00	38.00	38.00	40.00	42.00	44.00
8	47.50	50.00	52.50	55.00	47.50	50.00	52.50	55.00
10	76.00	80.00	84.00	88.00	66.00	70.00	73.50	77.50
12	100.50	105.00	110.50	115.00	90.50	95.00	100.50	105.00
14	129.50	135.00	144.50	150.00	119.50	125.00	132.50	138.00
16	152.50	160.00	167.50	175.00	142.50	150.00	157.50	165.00

***Side Outlet Elbows:** The outlet is on the intersecting center lines.

"Reducing" list prices apply only to elbows reduced only on the side outlet. Other reductions are entirely special, and orders should be accompanied by a sketch; prices on application.

***Double Branch Elbows:** "Reducing" list prices apply only to elbows reduced on the branches, and with both branches the same size. Other reductions are entirely special, and orders should be accompanied by a sketch; prices on application.

In describing Double Branch Elbows, the branch openings are named first, then the outlet.

Drilling: These fittings are furnished "faced only", unless ordered "faced and drilled".

Facing: The flanges on 125-Pound Cast Iron Flanged Fittings are plain faced, with a smooth finish.

Reducing with flanges: To avoid delays, orders for reducing fittings not carried in stock can be filled by using reducing companion flanges. Orders should specify "Reduce with flanges if necessary". For reducing flanges, see page 291.

Larger sizes: Larger sizes are made to order. Prices on application.

Bolting on Companion Flanges ..... **page 352**
Galvanized Flanged Fittings ..... **page 295**
Dimensions ..... **pages 272 and 273**
Templates for drilling ..... **page 370**

125-Pound Cast Iron Flanged Fittings

For working pressures, see page 272.



No. 545
90° Elbow
*Reducing



No. 546
90° Long Radius Elbow
*Reducing



No. 547
*Taper Reducer



No. 548
*Eccentric Reducer

List Prices

Size	90° Elbows No. 545 *Reducing		90° Long Radius Elbows No. 546 *Reducing		Reducers No. 547 *Taper		Reducers No. 548 *Eccentric	
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled
Inches	Each	Each	Each	Each	Each	Each	Each	Each
1½	6.00	6.60						
2	6.00	6.60	10.00	10.90	6.00	6.60		
2½	6.30	6.90	10.50	11.40	6.30	6.90	6.30	6.90
3	6.90	7.60	11.50	12.60	6.90	7.60	6.90	7.60
3½	8.10	8.95			8.10	8.95	8.10	8.95
4	9.00	10.00	15.00	16.50	9.00	10.00	9.00	10.00
5	12.50	13.50	21.00	22.50	12.50	13.50	12.50	13.50
6	15.25	16.55	25.30	27.25	15.25	16.55	15.25	16.55
8	24.00	25.60	40.00	42.40	24.00	25.60	24.00	25.60
10	38.00	40.70	63.00	67.00	38.00	40.70	38.00	40.70
12	56.00	59.00	93.00	97.50	56.00	59.00	56.00	59.00
14	70.00	73.75	138.00	143.50	70.00	73.75	70.00	73.75
16	90.00	95.00	182.00	189.50	90.00	95.00	90.00	95.00
18	105.00	111.00	236.00	245.00	105.00	111.00	105.00	111.00
20	120.00	127.00	300.00	310.00	120.00	127.00	120.00	127.00
24	187.00	197.00	470.00	485.00	190.00	200.00	190.00	200.00

*List prices of Reducing Elbows and Reducers apply only to the reductions shown below. Other reductions are entirely special; prices on application.

No. 545 90° Elbows

1½ x 1¼	6 x 5	16 x 14
2 x 1½	6 x 4	16 x 12
2 x 1¼	6 x 3½	16 x 10
2½ x 2	6 x 3	16 x 8
2½ x 1½	6 x 2½	18 x 16
2½ x 1¼	6 x 2	18 x 14
3 x 2½	8 x 6	18 x 12
3 x 2	8 x 5	18 x 10
3 x 1½	8 x 4	20 x 18
3 x 1¼	8 x 3½	20 x 16
3½ x 3	8 x 3	20 x 14
3½ x 2½	10 x 8	20 x 12
3½ x 2	10 x 6	24 x 20
3½ x 1½	10 x 5	24 x 18
4 x 3½	10 x 4	24 x 16
4 x 3	12 x 10	24 x 14
4 x 2½	12 x 8	24 x 12
4 x 2	12 x 6	
4 x 1½	12 x 5	
5 x 4	12 x 4	
5 x 3½	14 x 12	
5 x 3	14 x 10	
5 x 2½	14 x 8	
5 x 2	14 x 6	

No. 546 90° Elbows Long Radius

2 x 1½	10 x 8	
2½ x 2	10 x 6	
2½ x 1½	10 x 5	
3 x 2½	12 x 10	
3 x 2	12 x 8	
3 x 1½	12 x 6	
4 x 3½	12 x 5	
4 x 3	14 x 12	
4 x 2½	14 x 10	
4 x 2	16 x 14	
4 x 1½	16 x 12	
5 x 4	16 x 10	
5 x 3½	18 x 16	
5 x 3	18 x 14	
5 x 2½	18 x 10	
6 x 5	20 x 18	
6 x 4	20 x 16	
6 x 3½	20 x 14	
6 x 3	20 x 12	
6 x 2½	24 x 18	
6 x 2	24 x 16	
8 x 6		
8 x 5		
8 x 4		
8 x 3½		

No. 547 Reducers

2 x 1¼	6 x 5	16 x 14
2½ x 1½	6 x 4	16 x 12
2½ x 1¼	6 x 3½	16 x 10
3 x 2	6 x 3	16 x 8
3 x 1½	6 x 2½	18 x 16
3 x 1¼	6 x 2	18 x 14
3½ x 3	8 x 6	18 x 12
3½ x 2½	8 x 5	18 x 10
3½ x 2	8 x 4	18 x 8
3½ x 1½	8 x 3½	18 x 6
4 x 3½	8 x 3	20 x 18
4 x 3	8 x 2½	20 x 16
4 x 2½	10 x 8	20 x 14
4 x 2	10 x 6	20 x 12
4 x 1½	10 x 5	20 x 10
5 x 4	10 x 4	20 x 8
5 x 3½	12 x 10	24 x 20
5 x 3	12 x 8	24 x 18
5 x 2½	12 x 6	24 x 16
5 x 2	12 x 5	24 x 14
5 x 1½	12 x 4	24 x 12
	14 x 12	
	14 x 10	
	14 x 8	
	14 x 6	

No. 548 Eccentric Reducers

2½ x 2	14 x 12
3 x 2½	14 x 10
3 x 2	14 x 8
3 x 1½	14 x 6
3½ x 3	16 x 14
3½ x 2½	16 x 12
3½ x 2	16 x 10
4 x 3	16 x 8
4 x 2½	16 x 6
4 x 2	18 x 16
5 x 4	18 x 14
6 x 5	18 x 12
6 x 4	18 x 10
6 x 3½	18 x 8
6 x 3	20 x 18
8 x 6	20 x 16
8 x 5	20 x 14
8 x 4	20 x 12
10 x 8	24 x 18
10 x 6	24 x 16
10 x 5	24 x 14
10 x 4	24 x 12
12 x 10	
12 x 8	
12 x 6	
12 x 5	

Drilling: These fittings are furnished "faced only", unless ordered "faced and drilled".

Facing: The flanges on 125-Pound Cast Iron Flanged Fittings are plain faced, with a smooth finish.

Reducing with flanges: To avoid delays, orders for reducing fittings not carried in stock can be filled by using reducing companion flanges. Orders should specify "Reduce with flanges if necessary". For reducing flanges, see page 291.

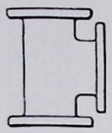
Larger sizes: Larger sizes are made to order. Prices on application.

Bolting on Companion Flanges ..... **page 352**
Galvanized Flanged Fittings ..... **page 295**
Dimensions ..... **pages 272 and 273**
Templates for drilling ..... **page 370**

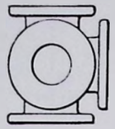
Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 156 of 402
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asbestosclaims.law/library/21275/156

125-Pound Cast Iron Flanged Fittings

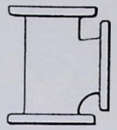
For working pressures, see page 272.



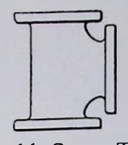
Tee
No. 529, Straight
*No. 531, Reducing



Side Outlet Tee
No. 530, Straight
No. 532, Reducing



Single Sweep Tee
No. 533, Straight
*No. 535, Reducing



Double Sweep Tee
No. 534, Straight
*No. 536, Reducing

List Prices

Size	Tees				Single Sweep Tees				Double Sweep Tees			
	No. 529 Straight		No. 531 *Reducing		No. 533 Straight		No. 535 *Reducing		No. 534 Straight		No. 536 *Reducing	
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled
Inches	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each	Each
1	4.35	5.25										
1¼	4.35	5.25	5.00	5.90								
1½	4.35	5.25	5.00	5.90								
2	4.35	5.25	5.00	5.90	5.00	5.90			5.00	5.90		
2½	4.55	5.45	5.25	6.15	5.25	6.15	6.00	6.90	5.25	6.15	6.00	6.90
3	5.00	6.10	5.75	6.85	5.75	6.85	6.60	7.70	5.75	6.85	6.60	7.70
3½	5.85	7.10	6.75	8.00	6.75	8.00	7.75	9.00	6.75	8.00	7.75	9.00
4	6.50	8.00	7.50	9.00	7.50	9.00	8.65	10.15	7.50	9.00	8.65	10.15
5	9.10	10.60	10.50	12.00	10.50	12.00	12.00	13.50	10.50	12.00	12.00	13.50
6	11.00	12.95	12.65	14.60	12.65	14.60	14.50	16.45	12.65	14.60	14.50	16.45
8	17.40	19.80	20.00	22.40	20.00	22.40	23.00	25.40	20.00	22.40	23.00	25.40
10	27.50	31.50	31.50	35.50	31.50	35.50	36.00	40.00	31.50	35.50	36.00	40.00
12	40.50	45.00	46.50	51.00	46.50	51.00	53.50	58.00	46.50	51.00	53.50	58.00
14	60.00	65.50	69.00	74.50	69.00	74.50	79.00	84.50	69.00	74.50	79.00	84.50
16	79.00	86.50	91.00	98.50	91.00	98.50	105.00	112.50	91.00	98.50	105.00	112.50
18	103.00	112.00	118.00	127.00								
20	130.00	140.00	150.00	160.00								
24	203.00	218.00	233.00	248.00								

Size	Side Outlet Tees			
	No. 530 Straight		No. 532 Reducing	
	Faced	Faced and Drilled	Faced	Faced and Drilled
Inches	Each	Each	Each	Each
4	31.00	33.00	34.00	36.00
5	35.00	37.00	39.00	41.00
6	42.25	45.00	47.25	50.00
8	56.75	60.00	62.75	66.00
10	84.50	90.00	94.50	100.00
12	114.00	120.00	126.00	132.00
14	142.50	150.00	157.50	165.00
16	170.00	180.00	190.00	200.00

Bolting on Companion Flanges....page 352
Galvanized Flanged Fittings.....page 295
Dimensions.....pages 272 and 273
Templates for drilling.....page 370

***Reducing sizes:** List prices of No. 531, No. 535, and No. 536 Reducing Tees apply to sizes carried in stock, shown on the opposite page. Sizes not carried in stock are made to order, at an advance in price depending upon the quantity of a size ordered at one time. See the opposite page for price advances.

Single Sweep Tees: No. 535 Single Sweep Tees with the outlet larger than the run are entirely special. Prices and dimensions on application.

Double Sweep Tees: No. 536 Double Sweep Tees reduced on the run are entirely special. Prices and dimensions on application.

Double Sweep Tees with the outlet larger than the run can be made with only a reasonable increase in the size of the outlet.

Side Outlet Tees: Orders for No. 532 Reducing Side Outlet Tees should be accompanied by a drawing showing the size and location of all openings.

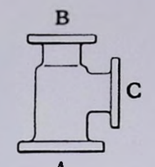
Drilling: These fittings are furnished "faced only", unless ordered "faced and drilled".

Facing: The flanges on 125-Pound Cast Iron Flanged Fittings are plain faced, with a smooth finish.

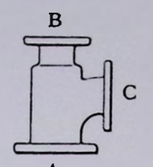
Larger sizes: Larger sizes are made to order. Prices on application.

125-Pound Cast Iron Flanged Fittings

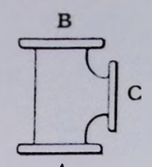
Reducing Flanged Tees Carried in Stock



No. 531
Tee
Reducing



No. 535
Single Sweep Tee
Reducing



No. 536
Double Sweep Tee
Reducing

No. 531, No. 535, and No. 536 Reducing Flanged Tees are carried in stock in the sizes shown below; these are furnished at the regular "Reducing" prices. Sizes not carried in stock are made to order, at an advance in price depending upon the quantity of a size ordered at one time. See the table below for price advances.

No. 531 Tees				No. 535 Single Sweep Tees	No. 536 Double Sweep Tees
A B C	A B C	A B C	A B C	A B C	A B C
2 x 2 x 1½	5 x 5 x 4	8 x 8 x 6	12 x 12 x 10	4 x 4 x 2	4 x 4 x 2
2½ x 2½ x 2	5 x 5 x 3½	8 x 8 x 5	12 x 12 x 8	6 x 6 x 5	6 x 6 x 5
2½ x 2½ x 1½	5 x 5 x 3	8 x 8 x 4	12 x 12 x 6	6 x 6 x 4	6 x 6 x 4
2½ x 2 x 2½	5 x 5 x 2½	8 x 8 x 3½	12 x 12 x 5	6 x 6 x 3	6 x 6 x 3
2½ x 2 x 2	5 x 5 x 2	8 x 8 x 3	12 x 12 x 4	6 x 6 x 2½	8 x 8 x 6
2½ x 2 x 1½	5 x 5 x 1½	8 x 8 x 2½	12 x 12 x 3	8 x 8 x 6	10 x 10 x 8
3 x 3 x 2½	5 x 5 x 1¼	8 x 8 x 2	12 x 12 x 2	8 x 8 x 5	10 x 10 x 6
3 x 3 x 2	5 x 4 x 5	8 x 6 x 8	12 x 10 x 12	8 x 8 x 3	10 x 10 x 5
3 x 3 x 1½	5 x 4 x 4	8 x 6 x 6	12 x 10 x 10	8 x 6 x 6	10 x 10 x 4
3 x 3 x 1¼	5 x 4 x 3	8 x 6 x 5	12 x 10 x 8	8 x 6 x 4	
3 x 3 x 1	5 x 4 x 2½	8 x 6 x 4	12 x 10 x 6	10 x 10 x 6	
3 x 2½ x 3	5 x 4 x 2	8 x 6 x 3	12 x 8 x 12	10 x 8 x 8	
3 x 2½ x 2½	5 x 3½ x 4	8 x 5 x 8	12 x 8 x 10	10 x 6 x 6	
3 x 2½ x 2	5 x 3 x 5	8 x 5 x 6	12 x 8 x 8		
3 x 2 x 3	5 x 3 x 3½	8 x 5 x 5	12 x 8 x 6		
3 x 2 x 2½	5 x 3 x 3	8 x 4 x 8	12 x 6 x 12		
3 x 2 x 2	5 x 2½ x 5	8 x 4 x 6	12 x 6 x 8		
2½ x 2½ x 3	5 x 2 x 5	8 x 4 x 4	12 x 4 x 12		
3½ x 3½ x 3	4 x 4 x 5	8 x 3½ x 8	10 x 10 x 12		
3½ x 3½ x 2½	6 x 6 x 5	8 x 3 x 8	8 x 8 x 12		
3½ x 3½ x 2	6 x 6 x 4	6 x 6 x 8	14 x 14 x 12		
3½ x 2½ x 2½	6 x 6 x 3½	5 x 5 x 8	14 x 14 x 10		
4 x 4 x 3½	6 x 6 x 3	10 x 10 x 8	14 x 14 x 8		
4 x 4 x 3	6 x 6 x 2½	10 x 10 x 6	14 x 14 x 6		
4 x 4 x 2½	6 x 6 x 2	10 x 10 x 5	14 x 14 x 5		
4 x 4 x 2	6 x 6 x 1½	10 x 10 x 4	14 x 14 x 4		
4 x 4 x 1½	6 x 5 x 6	10 x 10 x 3½	14 x 12 x 14		
4 x 4 x 1¼	6 x 5 x 5	10 x 10 x 3	14 x 12 x 12		
4 x 3½ x 4	6 x 5 x 4	10 x 10 x 2½	14 x 10 x 10		
4 x 3 x 4	6 x 5 x 3	10 x 10 x 2	10 x 10 x 14		
4 x 3 x 3	6 x 5 x 2½	10 x 8 x 10	16 x 16 x 14		
4 x 3 x 2½	6 x 4 x 6	10 x 8 x 8	16 x 16 x 12		
4 x 3 x 2	6 x 4 x 5	10 x 8 x 6	16 x 16 x 10		
4 x 2½ x 4	6 x 4 x 4	10 x 8 x 5	16 x 16 x 8		
4 x 2½ x 3	6 x 4 x 3	10 x 8 x 4	16 x 16 x 6		
4 x 2½ x 2½	6 x 4 x 2½	10 x 6 x 10	16 x 12 x 12		
4 x 2 x 4	6 x 3 x 6	10 x 6 x 8	12 x 12 x 16		
4 x 2 x 2	6 x 3 x 4	10 x 6 x 6			
3 x 3 x 4	6 x 3 x 3	10 x 5 x 10			
2½ x 2½ x 4	6 x 2½ x 6	10 x 4 x 10			
	6 x 2 x 6	10 x 3 x 10			
	5 x 5 x 6	8 x 8 x 10			
	5 x 4 x 6	8 x 6 x 10			
	4 x 4 x 6	6 x 6 x 10			

Drilling: These fittings are furnished "faced only", unless ordered "faced and drilled".

Facing: The flanges on 125-Pound Cast Iron Flanged Fittings are plain faced, with a smooth finish.

Reducing Companion Flanges.....page 291
Bolting on Companion Flanges....page 352
Galvanized Flanged Fittings.....page 295

Price Advances for Non-Stock Sizes

Sizes not carried in stock are made to order, at the following price advances over "Reducing" list prices, depending upon the quantity of a size ordered at one time.

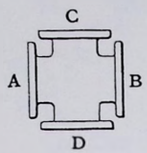
Size	1 to 3½ inch	4 to 8 inch	10 inch	12 to 24 inch
1 piece	100%	50%	25%	No advance
2 pieces	80%	40%	20%	
3 pieces	60%	30%	15%	
4 pieces	40%	20%	10%	
5 pieces	20%	10%	5%	
6 or more	No advance			

Reducing with flanges: To avoid delays, orders for reducing fittings not carried in stock can be filled by using reducing companion flanges. Orders should specify "Reduce with flanges if necessary". For reducing flanges, see page 291.

Dimensions.....pages 272 and 273
Templates for drilling....page 370

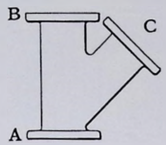
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125-Pound Cast Iron Flanged Fittings



Cross
No. 537, Straight
*No. 539, Reducing

For working pressures, see page 272.



45° Lateral
No. 541, Straight
*No. 543, Reducing

List Prices

Size	Crosses				45° Laterals			
	No. 537 Straight		No. 539 *Reducing		No. 541 Straight		No. 543 *Reducing	
Inches	Faced Each	Faced and Drilled Each	Faced Each	Faced and Drilled Each	Faced Each	Faced and Drilled Each	Faced Each	Faced and Drilled Each
1	6.75	7.95						
1¼	6.75	7.95	7.75	8.95				
1½	6.75	7.95	7.75	8.95				
2	6.75	7.95	7.75	8.95	6.75	7.95		
2½	6.95	8.15	8.00	9.20	6.95	8.15	8.00	9.20
3	7.65	9.05	8.75	10.15	7.65	9.05	8.75	10.15
3½	9.00	10.70	10.35	12.05	9.00	10.70	10.35	12.05
4	10.00	12.00	11.50	13.50	10.00	12.00	11.50	13.50
5	13.75	15.75	15.75	17.75	13.75	15.75	15.75	17.75
6	16.75	19.25	19.25	21.75	16.75	19.25	19.25	21.75
8	26.50	29.75	30.50	33.75	26.50	29.75	30.50	33.75
10	42.00	47.50	48.00	53.50	42.00	47.50	48.00	53.50
12	61.50	67.50	71.00	77.00	61.50	67.50	71.00	77.00
14	91.00	98.50	105.00	112.50	91.00	98.50	105.00	112.50
16	120.00	130.00	138.00	148.00	120.00	130.00	138.00	148.00
18	157.00	169.00	180.00	192.00	157.00	169.00	180.00	192.00
20	198.00	212.00	228.00	242.00	198.00	212.00	228.00	242.00
24	310.00	330.00	355.00	375.00	310.00	330.00	355.00	375.00

***Reducing fittings:** List prices of No. 539 Reducing Crosses and No. 543 Reducing 45° Laterals apply to sizes carried in stock, shown below. Sizes not carried in stock are made to order, at the following price advances over "Reducing" list prices, depending upon the quantity of a size ordered at one time.

Sizes carried in stock						Price advances for non-stock sizes				
No. 539 Crosses				No. 543 45° Laterals			Size	1 to 3½ inch	4 to 8 inch	10 inch	12 to 24 inch
A	B	C	D	A	B	C					
4	4	x 3	x 3	4	4	x 2½	1 piece	100%	50%	25%	No advance
5	5	x 4	x 4	6	6	x 4	2 pieces	80%	40%	20%	
5	5	x 3	x 3	6	6	x 3	3 pieces	60%	30%	15%	
5	5	x 2½	x 2½	6	6	x 2½	4 pieces	40%	20%	10%	
6	6	x 6	x 4	8	8	x 6	5 pieces	20%	10%	5%	
6	6	x 5	x 5	8	8	x 3	6 or more	No advance			
6	6	x 4	x 4	8	6	x 6					
6	6	x 3	x 3	10	x 10	x 8					
8	8	x 6	x 6	10	x 10	x 6					
8	8	x 5	x 5	10	x 8	x 10					
8	8	x 4	x 4	10	x 8	x 8					
8	8	x 3	x 3								
8	6	x 8	x 6								
8	6	x 6	x 6								
10	x 10	x 8	x 8								
10	x 10	x 6	x 6								
10	x 10	x 5	x 5								

***Reducing 45° Laterals:** No. 543 Reducing 45° Laterals with the outlet larger than the run are entirely special. Prices on application.

Reducing with flanges: To avoid delays, orders for reducing fittings not carried in stock can be filled by using reducing companion flanges. Orders should specify "Reduce with flanges if necessary". For reducing flanges, see page 291.

Drilling: These fittings are furnished "faced only", unless ordered "faced and drilled".

Facing: The flanges on 125-Pound Cast Iron Flanged Fittings are plain faced, with a smooth finish.

Larger sizes: Larger sizes are made to order. Prices on application.

Bolting on Companion Flanges . . . . page 352
Galvanized Flanged Fittings . . . . . page 295
Dimensions . . . . . pages 272 and 273
Templates for drilling . . . . . page 370

Special Flanged Fittings



Special Angle Elbow



Base Tee



Filler Piece
with Parallel Faces

In addition to the ordinary types of Flanged Fittings listed and described on pages 270 to 287, Crane Co. can supply special fittings of any shape or size, made to special dimensions, and for any pressure and service. These can be made of Cast Iron, Ferrosteel, or Cast Steel.

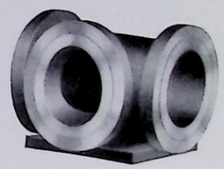
The illustrations on this page show only a few varieties, ranging from simple Special Angle Elbows to exceedingly intricate and massive fittings built to meet peculiar piping conditions.

Attention is directed especially to the fittings in the two photographs at the bottom of the page. These are merely typical of the many unusually special fittings that have been made in the Crane factories over a period of many years.

Prices will be quoted on application. Inquiries should be accompanied by drawings.



Anchorage Tee
with Outlet at Top



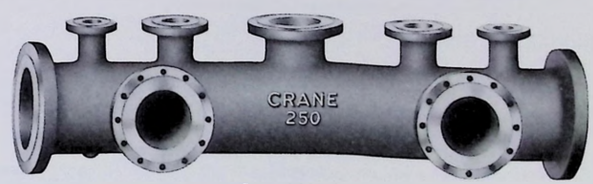
Anchorage Tee
with Outlet at Side



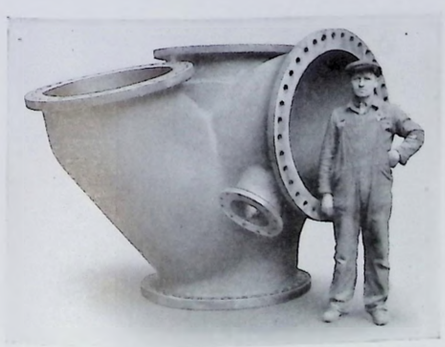
Beveled Filler Piece



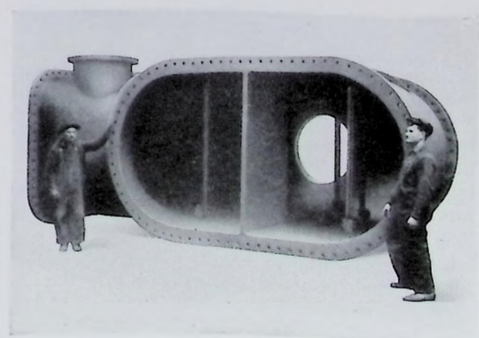
Return Bend



Special Header



Special Side Outlet Y-Bend



Special Fitting for Condenser Connection

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250-Pound Cast Iron Flanged Fittings

WORKING PRESSURES
1 to 24-inch — **250** pounds steam
1 to 12-inch — **400** pounds cold water, oil, or gas, non-shock
14 to 24-inch — **350** pounds cold water, oil, or gas, non-shock

Pages 281 to 286 illustrate Crane 250-Pound Cast Iron Flanged Fittings.

American Standard: The dimensions and drilling of these fittings conform to the 250-Pound American Cast Iron Flanged Fitting Standard (B16b-1928).

Although the American Standard rates fittings 1 to 30-inch for 250 pounds steam working pressure, 250-Pound fittings larger than 24-inch are made to order of a design suitable for the pressure intended, retaining American Standard center to face dimensions, flange dimensions, and drilling.

Facing: The flanges have a 1/16-inch raised face. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Fittings with male, female, tongue, or groove faces can be made to order at an additional price. See page 353 for prices and dimensions.

Drilling: Fittings are not drilled unless so ordered.

The bolt holes on drilled fittings straddle the center lines unless otherwise ordered, in which case a sketch should accompany the order.

For bolts smaller than 1¾-inch diameter, the bolt holes are drilled 1/8-inch larger than the diameter of the bolts; for bolts 1¾-inch diameter and larger, ¼-inch larger than the diameter of the bolts.

Side Outlet Elbows: All openings are on the intersecting center lines.

Reducing Side Outlet Elbows are regularly made reduced only on the side outlet. Other reductions are made to order only; orders should be accompanied by a sketch showing the size and location of all openings; prices on application.

Double Branch Elbows: In describing Double Branch Elbows, the branches are named first, then the outlet.

Reducing Double Branch Elbows are regularly made reduced only on the branches, with both branches the same size. Other reductions are made to order only; orders should be accompanied by a sketch showing the size and location of all openings; prices on application.

Base Elbows: The base on Base Elbows is not faced nor drilled unless so ordered.

Round bases, when drilled, will be drilled to the template of the flange corresponding to the size of the supporting pipe.

Special Angle Elbows: Elbows from 1° to 45° have the same center to face dimensions as 45° Elbows; 46° to 90°, the same center to face dimensions as 90° Elbows. These fittings are made to order only.

List prices . . . pages 282 to 286

Single Sweep Tees: Single Sweep Tees with the outlet larger than the run are made to order only. Prices and dimensions on application.

Double Sweep Tees: Double Sweep Tees reduced on the run are made to order only. Prices and dimensions on application.

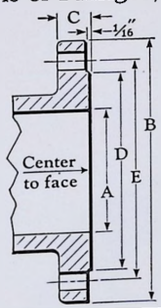
Double Sweep Tees with the outlet larger than the run can be made with only a reasonable increase in the size of the outlet.

Side Outlet Tees: Orders for Reducing Side Outlet Tees should be accompanied by a sketch showing the size and location of all openings.

Base Tees: Base Tees are made to order only; prices on application. The dimensions of the base are the same as for Base Elbows.

45° Laterals: Reducing 45° Laterals with the outlet larger than the run are entirely special. Prices and dimensions on application.

Dimensions of Flanges, in Inches

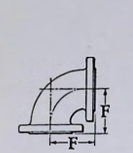


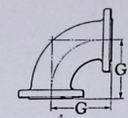
Size	A	B	C	D	E	No. of bolts	Dia. of bolts
1	1	4 7/8	11/16	2 11/16	3 1/2	4	5/8
1¼	1¼	5¼	¾	3 1/16	3 7/8	4	5/8
1½	1½	6 1/8	13/16	3 9/16	4 1/2	4	¾
2	2	6½	⅞	4 3/16	5	8	5/8
2½	2½	7½	1	4 15/16	5 7/8	8	¾
3	3	8¼	1⅛	5 11/16	6 5/8	8	¾
3½	3½	9	13/16	6 5/16	7¼	8	¾
4	4	10	1¼	6 15/16	7 7/8	8	¾
5	5	11	1⅜	8 5/16	9¼	8	¾
6	6	12½	1 7/16	9 11/16	10 5/8	12	¾
8	8	15	1⅝	11 5/16	13	12	⅞
10	10	17½	1⅞	14 1/16	15¼	16	1
12	12	20½	2	16 7/16	17¾	16	1⅛
14	13¼	23	2⅛	18 15/16	20½	20	1⅛
16	15¼	25½	2¼	21 1/16	22½	20	1¼
18	17	28	2⅜	23 5/16	24¾	24	1¼
20	19	30½	2½	25 9/16	27	24	1¼
24	23	36	2¾	30 5/16	32	24	1½
30	29	43	3	37 3/16	39¼	28	1¾

Templates for drilling . . . page 371

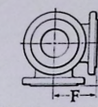
250-Pound Cast Iron Flanged Fittings

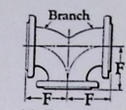
Dimensions, in Inches

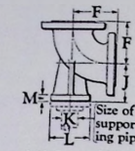

90° Elbow

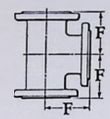

90° Long Radius Elbow

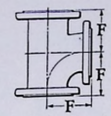

45° Elbow

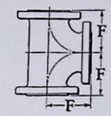

Side Outlet Elbow


Double Branch Elbow

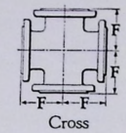

90° Base Elbow Square Base or Round Base

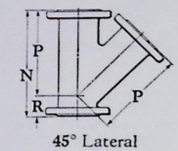

Tee

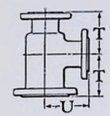

Single Sweep Tee

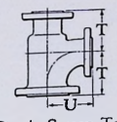

Double Sweep Tee

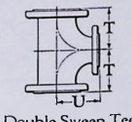

Side Outlet Tee

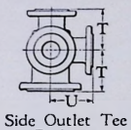

Cross

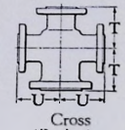

45° Lateral

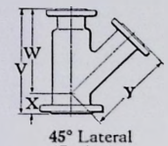

Tee *Reducing


Single Sweep Tee *Reducing

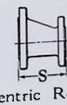

Double Sweep Tee *Reducing

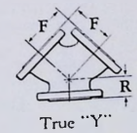

Side Outlet Tee *Reducing


Cross *Reducing


45° Lateral *Reducing


Taper Reducer


Eccentric Reducer



True "Y"

Size	F	FF	G	H	J	K	L	M	N	P	R	S
1	4	8	5	2	3¾	¾	4	5/8	8½	6½	2	
1¼	4¼	8½	5½	2½	4	¾	4	5/8	9½	7¼	2¼	
1½	4½	9	6	2¾	4⅛	1	4⅞	11/16	11	8½	2½	
2	5	10	6½	3	4½	1¼	5¼	¾	11½	9	2½	5
2½	5½	11	7	3½	4¾	1¼	5¼	¾	13	10½	2½	5½
3	6	12	7¾	3½	5¼	1½	6⅛	13/16	14	11	3	6
3½	6½	13	8½	4	5⅝	1½	6⅛	13/16	15½	12½	3	6½
4	7	14	9	4½	6	2	6½	⅞	16½	13½	3	7
5	8	16	10¼	5	6¾	2½	7½	1	18½	15	3½	8
6	8½	17	11½	5½	7½	2½	7½	1	21½	17½	4	9
8	10	20	14	6	9	4	10	1¼	25½	20½	5	11
10	11½	23	16½	7	10½	4	10	1¼	29½	24	5½	12
12	13	26	19	8	12	6	12½	1 7/16	33½	27½	6	14
14	15	30	21½	8½	13½	6	12½	1 7/16	37½	31	6½	16
16	16½	33	24	9½	14¾	6	12½	1 7/16	42	34½	7½	18
18	18	36	26½	10	16¼	8	15	1⅝	45½	37½	8	19
20	19½	39	29	10½	17⅞	8	15	1⅝	49	40½	8½	20
24	22½	45	34	12	20¾	10	17½	1⅞	57½	47½	10	24
30	27½	55	41½	15								30

Dimensions of reducing fittings:** The center to face dimensions of Reducing Elbows, Tees, Crosses, and 45° Laterals are the same as for the straight size corresponding to the size of the largest opening, ***with the following exception:

Exception: In sizes 18-inch and larger, if the outlet of a Reducing Tee, Cross, or 45° Lateral is the size given in the table below, or is smaller, use the "Short Body" dimensions shown below.

The face to face dimension of Reducers is governed by the size of the larger opening, regardless of the size of the smaller opening.

Short Body Reducing Fittings

Size	Tees and Crosses: Size of outlet and smaller	T	TT	U	45° Laterals: Size of outlet and smaller	V	W	X	Y
18	12	14	28	17	8	34	31	3	32½
20	14	15½	31	18½	10	37	34	3	36
24	16	17	34	21½	12	44	41	3	43
30	20	20½	41	25½					

List prices . . . . . pages 282 to 286
Special facings . . . . . page 353
Templates for drilling . . . page 371

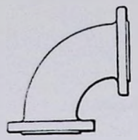
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asbestosclaims.law/library/21275/159

250-Pound Cast Iron Flanged Fittings

For working pressures, see page 280.



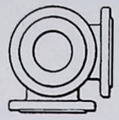
90° Elbow
No. 101 E
Straight



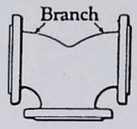
90° Long Radius Elbow
No. 127 E
Straight



45° Elbow
No. 103 E
Straight



Side Outlet Elbow
No. 131 E, Straight
*No. 133 E, Reducing



Double Branch Elbow
No. 139 E, Straight
*No. 141 E, Reducing



90° Base Elbow
No. 125 E, Square Base
No. 125½ E, Round Base

List Prices

Size	90° Elbows No. 101 E Straight		90° Long Radius Elbows No. 127 E Straight		45° Elbows No. 103 E Straight		90° Base Elbows No. 125 E, with Square Base No. 125½ E, with Round Base		
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced except Base Flange	Faced and Drilled except Base Flange	Facing and Drilling Base Flange
Inches	Each	Each	Each	Each	Each	Each	Each	Each	Each
1	4.50	5.40	7.50	8.85	5.00	5.90			
1¼	4.50	5.40	7.50	8.85	5.00	5.90			
1½	4.50	5.40	7.50	8.85	5.00	5.90			
2	4.50	5.40	7.50	8.85	5.00	5.90			
2½	4.75	5.65	8.00	9.35	5.25	6.15			
3	5.15	6.25	8.60	10.25	5.65	6.75			
3½	6.10	7.35	10.25	12.15	6.75	8.00			
4	6.75	8.25	11.25	13.50	7.50	9.00	13.50	15.00	4.50
5	9.35	10.85	15.50	17.75	10.35	11.85	18.75	20.25	5.25
6	11.40	13.40	19.00	22.00	12.50	14.50	22.75	24.75	5.25
8	18.00	20.50	30.00	33.75	19.00	21.50	36.00	38.50	7.50
10	28.50	32.50	47.75	53.75	30.00	34.00	57.00	61.00	7.50
12	42.00	46.50	70.00	76.75	44.00	48.50	84.00	88.50	11.00
14	62.00	67.50	103.50	111.75	62.00	67.50	105.00	110.50	11.00
16	82.00	90.00	137.00	149.00	82.00	90.00	135.00	143.00	11.00
18	106.00	115.00	177.00	191.00	106.00	115.00			
20	135.00	145.00	225.00	240.00	135.00	145.00			
24	210.00	225.00			210.00	225.00			

Size	Side Outlet Elbows No. 131 E Straight		Side Outlet Elbows No. 133 E *Reducing		Double Branch Elbows No. 139 E Straight		Double Branch Elbows No. 141 E *Reducing	
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled
Inches	Each	Each	Each	Each	Each	Each	Each	Each
4	35.75	38.00	39.75	42.00	35.75	38.00	39.75	42.00
5	37.75	40.00	41.75	44.00	42.75	45.00	47.75	50.00
6	42.00	45.00	47.00	50.00	49.50	52.50	54.50	57.50
8	61.25	65.00	67.25	71.00	66.25	70.00	73.75	77.50
10	89.00	95.00	99.00	105.00	84.00	90.00	94.00	100.00
12	113.25	120.00	123.25	130.00	108.25	115.00	118.25	125.00
14	146.75	155.00	161.75	170.00	141.75	150.00	156.75	165.00
16	168.00	180.00	183.00	195.00	168.00	180.00	188.00	200.00

***Side Outlet Elbows:** The outlet is on the intersecting center lines.

"Reducing" list prices apply only to elbows reduced only on the side outlet. Other reductions are entirely special, and orders should be accompanied by a sketch; prices on application.

***Double Branch Elbows:** "Reducing" list prices apply only to elbows reduced on the branches, and with both branches the same size. Other reductions are entirely special, and orders should be accompanied by a sketch; prices on application.

In describing Double Branch Elbows, the branch openings are named first, then the outlet.

Drilling: These fittings are furnished "faced only", unless ordered "faced and drilled".

Facing: 250-Pound Cast Iron Flanged Fittings are regularly furnished with a 1/16-inch raised face on the flanges. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Fittings with male, female, tongue, or groove faces can be made to order. See page 353.

Larger sizes: Larger sizes are made to order. Prices on application.

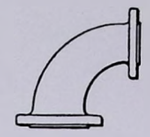
Ferrosteel: 1 to 3½-inch, 50% advance in price; 4 to 24-inch, 25% advance.

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250-Pound Cast Iron Flanged Fittings

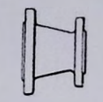


No. 121 E
90° Elbow
*Reducing

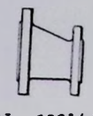


No. 122 E
90° Long Radius Elbow
*Reducing

For working pressures, see page 280.



No. 123 E
*Taper Reducer



No. 123½ E
*Eccentric Reducer

List Prices

Size	90° Elbows No. 121 E *Reducing		90° Long Radius Elbows No. 122 E *Reducing		Reducers No. 123 E *Taper		Reducers No. 123½ E *Eccentric	
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled
Inches	Each	Each	Each	Each	Each	Each	Each	Each
1½	9.00	9.90						
2	9.00	9.90			9.00	9.90		
2½	9.50	10.40	16.00	17.35	9.50	10.40	9.50	10.40
3	10.25	11.35	17.20	18.85	10.25	11.35	10.25	11.35
3½	12.25	13.50	20.50	22.40	12.25	13.50		
4	13.50	15.00	22.50	24.75	13.50	15.00	13.50	15.00
5	18.75	20.25	31.00	33.25	18.75	20.25	18.75	20.25
6	22.75	24.75	38.00	41.00	22.75	24.75	22.75	24.75
8	36.00	38.50	60.00	63.75	36.00	38.50	36.00	38.50
10	57.00	61.00	95.50	101.50	57.00	61.00	57.00	61.00
12	84.00	88.50	140.00	146.75	84.00	88.50	84.00	88.50
14	105.00	110.50	207.00	215.25	105.00	110.50		
16	135.00	143.00	274.00	286.00	135.00	143.00		
18					157.00	166.00		
20					180.00	190.00		
24					285.00	300.00		

*List prices of Reducing Elbows and Reducers apply only to the reductions shown below. Other reductions are entirely special; prices on application.

No. 121 E 90° Elbows		No. 122 E 90° Elbows Long Radius	No. 123 E Reducers				No. 123½ E Eccentric Reducers	
1½ x 1¼	6 x 5	2½ x 2	2 x 1½	6 x 5	14 x 12	2½ x 2	8 x 6
2 x 1½	6 x 4	2½ x 1½	2½ x 2	6 x 4	14 x 10	3 x 2½	8 x 5
2 x 1¼	6 x 3½	3 x 2½	3 x 2½	6 x 3½	14 x 8	3 x 2	8 x 4
2½ x 2	6 x 3	3 x 2	3 x 2	6 x 3	14 x 6	4 x 3½	8 x 3½
2½ x 1½	6 x 2½	3½ x 2½	3½ x 3	6 x 2½	16 x 14	4 x 3	8 x 3
3 x 2½	6 x 2	4 x 3½	3½ x 2½	6 x 2	16 x 12	4 x 2½	10 x 8
3 x 2	8 x 6	4 x 3	3½ x 2	8 x 6	16 x 10	4 x 2	10 x 6
3 x 1½	8 x 5	5 x 4	4 x 3½	8 x 5	16 x 8	5 x 4	10 x 5
3 x 1¼	8 x 4	5 x 3	4 x 3	8 x 4	18 x 16	5 x 3½	10 x 4
3½ x 3	8 x 3	6 x 5	4 x 2½	8 x 3½	18 x 14	5 x 3	12 x 10
3½ x 2½	10 x 8	6 x 4	4 x 2	8 x 3	18 x 12	5 x 2½	12 x 8
3½ x 2	10 x 6	6 x 3	5 x 4	10 x 8	18 x 10	5 x 2	12 x 6
3½ x 1½	10 x 5	8 x 6	5 x 3½	10 x 6	20 x 18	6 x 5	12 x 5
4 x 3½	10 x 4	8 x 5	5 x 3	10 x 5	20 x 16	6 x 4	
4 x 3	12 x 10	8 x 4	5 x 2½	10 x 4	20 x 14	6 x 3½	
4 x 2½	12 x 8	10 x 8	5 x 2	12 x 10	20 x 12	6 x 3	
4 x 2	12 x 6	10 x 6		12 x 8	24 x 20		
4 x 1½	12 x 5	10 x 5		12 x 6	24 x 18		
5 x 4	14 x 12	10 x 4		12 x 5	24 x 16		
5 x 3½	14 x 10	12 x 10		12 x 4			
5 x 3	14 x 6	12 x 8					
5 x 2½	16 x 14	12 x 6					
	16 x 12	14 x 12					
	16 x 10	16 x 14					
	16 x 8	16 x 12					

Drilling: These fittings are furnished "faced only", unless ordered "faced and drilled".

Facing: 250-Pound Cast Iron Fittings are regularly furnished with a 1/16-inch raised face on the flanges. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish. Fittings with male, female, tongue, or groove faces can be made to order. See page 353.

Reducing with flanges: To avoid delays, orders for reducing fittings not carried in stock can be filled by using reducing companion flanges. Orders should specify "Reduce with flanges if necessary". For reducing flanges, see page 293.

Larger sizes: Larger sizes are made to order. Prices on application.

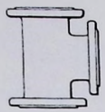
Ferrosteel: 1 to 3½-inch, 50% advance in price; 4 to 24-inch, 25% advance.

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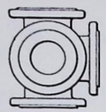
Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 160 of 402
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asbestosclaims.law/library/21275/160

250-Pound Cast Iron Flanged Fittings

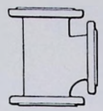
For working pressures, see page 280.



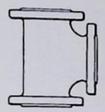
Tee
No. 105 E, Straight
*No. 107 E, Reducing



Side Outlet Tee
No. 135 E, Straight
No. 137 E, Reducing



Single Sweep Tee
No. 109 E, Straight
*No. 111 E, Reducing



Double Sweep Tee
No. 112 E, Straight
*No. 112½ E, Reducing

List Prices

Size	Tees				Single Sweep Tees				Double Sweep Tees			
	No. 105 E Straight		No. 107 E *Reducing		No. 109 E Straight		No. 111 E *Reducing		No. 112 E Straight		No. 112½ E *Reducing	
Inches	Faced Each	Faced and Drilled Each	Faced Each	Faced and Drilled Each	Faced Each	Faced and Drilled Each	Faced Each	Faced and Drilled Each	Faced Each	Faced and Drilled Each	Faced Each	Faced and Drilled Each
1	6.50	7.85										
1¼	6.50	7.85	7.50	8.85								
1½	6.50	7.85	7.50	8.85								
2	6.50	7.85	7.50	8.85	7.50	8.85			7.50	8.85		
2½	6.90	8.25	8.00	9.35	8.00	9.35	9.15	10.50	8.00	9.35	9.15	10.50
3	7.50	9.15	8.60	10.25	8.60	10.25	9.90	11.55	8.60	10.25	9.90	11.55
3½	8.90	10.80	10.25	12.15	10.25	12.15	11.75	13.65	10.25	12.15	11.75	13.65
4	9.75	12.00	11.25	13.50	11.25	13.50	13.00	15.25	11.25	13.50	13.00	15.25
5	13.50	15.75	15.50	17.75	15.50	17.75	17.85	20.10	15.50	17.75	17.85	20.10
6	16.50	19.50	19.00	22.00	19.00	22.00	22.00	25.00	19.00	22.00	22.00	25.00
8	26.00	29.75	30.00	33.75	30.00	33.75	34.50	38.25	30.00	33.75	34.50	38.25
10	41.50	47.50	47.75	53.75	47.75	53.75	55.00	61.00	47.75	53.75	55.00	61.00
12	61.00	67.75	70.00	76.75	70.00	76.75	80.00	86.75	70.00	76.75	80.00	86.75
14	90.00	98.25	103.50	111.75	103.50	111.75	119.00	127.25	103.50	111.75	119.00	127.25
16	119.00	131.00	137.00	149.00	137.00	149.00	158.00	170.00	137.00	149.00	158.00	170.00
18	154.00	168.00	177.00	191.00	177.00	191.00	204.00	218.00	177.00	191.00	204.00	218.00
20	195.00	210.00	225.00	240.00	225.00	240.00	260.00	275.00	225.00	240.00	260.00	275.00
24	305.00	328.00	350.00	373.00	350.00	373.00	402.00	425.00	350.00	373.00	402.00	425.00

Size	Side Outlet Tees			
	No. 135 E Straight		No. 137 E Reducing	
Inches	Faced Each	Faced and Drilled Each	Faced Each	Faced and Drilled Each
4	42.00	45.00	47.00	50.00
5	47.00	50.00	52.00	55.00
6	53.50	57.50	59.00	63.00
8	72.50	77.50	80.00	85.00
10	102.00	110.00	112.00	120.00
12	131.00	140.00	146.00	155.00
14	159.00	170.00	174.00	185.00
16	184.00	200.00	204.00	220.00

***Reducing sizes:** List prices of No. 107 E, No. 111 E, and No. 112½ E Reducing Tees apply to sizes carried in stock, shown on the opposite page. Sizes not carried in stock are made to order, at an advance in price depending upon the quantity of a size ordered at one time. See the opposite page for price advances.

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Single Sweep Tees: No. 111 E Single Sweep Tees with the outlet larger than the run are entirely special. Prices and dimensions on application.

Double Sweep Tees: No. 112½ E Double Sweep Tees reduced on the run are entirely special. Prices and dimensions on application.

Double Sweep Tees with the outlet larger than the run can be made with only a reasonable increase in the size of the outlet.

Side Outlet Tees: Orders for No. 137 E Reducing Side Outlet Tees should be accompanied by a drawing showing the size and location of all openings.

Drilling: These fittings are furnished "faced only", unless ordered "faced and drilled".

Facing: 250-Pound Cast Iron Flanged Fittings are regularly furnished with a 1/16-inch raised face on the flanges. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

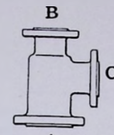
Fittings with male, female, tongue, or groove faces can be made to order. See page 353.

Larger sizes: Larger sizes are made to order. Prices on application.

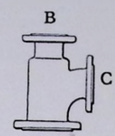
Ferrosteel: 1 to 3½-inch, 50% advance in price; 4 to 24-inch, 25% advance.

250-Pound Cast Iron Flanged Fittings

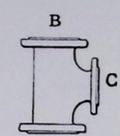
Reducing Flanged Tees Carried in Stock



No. 107 E
Tee
Reducing



No. 111 E
Single Sweep Tee
Reducing



No. 112½ E
Double Sweep Tee
Reducing

No. 107 E, No. 111 E, and No. 112½ E Reducing Flanged Tees are carried in stock in the sizes shown below; these are furnished at the regular "Reducing" prices. Sizes not carried in stock are made to order, at an advance in price depending upon the quantity of a size ordered at one time. See the table below for price advances.

No. 107 E Tees				No. 111 E Single Sweep Tees	No. 112½ E Double Sweep Tees
A B C	A B C	A B C	A B C	A B C	A B C
2½ x 2½ x 2	5 x 5 x 4	8 x 8 x 6	12 x 12 x 10	4 x 4 x 2½	4 x 4 x 2½
2½ x 2½ x 1½	5 x 5 x 3½	8 x 8 x 5	12 x 12 x 8	4 x 4 x 2	4 x 4 x 2
2½ x 2½ x 1¼	5 x 5 x 3	8 x 8 x 4	12 x 12 x 6		
2½ x 2 x 2	5 x 5 x 2½	8 x 8 x 3½	12 x 12 x 5	6 x 6 x 4	5 x 5 x 4
3 x 3 x 2½	5 x 5 x 2	8 x 8 x 3	12 x 12 x 4	6 x 4 x 4	5 x 5 x 3
3 x 3 x 2	5 x 5 x 1½	8 x 8 x 2½	12 x 12 x 3½		
3 x 3 x 1½	5 x 4 x 5	8 x 8 x 2	12 x 12 x 3	8 x 8 x 6	6 x 6 x 4
3 x 3 x 1¼	5 x 3 x 5	8 x 6 x 8	12 x 12 x 2½	8 x 6 x 6	6 x 6 x 3
3 x 3 x 1	5 x 2½ x 5	8 x 4 x 8	12 x 10 x 12		
3 x 2½ x 3	5 x 4 x 4	8 x 3 x 8	12 x 8 x 12		8 x 8 x 6
3 x 2 x 3	5 x 4 x 3	8 x 6 x 6	12 x 10 x 10		8 x 8 x 5
3 x 1½ x 3	5 x 4 x 2½	8 x 6 x 5	12 x 10 x 8		8 x 8 x 4
3 x 1¼ x 3	5 x 3 x 4	8 x 6 x 4	12 x 10 x 6		
3 x 2½ x 2½	5 x 3 x 3	8 x 5 x 6	12 x 8 x 8		
3 x 2 x 2	4 x 4 x 5	8 x 5 x 5	12 x 8 x 6		
2 x 2 x 3		8 x 4 x 6	10 x 10 x 12		
3½ x 3½ x 2½	6 x 6 x 5	8 x 4 x 4	8 x 8 x 12		
3½ x 3½ x 2	6 x 6 x 4	6 x 6 x 8	14 x 14 x 12		
3½ x 2½ x 3½	6 x 6 x 3½	5 x 5 x 8	14 x 14 x 10		
4 x 4 x 3½	6 x 6 x 3		14 x 14 x 8		
4 x 4 x 3	6 x 6 x 2½	10 x 10 x 8	14 x 14 x 6		
4 x 4 x 2½	6 x 6 x 2	10 x 10 x 6	14 x 14 x 5		
4 x 4 x 2	6 x 5 x 6	10 x 10 x 5	14 x 12 x 8		
4 x 4 x 1½	6 x 4 x 6	10 x 10 x 4			
4 x 3 x 4	6 x 3 x 6	10 x 10 x 3½	16 x 16 x 14		
4 x 2½ x 4	6 x 2½ x 6	10 x 10 x 3	16 x 16 x 12		
4 x 2 x 4	6 x 5 x 5	10 x 10 x 2	16 x 16 x 10		
4 x 3 x 3	6 x 5 x 4	10 x 8 x 10	16 x 16 x 8		
4 x 3 x 2	6 x 5 x 3	10 x 6 x 10	16 x 16 x 6		
4 x 3 x 1½	6 x 5 x 2½	10 x 8 x 8			
4 x 2½ x 2½	6 x 5 x 2	10 x 8 x 6			
4 x 2 x 3	6 x 4 x 5	10 x 8 x 5			
3 x 3 x 4	6 x 4 x 4	10 x 6 x 8			
2½ x 2½ x 4	6 x 4 x 3	10 x 6 x 6			
	6 x 3 x 3	8 x 8 x 10			
	5 x 5 x 6				
	4 x 4 x 6				

Price Advances for Non-Stock Sizes

Sizes not carried in stock are made to order, at the following price advances over "Reducing" list prices, depending upon the quantity of a size ordered at one time:

Size	1 to 3½ inch	4 to 8 inch	10 to 24 inch
1 piece	50%	25%	No advance
2 pieces	40%	20%	
3 pieces	30%	15%	
4 pieces	20%	10%	
5 pieces	10%	5%	
6 or more	No advance		

Drilling: These fittings are furnished "faced only", unless ordered "faced and drilled".

Facing: 250-Pound Cast Iron Flanged Fittings are regularly furnished with a 1/16-inch raised face on the flanges. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Fittings with male, female, tongue, or groove faces can be made to order. See page 353.

Reducing with flanges: To avoid delays, orders for reducing fittings not carried in stock can be filled by using reducing companion flanges. Orders should specify "Reduce with flanges if necessary". For reducing flanges, see page 293.

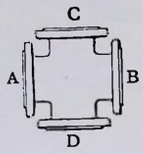
Ferrosteel: 1 to 3½-inch, 50% advance in price; 4 to 24-inch, 25% advance.

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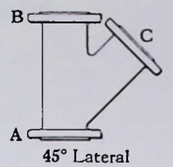
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250-Pound Cast Iron Flanged Fittings

For working pressures, see page 280.



Cross
No. 113 E, Straight
*No. 115 E, Reducing



45° Lateral
No. 117 E, Straight
*No. 119 E, Reducing

List Prices

Size	Crosses				45° Laterals			
	No. 113 E Straight		No. 115 E *Reducing		No. 117 E Straight		No. 119 E *Reducing	
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled
Inches	Each	Each	Each	Each	Each	Each	Each	Each
1	10.00	11.80						
1¼	10.00	11.80	11.50	13.30				
1½	10.00	11.80	11.50	13.30				
2	10.00	11.80	11.50	13.30	10.00	11.80		
2½	10.50	12.30	12.00	13.80	10.50	12.30	12.00	13.80
3	11.50	13.75	13.25	15.50	11.50	13.75	13.25	15.50
3½	13.50	16.00	15.50	18.00	13.50	16.00	15.50	18.00
4	15.00	18.00	17.00	20.00	15.00	18.00	17.00	20.00
5	20.50	23.50	23.50	26.50	20.50	23.50	23.50	26.50
6	25.00	29.00	29.00	33.00	25.00	29.00	29.00	33.00
8	40.00	45.00	46.00	51.00	40.00	45.00	46.00	51.00
10	63.00	71.00	72.00	80.00	63.00	71.00	72.00	80.00
12	92.00	101.00	106.00	115.00	92.00	101.00	106.00	115.00
14	136.00	147.00	158.00	169.00	136.00	147.00	158.00	169.00
16	180.00	196.00	207.00	223.00	180.00	196.00	207.00	223.00
18	235.00	253.00	270.00	288.00	235.00	253.00	270.00	288.00
20	300.00	320.00	345.00	365.00	300.00	320.00	345.00	365.00
24	465.00	495.00	535.00	565.00	465.00	495.00	535.00	565.00

***Reducing fittings:** List prices of No. 115 E Reducing Crosses and No. 119 E Reducing 45° Laterals apply only to sizes carried in stock, shown below. Sizes not carried in stock are made to order, at the following price advances over "Reducing" list prices, depending upon the quantity of a size ordered at one time.

Sizes carried in stock							Price advances for non-stock sizes			
No. 115 E Crosses				No. 119 E 45° Laterals			Size	1 to 3½ inch	4 to 8 inch	10 to 24 inch
A	B	C	D	A	B	C				
3	3	2½	2½	4	4	2½	1 piece	50%	25%	No advance
4	4	2½	2½	6	6	2½	2 pieces	40%	20%	
6	6	4	x 4				3 pieces	30%	15%	
6	6	3	x 3				4 pieces	20%	10%	
8	8	6	x 6				5 pieces	10%	5%	
8	8	5	x 5				6 or more	No advance		
8	8	4	x 4							

***Reducing 45° Laterals:** No. 119 E Reducing 45° Laterals with the outlet larger than the run are entirely special. Prices on application.

Reducing with flanges: To avoid delays, orders for reducing fittings not carried in stock can be filled by using reducing companion flanges. Orders should specify "Reduce with flanges if necessary". For reducing flanges, see page 293.

Drilling: These fittings are furnished "faced only", unless ordered "faced and drilled".

Facing: 250-Pound Cast Iron Flanged Fittings are regularly furnished with a 1/16-inch raised face on the flange. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Fittings with male, female, tongue, or groove faces can be made to order. See page 353.

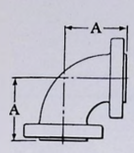
Larger sizes: Larger sizes are made to order. Prices on application.

Ferrosteel: 1 to 3½-inch, 50% advance in price; 4 to 24-inch, 25% advance.

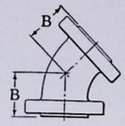
Galvanized Flanged Fittings ..... *page 295*
Special facings ..... *page 353*
Bolting on Companion Flanges ..... *page 352*
Dimensions ..... *pages 280 and 281*
Templates for drilling ..... *page 371*

800-Pound Hydraulic Ferrosteel Flanged Fittings

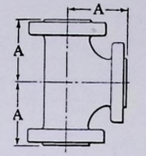
WORKING PRESSURE
800 pounds cold water, oil, or gas, non-shock
TEST PRESSURE — 1600 pounds hydrostatic



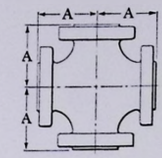
No. 845 H
90° Elbow



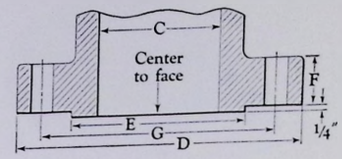
No. 846 H
45° Elbow



No. 847 H
Tee



No. 849 H
Cross



List Prices and Dimensions

Size	List Prices								Dimensions, in Inches								
	90° Elbows No. 845 H		45° Elbows No. 846 H		Tees No. 847 H		Crosses No. 849 H										
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	A	B	C	D	E	F	G	No. of bolts	Dia. of bolts
Inches	Each	Each	Each	Each	Each	Each	Each	Each									
2	17.00	19.00	17.00	19.00	22.50	25.00	32.00	35.00	5¾	4¼	2	6½	3⅝	1¼	5	8	⅝
2½	18.00	20.50	18.00	20.50	24.00	27.00	33.50	37.50	6½	4½	2½	7½	4⅛	1⅜	5⅞	8	¾
3	20.00	22.50	20.00	22.50	27.00	30.00	38.00	42.00	7	5	3	8¼	5	1½	6⅝	8	¾
3½	22.50	26.00	22.50	26.00	30.00	35.00	43.00	49.00	7½	5½	3½	9	5½	1⅝	7¼	8	⅞
4	26.00	30.00	26.00	30.00	35.00	40.00	49.00	55.00	8½	6	4	10¾	6 3/16	1⅞	8½	8	⅞
5	38.00	42.00	38.00	42.00	50.00	55.00	69.00	75.00	10	7	5	13	7 5/16	2⅛	10½	8	1
6	46.00	50.00	46.00	50.00	60.00	65.00	84.00	90.00	11	7½	6	14	8½	2¼	11½	12	1
8	67.50	75.00	67.50	75.00	90.00	100.00	122.50	135.00	13	8½	7⅞	16½	10⅝	2½	13¾	12	1⅛
10	110.00	120.00	110.00	120.00	140.00	155.00	180.00	200.00	15½	9½	9¾	20	12¾	2⅞	17	16	1¼
12	160.00	185.00	160.00	185.00	200.00	225.00	260.00	285.00	16½	10	11¾	22	15	3	19¼	20	1¼

Facing: 800-Pound Hydraulic Flanged Fittings are regularly furnished with a male face ¼-inch high (large male) on the flanges. The male face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Fittings with female, tongue, or groove faces can be made to order at an additional price. See page 353 for prices and dimensions.

Drilling: These fittings are furnished "faced only", unless ordered "faced and drilled".

Other fittings and additional sizes: These fittings are interchangeable with Crane 600-Pound Cast Steel Flanged Fittings, differing only in flange thickness. For sizes and types not listed, the 600-Pound Cast Steel Fittings may be used.

Reducing fittings: Reducing fittings can be made to order. They have the same center to face dimensions as the straight size corresponding to the size of the largest opening. Prices on application.

American Standard: The dimensions and drilling of these fittings conform to the American Standard for 800-Pound Hydraulic Cast Iron Flanged Fittings (B16b1-1931).

Shock: When these fittings are used in lines subjected to shock, properly designed shock absorbers should be installed to protect the piping and fittings.

Bolting on Companion Flanges ..... *page 352* *Special facings* ..... *page 353* *Templates for drilling* ..... *page 371*

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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Cast Iron
Common Flanges



No. 521
Cast Iron Common Flange

Galvanized Flanges
Cast Iron Common Flanges can be furnished galvanized at double the list prices of black flanges.

Common Flanges are neither faced nor drilled. When wanted drilled, orders must specify size and number of holes, and the diameter of the bolt circle. An extra charge is made for drilling.

These flanges are intended for structural work and not for pressure service on pipe lines.

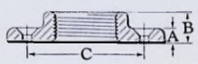
List Prices, Black

Size Inches	Black Each	Size Inches	Black Each
3/4 x 4	.22	3 x 7 1/2	.75
1 1/4 x 4 1/2	.25	2 x 8	.90
3/4 x 5	.30	2 1/2 x 8	.90
1 x 5	.30	3 x 8	.90
1 1/4 x 5	.30	3 1/2 x 8	.90
1 1/2 x 5	.30	4 x 8	.90
1 x 6	.42	3 1/2 x 8 1/2	1.00
1 1/4 x 6	.40	3 x 9	1.15
1 1/2 x 6	.40	4 x 9	1.15
2 x 6	.42	4 x 10	1.50
2 1/2 x 6	.42	5 x 10	1.50
2 x 6 1/2	.50	6 x 10	1.50
2 1/2 x 6 1/2	.50	5 x 11	1.75
3 x 6 1/2	.50	6 x 11	1.75
2 x 7	.62	6 x 12	2.20
2 1/2 x 7	.62	8 x 13 1/2	2.80
3 x 7	.62		

Cast Iron or Malleable Iron
Round Floor Flanges



Cast Iron
Floor Flange





Malleable Iron
Floor Flange

Floor Flanges are cast with countersunk holes for screws and are not faced.

List Prices and Dimensions

Size	Cast Iron Round Floor Flanges						Malleable Iron Round Floor Flanges					
	List Prices		Dimensions, in Inches				List Prices		Dimensions, in Inches			
Inches	Black Each	Galv. Each	Flange thickness A	Hub length B	Bolt circle C	No. and dia. of holes	Black Each	Galv. Each	Flange thickness A	Hub length B	Bolt circle C	No. and dia. of holes
1/4 x 2 13/16	.10	.20	1/4	1/2	1 7/8	4-1/4						
3/8 x 3	.10	.20	1/4	7/16	2	4-1/4						
1/2 x 3 1/2	.15	.30	5/16	9/16	2 1/2	4-1/4	.15	.30	1/4	1/2	2 1/2	4-1/4
3/4 x 3 1/2	.15	.30	5/16	5/8	2 1/2	4-1/4	.15	.30	1/4	9/16	2 1/2	4-1/4
1 x 4	.16	.32	3/8	11/16	3	4-1/4	.16	.32	5/16	5/8	3	4-1/4
1 1/4 x 4	.16	.32	3/8	3/4	3	4-1/4	.16	.32	5/16	11/16	3	4-1/4
1 1/2 x 4 1/2	.22	.44	3/8	7/8	3 1/2	4-5/16	.22	.44	5/16	13/16	3 1/2	4-5/16
2 x 5 1/2	.35	.70	7/16	1	4 1/4	4-5/16	.35	.70	3/8	7/8	4 1/2	4-5/16

Brass Floor Flanges . . . page 263

25-Pound
Cast Iron Flanges

WORKING PRESSURES
25 pounds steam
43 pounds cold water or oil, non-shock
25 pounds cold gas



Screwed Flange
Cast Iron



Reducing Screwed Flange
Cast Iron

Sizes 5 to 24-inch inclusive, only

For smaller sizes, use 125-Pound Cast Iron Flanges; pages 290 and 291. Larger sizes, prices on application.

These flanges (sizes 5 to 24-inch inclusive, only) are the same as 125-Pound Cast Iron Flanges except that they have smaller bolt holes. For list prices, see pages 290 and 291.

Interchangeability with 125-Pound Flanges: 25-Pound Cast Iron Screwed Flanges are interchangeable with 125-Pound Cast Iron Flanges, differing only in bolt diameters (sizes 5 to 24-inch inclusive). Bolt diameters are smaller than those specified for 125-Pound Cast Iron Flanges.

Drilling: 25-Pound Flanges are regularly furnished "faced only", unless ordered "faced and drilled".

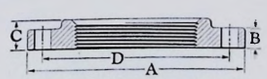
Facing: These flanges are plain faced, with a smooth finish.

Spot facing: Cast iron flanges are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is **10** cents per hole.

American Standard: The dimensions of these screwed flanges conform to the 25-Pound American Tentative Cast Iron Flange Standard (B16b2-1931). As specified in the Standard the thickness of the flanges is the same as the thickness of 125-Pound Cast Iron Flanges.

How to order reducing flanges: When ordering reducing flanges, the screwed or reduced size should be designated first, and then the outside diameter of the flange. For example, a 25-Pound Flange to connect a 6-inch pipe to a 10-inch valve or fitting (O.D. of flange, 16 inches) should be ordered

6" x 16" Reducing Flange.



Dimensions, in Inches

Size of pipe	Smaller sizes	5	6	8	10	12	14 OD	16 OD	18 OD	20 OD	24 OD	Larger sizes
A	Use 125-Pound Cast Iron Flanges pages 290 and 291.	10	11	13 1/2	16	19	21	23 1/2	25	27 1/2	32	Dimensions on application
B		15/16	1	1 1/8	1 3/16	1 1/4	1 3/8	1 7/16	1 9/16	1 11/16	1 7/8	
C		1 7/16	1 9/16	1 3/4	1 15/16	2 1/8	2 1/4	2 1/2	2 11/16	2 7/8	3 1/4	
D		8 1/2	9 1/2	11 3/4	14 1/4	17	18 3/4	21 1/4	22 3/4	25	29 1/2	
No. of bolts		8	8	8	12	12	12	16	16	20	20	
Dia. of bolts		5/8	5/8	5/8	5/8	5/8	3/4	3/4	3/4	3/4	3/4	

Templates for drilling page 370

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125-Pound
Cast Iron, Ferrosteel, or Malleable Iron Flanges

WORKING PRESSURES
1 to 36-inch — **125** pounds steam
1 to 12-inch — **175** pounds cold water, oil, or gas, non-shock
14 to 36-inch — **150** pounds cold water, oil, or gas, non-shock



Screwed Flange
No. 553, Cast Iron
No. 558, Ferrosteel
No. 559, Malleable Iron



16 inches O.D. and smaller



19 inches O.D. and larger

Blind Flange
No. 555, Cast Iron

Ferrosteel Blind Flanges are made to order at an advance of 25 per cent.

List Prices

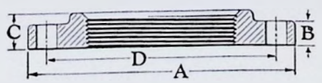
Size of pipe Inches	Screwed Flanges: No. 553, Cast Iron Faced Each	Screwed Flanges: No. 553, Cast Iron Faced and Drilled Each	Screwed Flanges: No. 558, Ferrosteel Faced Each	Screwed Flanges: No. 558, Ferrosteel Faced and Drilled Each	Screwed Flanges: No. 559, Malleable Iron Faced Each	Screwed Flanges: No. 559, Malleable Iron Faced and Drilled Each	Blind Flanges: No. 555, Cast Iron Faced Each	Blind Flanges: No. 555, Cast Iron Faced and Drilled Each
1	.55	.80	.70	1.00			.85	1.10
1¼	.60	.85	.75	1.05			.90	1.15
1½	.65	.90	.80	1.10			1.00	1.25
2	.75	1.00	.95	1.25	1.50	2.00	1.15	1.40
2½	.85	1.10	1.05	1.35	1.70	2.20	1.30	1.55
3	.95	1.25	1.20	1.55	1.90	2.50	1.40	1.70
3½	1.20	1.55	1.50	1.95	2.40	3.10	1.80	2.15
4	1.35	1.80	1.70	2.25	2.70	3.60	2.00	2.45
5	1.60	2.05	2.00	2.55	3.20	4.10	2.40	2.85
6	2.00	2.50	2.50	3.10	4.00	5.00	3.00	3.50
8	3.10	3.80	3.90	4.75	6.20	7.60	4.60	5.30
10	4.50	5.50	5.65	6.85	9.00	11.00	6.75	7.75
12	6.50	7.65	8.15	9.55	13.00	15.30	9.75	10.90
14 OD	9.00	10.35	11.25	13.00			13.50	14.85
16 OD	13.50	15.30	17.00	19.00			20.00	21.80
18 OD	16.00	18.00	20.00	22.50			24.00	26.00
20 OD	19.00	21.50	24.00	27.00			28.00	30.50
24 OD	27.00	30.50	34.00	38.00			40.00	43.50
30 OD							90.00	100.00
36 OD							137.50	150.00

Drilling: 125-Pound Flanges are furnished "faced only", unless ordered "faced and drilled".

Facing: These flanges are plain faced, with a smooth finish.

Spot facing: Cast iron, Ferrosteel, or malleable iron flanges are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is **10** cents per hole.

American Standard: The dimensions of these flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928).



Dimensions, in Inches

Size of pipe	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14 OD	16 OD	18 OD	20 OD	24 OD	30 OD	36 OD
A	4¼	4⅝	5	6	7	7½	8½	9	10	11	13½	16	19	21	23½	25	27½	32	38¾	46
B	7/16	½	9/16	⅝	11/16	¾	13/16	15/16	15/16	1	1⅛	1 3/16	1¼	1⅜	1 7/16	1 9/16	1 11/16	1⅞	2⅛	2⅜
C	1 11/16	1 3/16	⅞	1	1 3/16	1¼	1¼	1 5/16	1 7/16	1 9/16	1¾	1 15/16	2⅛	2¼	2½	2 11/16	2⅞	3¼		
D	3½	3½	3⅞	4¾	5½	6	7	7½	8½	9½	11¾	14¼	17	18¾	21¼	22¾	25	29½	36	42¾
No. of bolts	4	4	4	4	4	4	8	8	8	8	8	12	12	12	16	16	20	20	28	32
Dia. of bolts	½	½	½	⅝	⅝	⅝	⅝	⅝	¾	¾	¾	⅞	⅞	1	1	1⅛	1⅛	1¼	1¼	1½

Templates for drilling . . . page 370

Galvanized flanges . . . page 295

125-Pound
Cast Iron or Ferrosteel Reducing Flanges

WORKING PRESSURES
5 to 32-inch O.D. — **125** pounds steam
5 to 19-inch O.D. — **175** pounds cold water, oil, or gas, non-shock
21 to 32-inch O.D. — **150** pounds cold water, oil, or gas, non-shock



Reducing Screwed Flange
No. 557, Cast Iron

Ferrosteel Reducing Flanges are made to order at an advance of 25 per cent.



Eccentric Reducing Screwed Flange
Prices on application

List Prices, No. 557, Cast Iron

Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each	Size Inches	Faced Each	Faced and Drilled Each
1 x 5	1.15	1.40	1½ x 10	2.65	3.10	1½ x 16	7.45	8.45	4 x 21	15.00	16.35
1¼ x 5			2 x 10			2 x 16			5 x 21		
1 x 6	1.30	1.55	2½ x 10			2½ x 16			6 x 21		
1¼ x 6			3 x 10			3 x 16			8 x 21		
1½ x 6			3½ x 10			3½ x 16			10 x 21		
1½ x 7	1.45	1.70	4 x 10			4 x 16			12 x 21		
2 x 7			1½ x 11			5 x 16			6 x 23½		
1 x 7½	1.55	1.85	2 x 11	3.30	3.80	6 x 16			8 x 23½	22.00	23.80
1¼ x 7½			2½ x 11			8 x 16			10 x 23½		
1½ x 7½			3 x 11			1½ x 19	10.75	11.90	12 x 23½		
2 x 7½			3½ x 11			2 x 19			14 x 23½		
2½ x 7½			4 x 11			2½ x 19			6 x 25		
1½ x 8½	2.00	2.35	5 x 11			3 x 19			8 x 25		
2 x 8½			1½ x 13½	5.10	5.80	3½ x 19			10 x 25	26.50	28.50
2½ x 8½			2 x 13½			4 x 19			12 x 25		
3 x 8½			2½ x 13½			5 x 19			14 x 25		
1 x 9	2.20	2.65	3 x 13½			6 x 19			16 x 25		
1¼ x 9			3½ x 13½			8 x 19			14 x 27½		
1½ x 9			4 x 13½			10 x 19			16 x 27½	31.00	33.50
2 x 9			5 x 13½						18 x 27½		
2½ x 9			6 x 13½						14 x 32		
3 x 9									16 x 32	44.00	47.50
3½ x 9									18 x 32		
									20 x 32		

Drilling: 125-Pound Cast Iron or Ferrosteel Reducing Flanges are furnished "faced only", unless ordered "faced and drilled".

Facing: These flanges are plain faced, with a smooth finish.

Spot facing: Cast iron or Ferrosteel flanges are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is **10** cents per hole.

American Standard: The dimensions of these flanges conform to the 125-Pound American Cast Iron Flange Standard (B16a-1928).

How to order reducing flanges: When ordering reducing flanges, the screwed or reduced size should be designated first, and then the outside diameter of the flange. For example, a 125-Pound Flange to connect a 6-inch pipe to a 10-inch valve or fitting (O.D. of flange, 16 inches) should be ordered

6" x 16" Reducing Flange.

Templates for drilling . . . page 370

Galvanized flanges . . . page 295

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250-Pound
Cast Iron or Ferrosteel Flanges

WORKING PRESSURES
1 to 24-inch — **250** pounds steam
1 to 12-inch — **400** pounds cold water, oil, or gas, non-shock
14 to 24-inch — **350** pounds cold water, oil, or gas, non-shock



Screwed Flange
No. 151 E, Cast Iron
No. 251 E, Ferrosteel



15-inch O.D. and smaller



17½-inch O.D. and larger

Blind Flange
No. 153 E, Cast Iron
No. 253 E, Ferrosteel

List Prices

Size of pipe	Screwed Flanges				Blind Flanges			
	No. 151 E, Cast Iron		No. 251 E, Ferrosteel		No. 153 E, Cast Iron		No. 253 E, Ferrosteel	
Inches	Faced Each	Faced and Drilled Each	Faced Each	Faced and Drilled Each	Faced Each	Faced and Drilled Each	Faced Each	Faced and Drilled Each
1	.95	1.30	1.20	1.65	1.45	1.80	1.80	2.25
1¼	1.00	1.35	1.25	1.70	1.50	1.85	1.85	2.30
1½	1.10	1.45	1.35	1.80	1.65	2.00	2.05	2.50
2	1.25	1.60	1.55	2.00	1.90	2.25	2.35	2.80
2½	1.40	1.75	1.75	2.20	2.10	2.45	2.60	3.05
3	1.60	2.05	2.00	2.55	2.40	2.85	3.00	3.55
3½	2.00	2.55	2.50	3.20	3.00	3.55	3.75	4.45
4	2.25	2.95	2.80	3.70	3.35	4.05	4.20	5.10
5	2.65	3.35	3.30	4.20	4.00	4.70	5.00	5.90
6	3.30	4.05	4.10	5.05	5.00	5.75	6.25	7.20
8	5.10	6.15	6.40	7.70	7.65	8.70	9.60	10.90
10	7.40	8.90	9.25	11.00	11.00	12.50	13.75	15.50
12	10.75	12.50	13.50	15.50	16.00	17.75	20.00	22.00
14 OD	15.00	17.00	18.50	21.00	22.50	24.50	28.00	30.50
16 OD	22.25	25.00	28.00	31.00	33.50	36.25	42.00	45.00
18 OD	26.00	29.00	32.50	36.00	39.00	42.00	48.50	52.00
20 OD	31.00	35.00	39.00	44.00	46.00	50.00	57.50	62.50
24 OD	45.00	50.00	56.00	62.00	67.00	72.00	84.00	90.00

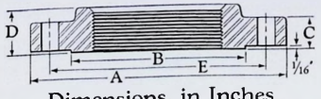
Drilling: 250-Pound Flanges are regularly furnished "faced only", unless ordered "faced and drilled".

Facing: These flanges are furnished with a 1/16-inch raised face; the raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Flanges with male, female, tongue, or groove face are made to order at an additional price. See page 353 for prices and dimensions.

Spot facing: These flanges are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is **10** cents per hole.

American Standard: The dimensions of these flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).



Dimensions, in Inches

Size of pipe	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14 OD	16 OD	18 OD	20 OD	24 OD
A	4 7/8	5 1/4	6 1/8	6 1/2	7 1/2	8 1/4	9	10	11	12 1/2	15	17 1/2	20 1/2	23	25 1/2	28	30 1/2	36
B	2 11/16	3 1/16	3 9/16	4 3/16	4 15/16	5 11/16	6 5/16	6 15/16	8 5/16	9 11/16	11 15/16	14 1/16	16 7/16	18 15/16	21 1/16	23 5/16	25 9/16	30 5/16
C	11/16	3/4	13/16	7/8	1	1 1/8	1 3/16	1 1/4	1 3/8	1 7/16	1 5/8	1 7/8	2	2 1/8	2 1/4	2 3/8	2 1/2	2 3/4
D	7/8	1	1 1/8	1 1/4	1 7/16	1 9/16	1 5/8	1 3/4	1 7/8	2	2 3/16	2 3/8	2 9/16	2 11/16	2 7/8	3 1/8	3 5/16	3 11/16
E	3 1/2	3 7/8	4 1/2	5	5 7/8	6 5/8	7 1/4	7 7/8	9 1/4	10 5/8	13	15 1/4	17 3/4	20 1/4	22 1/2	24 3/4	27	32
No. of bolts	4	4	4	8	8	8	8	8	8	12	12	16	16	20	20	24	24	24
Dia. of bolts	5/8	5/8	3/4	5/8	3/4	3/4	3/4	3/4	3/4	3/4	7/8	1	1 1/8	1 1/8	1 1/4	1 1/4	1 1/4	1 1/2

Templates for drilling . . . page 371 *Galvanized flanges . . . page 295* *Special facings . . . page 353*

250-Pound
Cast Iron or Ferrosteel Reducing Flanges

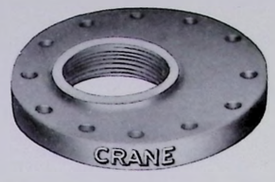
WORKING PRESSURES
6⅛ to 36-inch O.D. — **250** pounds steam
6⅛ to 20½-inch O.D. — **400** pounds cold water, oil, or gas, non-shock
23 to 36-inch O.D. — **350** pounds cold water, oil, or gas, non-shock



Reducing Screwed Flange
No. 155 E, Cast Iron

No. 255 E, Ferrosteel
Made to order

No. 255 E Ferrosteel Reducing Flanges are made to order at an advance of 25 per cent.



Eccentric Reducing Screwed Flange
Prices on application

List Prices, No. 155 E, Cast Iron

Size	Faced	Faced and Drilled	Size	Faced	Faced and Drilled	Size	Faced	Faced and Drilled
Inches	Each	Each	Inches	Each	Each	Inches	Each	Each
1¼ x 6⅛	1.80	2.15	1½ x 12½			2½ x 20½		
1½ x 6½	2.10	2.45	2 x 12½			3 x 20½		
1½ x 7½	2.30	2.65	2½ x 12½	5.50	6.25	3½ x 20½		
2 x 7½			3 x 12½			4 x 20½	17.50	19.25
1½ x 8¼	2.65	3.10	4 x 12½			5 x 20½		
2 x 8¼			5 x 12½			6 x 20½		
2½ x 8¼			1½ x 15			8 x 20½		
1½ x 9			2 x 15			10 x 20½		
2 x 9	3.30	3.85	2½ x 15			6 x 23		
2½ x 9			3 x 15	8.40	9.45	8 x 23	25.00	27.00
3 x 9			3½ x 15			10 x 23		
1½ x 10			4 x 15			12 x 23		
2 x 10	3.70	4.40	5 x 15			10 x 25½		
2½ x 10			6 x 15			12 x 25½	37.00	39.75
3 x 10			2 x 17½			14 x 25½		
3½ x 10			2½ x 17½			12 x 28		
1½ x 11			3 x 17½			14 x 28	43.00	46.00
2 x 11	4.40	5.10	4 x 17½	12.00	13.50	16 x 28		
2½ x 11			5 x 17½			14 x 30½		
3 x 11			6 x 17½			16 x 30½	51.00	55.00
3½ x 11			8 x 17½			18 x 30½		
4 x 11						18 x 36		
						20 x 36	74.00	79.00

How to order reducing flanges: When ordering reducing flanges, the screwed or reduced size should be designated first, and then the outside diameter of the flange. For example, a 250-Pound Flange to connect a 6-inch pipe to a 10-inch valve or fitting (O.D. of flange, 17½ inches) should be ordered 6" x 17½" Reducing Flange.

Drilling: These flanges are regularly furnished "faced only", unless ordered "faced and drilled".

Facing: 250-Pound Flanges are furnished with a 1/16-inch raised face; the raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Flanges with male, female, tongue, or groove face are made to order at an additional price. See page 353 for prices and dimensions.

Spot facing: Cast iron or Ferrosteel flanges are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is **10** cents per hole.

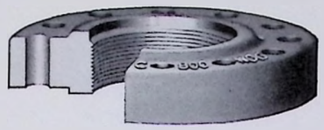
American Standard: The dimensions of these flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

Templates for drilling . . . page 371 *Galvanized flanges . . . page 295* *Special facings . . . page 353*

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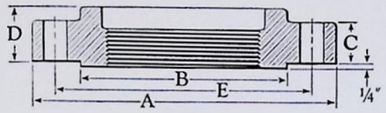
800-Pound
Hydraulic Ferrosteel Flanges

WORKING PRESSURE
800 pounds cold water, oil, or gas, non-shock

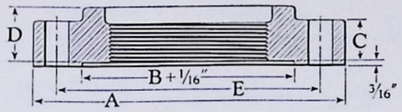


No. 855 H
Ferrosteel Screwed Flange

Furnished with male or female face, as ordered.



Male Face (Large Male) Flange



Female Face (Large Female) Flange

List Prices and Dimensions

Size of pipe	List Prices: No. 855 H, Ferrosteel Screwed Flanges		Dimensions, in Inches						
	Faced	Faced and Drilled	Flange diameter	Diameter of male face	Flange thickness	Hub length	Bolt circle	Number of bolts	Diameter of bolts
Inches	Each	Each	A	B	C	D	E		
2	3.25	3.75	6½	3⅝	1¼	1⅜	5	8	⅝
2½	4.25	4.75	7½	4⅛	1⅜	1 9/16	5⅞	8	¾
3	4.50	5.00	8¼	5	1½	1 11/16	6⅝	8	¾
3½	5.00	5.75	9	5½	1⅝	1 13/16	7¼	8	⅞
4	6.00	6.75	10¾	6 3/16	1⅞	2 1/16	8½	8	⅞
5	11.00	12.00	13	7 5/16	2⅛	2⅜	10½	8	1
6	13.00	15.00	14	8½	2¼	2½	11½	12	1
8	17.50	20.00	16½	10⅝	2½	2¾	13¾	12	1⅛
10	26.00	30.00	20	12¾	2⅞	3⅛	17	16	1¼
12	36.00	40.00	22	15	3	3¼	19¼	20	1¼

Drilling: 800-Pound Hydraulic Ferrosteel Flanges are regularly furnished faced only unless ordered faced and drilled.

Facing: These flanges are furnished with either a male face ¼-inch high (large male) or with a female face 3/16-inch deep (large female). Orders must specify which facing is wanted.

Male faces (large male) are finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish. Female face flanges have a smooth finish.

Flanges with tongue or groove face can be made to order at an additional price. See page 353 for prices and dimensions.

Spot facing: Ferrosteel flanges are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is 10 cents per hole.

American Standard: The dimensions of these flanges conform to the American Standard for 800-Pound Hydraulic Cast Iron Flanges (B16b1-1931).

Shock: When No. 855 H Flanges are used on water lines, precautions should be taken to protect them from the effects of severe shock. Properly designed shock absorbers may be used for this purpose.

Other flanges and additional sizes: These flanges are interchangeable with 600-Pound Crane Forged Steel Flanges, differing only in flange thickness.

For sizes and types not listed, use 600-Pound Forged Steel Flanges, page 335.

Templates for drilling . . . . page 371

Special facings . . . . page 353

Galvanized Flanged Fittings and Flanges

Galvanized 125-Pound or 250-Pound Cast Iron or Ferrosteel Flanged Fittings or Flanges can be made to order, at the extra list prices shown below. For list prices of Black, see pages 274 to 286, and 290 to 293.

Extra List Prices for Galvanizing

Size	125-Pound						250-Pound					
	No. 525 No. 527 No. 545 Elbows No. 547 No. 548 Reducers	No. 526 No. 528 No. 538 No. 540 No. 546 No. 549 No. 550 No. 551 Elbows No. 529 No. 531 No. 533 No. 534 No. 535 No. 536 Tees	No. 530 No. 532 Tees No. 537 No. 539 Crosses No. 541 No. 543 Laterals	No. 553 No. 558 Screwed Flanges	No. 555 Blind Flanges No. 557 Reducing Screwed Flanges		No. 101 E No. 103 E No. 121 E Elbows No. 123 E No. 123½ E Reducers	No. 122 E No. 125 E No. 125½ E No. 127 E No. 131 E No. 133 E No. 139 E No. 141 E Elbows No. 105 E No. 107 E No. 109 E No. 111 E No. 112 E No. 112½ E Tees	No. 135 E No. 137 E Tees No. 113 E No. 115 E Crosses No. 117 E No. 119 E Laterals	No. 151 E No. 251 E Screwed Flanges	No. 153 E No. 253 E Blind Flanges No. 155 E No. 255 E Reducing Screwed Flanges	
Inches	Extra Each	Extra Each	Extra Each	Extra Each	O.D. In.	Extra Each	Extra Each	Extra Each	Extra Each	Extra Each	O.D. In.	Extra Each
1	2.40	3.60	4.80	.60	4¼	.90	3.00	4.50	6.00	.85	4⅞	1.25
1¼	2.40	3.60	4.80	.60	4⅝	.90	3.00	4.50	6.00	.85	5¼	1.25
1½	2.40	3.60	4.80	.60	5	.90	3.00	4.50	6.00	.85	6⅛	1.25
2	2.40	3.60	4.80	.70	6	1.00	3.00	4.50	6.00	1.00	6½	1.50
2½	2.50	3.75	5.00	.75	7	1.10	3.10	4.65	6.25	1.05	7½	1.60
3	2.75	4.15	5.50	.85	7½	1.25	3.50	5.25	7.00	1.15	8¼	1.75
3½	3.25	4.90	6.50	1.00	8½	1.50	4.10	6.15	8.25	1.40	9	2.10
4	3.65	5.50	7.25	1.20	9	1.80	4.50	6.75	9.00	1.65	10	2.50
5	4.85	7.25	9.75	1.35	10	2.00	6.00	9.00	12.00	1.90	11	2.85
6	6.00	9.00	12.00	1.65	11	2.50	7.50	11.25	15.00	2.30	12½	3.50
8	9.00	13.50	18.00	2.50	13½	3.75	11.25	16.75	22.50	3.50	15	5.25
10	14.50	22.00	29.00	3.75	16	5.75	18.00	27.00	36.00	5.25	17½	8.00
12	21.00	31.00	42.00	5.00	19	7.50	26.00	39.00	52.00	7.00	20½	10.50
14	30.00	45.00	60.00	7.00	21	10.50	37.50	56.00	75.00	10.00	23	15.00
16	40.00	60.00	80.00	10.50	23½	16.00	50.00	75.00	100.00	15.00	25½	22.50

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Steel Flanged Fittings and Flanges

For the higher pressures and temperatures, Steel Flanged Fittings and Flanges are recommended. These are shown in the section of this catalogue devoted to Steel Valves and Fittings.

Flanges for welding are shown in the section devoted to Steel Valves and Fittings.

Cranelap Pipe Joints are shown in the section devoted to Fabricated Piping.

Steel Valves and Fittings

Crane Co. manufactures a complete line of steel valves and fittings. Pages 298 to 349 are intended primarily to illustrate the scope of the line and, in addition, to list completely such parts of the line as are used frequently in general industrial installations. Prices and additional information on any of the other items will be furnished on request.

Cast Steel Valves and Fittings

General Description ..... pages 298 to 300
Pressure-Temperature Ratings and Tests ..... page 301
150, 300, 400, 600, 900, and 1500-Pound Valves and Fittings ..... pages 302 to 313
Dimensions, 150, 300, 400, 600, 900, and 1500-Pound ..... pages 314 to 319
1000 and 2000-Pound W.O.G. Screwed Fittings ..... pages 330 to 331
Specialties ..... page 348
Oil Field Valves and Fittings ..... page 340

Forged Steel Valves, Fittings, and Flanges

Globe and Angle Valves (including valves made from bar stock) ..... pages 320 to 324
Gate Valves ..... page 325
Check Valves ..... pages 326 to 327
3000, 6000, and 9000-Pound W.O.G. Screwed Fittings ..... pages 328 to 329
150, 300, 400, and 600-Pound Flanges ..... pages 332 to 335
Boiler Flanges ..... page 330

Steel Fittings, Flanges, and Valves for Welding

General Description and Pressure-Temperature Ratings ..... page 337
Welding Elbows, Tees, Caps, Return Bends, and Reducing Nipples ..... pages 338 to 339
Cranelap Welding Nipples and Cranelap Flanges ..... page 340
Welding Neck Flanges ..... page 341
Slip-On Welding Flanges ..... pages 341 to 342
Valves with Welding Ends ..... page 343
Expansion Joints with Welding Ends ..... page 343
Dimensions, Cranelap Welding Nipples and Cranelap Flanges ..... pages 344 to 345
Dimensions, Welding Neck and Slip-On Welding Flanges ..... pages 346 to 347

As indicated above, Cast Steel Specialties are shown on page 348. In addition, more complete information on several of the items is shown on the pages referred to below:

Cast Steel Pop Safety Valves ..... page 309
Cast Steel Relief Valves ..... page 413
Cast Steel Inverted Open Float Steam Traps, page 424

Complete information on other Cast Steel Specialties will be furnished on application.

Crane Forged Steel 150, 300, 400, and 600-Pound Screwed, Screwed Reducing, and Blind Flanges are shown on pages 332 to 335 inclusive, as indicated above. Similar data on Crane Forged Steel 900 and 1500-Pound Flanges will be furnished on request.

Crane No. 18-8 Chrome-Nickel Alloy Steel Valves, Fittings, Unions, and Flanges for corrosion resistant service are shown on pages 420 and 421. 18-8 Chrome-Nickel Alloy Steel Sanitary Valves and Fittings are shown on pages 422 and 423.

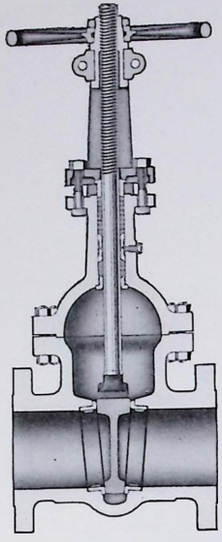
For data on Cranelap joints, Ring joints, Sarlun and Sargol joints, American Standard flange facings, flange finishes, seamless steel pipe, pipe bends, welding, and other allied subjects, see the section of this catalogue devoted to Pipe and Fabricated Piping.

Steel Bushings ..... *page 225*
Steel Plugs ..... *page 226*
Wrought Couplings ..... *page 227*
Wrought Steel Nipples ..... *pages 228 and 229*
Forged Steel Unions and Union Fittings ..... *pages 244 and 245*
Forged Steel Flange Unions ..... *pages 248 and 249*

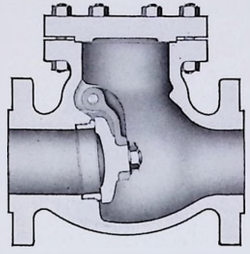
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Steel Valves and Flanged Fittings

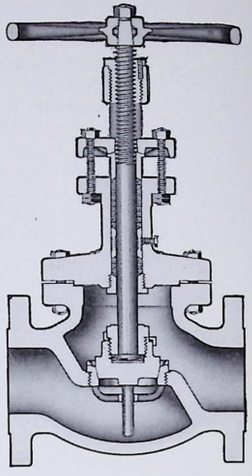
For All Pressures and Purposes



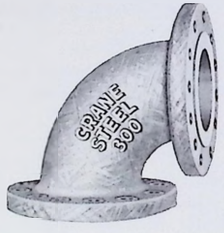
300-Pound Gate Valve



300-Pound Swing Check Valve



300-Pound Globe Valve



300-Pound 90° Elbow



300-Pound 45° Elbow



300-Pound Tee



300-Pound Cross

General Description

The Crane line of Steel Valves and Fittings covers a broad range of materials for practically every service condition where Steel is required or desirable. On the following pages, only the principal lines of Cast Steel Valves and Fittings are illustrated and briefly described.

Body and bonnet metals: Although any of the various steel alloys described on pages 4 and 5 are available, the metals from which Crane Steel Valves are regularly cast have been standardized in our manufacture on the basis of selecting the most desirable and practicable material for each purpose. Valves for primary steam or oil service pressures up to and including 400 pounds are regularly made of Carbon Steel. For pressures higher than 400 pounds, Valves of Nickel-Chrome Alloy Steel are regularly carried in stock. Valves made of Carbon-Molybdenum Steel are also available. When intended for welding into the pipe line, subject to high temperature service, the use of Carbon-Molybdenum Steel is recommended in preference to other alloy steels.

Seating metals: Crane Valves are furnished with a variety of seating metals, each combination depending upon the particular service conditions. As a result of our years of experience and development, the following seating metal combinations are recommended and have been adopted as our standard.

The following classification letters are applied as a suffix to the catalogue number for convenience in ordering and identifying the seating metal combinations.

Class X: Exelloy to Exelloy.

For oil refinery service at all temperatures.

Check Valves with this trimming are also recommended for steam, water, air, or gas at all temperatures.

Class XR: Exelloy to No. 49 Nickel Alloy.

For steam, water, air, gas, or non-corrosive oil up to 750° F. maximum temperature.

Class XU: Exelloy to Stellite.

For steam service above 750° F.

Class U: Stellite to Stellite.

For steam service above 750° F.

Type P: This letter is not intended to designate seating materials but is used only as a suffix to catalogue numbers of Globe and Angle Valves having a plug type disc.

Crane steel plug type Globe and Angle Valves are regularly furnished with the "XR" seating metal combination.

Trimming metals: All Crane Steel Valves are regularly furnished with Exelloy stems. Other parts are made of materials which our experience has demonstrated to be the most suitable for the purpose, considering the function of the part and the service for which the valve is recommended.

Bonnet joint: The bonnet joints of Steel Valves are regularly furnished with the following types of facings:

150-Pound Valves — Flat Face.

300 and 400-Pound Valves — Male and Female Face.

600-Pound and higher pressure Valves — Ring Type Joint, similar to that described in the section of this catalogue devoted to Fabricated Piping.

Crane Triplex Steel bolt-studs made from selected material, threaded full length, are used in all bonnet joints.

Metal thickness: The metal thickness of Crane Cast Steel Valves and Fittings is considerably heavier than the American Standard dimensions.

Wheel: Wheels having a diameter of 24 inches or less are made of malleable iron to assure maximum strength. They have an oval-shaped rim, affording an easy grip.

Wheels of larger than 24 inches diameter are cast iron.

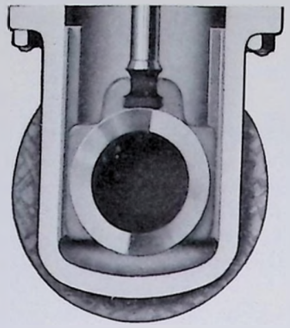
Flanged Fittings: Although any of the various steel alloys described on pages 4 and 5 are available, the metals from which Crane Steel Flanged Fittings are regularly cast have been standardized in our manufacture on the basis of selecting the most desirable and practicable material for each purpose. Flanged Fittings for primary steam and oil service pressures up to and including 400 pounds, are regularly made of Carbon Steel. For pressures higher than 400 pounds, Flanged Fittings of Nickel-Chrome Alloy Steel are regularly carried in stock. Flanged Fittings cast in Carbon-Molybdenum Steel are also available. When intended for welding into the pipe line, subject to high temperature service, the use of Carbon-Molybdenum Steel is recommended in preference to other alloy steels.

Flanges: Flanges are regularly made of Carbon Forged Steel. 600, 900, and 1500-Pound Forged or Cast Steel Flanges, when made from Crane Nickel-Chrome or Carbon-Molybdenum Steel, are suitable for the same pressures and temperatures as Crane Cast Steel Valves and Flanged Fittings.

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General Description (Continued)

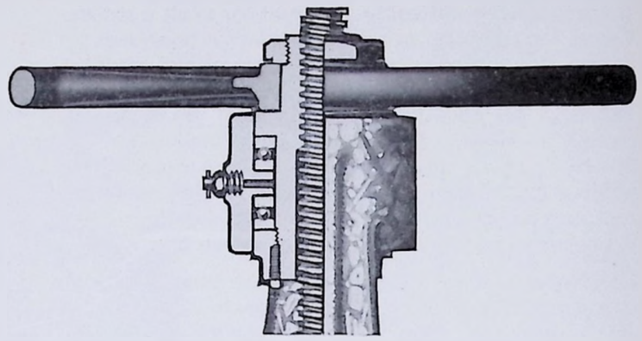
Stem and Disc Connection



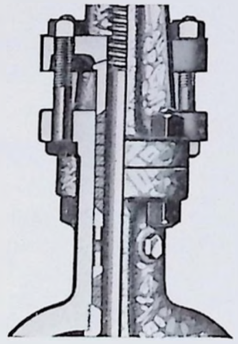
The connection between stem and disc is a sturdy tee-head construction which provides ample clearance and prevents any side strains on the stem. The stem simply moves the disc to the open and closed positions but does not guide the disc.

Ball Bearing Yoke Sleeve

The amount of power necessary to operate the large size valves is materially reduced by regularly equipping them with ball bearings. These ball bearings are of the highest grade, conform to standard dimensions, are equipped with ball retainers, and are lubricated by means of a grease fitting.



Stuffing Box

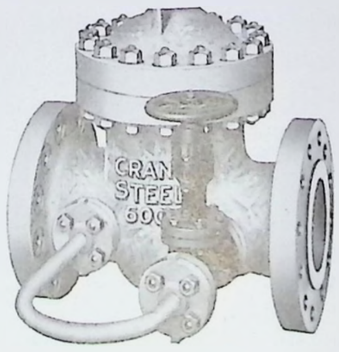


The stuffing box is of the lantern type, providing for three rings of packing at the bottom, a lantern or spacer above this packing and a deep space for packing rings above the spacer. The lower rings act as cleaners and remove all dirt from the stem before it passes through the upper packing—a clean stem in the upper packing assures tightness. The lantern separates the upper and lower packing and at the same time provides the usual space for a cooling chamber. This cooling chamber space is tapped and plugged with a steel pipe plug.

By-Pass

By-pass on steel valves is of the "built-up" type and is furnished with a globe valve, in order to insure the longest service under the conditions to which these valves are subjected.

Pipe bends are used to provide flexibility and to compensate for expansion strains.



A copy of our catalogue, describing a complete line of Steel Valves and Fittings, will be sent upon request.

Pressure-Temperature Ratings

For Crane Cast Steel Valves, Cast Steel Flanged Fittings, and Forged Steel Flanges

	Pressure Class	Size	Hydrostatic Shell Test Pounds	Working Pressures, Pounds per Square Inch: Steam or Hot Oil 500° F.	750° F.	900° F.	1000° F.	(1) Cold water, oil, or gas, non-shock
(2) Cast Steel Valves and Flanged Fittings	150-Pound	2 to 12-inch	350	150	125	75	40	350
		14 to 24-inch	350	150	100	70	40	230
	300-Pound	1 to 6-inch	750	410	300	275	225	600
		8 to 12-inch	750	410	300	275	165	600
		14 to 24-inch	750	410	300	225	120	600
	400-Pound	4 to 6-inch	1000	550	400	375	325	800
		8 to 12-inch	1000	550	400	375	220	800
		14 to 24-inch	1000	550	400	300	160	800
	600-Pound	½ to 12-inch	1500	920	720	600	475	1200
		14 to 24-inch	1500	920	720	600	380	1200
	900-Pound	3 to 12-inch	2000	1380	1080	900	725	1800
		14 to 24-inch	2000	1380	1080	900	570	1800
	1500-Pound	1 to 12-inch	3500	2300	1800	1500	1100	3000
(3) Forged Steel Flanges	150-Pound	½ to 12-inch		150	125	75	40	350
		14 to 24-inch		150	100	70	40	230
	300-Pound	½ to 6-inch		410	300	275	225	600
		8 to 12-inch		410	300	275	165	600
		14 to 24-inch		410	300	225	120	600
	400-Pound	4 to 6-inch		550	400	375	325	800
		8 to 12-inch		550	400	375	220	800
		14 to 24-inch		550	400	300	160	800
	600-Pound	½ to 6-inch		820	600	475	420	1200
		8 to 12-inch		820	600	475	330	1200
		14 to 24-inch		820	600	420	240	1200
	900-Pound	3 to 6-inch		1230	900	725	495	1800
		8 to 12-inch		1230	900	725	425	1800
		14 to 24-inch		1230	900	900	630	360	1800
	1500-Pound	½ to 6-inch		2050	1500	1100	670	3000
		8 to 12-inch		2050	1500	1100	630	3000

Working pressure ratings at other temperatures will be furnished on request.

(1) The cold rating for Globe and Angle Valves larger than 6-inch is the same as for 500° F.

(2) These ratings are for Crane Carbon Cast Steel Valves and Flanged Fittings in the 150, 300, and 400-Pound pressure classes, and for Crane Nickel-Chrome or Carbon-Molybdenum Cast Steel Valves and Flanged Fittings in the 600, 900, and 1500-Pound pressure classes.

(3) These ratings are for Forged Carbon Steel Flanges. The ratings for 600, 900, and 1500-Pound Forged or Cast Steel Flanges, when made from Crane Nickel-Chrome or Carbon-Molybdenum Steel, are the same as for Cast Steel Valves and Flanged Fittings.

Seating metals: Valve ratings are for valves with the proper seating metals, described on page 209.

Valves for air service: Steel Valves, as regularly furnished, are suitable for air or gas service up to the cold working pressure rating.

Where volatile fluids, high-pressure gas, or high-pressure air are to be retained in storage, and the valves are to be operated frequently, and a bubble-tight valve is required to prevent leakage, a special seat and disc construction is necessary. These special valves are made to order only; prices on application.

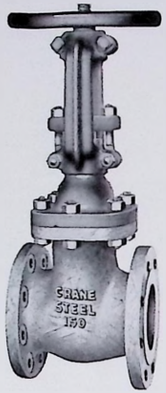
Standardized ratings: The working pressure ratings specified above are for Crane products. They are based upon the actual strength of the valves, fittings, and flanges, and provide an ample factor of safety.

In some instances, they are higher than ratings established by various Standardization Bodies and Safety Codes.

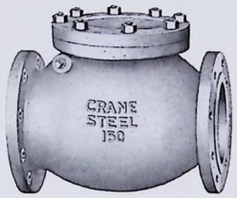
Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 169 of 402
Published by AsbestosClaims.Law
asbestosclaims.law/library/21275/169

150-Pound Cast Steel Valves

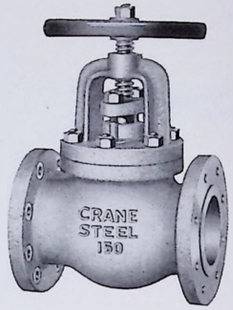
WORKING PRESSURES
2 to 12-inch — 150 pounds, 500° F. — 125 pounds, 750° F.
14 to 24-inch — 150 pounds, 500° F. — 100 pounds, 750° F.
For working pressures at other temperatures, see page 301.



150-Pound Gate Valve



150-Pound Swing Check Valve



150-Pound Globe Valve

Gate Valves: 150-Pound Gate Valves are made outside screw and yoke type and are furnished in a complete range of seating metals and sizes:

No. 46 XR, Screwed . . . . . Sizes 2 to 6-inch
No. 47 XR, Flanged . . . . . Sizes 2 to 24-inch
No. 46 X, Screwed . . . . . Sizes 2 to 6-inch
No. 47 X, Flanged . . . . . Sizes 2 to 24-inch

These valves are well proportioned and embody many distinctive Crane features, such as:

Straight through ports.
Tee head stem and disc connection.
Ball type packing gland.

Swing Check Valves: Swing Check Valves are furnished regularly with Exelloy seating metal, which is suitable for the various service conditions covered on page 299.

All moving valve parts are made of high temperature corrosion resisting metals.

No. 148 X, Screwed . . . . . Sizes 2 to 6-inch
No. 147 X, Flanged . . . . . Sizes 2 to 8-inch

Lift Check Valves can be furnished on order.

Dimensions . . page 314

Globe and Angle Valves: For steam, water, air, or gas, are furnished with Crane plug type disc and seat, especially designed to resist such severe conditions as wiredrawing and the cutting action of foreign substances, and to give positive flow regulation when used on throttling service.

For high temperature refinery service these valves are furnished with ball to flat seating surfaces, which construction has proved exceptionally satisfactory for service where coking is prevalent.

No. 142 P Globe, Screwed . . . . Sizes 2 to 6-inch
No. 143 P Globe, Flanged . . . . Sizes 2 to 8-inch
No. 144 P Angle, Screwed . . . . Sizes 2 to 6-inch
No. 145 P Angle, Flanged . . . . Sizes 2 to 8-inch

Note: "P" type (plug disc) valves use the "XR" metal combination.

No. 142 X Globe, Screwed . . . . Sizes 2 to 6-inch
No. 143 X Globe, Flanged . . . . Sizes 2 to 8-inch
No. 144 X Angle, Screwed . . . . Sizes 2 to 6-inch
No. 145 X Angle, Flanged . . . . Sizes 2 to 8-inch

Facing: 150-Pound Valves are regularly furnished with a 1/16-inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

Templates for drilling . . . page 372

150-Pound Cast Steel Flanged Fittings

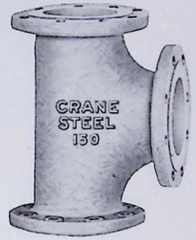
WORKING PRESSURES
2 to 12-inch — 150 pounds, 500° F. — 125 pounds, 750° F.
14 to 24-inch — 150 pounds, 500° F. — 100 pounds, 750° F.
For working pressures at other temperatures, see page 301.



No. 525 D 90° Elbow



No. 527 D 45° Elbow



No. 534 D Tee



No. 537 D Cross

150-Pound Flanged Fittings are made in a large variety of types and sizes:

No. 525 D 90° Elbow . . . . . Sizes 2 to 24-inch
No. 545 D 90° Elbow—Reducing . . . . . Sizes 2 to 24-inch
No. 527 D 45° Elbow . . . . . Sizes 2 to 24-inch
No. 550 D 90° Base Elbow . . . . . Sizes 2 to 24-inch
No. 551 D 90° Long Radius Elbow . . . . . Sizes 2 to 24-inch
No. 534 D Tee . . . . . Sizes 2 to 24-inch
No. 531 D Tee—Reducing . . . . . Sizes 2 to 24-inch
No. 537 D Cross . . . . . Sizes 2 to 24-inch
No. 539 D Cross—Reducing . . . . . Sizes 2 to 24-inch
No. 541 D 45° Lateral . . . . . Sizes 2 to 24-inch
No. 543 D 45° Lateral—Reducing . . . . . Sizes 2 to 24-inch
No. 547 D Taper Reducer . . . . . Sizes 2 to 24-inch
No. 548 D Eccentric Reducer . . . . . Made to Order
No. 553 D Return Bend . . . . . Sizes 2 to 12-inch Variety of Centers

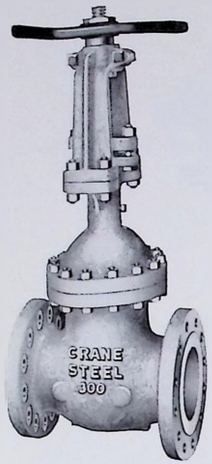
Facing: 150-Pound Fittings are regularly furnished with a 1/16-inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

Dimensions . . page 314 *Templates for drilling . . page 372*

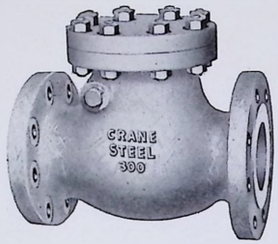
Published by AsbestosClaims.Law
asbestosclaims.law/library/21275/170

300-Pound Cast Steel Valves

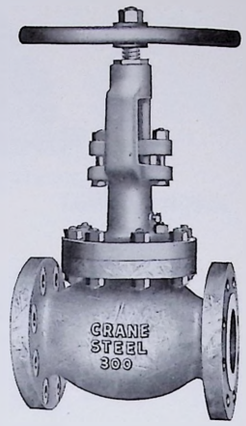
WORKING PRESSURE
300 pounds, 750° F.
For working pressures at other temperatures, see page 301.



300-Pound Gate Valve



300-Pound Swing Check Valve



300-Pound Globe Valve

Gate Valves: 300-Pound Gate Valves are made outside screw and yoke type and are furnished in a complete range of seating metals and sizes:

No. 32 XR, Screwed . . . . . Sizes 1¼ to 6-inch
No. 33 XR, Flanged . . . . . Sizes 1¼ to 24-inch
No. 34 XR, Flanged with by-pass . . Sizes 6 to 24-inch
No. 32 X, Screwed . . . . . Sizes 1¼ to 6-inch
No. 33 X, Flanged . . . . . Sizes 1¼ to 24-inch

These valves are sturdy in construction, well proportioned, and embody such distinctive features as:

Straight through ports.
Tee head stem and disc connection.
Ball type packing gland and lantern type stuffing box.

Valves 6-inch and larger can be furnished with by-pass.
By-pass when furnished is of the "built up" type.

Swing Check Valves: Swing Check Valves are regularly furnished with Exelloy seating metal, which is suitable for the various service conditions covered on page 299.

All moving valve parts are made of high temperature, corrosion resisting metals. Valves are regularly furnished flanged end.

No. 159 X, Flanged . . . . . Sizes 1¼ to 8-inch Lift Check Valves can be furnished on order.

Globe and Angle Valves: For steam, water, air or gas, are made with Crane plug type disc and seat, especially designed to resist such severe conditions as wiredrawing and the cutting action of foreign substances, and to provide positive flow regulation when used on throttling service.

For high temperature refinery service these valves are furnished with ball to flat seating surfaces, which construction has proved exceptionally satisfactory for service where coking is prevalent.

No. 150 P Globe, Screwed . . . . Sizes 2 to 4-inch
No. 151 P Globe, Flanged . . . . . Sizes 2 to 8-inch
No. 152 P Angle, Screwed . . . . Sizes 2 to 4-inch
No. 153 P Angle, Flanged . . . . . Sizes 2 to 8-inch

Note: "P" type (plug disc) valves use the "XR" metal combination.

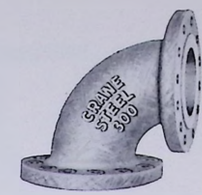
No. 150 X Globe, Screwed . . . . Sizes 2 to 4-inch
No. 151 X Globe, Flanged . . . . Sizes 2 to 8-inch
No. 152 X Angle, Screwed . . . . Sizes 2 to 4-inch
No. 153 X Angle, Flanged . . . . Sizes 2 to 8-inch

Facing: 300-Pound Valves are regularly furnished with a 1/16-inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

Dimensions . . . . page 315
Templates for drilling . . . . page 373

300-Pound Cast Steel Flanged Fittings

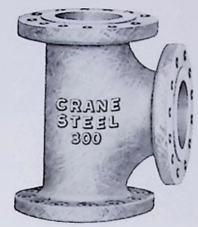
WORKING PRESSURE
300 pounds, 750° F.
For working pressures at other temperatures, see page 301.



No. 401 D 90° Elbow



No. 403 D 45° Elbow



No. 412 D Tee



No. 413 D Cross

300-Pound Flanged Fittings are made in a large variety of types and sizes:

No. 401 D 90° Elbow . . . . . Sizes 1 to 24-inch
No. 421 D 90° Elbow-Reducing . . . . . Sizes 2 to 24-inch
No. 403 D 45° Elbow . . . . . Sizes 1 to 24-inch
No. 425½ D 90° Base Elbow . . . . . Sizes 2 to 24-inch
No. 427 D 90° Long Radius Elbow . . . . . Sizes 2 to 24-inch
No. 412 D Tee . . . . . Sizes 1 to 24-inch
No. 407 D Tee-Reducing . . . . . Sizes 1¼ to 24-inch
No. 413 D Cross . . . . . Sizes 1 to 24-inch
No. 415 D Cross-Reducing . . . . . Sizes 1¼ to 24-inch
No. 417 D 45° Lateral . . . . . Sizes 1 to 24-inch
No. 419 D 45° Lateral-Reducing . . . . . Sizes 1¼ to 24-inch
No. 423 D Taper Reducer . . . . . Sizes 2 to 24-inch
No. 423½ D Eccentric Reducer . . . . . Made to Order
No. 429 D Return Bend . . . . . Sizes 2 to 8-inch Variety of Centers

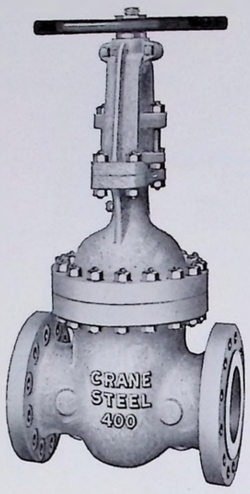
Facing: 300-Pound Fittings are regularly furnished with a 1/16-inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

Dimensions . . . . page 315
Templates for drilling . . . . page 373

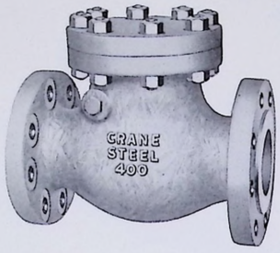
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400-Pound Cast Steel Valves

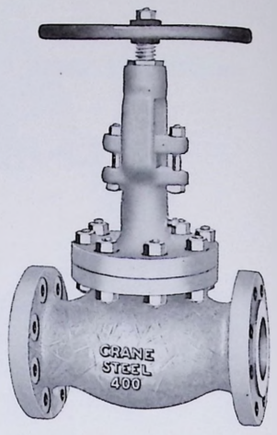
WORKING PRESSURE
400 pounds, 750° F.
For working pressures at other temperatures, see page 301.



400-Pound Gate Valve



400-Pound Swing Check Valve



400-Pound Globe Valve

For sizes smaller than 4-inch, use 600-Pound Valves.

Gate Valves: 400-Pound Gate Valves are made outside screw and yoke type and are furnished in a complete range of seating metals and sizes:

No. 62 XR, Screwed.....Sizes 4 to 6-inch
No. 61 XR, Flanged.....Sizes 4 to 24-inch
No. 63 XR, Flanged with by-pass..Sizes 6 to 24-inch
No. 62 X, Screwed.....Sizes 4 to 6-inch
No. 61 X, Flanged.....Sizes 4 to 24-inch

These valves are sturdy in construction, well proportioned, and have long close fitting machined body guide ribs for guiding the disc. Sizes 10-inch and larger, are regularly furnished with ball bearing yokes. However, sizes 6 and 8-inch can be obtained with ball bearing yokes when so desired. Other distinctive features are:

Straight through ports.
Tee head stem and disc connection.
Ball type packing gland and lantern type stuffing box.

Valves 6-inch and larger can be furnished with by-pass. By-pass when furnished is of the "built-up" type.

Swing Check Valves: These valves are regularly furnished with Exelloy seating metal, which is suitable for the various service conditions covered on page 299.

All moving valve parts are made of high temperature, corrosion resisting metals. Valves are regularly furnished flanged end.

No. 169 X, Flanged.....Sizes 4 to 8-inch

Lift Check Valves can be furnished on order.

Globe and Angle Valves: For steam, water, air, or gas, sizes 6-inch and smaller, are furnished with Crane plug type disc and seat, especially designed to resist such severe conditions as wire-drawing and cutting action of foreign substances, and to provide positive flow regulation when used on throttling service. Larger sizes are made with flat seats.

For high temperature refinery service these valves are furnished with ball to flat seating surfaces which have proved exceptionally satisfactory for service where coking is prevalent.

No. 161 P Globe, Flanged....Sizes 4 to 8-inch
No. 165 P Globe, Flanged, with by-pass..Sizes 6 and 8-inch
No. 163 P Angle, Flanged....Sizes 4 to 8-inch
No. 167 P Angle, Flanged, with by-pass..Sizes 6 and 8-inch

Note: "P" type (plug disc) valves use the "XR" metal combination.

No. 361 X Globe, Flanged....Sizes 4 to 8-inch
No. 363 X Angle, Flanged....Sizes 4 to 8-inch

Facing: 400-Pound Valves are regularly furnished with a ¼-inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

Dimensions....page 316

Templates for drilling....page 374

400-Pound Cast Steel Flanged Fittings

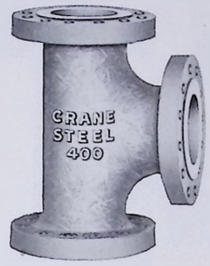
WORKING PRESSURE
400 pounds, 750° F.
For working pressures at other temperatures, see page 301.



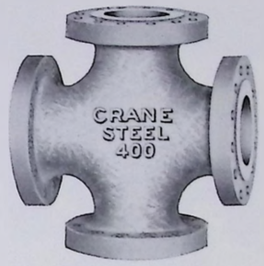
No. 601 D 90° Elbow



No. 603 D 45° Elbow



No. 605 D Tee



No. 613 D Cross

For sizes smaller than 4-inch, use 600-Pound Fittings.

400-Pound Flanged Fittings are made in various types and sizes:

No. 601 D 90° Elbow.....Sizes 4 to 24-inch
No. 621 D 90° Elbow—Reducing.....Sizes 4 to 24-inch
No. 603 D 45° Elbow.....Sizes 4 to 24-inch
No. 625 D 90° Base Elbow.....Sizes 4 to 24-inch
No. 605 D Tee.....Sizes 4 to 24-inch
No. 607 D Tee—Reducing.....Sizes 4 to 24-inch
No. 613 D Cross.....Sizes 4 to 24-inch
No. 615 D Cross—Reducing.....Sizes 4 to 24-inch
No. 617 D 45° Lateral.....Sizes 4 to 24-inch
No. 619 D 45° Lateral—Reducing.....Sizes 4 to 24-inch
No. 623 D Taper Reducer.....Sizes 4 to 24-inch

Facing: 400-Pound Fittings are regularly furnished with a ¼-inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

Dimensions... page 316

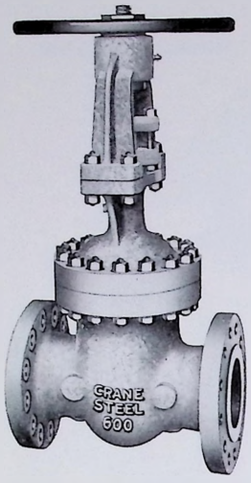
Templates for drilling... page 374

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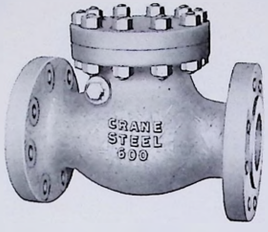
600-Pound Cast Steel Valves

WORKING PRESSURE
600 pounds, 900° F.*
For working pressures at other temperatures, see page 301.

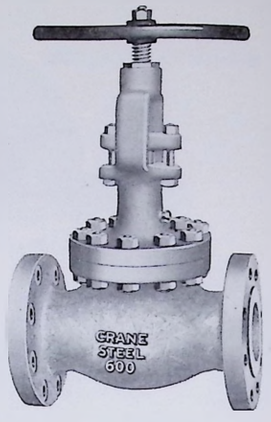
*Valves with "XR" trimming are suitable for 600 pounds, 750° F.



600-Pound Gate Valve



600-Pound Swing Check Valve



600-Pound Globe Valve

Gate Valves: 600-Pound Gate Valves are made outside screw and yoke and are furnished in a complete range of seating metals and sizes:

No. 74 XR, *Screwed . . . . . Sizes 2½ to 4-inch
No. 76 XR, *Flanged . . . . . Sizes 2½ to 24-inch
No. 78 XR, *Flanged, with by-pass . . Sizes 6 to 24-inch
No. 74 X, Screwed . . . . . Sizes 2½ to 4-inch
No. 76 X, Flanged . . . . . Sizes 2½ to 24-inch

Sizes 2-inch and smaller are forged steel. See page 325.

These valves are sturdy and exceptionally serviceable, embodying all the latest refinements in gate valve construction. The discs are guided to their seats on accurately machined close-fitting guides, with longer bearing surfaces than heretofore used in any valves. Sizes 6-inch and larger are regularly furnished with ball bearing yokes. Other distinctive features are:

Straight through ports.
Tee head stem and disc connection.
Ball type packing gland and lantern type stuffing box.

Valves 6-inch and larger can be furnished with by-pass. By-pass when furnished is of the "built-up" type.

Swing Check Valves: These valves are regularly furnished with Exelloy seating metal, which is suitable for the various service conditions covered on page 299.

All moving valve parts are made of high temperature, corrosion resisting metals. Valves are regularly furnished flanged end.

No. 175 X, Flanged . . . . . Sizes 2½ to 8-inch

Check Valves, 2-inch and smaller, are furnished lift type and are made of forged steel. See page 326.

Cast Steel Lift Check Valves can be furnished on order.

Globe and Angle Valves: For steam, water, air, or gas, these valves are furnished with Crane plug type disc and seat, especially designed to resist such severe conditions as wiredrawing and cutting action of foreign substances, and to provide positive flow regulation when used on throttling service.

For high temperature refinery service these valves are furnished with ball to flat seating surfaces, which construction has proved exceptionally satisfactory for service where coking is prevalent.

No. 171 P Globe, Flanged . . . Sizes 2½ to 6-inch
No. 173 P Angle, Flanged . . . Sizes 2½ to 6-inch

Note: "P" type (plug disc) valves use the "XR" metal combination.*

No. 371 X Globe, Flanged . . Sizes 2½ to 6-inch
No. 373 X Globe, Flanged . . Sizes 2½ to 6-inch

Sizes 2-inch and smaller are forged steel. See page 323.

Forged Steel Valves: Gate, Globe, Angle, and Check Valves, sizes 2-inch and smaller, are furnished in forged steel. See pages 323, 325, and 326.

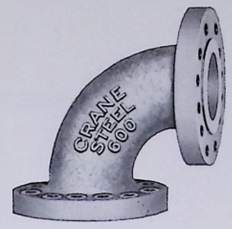
Facing: 600-Pound Valves are regularly furnished with a ¼-inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

*Valves with "XR" trimming are suitable for 600 pounds, 750° F.

Dimensions . . . page 317 *Templates for drilling . . . page 375*

600-Pound Cast Steel Flanged Fittings

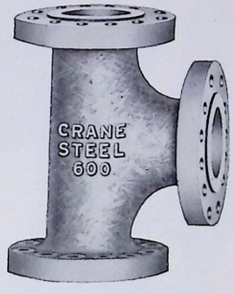
WORKING PRESSURE
600 pounds, 900° F.
For working pressures at other temperatures, see page 301.



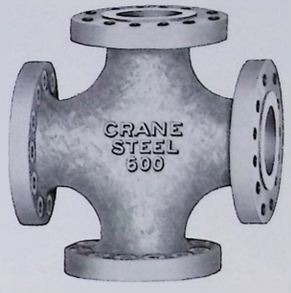
No. 845 D 90° Elbow



No. 846 D 45° Elbow



No. 847 D Tee



No. 849 D Cross

600-Pound Flanged Fittings are made in various types and sizes:

No. 845 D 90° Elbow . . . . . Sizes ½ to 24-inch
No. 841 D 90° Elbow—Reducing . . . . . Sizes 1¼ to 24-inch
No. 846 D 45° Elbow . . . . . Sizes ½ to 24-inch
No. 854 D 90° Base Elbow . . . . . Sizes 2 to 16-inch
No. 847 D Tee . . . . . Sizes ½ to 24-inch
No. 848 D Tee—Reducing . . . . . Sizes ¾ to 24-inch
No. 849 D Cross . . . . . Sizes ½ to 24-inch
No. 850 D Cross—Reducing . . . . . Sizes ¾ to 24-inch
No. 851 D 45° Lateral . . . . . Sizes ½ to 24-inch
No. 852 D 45° Lateral—Reducing . . . . . Sizes ¾ to 24-inch
No. 853 D Taper Reducer . . . . . Sizes ¾ to 24-inch

Facing: 600-Pound Fittings are regularly furnished with a ¼-inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

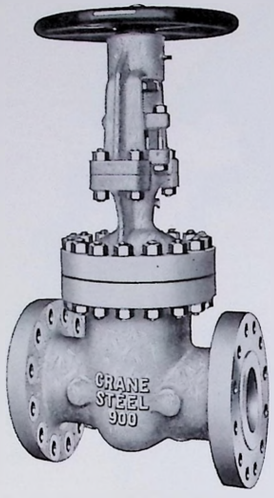
Dimensions . . . page 317 *Templates for drilling . . . page 375*

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asbestosclaims.law/library/21275/173

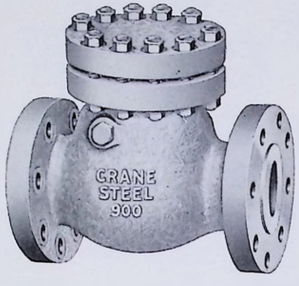
900-Pound Cast Steel Valves

WORKING PRESSURE
900 pounds, 900° F.*
For working pressures at other temperatures, see page 301.

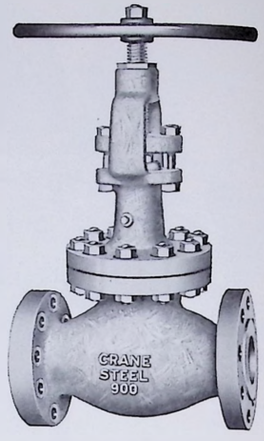
*Valves with "XR" trimming are suitable for 900 pounds, 750° F.



900-Pound Gate Valve



900-Pound Swing Check Valve



900-Pound Globe Valve

For sizes smaller than 3-inch, use 1500-Pound Valves.

Gate Valves: 900-Pound Gate Valves are made outside screw and yoke type and can be furnished in a complete range of seating metals and sizes:

No. 83 XR, *Flanged.....Sizes 3 to 18-inch
No. 83 X, Flanged.....Sizes 3 to 18-inch
No. 85 XR, *Flanged, with by-pass..Sizes 4 to 18-inch

These valves are sturdy, well proportioned, and embody all the latest refinements in gate valve design. The discs are guided to their seats on accurately machined close-fitting guides with longer bearing surface than heretofore used in any valves. Sizes 6-inch and larger are regularly furnished with ball bearing yokes. Other distinctive features are:

Straight through ports.
Tee head stem and disc connection.
Ball type gland and lantern type stuffing box.

Valves 4-inch and larger can be furnished with by-pass. By-pass when furnished is of the "built-up" type.

Swing Check Valves: These valves are regularly furnished with Exelloy seating metal, which is suitable for the various service conditions covered on page 299.

All moving valve parts are made of high temperature, corrosion resisting metals. Valves are regularly furnished flanged end.

No. 187 X, Flanged.....Sizes 3 and 4-inch

Lift Check Valves can be furnished on order.

Globe and Angle Valves: For steam, water, air, or gas, these valves are furnished with Crane plug type disc and seat, especially designed to resist such severe conditions as wiredrawing and the cutting action of foreign substances and to provide positive flow regulation when used on throttling service.

For high temperature refinery service these valves are furnished with ball to flat seating surfaces, which construction has proved exceptionally satisfactory for service where coking is prevalent.

No. 183 P Globe, Flanged...Sizes 3 to 6-inch
No. 185 P Angle, Flanged...Sizes 3 and 4-inch

Note: "P" type (plug disc) valves use the "XR" metal combination.*

No. 383 X Globe, Flanged...Sizes 3 to 6-inch
No. 385 X Angle, Flanged...Sizes 3 and 4-inch

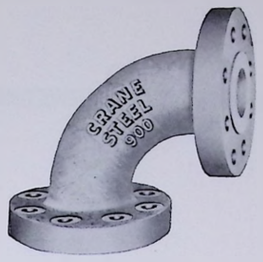
Facing: 900-Pound Valves are regularly furnished with a ¼-inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

*Valves with "XR" trimming are suitable for 900 pounds, 750° F.

Dimensions . . . page 318 *Templates for drilling . . . page 376*

900-Pound Cast Steel Flanged Fittings

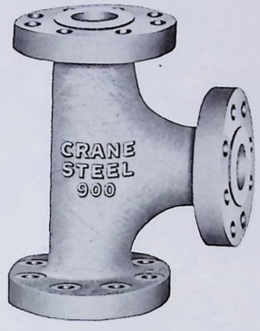
WORKING PRESSURE
900 pounds. 900° F.
For working pressures at other temperatures, see page 301.



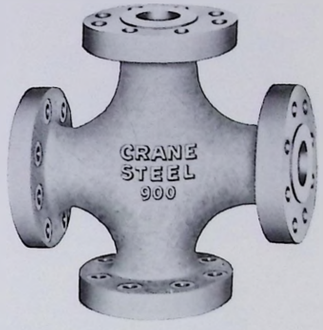
No. 1245 D 90° Elbow



No. 1246 D 45° Elbow



No. 1247 D Tee



No. 1249 D Cross

For sizes smaller than 3-inch, use 1500-Pound Fittings.

900-Pound Flanged Fittings are made in types and sizes listed below:

No. 1245 D 90° Elbow.....Sizes 3 to 24-inch
No. 1241 D 90° Elbow—Reducing.....Sizes 3 to 24-inch
No. 1246 D 45° Elbow.....Sizes 3 to 24-inch
No. 1254 D 90° Base Elbow.....Sizes 3 to 16-inch
No. 1247 D Tee.....Sizes 3 to 24-inch
No. 1248 D Tee—Reducing.....Sizes 3 to 24-inch
No. 1249 D Cross.....Sizes 3 to 24-inch
No. 1250 D Cross—Reducing.....Sizes 3 to 24-inch
No. 1251 D 45° Lateral.....Sizes 3 to 24-inch
No. 1252 D 45° Lateral—Reducing.....Sizes 3 to 24-inch
No. 1253 D Taper Reducer.....Sizes 3 to 24-inch

Facing: 900-Pound Fittings are regularly furnished with a ¼-inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

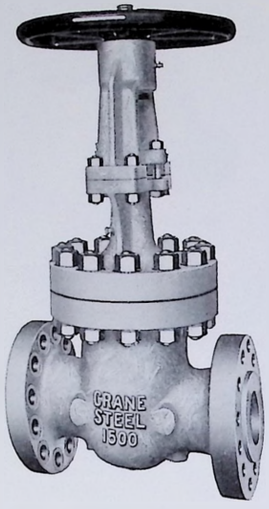
Dimensions . . . page 318 *Templates for drilling . . . page 376*

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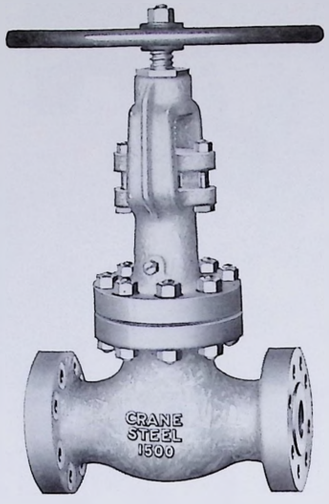
1500-Pound Cast Steel Valves

WORKING PRESSURE
1500 pounds, 900° F.*
For working pressures at other temperatures, see page 301.

Valves with "XR" trimming are suitable for 1500 pounds, 750° F.



1500-Pound Gate Valve



1500-Pound Globe Valve

Gate Valves: 1500-Pound Gate Valves are made outside screw and yoke type and can be furnished in a complete range of seating metals and sizes:

No. 87 XR, *Flanged.....Sizes 1 to 12-inch
No. 89 XR, *Flanged, with by-pass..Sizes 4 to 12-inch
No. 87 X, Flanged.....Sizes 1 to 12-inch

These valves are sturdy, well proportioned, and embody all the latest refinements in gate valve design. The discs are guided to their seats on accurately machined close-fitting guides with longer bearing surfaces than heretofore used in any valves. Sizes 5-inch and larger are regularly furnished with ball bearing yokes. Other distinctive features are:

Straight through ports.
Tee head stem and disc connection.
Ball type gland and lantern type stuffing box.

Valves 4-inch and larger can be furnished with by-pass. By-pass when furnished is of the "built-up" type.

Globe Valves: For steam, water, air, or gas, these valves are furnished with Crane plug type disc and seat, especially designed to resist such severe conditions as wiredrawing and the cutting action of foreign substances and to provide positive flow regulation when used on throttling service.

For high temperature refinery service these valves are furnished with ball to flat seating surfaces, which construction has proved exceptionally satisfactory for service where coking is prevalent.

No. 189 P Globe, Flanged....Sizes 1 to 4-inch

Angle Valves can be furnished on order.

Note: "P" type (plug disc) valves use the "XR" metal combination.*

No. 389 X Globe, Flanged...Sizes 1 to 4-inch

Note: Sizes 1½-inch and smaller are made of Forged Steel.

Check Valves: Swing and Lift Type Check Valves can be furnished for this class on order.

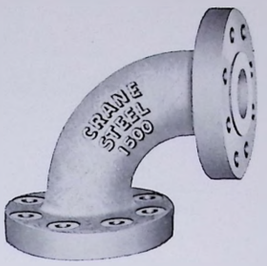
Facing: 1500-Pound Valves are regularly furnished with a ¼-inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 32 grooves per inch, known as "serrated" finish.

Valves with "XR" trimming are suitable for 1500 pounds, 750° F.

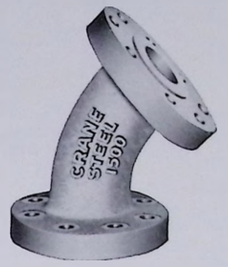
Dimensions....page 319 *Templates for drilling....page 377*

1500-Pound Cast Steel Flanged Fittings

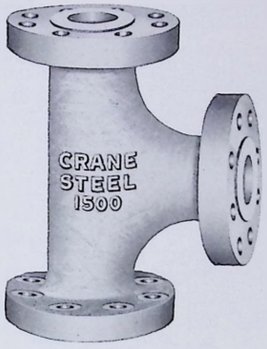
WORKING PRESSURE
1500 pounds, 900° F.
For working pressures at other temperatures, see page 301.



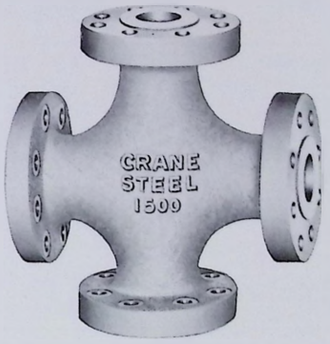
No. 1545 D 90° Elbow



No. 1546 D 45° Elbow



No. 1547 D Tee



No. 1549 D Cross

1500-Pound Flanged Fittings are made in types and sizes listed below:

No. 1545 D	90° Elbow	Sizes 1 to 12-inch
No. 1541 D	90° Elbow—Reducing	Sizes 1¼ to 12-inch
No. 1546 D	45° Elbow	Sizes 1 to 12-inch
No. 1547 D	Tee	Sizes 1 to 12-inch
No. 1548 D	Tee—Reducing	Sizes 1¼ to 12-inch
No. 1549 D	Cross	Sizes 1 to 12-inch
No. 1550 D	Cross—Reducing	Sizes 1¼ to 12-inch
No. 1551 D	45° Lateral	Sizes 1 to 12-inch
No. 1552 D	45° Lateral—Reducing	Sizes 1¼ to 12-inch
No. 1553 D	Taper Reducer	Sizes 1¼ to 12-inch

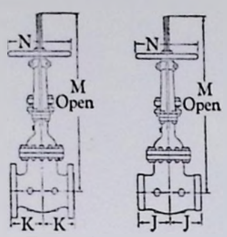
Facing: 1500-Pound Fittings are regularly furnished with a ¼-inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

Dimensions....page 319 *Templates for drilling....page 377*

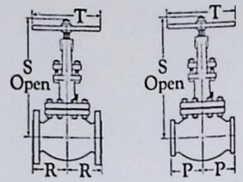
Published by AsbestosClaims.Law
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150-Pound Cast Steel Valves and Flanged Fittings

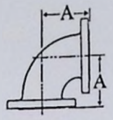
Dimensions, in Inches



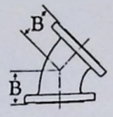
Flanged and Screwed Gate Valves



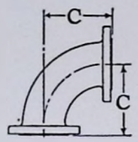
Flanged and Screwed Globe Valves



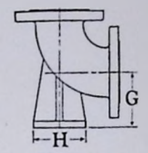
90° Elbow



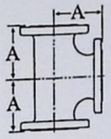
45° Elbow



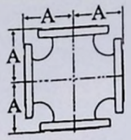
90° Long Radius Elbow



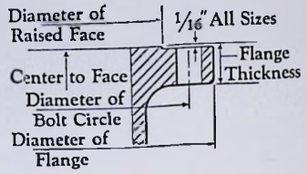
90° Base Elbow

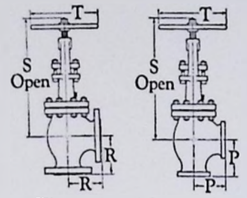


Tee

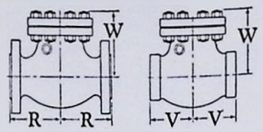


Cross

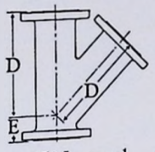




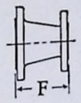
Flanged and Screwed Angle Valves



Flanged and Screwed Swing Check Valves



45° Lateral



Reducer

Size, Nominal Pipe	2	2½	3	3½	4	5	6	8	10	12	14 O.D.	16 O.D.	18 O.D.	20 O.D.	24 O.D.
Inside Diameter of Port	2	2½	3	3½	4	5	6	8	10	12	13¼	15¼	17¼	19¼	23¼
Diameter of Flanges	6	7	7½	8½	9	10	11	13½	16	19	21	23½	25	27½	32
Thickness of Flanges	5/8	11/16	3/4	13/16	15/16	15/16	1	1 1/8	1 3/16	1 1/4	1 3/8	1 7/16	1 9/16	1 11/16	1 7/8
Diameter of Bolt Circle	4¾	5½	6	7	7½	8½	9½	11¾	14¼	17	18¾	21¼	22¾	25	29½
Size of Bolts	5/8	5/8	5/8	5/8	5/8	3/4	3/4	3/4	7/8	7/8	1	1	1 1/8	1 1/8	1 1/4
Number of Bolts	4	4	4	8	8	8	8	8	12	12	12	16	16	20	20
A — Center to Face — 90° Elbows, Tees and Crosses	4½	5	5½	6	6½	7½	8	9	11	12	14	15	16½	18	22
B — Center to Face — 45° Elbows	2½	3	3	3½	4	4½	5	5½	6½	7½	7½	8	8½	9½	11
C — Center to Face — Long Radius Elbows	6½	7	7¾	8½	9	10¼	11½	14	16½	19	21½	24	26½	29	34
D — Long Center to Face — 45° Laterals	8	9½	10	11½	12	13½	14½	17½	20½	24½	27	30	32	35	40½
E — Short Center to Face — 45° Laterals	2½	2½	3	3	3	3½	3½	4½	5	5½	6	6½	7	8	9
F — Face to Face — Reducers	5	5½	6	6½	7	8	9	11	12	14	16	18	19	20	24
G — Center to Face — Base Flange	4⅛	4½	4⅞	5¼	5½	6¼	7	8⅜	9¾	11¼	12½	13¾	15	16	18½
H — Diameter — Base Flange	4⅝	4⅝	5	5	6	7	7	9	9	11	11	11	13½	13½	13½
J — Center to End — Screwed Gate Valves	2¾	2 15/16	3 1/16		3 7/16		4¼								
K — Center to Face — Flanged Gate Valves	3½	3¾	4	4¼	4½	5	5¼	5¾	6½	7	7½	8	8½	9	10
M — Center to Top — OS&Y Gate Valves	16	17¼	20¾	22	25½	30½	34	42	50¾	58½	70¼	80	89¼	97½	112¾
N — Diameter of Handwheel — Gate Valves	8	8	9	9	10	12	12	14	18	20	22	24	27	30	30
Number of Turns to Open — Gate Valves	15	18	18	20	18	23	26	35	43	51	52	60	67	75	89
P — Center to End — Screwed Globe and Angle Valves	3¼	3½	4	4½	5	5⅝	6½								
R — Center to Face — Flanged Globe, Angle and Check Valves	4	4¼	3¾	5¼	5¾	6½	7	9¾							
S — Center to Top — Open — Globe and Angle Valves	11½	12¼	13¾	14¼	16	18¾	20½	23							
T — Diameter of Handwheel — Globe and Angle Valves	8	8	9	9	10	10	12	16							
V — Center to End — Screwed Check Valves	3¼	3½	4	4½	5	5⅝	6¼								
W — Center to Top — Check Valves	3⅞	4⅛	4⅞	5½	6	6½	7	10							

Dimensions of Flanged Fittings, Flanges and Templates for Drilling conform to the American Standard for Steel Flanged Fittings and Companion Flanges (B16e-1932), for 150 pounds steam working pressure.

Reducing Fittings have the same center to face dimensions as the straight size corresponding to the size of the largest opening.

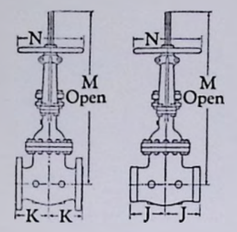
Where Facings other than the 1/16-inch Raised Face are used, the "Center to Flange Face" dimensions remain unchanged, and new "Center to Contact Surface" dimensions should be established to suit the facing used.

Special Angle Fittings 1° to 45° use center to face dimension of 45° Elbow, and over 45° and up to 90° use center to face dimension of 90° Elbow.

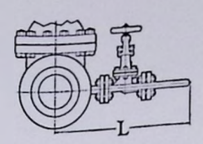
Templates for drilling . . . .page 372

300-Pound Cast Steel Valves and Flanged Fittings

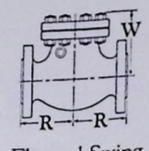
Dimensions, in Inches



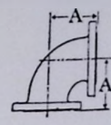
Flanged and Screwed Gate Valves



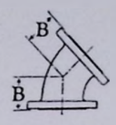
Gate Valve with By-Pass



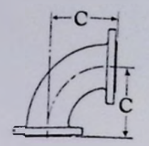
Flanged Swing Check Valve



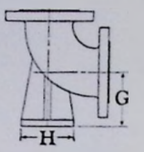
90° Elbow



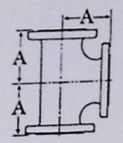
45° Elbow



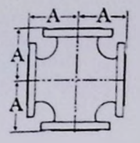
90° Long Radius Elbow



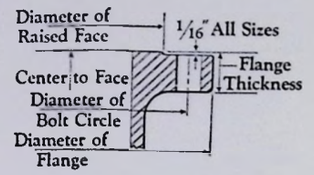
90° Base Elbow

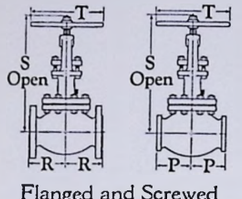


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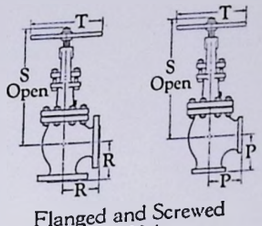


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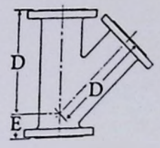




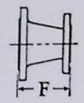
Flanged and Screwed Globe Valves



Flanged and Screwed Angle Valves



45° Lateral



Reducer

Size, Nominal Pipe	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14 O.D.	16 O.D.	18 O.D.	20 O.D.	24 O.D.
Inside Diameter of Port	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	13¼	15¼	17	19	23
Diameter of Flanges	4⅞	5¼	6⅛	6½	7½	8¼	9	10	11	12½	15	17½	20½	23	25½	28	30½	36
Thickness of Flanges	11/16	3/4	13/16	7/8	1	1 1/8	1 3/16	1 1/4	1 3/8	1 7/16	1 5/8	1 7/8	2	2 1/8	2 1/4	2 3/8	2 1/2	2 3/4
Diameter of Bolt Circle	3½	3⅞	4½	5	5⅞	6⅝	7¼	7⅞	9¼	10⅝	13	15¼	17¾	20¼	22½	24¾	27	32
Size of Bolts	5/8	5/8	3/4	5/8	3/4	3/4	3/4	3/4	3/4	3/4	7/8	1	1 1/8	1 1/8	1 1/4	1 1/4	1 1/4	1 1/2
Number of Bolts	4	4	4	8	8	8	8	8	8	12	12	16	16	20	20	24	24	24
A—Center to Face—90° Elbows, Tees and Crosses	4	4¼	4½	5	5½	6	6½	7	8	8½	10	11½	13	15	16½	18	19½	22½
B—Center to Face—45° Elbows	2	2½	2¾	3	3½	3½	4	4½	5	5½	6	7	8	8½	9½	10	10½	12
C—Center to Face—Long Radius Elbows	5	5½	6	6½	7	7¾	8½	9	10¼	11½	14	16½	19	20½	24	27½	31	34½
D—Long Center to Face—45° Laterals	6½	7¼	8½	9	10½	11	12½	13½	15	17½	20½	24	27½	31	34½	37½	40½	47½
E—Short Center to Face—45° Laterals	2	2¼	2½	2½	2½	3	3	3	3½	4	5	5½	6	6½	7½	8	8½	10
F—Face to Face—Reducers				5	5½	6	6½	7	8	9	11	12	14	16	18	19	20	24
G—Center to Face—Base Flange	3¾	4	4⅛	4½	4¾	5¼	5⅝	6	6¾	7½	9	10½	12	13½	14¾	16¼	17⅞	20¾
H—Diameter—Base Flange	4	4	4⅞	5¼	5¼	6⅛	6⅛	6½	7½	7½	10	10	12½	12½	12½	15	15	17½
J—Center to End—Screwed Gate Valves		2¾	3⅛	3½	4	4½		5½	6¾	7 15/16								
K—Center to Face—Flanged Gate Valves		3¼	3¾	4¼	4¾	5 9/16	5 15/16	6	7½	7 15/16	8¼	9	9⅞	15	16½	18	19½	22½
L—Center to End of By-Pass Gate Valves										22½	23¾	28	29½	33¼	35	38½	39½	47½
Size of By-Pass										¾	¾	1	1	1¼	1¼	1½	1½	2
M—Center to Top—Open—OS&Y Gate Valves		15	17½	18¼	21¼	25	26¼	30½	34½	38½	48	59	65¾	74¾	80¾	91	100¼	120½
N—Diameter of Handwheel—Gate Valves		7	8	8	9	10	10	12	14	16	20	24	24	27	27	30	36	36
Number of Turns to Open—Gate Valves		16	14	15	15	14	16	18	23	26	35	38	46	51	59	65	73	87
P—Center to End—Screwed Globe and Angle Valves				4¾	5⅜	5⅞	6⅛	6½										
R—Center to Face—Flanged Globe, Angle and Check Valves				5¼	5¾	6¼	6⅝	7	7⅞	8¾	11							
S—Center to Top—Open—Globe and Angle Valves				18	19	20	22½	24½	26	29	35							
T—Diameter of Handwheel—Globe and Angle Valves				10	10	10	12	14	16	18	24							
W—Center to Top—Check Valves				6½	7½	8¾	9¼	9½	10½	11¼	13¾							

Dimensions of Flanged Fittings, Flanges and Templates for Drilling conform to the American Standard for Steel Flanged Fittings and Companion Flanges (B16e-1932), for 300 pounds steam working pressure, except the 1, 1¼ and 1½ inch sizes, which are the same as the 250-Pound Cast Iron Standard.

Reducing Fittings have the same center to face dimensions as the straight size corresponding to the size of the largest opening.

Where Facings other than the 1/16 inch raised face are used, the "Center to Flange Face" dimensions remain unchanged, and new "Center to Contact Surface" dimensions should be established to suit facing used.

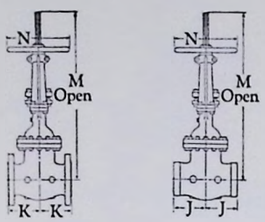
Special Angle Fittings 1° to 45° use center to face dimension of 45° Elbow, and over 45° and up to 90° use center to face dimension of 90° Elbow

Templates for drilling . . . .page 373

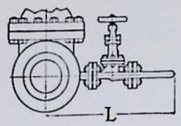
Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 176 of 402
Published by AsbestosClaims.Law
asbestosclaims.law/library/21275/176

400-Pound Cast Steel Valves and Flanged Fittings

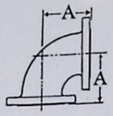
Dimensions, in Inches



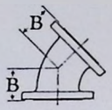
Flanged and Screwed Gate Valves



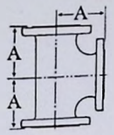
Gate Valve with By-Pass



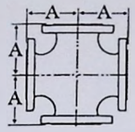
90° Elbow



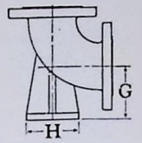
45° Elbow



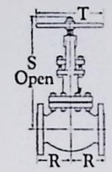
Tee



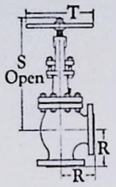
Cross



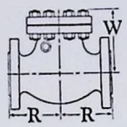
90° Base Elbow



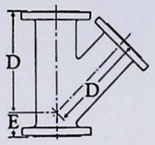
Flanged Globe Valve



Flanged Angle Valve



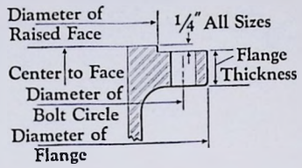
Flanged Swing Check Valve



45° Lateral



Reducer



Size, Nominal Pipe — For sizes 3½ inch and smaller use 600 pound material	4	5	6	8	10	12	14 O.D.	16 O.D.	18 O.D.	20 O.D.	24 O.D.
Inside Diameter of Port	4	5	6	8	10	12	13⅛	15	17	18⅞	22⅝
Diameter of Flanges	10	11	12½	15	17½	20½	23	25½	28	30½	36
Thickness of Flanges	1⅜	1½	1⅝	1⅞	2⅛	2¼	2⅜	2½	2⅝	2¾	3
Diameter of Bolt Circle	7⅞	9¼	10⅝	13	15¼	17¾	20¼	22½	24¾	27	32
Size of Bolts	⅞	⅞	⅞	1	1⅛	1¼	1¼	1⅜	1⅜	1½	1¾
Number of Bolts	8	8	12	12	16	16	20	20	24	24	24
A — Center to Face — 90° Elbows, Tees and Crosses	8	9	9¾	11¾	13¼	15	16¼	17¾	19¼	20¾	24¼
B — Center to Face — 45° Elbows	5½	6	6¼	6¾	7¾	8¾	9¼	10¼	10¾	11¼	12¾
D — Long Center to Face — 45° Laterals	16	16¾	18¾	22¼	25¾	29¾	32¾	36¼	39¼	42¾	50¼
E — Short Center to Face — 45° Laterals	4½	5	5¼	5¾	6¼	6½	7	8	8½	9	10½
F — Face to Face — Reducers	8¼	9¼	10	12	13½	15¼	16½	18½	19½	21	24½
G — Center to Face — Base Flange	6	6¾	7½	9	10½	12	13½	14¾	16¼	17⅞	20¾
H — Diameter — Base Flange	6½	7½	7½	10	10	12½	12½	12½	15	15	17½
J — Center to End — Screwed Gate Valves	6½		8½								
K — Center to Face — Flanged Gate Valves	8	9	9¾	11¾	13¼	15	16¼	17¾	19¼	20¾	24¼
L — Center to End of By-Pass-Gate Valves			24	25	29¼	31	33¼	35	38½	39¾	47¾
Size of By-Pass			¾	¾	1	1	1¼	1¼	1½	1½	2
M — Center to Top — Open — OS&Y Gate Valves	31½	35	40	50¼	59¾	67½	74¾	80¾	91	100¼	120½
N — Diameter of Handwheel — Gate Valves	12	14	16	20	24	24	27	27	30	36	36
Number of Turns to Open — Gate Valves	18	23	26	35	43	47	51	59	65	73	87
P — Center to End — Screwed Globe and Angle Valves	6½		8½								
R — Center to Face — Flanged Globe, Angle and Check Valves — Oil Valve	8	9	9¾	11¾							
R — Center to Face — Flanged Globe, Angle and Check Valves — Steam Valve	8	9	9¾	14							
S — Center to Top — Open — Globe and Angle Valves — Oil Valve	25	28½	31	40							
S — Center to Top — Open — Globe and Angle Valves — Steam Valve	25	28½	31	41½							
T — Diameter of Handwheel — Globe and Angle Valves	14	18	20	27							
W — Center to Top — Check Valves	10	10½	11	14½							

Dimensions of Flanged Fittings, Flanges and Templates for Drilling conform to the American Standard for Steel Flanged Fittings and Companion Flanges (B16e-1932), for 400 pounds steam working pressure.

Reducing Fittings have the same center to face dimensions as the straight size corresponding to the size of the largest opening.

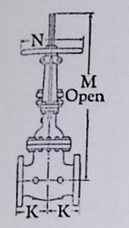
Where Facings other than the ¼-inch Raised Face are used, the "Center to Flange Edge" dimensions remain unchanged, and new "Center to Contact Surface" dimensions should be established to suit facing used.

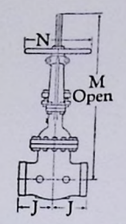
Special Angle Fittings 1° to 45° use center to face dimension of 45° Elbow, and over 45° and up to 90° use center to face dimension of 90° Elbow.

Templates for drilling . . . . page 374

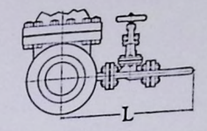
600-Pound Cast Steel Valves and Flanged Fittings

Dimensions, in Inches

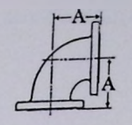




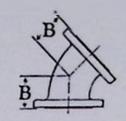
Flanged and Screwed Gate Valves



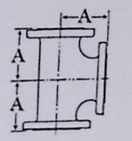
Gate Valve with By-Pass



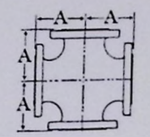
90° Elbow



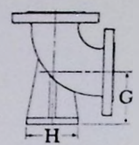
45° Elbow



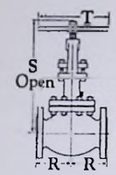
Tee



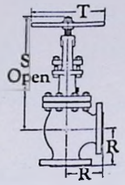
Cross



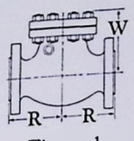
90° Base Elbow



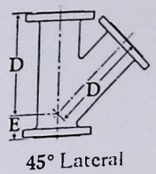
Flanged Globe Valve



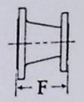
Flanged Angle Valve



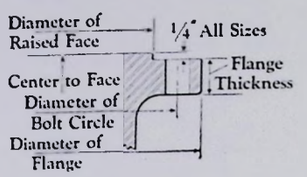
Flanged Swing Check Valve



45° Lateral



Reducer



Size, Nominal Pipe	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	7⅞	9¾	11¾	12⅞	14 O.D.	16 O.D.	18 O.D.	20 O.D.	24 O.D.
Inside Diameter of Port	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	7⅞	9¾	11¾	12⅞	14¾	16½	18¼	20	22
Diameter of Flanges	3¾	4⅝	4⅞	5¼	6⅛	6½	7½	8¼	9	10¾	13	14	16½	20	22	23¾	27	29¼	32	34¼	37
Thickness of Flanges	9/16	⅝	11/16	13/16	⅞	1	1⅛	1¼	1⅜	1½	1¾	1⅞	2 3/16	2½	2⅝	2¾	3	3¼	3½	3¾	4
Diameter of Bolt Circle	2⅝	3¼	3½	3⅞	4½	5	5⅞	6⅝	7¼	8½	10½	11½	13¾	17	19¼	20¾	23¾	25¾	28½	30¾	33
Size of Bolts	½	⅝	⅝	⅝	¾	⅝	¾	¾	⅞	⅞	1	1	1⅛	1¼	1¼	1⅜	1⅜	1½	1⅝	1⅝	1⅞
Number of Bolts	4	4	4	4	4	8	8	8	8	8	8	12	12	16	20	20	20	20	24	24	24
A—Center to Face—90° Elbows, Tees and Crosses	3¼	3¾	4¼	4½	4¾	5¾	6½	7	7½	8½	10	11	13	15½	16½	17½	19½	21½	23½	25½	27½
B—Center to Face—45° Elbows	2	2½	2½	2¾	3	4¼	4½	5	5½	6	7	7½	8½	9½	10	10¾	11¾	12¼	13	14	14¾
D—Long Center to Face—45° Laterals	5¾	6¾	7¼	8	9	10¼	11½	12¾	14	16½	19½	21	24½	29½	31½	34¼	38½	42	45½	49	53
E—Short Center to Face—45° Laterals	1¾	2	2¼	2½	2¾	3½	3½	4	4½	4½	6	6½	7	8	8½	9	10	10½	11	12	13
F—Face to Face—Reducers	5	5	5	5	5	6	6¾	7¼	7¾	8¾	10¼	11¼	13¼	15¾	16¾	17¾	19¾	21¾	23¾	25¾	27¾
G—Center to Face—Base Flange						4¾	5¼	5¾	6½	7	8¼	9	11	12½	13¼	14¾	16				
H—Diameter—Base Flange						6⅛	6⅛	6½	6½	7½	10	10	12½	12½	15	15	15				
J—Center to End—Screwed Gate Valves							4½	5½		6½		8½									
K—Center to Face—Flanged Gate Valves							6½	7		8½	10	11	13	15½	16½	17½	19½	21½	23½	25½	27½
L—Center to End of By-Pass—Gate Valves												24	25	29½	31¼	33½	35¼	38¾	40¼	43	48
Size of By-Pass												¾	¾	1	1	1¼	1¼	1½	1½	1½	2
M—Center to Top—Open—OS&Y Gate Valves							22¼	25¾		32¼	36¾	42¾	52¾	62½	70¼	77½	83¾	93¾	105¼	116¼	126¼
N—Diameter of Handwheel—Gate Valves							9	10		14	16	20	24	27	27	30	30	36	36	36	42
Number of Turns to Open—Gate Valves							15	14		18	23	26	31	38	48	51	59	65	72	75	
R—Center to Face—Flanged Globe, Angle and Check Valves					4¾	5¾	6½	7		8½	10	11	13								
S—Center to Top—Open—Globe and Angle Valves					17½	19	21	23¼		27¼	30½	32¼									
T—Diameter of Handwheel—Globe and Angle Valves					9	10	10	12		18	20	24									
W—Center to Top—Check Valves							8	8¾		10¼	11	12	15¼								

Dimensions of Flanged Fittings, Flanges and Templates for Drilling conform to the American Standard for Steel Flanged Fittings and Companion Flanges (B16e-1932), for 600 pounds steam working pressure.

Reducing Fittings have the same center to face dimensions as the straight size corresponding to the size of the largest opening.

Where Facings other than the ¼-inch Raised Face are used, the "Center to Flange Edge" dimensions remain unchanged, and new "Center to Contact Surface" dimensions should be established to suit facing used.

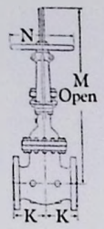
Special Angle Fittings 1° to 45° use center to face dimension of 45° Elbow, and over 45° and up to 90° use center to face dimension of 90° Elbow.

Templates for drilling . . . . page 375

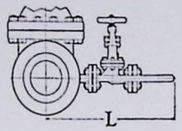
Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 177 of 402
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900-Pound Cast Steel Valves and Flanged Fittings

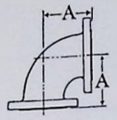
Dimensions, in Inches



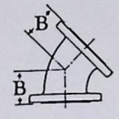
Flanged Gate Valve



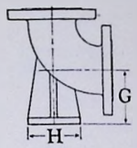
Gate Valve with By-Pass



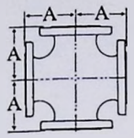
90° Elbow



45° Elbow

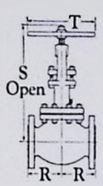


Tee

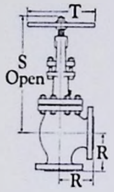


Cross

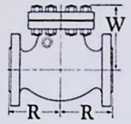
90° Base Elbow



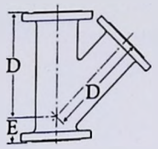
Flanged Globe Valve



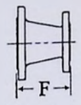
Flanged Angle Valve



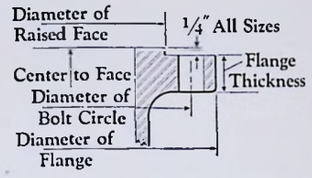
Flanged Swing Check Valve



45° Lateral



Reducer



Size, Nominal Pipe — For sizes 2½ inch and smaller use 1500 pound material	3	3½	4	5	6	8	10	12	14 O.D.	16 O.D.	18 O.D.	20 O.D.	24 O.D.
Inside Diameter of Port	2⅞	3⅜	3⅞	4¾	5¾	7½	9⅜	11⅛	12¼	14	15¾	17½	21
Diameter of Flanges	9½	10¾	11½	13¾	15	18½	21½	24	25¼	27¾	31	33¾	41
Thickness of Flanges	1½	1⅝	1¾	2	2 3/16	2½	2¾	3⅛	3⅜	3½	4	4¼	5½
Diameter of Bolt Circle	7½	8½	9¼	11	12½	15½	18½	21	22	24¼	27	29½	35½
Size of Bolts	⅞	1	1⅛	1¼	1⅛	1⅜	1⅜	1⅜	1½	1⅝	1⅞	2	2½
Number of Bolts	8	8	8	8	12	12	16	20	20	20	20	20	20
A — Center to Face — 90° Elbows, Tees and Crosses	7½	8½	9	11	12	14½	16½	19	20¼	22¼	24	26	30½
B — Center to Face — 45° Elbows	5½	6	6½	7½	8	9	10	11	11½	12½	13¼	14½	18
D — Long Center to Face — 45° Laterals	14½	16½	17½	21	22½	27½	31½	34½	36½	40¾	45½	50¼	60
E — Short Center to Face — 45° Laterals	4½	4½	5½	6½	6½	7½	8½	9	9½	10½	12	13	15½
F — Face to Face — Reducers	7¾	8¾	9¼	11¼	12¼	14¾	16¾	17¾	19	21	24½	26½	30½
G — Center to Face — Base Flange	5¾		7	8¼	9	11	12½	13¼	14¾	16			
H — Diameter — Base Flange	6½		7½	10	10	12½	12½	15	15	15			
K — Center to Face — Flanged Gate Valves	7½		9	11	12	14½	16½	19	20¼	22¼	24		
L — Center to End of By Pass — Gate Valves			25½	26½	27	29¼	33¾	35½	38½	40	43½		
Size of By Pass			¾	¾	¾	¾	1	1	1¼	1¼	1½		
M — Center to Top — Open — OS&Y Gate Valves	28½		32	36¾	42¾	52½	62½	72½	77¾	85¾	97¾		
N — Diameter of Handwheel — Gate Valves	12		14	16	20	24	27	30	30	36	36		
Number of Turns to Open — Gate Valves	14		19	23	26	32	38	46	51	59	65		
R — Center to Face — Flanged Globe, Angle and Check Valves	7½		9	11									
S — Center to Top — Open — Globe and Angle Valves	24		29½	34¼									
T — Diameter of Handwheel — Globe and Angle Valves	12		20	24									
W — Center to Top — Check Valves	9½		11	13									

Dimensions of Flanged Fittings, Flanges and Templates for Drilling conform to the American Standard for Steel Flanged Fittings and Companion Flanges (B16e-1932), for 900 pounds steam working pressure, except the 3½-inch size which is not included in the standard.

Reducing Fittings have the same center to face dimensions as the straight size corresponding to the size of the largest opening.

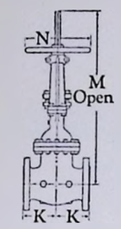
Where Facings other than the ¼-inch Raised Face are used, the "Center to Flange Edge" dimensions remain unchanged, and new "Center to Contact Surface" dimensions should be established to suit Facing used.

Special Angle Fittings 1° to 45° use center to face dimension of 45° Elbow, and over 45° and up to 90° use center to face dimension of 90° Elbow.

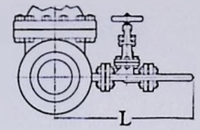
Templates for drilling . . . . page 376

1500-Pound Cast Steel Valves and Flanged Fittings

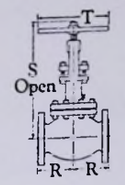
Dimensions, in Inches



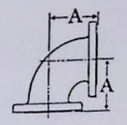
Flanged Gate Valve



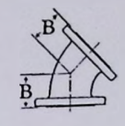
Gate Valve with By-Pass



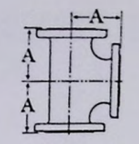
Flanged Globe Valve



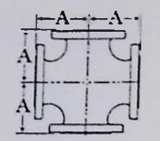
90° Elbow



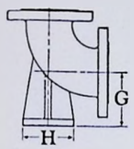
45° Elbow



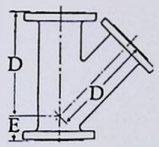
Tee



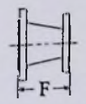
Cross



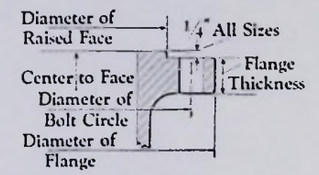
90° Base Elbow



45° Lateral



Reducer



Size, Nominal Pipe	1	1¼	1½	2	2½	3	4	5	6	8	10	12	14 O.D.	16 O.D.	18 O.D.	20 O.D.	24 O.D.
Inside Diameter of Port	⅞	1⅛	1⅜	1⅞	2¼	2¾	3⅝	4⅜	5⅜	7	8¾	10 3/8	11⅜	13	14⅝	16⅜	19⅝
Diameter of Flanges	5⅞	6¼	7	8½	9⅝	10½	12¼	14¾	15½	19	23	26½	29½	32½	36	38¾	46
Thickness of Flanges	1⅛	1⅛	1¼	1½	1⅝	1⅞	2⅛	2⅞	3¼	3⅝	4¼	4⅞	5¼	5¾	6⅜	7	8
Diameter of Bolt Circle	4	4⅜	4⅞	6½	7½	8	9½	11½	12½	15½	19	22½	25	27¾	30½	32¾	39
Size of Bolts	⅞	⅞	1	⅞	1	1⅛	1¼	1½	1⅜	1⅝	1⅞	2	2¼	2½	2¾	3	3½
Number of Bolts	4	4	4	8	8	8	8	8	12	12	12	16	16	16	16	16	16
A—Center to Face—90° Elbows, Tees and Crosses	5	5½	6	7¼	8¼	9¼	10¾	13¼	13⅞	16⅜	19½	22¼	24¾	27¼	30¼	32¾	38¼
B—Center to Face—45° Elbows	3½	4	4¼	4¾	5¼	5¾	7¼	8¾	9⅜	10⅞	12	13¼	14¼	16¼	17¾	18¾	20¾
D—Long Center to Face—45° Laterals	9	10	11	13¼	15¼	17¼	19¼	23¼	24⅞	29⅞	36	40¾	44	48¼	53¼	57¾	67¼
E—Short Center to Face—45° Laterals	2½	3	3½	4	4½	5	6	7½	8⅛	9⅛	10¼	12	12½	14¾	16½	17¾	20½
F—Face to Face—Reducers	5	5¾	6¼	7¼	8¼	9¼	10¾	13¼	13⅞	16⅜	19½	22¼					
K—Center to Face—Flanged Gate Valves	5	5½	6	7¼	8¼	9¼	10¾	13¼	13⅞	16⅜	19½	22¼					
L—Center to End of By-Pass—Gate Valves							25¼	26¾	27¾	30½	35	37					
Size of By-Pass							¾	¾	¾	¾	1	1					
M—Center to Top—Open—OS&Y Gate Valves	16	16½	20	23¼	27½	29	34	39	47¼	55	65	79					
N—Diameter of Handwheel—Gate Valves	8	8	9	10	12	14	16	20	24	27	36	36					
Number of Turns to Open—Gate Valves	9	11	10	10	12	14	19	23	26	33	38	45					
R—Center to Face—Flanged Globe Valves	5	5½	6	7¼	8¼	9¼	10¾										
S—Center to Top—Open—Globe and Angle Valves	18½	20½	23¼	25	28½	33¾	37½										
T—Diameter of Handwheel—Globe and Angle Valves	10	10	12	14	18	24	27										

Dimensions of Flanged Fittings, Flanges and Templates for Drilling, sizes 12-inch and smaller, conform to the American Standard for Steel Flanged Fittings and Companion Flanges (B16e-1932), for 1500 pounds steam working pressure. Dimensions for sizes 14-inch and larger are tentative.

Reducing Fittings have the same center to face dimensions as the straight size corresponding to the size of the largest opening.

Where Facings other than the ¼-inch Raised Face are used, the "Center to Flange Edge" dimensions remain unchanged, and new "Center to Contact Surface" dimensions should be established to suit facing used.

Special Angle Fittings 1° to 45° use center to face dimension of 45° Elbow, and over 45° and up to 90° use center to face of 90° Elbow.

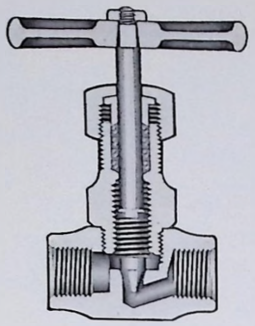
Templates for drilling . . . . page 377

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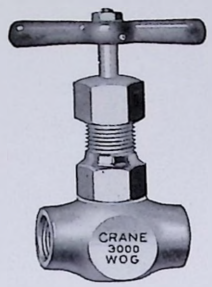
3000-Pound W.O.G.
Steel or Exelloy Globe and Angle Valves
Plug Type Disc

WORKING PRESSURE
3000 pounds cold water, oil, or gas, non-shock

Air Tested



Cross Section
Globe
No. 222 H, Steel
No. 222 X, Exelloy



Globe, Screwed
No. 222 H, Steel
No. 222 X, Exelloy



Angle, Screwed
No. 223 H, Steel
No. 223 X, Exelloy

List Prices

Size		Inches	¼	⅜	½	¾
Steel Valves	No. 222 H, Globe	Each	1.85	2.10	3.00	7.25
	No. 223 H, Angle	Each	2.00	2.25	3.15	7.50
Exelloy Valves	No. 222 X, Globe	Each	2.80	3.10	5.15	12.75
	No. 223 X, Angle	Each	3.00	3.30	5.35	13.10

Service recommendations: These are small, rugged, neat appearing valves that find application in almost every industry. They are ideal for connections on orifice meters, regulator leads, by-passes, gauges, for use as expansion valves on ammonia lines, and for many similar services where accurate regulation of flow is desired or where parts of measuring instruments must be protected against the sudden release of high pressures.

The Exelloy Valves are particularly suitable for handling oil or gas containing sulphur compounds, or for installations where steel valves do not have sufficient resistance to atmospheric corrosion.

Construction: The body and bonnet are made from solid bar stock. The thread chambers are extra long, assuring liberal thread engagement.

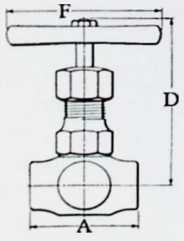
The plug type disc and seat are exceptionally resistant to wear and to foreign matter, and permit accurate flow regulation. The disc and stem are made in one piece.

The stuffing box is deep, is equipped with a gland, and is filled with high grade packing.

The valves, when wide open, can be repacked while under pressure.

Materials: The Steel Valves have a steel body, bonnet, packing nut, and gland, an Exelloy stem, and a malleable iron tee handle.

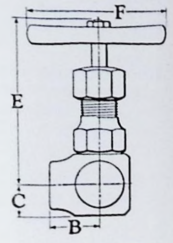
The Exelloy Valves have an Exelloy body, bonnet, stem, packing nut, and gland, and a malleable iron tee handle. Exelloy is a specially heat-treated chromium iron having a chromium content of about 12 per cent, and a carbon content of about 0.10 per cent.



Dimensions, in Inches

Size	¼	⅜	½	¾
A	1 15/16	2 3/16	2½	3¼
B	1	1 3/32	1¼	1 5/8
C	9/16	11/16	13/16	1
D—Open	3⅜	3⅞	4 13/16	6 5/8
E—Open	3 7/16	3 15/16	4⅞	6 5/8
F	2 9/16	2 9/16	3 9/16	4 3/4
Diameter of seat opening	3/16	¼	5/16	7/16

Brass Needle Point Globe and Angle Valves . . . page 15



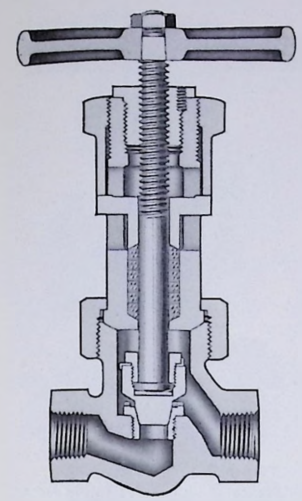
Forged Steel Globe and Angle Valves
Union Bonnet—Outside Screw and Yoke

WORKING PRESSURES

No. 216 P and No. 217 P, Steam Valves
600 pounds steam, **750°** F.
3000 pounds cold water or *gas, non-shock

No. 218 P and No. 219 P, Oil Valves
600 pounds oil, **900°** F.
3000 pounds cold oil, non-shock

Ratings at other temperatures furnished on request



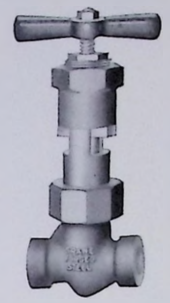
**Cross Section
No. 216 P, for Steam
No. 218 P, for Oil

TEST PRESSURES
Shell and seat test
3500 pounds hydrostatic

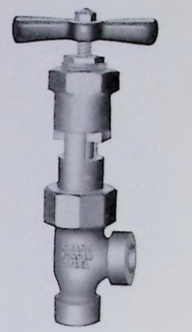
Seat — air tested

1¼-inch and smaller are forged steel

1½ and 2-inch are cast steel



**Globe, Screwed
No. 216 P, for Steam
No. 218 P, for Oil



**Angle, Screwed
No. 217 P, for Steam
No. 219 P, for Oil

**Sizes 1¼-inch and smaller have a union bonnet and a tee handle, as illustrated. 1½ and 2-inch valves have a bolted bonnet and gland, and are equipped with a wheel (not illustrated).

List Prices and Dimensions

Size		Inches	¼	⅜	½	¾	1	1¼	1½	2
No. 216 P, No. 217 P, No. 218 P, or No. 219 P		Each	9.75	9.75	11.80	14.00	17.25	27.50	33.25	50.50
End to end, Globe		Inches	3	3	3½	4½	5¼	6	6½	8
Center to end, Angle		Inches	1½	1½	1¾	2¼	2⅝	3	3¼	4
Center to top of stem, open	Globe	Inches	6¼	6¼	7⅝	9⅜	10⅞	11½	12½	14 5/8
	Angle	Inches	6¼	6¼	7¾	9⅛	10¾	11	12¼	14⅜
End to end of tee handle, or wheel diameter		Inches	4⅛	4⅛	4¾	5⅜	7	7	8	10

For wrenches for removing seat rings, see page 169.

Service recommendations: These valves are strong, compact, and rugged. Being equipped with a plug type disc and seat, they are ideal for severe service, such as for throttling, for soot blower, blow-off, boiler feed, drip, and drain lines.

The No. 216 P and No. 217 P Valves are recommended for steam, hot or cold water, *air, *gas, or non-corrosive cold oil lines. The No. 218 P and No. 219 P Valves are recommended for oil refinery service on both hot and cold oil lines.

Body and bonnet: Sizes 1¼-inch and smaller have a union yoke-type bonnet and a tee handle; the body and bonnet are forged No. 4 Carbon-Molybdenum Steel. Sizes 1½ and 2-inch have a bolted bonnet, fastened to the body with Triplex Steel studs, and a bolted gland; they are equipped with a wheel. The body and bonnet on the 1½ and 2-inch sizes are cast No. 4 Carbon-Molybdenum Steel.

Crane No. 4 Steel has been specially developed for service on high pressure-temperature lines.

Plug type disc and seat: The plug type disc and seat offers unusual resistance to wear and to the cutting action of foreign matter. In addition, the long tapered seating surfaces permit accurate regulation of flow.

The Steam Valves have a Crane Nickel Alloy disc and an Exelloy body seat ring. The Oil Valves have an Exelloy disc and body seat ring.

Stem: The stem in all of these valves is made of Exelloy. The stem threads are on the outside where they are not affected by the fluid in the line and where they can be easily lubricated when necessary.

Stuffing box: The stuffing box is exceptionally large and deep; it is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

**Air or gas service . . . page 301*

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Forged Steel Globe and Angle Valves

Bolted Bonnet—Outside Screw and Yoke

WORKING PRESSURES, in Pounds

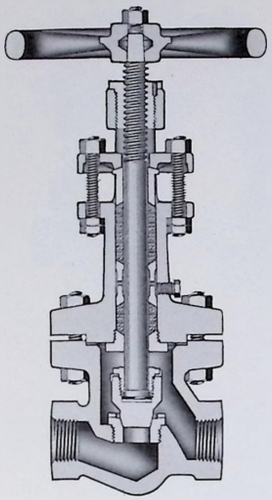
	Steam Valves	
	Steam 750° F.	Cold water or *gas, non-shock
Screwed	1250	3000
Flanged	720	1200
	Oil Valves	
	Oil 900° F.	Cold oil non-shock
Screwed	800	3000
Flanged	600	1200

Ratings at other temperatures furnished on request

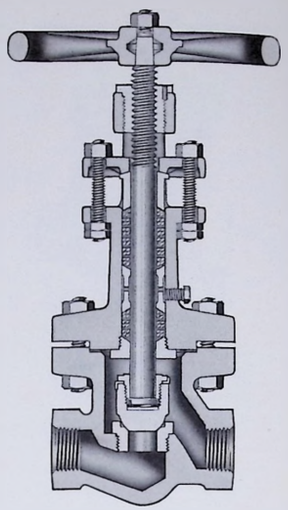
TEST PRESSURES

Screwed Valves
Shell —3500 pounds hydrostatic
Seat —3500 pounds hydrostatic
Seat —air tested

Flanged Valves
Shell —1500 pounds hydrostatic
Seat —1350 pounds hydrostatic
Seat —air tested



Cross Section
No. 176 P, for Steam



Cross Section
No. 376 X, for Oil

Steam Valves: The valves for steam are recommended for severe service on steam, hot or cold water, *air, *gas, or non-corrosive cold oil lines. They have a plug type disc and seat, which offers excellent resistance to wear and to foreign matter. The disc taper assists in maintaining tightness and permits accurate regulation of flow when throttling.

The disc is made of Crane Nickel Alloy, and the body seat ring, of Exelloy. These metals are ideal for steam and general service, being hard, tough, strong, and durable.

Oil Valves: The valves for oil are recommended for severe oil refinery service on both hot and cold oil lines. They are made with a ball shaped face on the disc and a flat, angular shaped face on the body seat ring. This construction produces a line bearing seating contact, avoiding any danger of jamming caused by the coking action of hot oil.

Both the disc and the body seat ring are made of Exelloy. Exelloy to Exelloy seating surfaces have been used in valves on oil refinery service for many years with unusual success.

Body and bonnet: The body and bonnet are forged from No. 4 Carbon-Molybdenum Steel, and are exceptionally massive and rugged. Crane No. 4 Steel has a higher yield point than ordinary carbon steel, making it especially suitable for service on elevated pressures and temperatures.

Triplex Steel bolt-studs, threaded full length, and fitted with medium carbon oil-quenched steel nuts, are used in the bonnet joint.

Stem: The stem in all of these valves is made of Exelloy. The stem threads are on the outside where they are not affected by the fluid in the line and where they can be easily lubricated when necessary.

Stuffing box: The stuffing box is of the lantern type and is extra deep. Packing is used both above and below the lantern, assuring tightness. The lantern provides space for a cooling chamber, and the cooling chamber is tapped and fitted with a steel plug.

Repacking: These valves, when wide open, can be repacked while under pressure.

Flange dimensions and facing: The dimensions and drilling of end flanges conform to the 600-Pound American Steel Flange Standard (B16e-1932). Flanges have a male face ¼-inch high (large male), finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

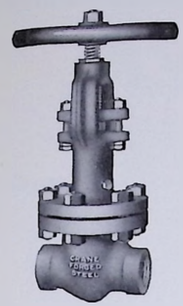
Valves with female, tongue, or groove faces are made to order at an extra price.

*Air or gas service . . . . page 301

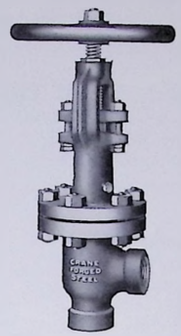
Forged Steel Globe and Angle Valves

Bolted Bonnet—Outside Screw and Yoke

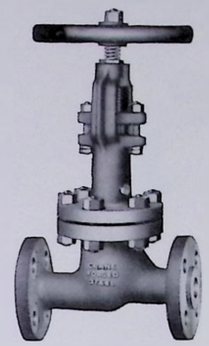
For working pressures, see the preceding page.



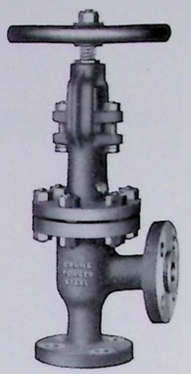
Globe, Screwed
No. 176 P, for Steam
No. 376 X, for Oil



Angle, Screwed
No. 177 P, for Steam
No. 377 X, for Oil



Globe, Flanged
No. 196 P, for Steam
No. 396 X, for Oil



Angle, Flanged
No. 197 P, for Steam
No. 397 X, for Oil

List prices of flanged valves include drilling to the 600-Pound American Steel Flange Standard, and spot facing. No deduction is made when valves are ordered "faced only".

List Prices

Size		Inches	½	¾	1	1¼	1½	2
Screwed	No. 176 P or No. 177 P	Each	40.00	51.00	64.00	70.00	90.00	125.00
	No. 376 X or No. 377 X	Each	40.00	51.00	64.00	70.00	90.00	125.00
Flanged	No. 196 P or No. 197 P, F., D., & S. F.	Each	66.00	66.00	84.00	95.00	123.00	163.00
	No. 396 X or No. 397 X, F., D., & S. F.	Each	66.00	66.00	84.00	95.00	123.00	163.00

For wrenches for removing seat rings, see page 169.

Dimensions, in Inches

Size		½	¾	1	1¼	1½	2
End to end, Globe, Screwed		3½	4½	5¼	6	7	8½
Center to end, Angle, Screwed		1¾	2¼	2⅝	3	3½	4¼
*Face to face, Globe, Flanged		7⅜	7½	8½	9	9½	11½
*Center to face, Angle, Flanged		3 11/16	3¾	4¼	4½	4¾	5¾
Center to top of stem, open	Globe, Screwed	9	11¼	13	13½	17¼	18½
	Angle, Screwed	8⅞	10⅞	12¾	13¼	17¼	17
	Globe, Flanged	11¾	11¾	13⅝	14⅝	18⅜	20⅛
	Angle, Flanged	11½	11½	12⅞	13¾	18¾	19
Diameter of wheel	Screwed Valves	4½	5½	8	8	9	10
	Flanged Valves	5½	5½	8	8	9	10
Flange dimensions	Diameter of flange	3¾	4⅝	4⅞	5¼	6⅛	6½
	*Thickness of flange	9/16	5/8	11/16	13/16	7/8	1
	Diameter of male face	1⅜	1 11/16	2	2½	2⅞	3⅝
	Diameter of bolt circle	2⅝	3¼	3½	3⅞	4½	5
	Number of bolts	4	4	4	4	4	8
	Diameter of bolts	½	5/8	5/8	5/8	¾	5/8

*Face to face and center to face dimensions include the ¼-inch male face; thickness of flange dimensions do not.

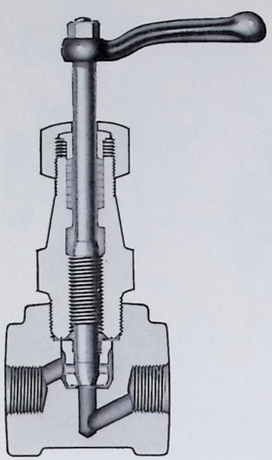
Templates for drilling . . . . page 375

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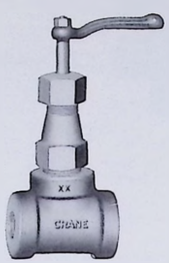
6000-Pound Hydraulic
Forged Steel Globe and Angle Valves
Plug Type Disc

WORKING PRESSURE
6000 pounds cold water or oil, non-shock

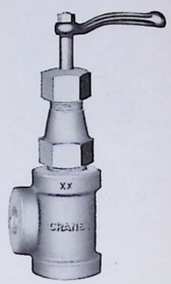
TEST PRESSURE
6500 pounds hydrostatic



Cross Section
No. 225 H, Globe



No. 225 H, Globe
Screwed



No. 226 H, Angle
Screwed

List Prices and Dimensions

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2
No. 225 H, Globe or No. 226 H, Angle	Each	21.00	21.00	23.00	27.00	33.00	45.00	130.00	175.00
End to end, Globe	Inches	2⅞	2⅞	3¼	4¼	5	6½	7½	9
Center to end, Angle	Inches	1 7/16	1 7/16	1⅝	2⅛	2½	3¼	3¾	4½
Center to top, open, Globe or Angle	Inches	6⅝	6⅝	7½	9⅞	11	13	14¼	16
Center to end of handle, or wheel diameter	Inches	3⅛	3⅛	3½	4⅝	5	5¾	12	14

Service recommendations: These valves have very heavy metal sections and are exceptionally rugged. They are recommended for severe and extremely high pressure service on hydraulic lines not subject to shock.

Plug type disc and seat: The plug type disc and seat are unusually resistant to wiredrawing and to foreign matter. The wide tapered seating surface permits easy flow regulation when throttling.

The seat bushing is made of Exelloy and can be easily renewed. The disc is made of brass.

Body and bonnet: The body is made from a solid steel forging. On sizes 1-inch and smaller, the bonnet is screwed into the body as illustrated in the cross section. On larger sizes the bonnet and body are bolted together (not illustrated).

Disc-stem connection: The disc and stem are made in one piece for sizes 1-inch and smaller, as shown in the cross section, and in two pieces with a swivel type connection, for sizes 1¼-inch and larger (not illustrated).

The stem in all sizes is made of brass.

Handle or wheel: Sizes 1¼-inch and smaller have a lever handle; larger sizes have a wheel.

Stuffing box: These valves have a deep stuffing box, filled with high grade packing. It is equipped with a gland.

Repacking: The valves, when wide open, can be repacked while under pressure.

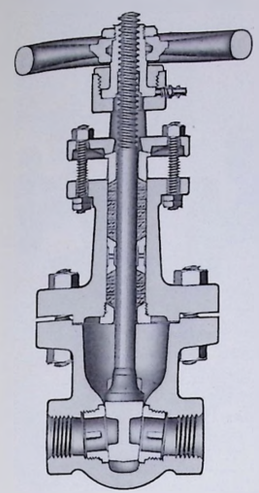
Seat opening: The diameter of the port opening in these valves is slightly smaller than the inside diameter of Double Extra Strong Pipe.

Forged Steel Gate Valves
Wedge Disc—Outside Screw and Yoke

WORKING PRESSURES, in Pounds

	Steam Valves		Oil Valves	
	Steam 750° F.	Cold water or *gas, non-shock	Oil 900° F.	Cold oil non-shock
Screwed	1250	3000	800	3000
Flanged	720	1200	600	1200

Ratings at other temperatures furnished on request



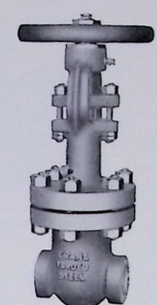
Cross Section
No. 80 XR, for Steam
No. 80 X, for Oil

TEST PRESSURES

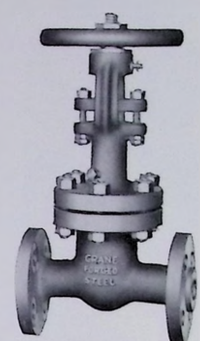
Screwed Valves
Shell — 3500 pounds hydrostatic
Seat — 3500 pounds hydrostatic
Seat — air tested

Flanged Valves
Shell — 1500 pounds hydrostatic
Seat — 1350 pounds hydrostatic
Seat — air tested

Sizes 1¼-inch and smaller have the yoke and bonnet forged integral, as illustrated. 1½ and 2-inch sizes have the yoke and bonnet forged separately (not illustrated).



Screwed
No. 80 XR, for Steam
No. 80 X, for Oil



Flanged
No. 79 XR, for Steam
No. 79 X, for Oil

List Prices

Size	Inches	½	¾	1	1¼	1½	2
No. 80 XR or X, Screwed	Each	65.00	65.00	80.00	105.00	115.00	152.00
No. 79 XR or X, Flanged, F., D., & S. F.	Each		80.00	100.00	130.00	148.00	190.00

Steam Valves: The valves for steam are recommended for steam, hot or cold water, *air, or *gas, and for non-corrosive cold oil.

The disc is made of Exelloy, and the body seat rings, of Crane Nickel Alloy. These metals are an ideal combination for steam and general service.

Oil Valves: The valves for oil are recommended for oil refinery service, on both hot and cold oil lines.

The disc and body seat rings are made of Exelloy, a combination that has been used on oil service for many years with unusual success.

Body and bonnet: The body and bonnet are forged from No. 4 Carbon-Molybdenum Steel, and are exceptionally rugged. Crane No. 4 Steel was specially developed for elevated pressures and temperatures. Triplex Steel bolt-studs are used in the bonnet joint.

Stem: The stem in all of these valves is made of Exelloy. The valves have the outside screw and yoke construction, with stem threads on the outside where they are not affected by the fluid in the line.

Stuffing box: These valves have an extra deep and an unusually tight lantern-type stuffing box with cooling chamber. The cooling chamber is tapped and fitted with a steel plug.

The valves, when wide open, can be repacked while under pressure.

Flange dimensions and facing: The dimensions and drilling of end flanges conform to the 600-Pound American Steel Flange Standard (B16e-1932). Flanges have a male face ¼-inch high (large male), finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

Valves with female, tongue, or groove faces are made to order at an extra price.

Drilling: List prices of flanged valves include drilling to the 600-Pound American Steel Flange Standard, and spot facing. No deduction is made when valves are ordered "faced only".

Dimensions, in Inches

Size		½	¾	1	1¼	1½	2
End to end, Screwed		3¾	3¾	4½	5½	6	7½
**Face to face, Flanged			7½	8½	9	9½	11½
Center to top of stem, open	Screwed	12	12	13⅝	14 3/16	17	20
	Flanged		12 5/16	14	14 9/16	17	20
Diameter of wheel		6	6	7	7	8	9
Flange dimensions	Flange diameter		4⅝	4⅞	5¼	6⅛	6½
	**Flange thickness		⅝	11/16	13/16	⅞	1
	Male face diameter		1 11/16	2	2½	2 7/8	3⅝
	Bolt circle		3¼	3½	3⅞	4½	5
	Number of bolts		4	4	4	4	8
	Diameter of bolts		⅝	⅝	⅝	¾	⅝

**Face to face dimensions include the ¼-inch male face, flange thickness dimensions do not.

*Air or gas service . . . . page 301

Templates for drilling . . . page 375

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 181 of 402
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Forged Steel Check Valves

Bolted Cap

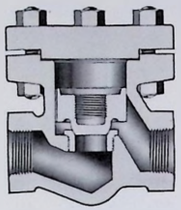
WORKING PRESSURES, in Pounds

	Steam 750° F.	Oil 900° F.	Cold water, oil, or *gas, non-shock
Screwed	1250	800	3000
Flanged	720	600	1200

Ratings at other temperatures furnished on request

TEST PRESSURES

Screwed Valves — Shell, **3500** pounds hydrostatic
— Seat, **3500** pounds hydrostatic
Flanged Valves — Shell, **1500** pounds hydrostatic
— Seat, **1350** pounds hydrostatic
Seat, Screwed and Flanged Valves, air tested



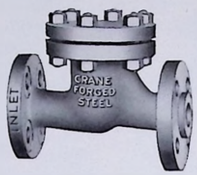
Cross Section
No. 178 X, Screwed



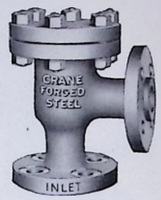
No. 178 X
Horizontal
Screwed



No. 178½ X
Angle
Screwed



No. 198 X
Horizontal
Flanged



No. 198½ X
Angle
Flanged

List Prices

Size	Inches	½	¾	1	1¼	1½	2
No. 178 X or No. 178½ X, Screwed	Each	28.00	37.00	48.00	54.00	73.00	107.00
No. 198 X or No. 198½ X, Flanged, F., D., & S. F.	Each	52.00	52.00	68.00	79.00	106.00	145.00

For wrenches for removing seat rings, see page 169.

Service recommendations: These check valves are recommended for severe service on steam, hot or cold water, hot or cold oil, *air, or *gas lines.

Body and cap: The body and cap are exceptionally massive and rugged. They are forged from No. 4 Carbon-Molybdenum Steel, a metal especially developed for service on elevated pressures and temperatures.

The cap is held to the body by Triplex Steel bolt-studs.

Disc and seat: The disc has a ball shaped face which seats against a flat, angular shaped face on the body seat ring. This construction produces a line bearing seating contact that is ideal for check valve service.

The top of the disc is a piston, fitting in the upper part of the body. It forms a dash pot, effectively cushioning the disc in service.

Both the disc and the body seat ring are made of Exelloy, a heat-treated chromium iron having unusual resistance to wear.

Flange dimensions and facing: The dimensions and drilling of end flanges conform to the 600-Pound American Steel Flange Standard (B16e-1932). Flanges have a male face ¼-inch high (large male), finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

Valves with female, tongue, or groove faces are made to order at an extra price.

Drilling: List prices of flanged valves include drilling to the 600-Pound American Steel Flange Standard, and spot facing. No deduction is made when valves are ordered "faced only".

Dimensions, in Inches

Size		½	¾	1	1¼	1½	2
End to end, Horizontal, Screwed		3½	4½	5¼	6	7	8½
Center to end, Angle, Screwed		1¾	2¼	2⅝	3	3½	4¼
**Face to face, Horizontal, Flanged		7⅜	7½	8½	9	9½	11½
**Center to face, Angle, Flanged		3 11/16	3¾	4¼	4½	4¾	5¾
Center to top	Horizontal, Screwed	3⅛	3 11/16	4 3/16	4½	5¼	6½
	Angle, Screwed	3	3 5/16	3 15/16	4¼	4 15/16	5⅞
	Horizontal, Flanged	4	4	4¾	5¼	5⅞	7⅜
	Angle, Flanged	3½	3½	4 3/16	4⅜	5¾	6¼
Flange dimensions	Diameter of flange	3¾	4⅝	4⅞	5¼	6⅛	6½
	**Thickness of flange	9/16	⅝	11/16	13/16	⅞	1
	Diameter of male face	1⅜	1 11/16	2	2½	2⅞	3⅝
	Diameter of bolt circle	2⅝	3¼	3½	3⅞	4½	5
	Number of bolts	4	4	4	4	4	8
	Diameter of bolts	½	⅝	⅝	⅝	¾	⅝

**Face to face and center to face dimensions include the ¼-inch male face; thickness of flange dimensions do not.

*Air or gas service . . . page 301 Templates for drilling . . . page 375

Forged Steel Check Valves

Union Cap

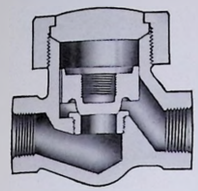
WORKING PRESSURES

600 pounds steam, **750°** F. — **600** pounds oil, **900°** F.
3000 pounds cold water, oil, or *gas, non-shock
Ratings at other temperatures furnished on request

TEST PRESSURES

Shell and seat test — **3500** pounds hydrostatic
Seat — air tested

1/4 to 1 1/4-inch are forged steel and have a union cap as illustrated. 1 1/2 and 2-inch are cast steel and have a bolted cap (not illustrated).



Cross Section
**No. 208 X



**No. 208 X
Horizontal
Screwed

List Prices and Dimensions

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2
No. 208 X, Horizontal	Each	16.50	16.50	19.50	26.50	37.00	43.00	58.00	83.00
End to end	Inches	3	3	3½	4½	5¼	6	6½	8
Center to top	Inches	1 13/16	1 13/16	2⅝16	3	3½	4	On application	

For wrenches for removing seat rings, see page 169.

Service recommendations: These are compact and rugged check valves, recommended for severe service on small, high-pressure steam or hot oil lines, and on high-pressure cold water, oil, *air, or *gas lines.

Body and cap: Sizes 1¼-inch and smaller have the union cap construction, with a forged No. 4 Carbon-Molybdenum Steel body and cap. Larger sizes have a bolted cap, fastened to the body with Triplex Steel studs; the body and cap are cast No. 4 Carbon-Molybdenum Steel.

Crane No. 4 Steel has been specially developed for service on high pressure-temperature lines.

Disc and seat: The disc and body seat ring are made of Exelloy, a heat-treated chromium iron having unusual resistance to wear.

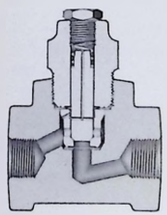
The disc has a ball shaped face which seats against a flat, angular shaped face on the body seat ring. This construction produces a line bearing seating contact that is ideal for check valve service.

In sizes 1¼-inch and smaller the disc has a piston type guide, operating in the valve body. The larger sizes have the disc guided in the cap.

*Air or gas service . . . page 301

6000-Pound Hydraulic

Forged Steel Check Valves

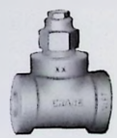


Cross Section
No. 227 H

WORKING PRESSURE

6000 pounds cold water or oil, non-shock

TEST PRESSURE — **6500** pounds hydrostatic



No. 227 H
Horizontal
Screwed

List Prices and Dimensions

Size	Inches	⅜	½	¾	1	1¼
No. 227 H, Horizontal	Each	21.00	23.00	27.00	33.00	45.00
End to end	Inches	2⅝	2⅞	3⅞	4½	5⅜
Center to top	Inches	2¼	2 9/16	3⅜	4⅛	4⅛

Service recommendations: These valves are recommended for severe and extremely high pressure service on hydraulic lines not subject to shock. They have very heavy metal sections and are exceptionally rugged.

Body and cap: The body is made of a solid steel forging. Sizes 1-inch and smaller have a screwed cap as illustrated. The 1¼-inch size has a bolted cap (not illustrated).

Disc and seat: The disc is made of brass and is accurately guided, assuring square seating. The seat bushing is made of Exelloy and can be easily renewed.

The valves have a small spring between the disc and cap.

Seat opening: The diameter of the port opening in these valves is slightly smaller than the inside diameter of Double Extra Strong Pipe.

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3000-Pound W.O.G. Forged Steel Fittings



90° Elbow
No. 300 D, Straight
No. 301 D, Reducing

WORKING PRESSURES
1750 pounds steam or hot oil, 500° F.
1250 pounds steam or hot oil, 750° F.
950 pounds steam or hot oil, 850° F.
3000 pounds cold water, oil, or gas, non-shock
Pressure ratings at higher temperatures furnished on application.



Coupling
No. 313 D



45° Elbow
No. 302 D, Straight



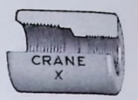
90° Street Elbow
No. 303 D, Straight



Tee
No. 304 D, Straight
No. 306 D, Reducing



Cross
No. 307 D, Straight
No. 308 D, Reducing



Reducer
No. 323 D

List Prices

Size		Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
90° Elbows	No. 300 D, Straight	Each	1.20	1.20	1.20	1.25	1.50	1.85	2.50	3.25	4.75	7.25	11.00	21.00	21.00
	*No. 301 D, Reducing	Each		1.45	1.45	1.50	1.80	2.20	3.00	3.90	5.70	8.70	13.20	25.20	25.20
45° Elbows	No. 302 D, Straight	Each		1.20	1.20	1.25	1.50	1.85	2.50	3.25	4.75	7.25	11.00	21.00	21.00
90° Street Elbows	No. 303 D, Straight	Each		1.40	1.40	1.45	1.75	2.15	2.90	3.75	5.45				
Tees	No. 304 D, Straight	Each	1.80	1.80	1.80	1.85	2.25	2.75	3.75	4.85	7.15	10.90	16.50	31.50	31.50
	*No. 306 D, Reducing	Each		2.15	2.15	2.20	2.70	3.30	4.50	5.80	8.60	13.00	19.80	37.80	37.80
Crosses	No. 307 D, Straight	Each		2.10	2.10	2.20	2.65	3.25	4.40	5.70	8.35	12.70	19.25	36.75	36.75
	*No. 308 D, Reducing	Each		2.50	2.50	2.65	3.15	3.90	5.30	6.85	10.00	15.25	23.00	44.00	44.00
Couplings	No. 313 D	Each		See Note		1.20	1.40	1.75	2.10	3.60	5.20	7.00	9.40	12.00	
Reducers	*No. 323 D	Each		1.20	1.25	1.35	1.50	1.75	2.20	2.65	4.50	6.50	8.80	11.75	15.00

***Reducing fittings:** List prices of reducing fittings and of Reducers apply to any reduction.

Note: For 1/4, 3/8, and 1/2-inch Couplings, use Extra Heavy Plain Couplings; see page 227.

Service recommendations: These fittings are unusually strong and rugged. They are ideal for high pressure hydraulic lines and for high pressure-temperature service. Their long thread lengths and the fact that the metal in the fittings expands and contracts in unison with steel pipe, assure tight joints even on lines subjected to great temperature change.

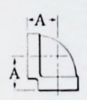
Material and construction: The fittings are forged solid from a special grade of steel, selected for its strength, toughness, and resistance to temperature and shock. The openings are drilled. The ends, except on Couplings and Reducers, are reinforced with heavy bands, assuring generous strength.

Threading: The threads are long and are accurately cut to gauge. The openings are chamfered to permit easy entrance of the pipe. All openings are in true alignment.

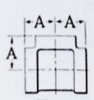
Cast Steel Screwed Fittings: Cast Steel Screwed Fittings for 1000 and 2000 pounds cold working pressure are shown on pages 330 and 331.

Dimensions, in Inches

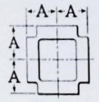
Dimensions of reducing sizes are the same as those of the straight size corresponding to the largest opening.



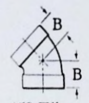
90° Elbow



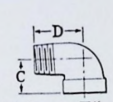
Tee



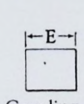
Cross



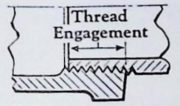
45° Elbow



90° Street Elbow



Coupling or Reducer



For Normal Thread Engagement, see page 367.

Size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
A—Center to end	15/16	15/16	1 1/16	1 1/4	1 7/16	1 5/8	1 7/8	2 1/8	2 1/2	3 1/4	3 3/4	4 1/2	4 1/2
B—Center to end, 45° Elbows		13/16	7/8	1	1 1/8	1 5/16	1 1/2	1 11/16	2	2 1/4	2 1/2	2 13/16	2 13/16
C—Center to end, 90° Street Elbows		25/32	1 5/16	1 1/4	1 7/16	1 5/8	1 7/8	2 1/8	2 1/2				
D—Center to end, 90° Street Elbows		1 1/4	1 1/2	1 3/4	2	2 5/16	2 5/8	2 13/16	3 5/16				
E—End to end, Couplings and Reducers		1 3/8	1 5/8	1 7/8	2 1/8	2 3/8	2 7/8	2 7/8	3 5/8	4 1/8	4 1/8	4 5/8	4 5/8

6000-Pound W.O.G. Forged Steel Fittings

WORKING PRESSURES
3500 pounds steam or hot oil, 500° F.
2500 pounds steam or hot oil, 750° F.
1900 pounds steam or hot oil, 850° F.
6000 pounds cold water, oil, or gas, non-shock
Pressure ratings at higher temperatures furnished on application.



90° Elbow
No. 310 D, Straight
No. 311 D, Reducing



45° Elbow
No. 312 D
Straight



Tee
No. 314 D, Straight
No. 316 D, Reducing



Cross
No. 317 D, Straight
No. 318 D, Reducing



Coupling
No. 333 D



Reducer
No. 341 D

List Prices

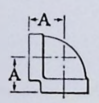
Size		Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
90° Elbows	No. 310 D, Straight	Each	1.20	1.25	1.50	1.85	2.50	3.25	4.75	7.25	11.00	21.00	21.00	
	*No. 311 D, Reducing	Each	1.45	1.50	1.80	2.20	3.00	3.90	5.70	8.70	13.20	25.20	25.20	
45° Elbows	No. 312 D, Straight	Each		1.25	1.50	1.85	2.50	3.25	4.75	7.25	11.00	21.00	21.00	
Tees	No. 314 D, Straight	Each	1.80	1.85	2.25	2.75	3.75	4.85	7.15	10.90	16.50	31.50	31.50	
	*No. 316 D, Reducing	Each	2.15	2.20	2.70	3.30	4.50	5.80	8.60	13.00	19.80	37.80	37.80	
Crosses	No. 317 D, Straight	Each	2.10	2.20	2.65	3.25	4.40	5.70	8.35	12.70	19.25	36.75	36.75	
	*No. 318 D, Reducing	Each	2.50	2.65	3.15	3.90	5.30	6.85	10.00	15.25	23.00	44.00	44.00	
Couplings	No. 333 D	Each	1.20	1.25	1.35	1.55	1.90	2.70	3.25	5.40	8.00	12.50	18.50	25.00
Reducers	*No. 341 D	Each	1.50	1.55	1.70	1.95	2.40	3.40	4.05	6.75	10.00	15.65	23.25	31.50

***Reducing fittings:** List prices of reducing fittings and of Reducers apply to any reduction.

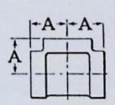
Service recommendations: These fittings are the same as the 3000-Pound Forged Steel Fittings shown on page 328 except they are much heavier. The fittings are recommended for the extreme pressures and temperatures encountered in some steam plants and oil refineries, and for very high hydraulic pressures. They are exceptionally massive and rugged

Dimensions, in Inches

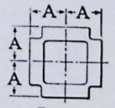
Dimensions of reducing sizes are the same as those of the straight size corresponding to the largest opening.



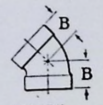
90° Elbow



Tee



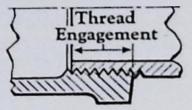
Cross



45° Elbow



Coupling or Reducer



For Normal Thread Engagement, see page 367.

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
A—Center to end	1 1/16	1 1/4	1 7/16	1 5/8	1 7/8	2 1/8	2 1/2	3 1/4	3 3/4	4 1/2	4 1/2	
B—Center to end, 45° Elbows	7/8	1	1 1/8	1 5/16	1 1/2	1 11/16	2	2 1/4	2 1/2	2 13/16	2 13/16	
E—End to end, Couplings and Reducers	1 3/8	1 5/8	1 7/8	2 1/8	2 3/8	2 7/8	2 7/8	3 5/8	4 1/8	4 1/8	4 5/8	4 5/8

9000-Pound W.O.G. Forged Steel Fittings



90° Elbow

Forged Steel Screwed Fittings, sizes 1/4 to 3-inch, for working pressures as high as 3750 pounds steam or hot oil at 750° F., or 9000 pounds cold water, oil, or gas, non-shock, can be made to order. Prices on application.



Tee

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1000-Pound W.O.G. Cast Steel Fittings

WORKING PRESSURES
575 pounds steam or hot oil, **500°** F.
415 pounds steam or hot oil, **750°** F.
315 pounds steam or hot oil, **850°** F.
1000 pounds cold water, oil, or gas, non-shock
Pressure ratings at higher temperatures furnished on request

TEST PRESSURE — **1000** pounds hydrostatic


No. 760 D
90° Elbow


No. 762 D
45° Elbow


No. 764 D
Tee


No. 766 D
Cross

List Prices

Size	Inches	2½	3	3½	4	5	6	8	10	12	*5 3/16	*6 5/8
No. 760 D, 90° Elbows	Each	4.75	6.00	7.75	8.50	13.50	16.50	34.00	61.00	92.00	14.75	32.30
No. 762 D, 45° Elbows	Each	4.75	6.00	7.75	8.50	13.50	16.50	34.00	61.00	92.00		
No. 764 D, Tees	Each	7.10	9.00	11.50	12.75	20.25	25.00	51.00	91.00	138.00	22.00	48.50
No. 766 D, Crosses	Each	9.50	12.00	15.50	17.00	27.00	33.00	68.00	122.00	184.00		

Reducing fittings: Reducing Elbows, Tees, and Crosses can be made to order. Reducing sizes use the same list prices as straight size fittings but are sold at an advance in price; see the Crane Discount Sheet for prices.

***Casing sizes:** These are casing sizes. Orders should specify the outside diameter of the casing, the number of threads per inch, and the style of the casing.

Service recommendations: Crane 1000-Pound W.O.G. Cast Steel Fittings are recommended for services that are beyond the pressure-temperature range of malleable or cast iron fittings, or where stronger and more rugged fittings are desired. They are well suited for general service on steam, hot oil, gas, and water lines.

Material and construction: The fittings are made of Crane Carbon Steel.

Crane Carbon Steel is produced by the basic electric furnace process. It conforms to A.S.T.M. Specification A95 for Carbon Steel Castings for Valves, Flanges, and Fittings for High Temperature Service.

The fittings are cast from special patterns and are not to be compared with steel fittings made from patterns used for cast iron fittings. The ends are reinforced with heavy bands to provide maximum strength at these points.

Threading: Threads are long and are accurately cut to gauge; all openings are in true alignment. Openings are chamfered to permit easy entrance of the pipe.

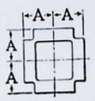
Alloy steel: Fittings made of Carbon-Molybdenum Cast Steel or of Crane No. 5 Chrome-Molybdenum Alloy Cast Steel to withstand elevated temperatures, corrosion, and erosion can be made to order. Prices on application.

Smaller sizes: For sizes 2-inch and smaller, use the forged steel fittings shown on pages 328 and 329.

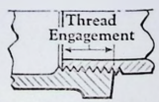
Dimensions, in Inches


90° Elbow


Tee


Cross


45° Elbow



For Normal Thread Engagement, see page 367.

Size	2½	3	3½	4	5	6	8	10	12	*5 3/16	*6 5/8
A—Center to end	3¼	3¾	4⅛	4½	5½	6¼	7¾	9¼	11½	5½	†6⅞
B—Center to end, 45° Elbows	2¼	2½	2⅝	2 13/16	3 3/16	3½	4 5/16	5 3/16	6		

*These are casing sizes. †When 6⅝-inch fittings are threaded for 6⅝-inch A. P. I. Casing, dimension "A" will be 6¼ inches.

2000-Pound W.O.G. Cast Steel Fittings

WORKING PRESSURES
1150 pounds steam or hot oil, **500°** F.
830 pounds steam or hot oil, **750°** F.
630 pounds steam or hot oil, **850°** F.
2000 pounds cold water, oil, or gas, non-shock
Pressure ratings at higher temperatures furnished on request

TEST PRESSURE — **2000** pounds hydrostatic


No. 260 D
90° Elbow


No. 262 D
45° Elbow


No. 264 D
Tee


No. 266 D
Cross

List Prices

Size	Inches	2½	3	3½	4	5	6	8	10	12	*5 3/16	*6 5/8
No. 260 D, 90° Elbows	Each	4.75	6.00	7.75	8.50	13.50	16.50	34.00	61.00	92.00	14.75	32.30
No. 262 D, 45° Elbows	Each	4.75	6.00	7.75	8.50	13.50	16.50	34.00	61.00	92.00		
No. 264 D, Tees	Each	7.10	9.00	11.50	12.75	20.25	25.00	51.00	91.00	138.00	22.00	48.50
No. 266 D, Crosses	Each	9.50	12.00	15.50	17.00	27.00	33.00	68.00	122.00	184.00		

Reducing fittings: Reducing Elbows, Tees, and Crosses can be made to order. Reducing sizes use the same list prices as straight size fittings but are sold at an advance in price; see the Crane Discount Sheet for prices.

***Casing sizes:** These are casing sizes. Orders should specify the outside diameter of the casing, the number of threads per inch, and the style of the casing.

Service recommendations: Crane 2000-Pound W.O.G. Cast Steel Fittings are of massive proportions, making them exceptionally strong and rugged. They will give excellent service when used on high pressure-temperature steam and hot oil lines such as are common in modern power plants and oil refineries, and on high pressure gas and water lines.

The fittings are made from special patterns and are not to be compared with cast steel fittings made from patterns designed for cast iron fittings. They have heavy metal sections and are liberally reinforced at points subjected to greatest stress.

Material: The fittings are made of Crane Carbon Steel.

Crane Carbon Steel is produced by the basic electric furnace process. It conforms to A.S.T.M. Specification A95 for Carbon Steel Castings for Valves, Flanges, and Fittings for High Temperature Service.

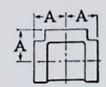
Threading: Threads are long and are accurately cut to gauge; all openings are in true alignment. Openings are chamfered to permit easy entrance of the pipe.

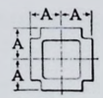
Alloy steel: Fittings made of Carbon-Molybdenum Cast Steel or of Crane No. 5 Chrome-Molybdenum Alloy Cast Steel to withstand elevated temperatures, corrosion, and erosion can be made to order. Prices on application.

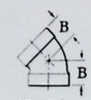
Smaller sizes: For sizes 2-inch and smaller, use the forged steel fittings shown on pages 328 and 329.

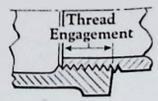
Dimensions, in Inches


90° Elbow


Tee


Cross


45° Elbow



For Normal Thread Engagement, see page 367.

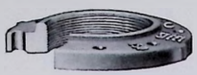
Size	2½	3	3½	4	5	6	8	10	12	*5 3/16	*6 5/8
A—Center to end	3¼	3¾	4⅛	4½	5½	6¼	7¾	9¼	11½	5½	†6⅞
B—Center to end, 45° Elbows	2¼	2½	2⅝	2 13/16	3 3/16	3½	4 5/16	5 3/16	6		

*These are casing sizes. †When 6⅝-inch fittings are threaded for 6⅝-inch A. P. I. Casing, dimension "A" will be 6¼ inches.

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150-Pound Forged Steel Flanges

WORKING PRESSURES
1 to 12-inch — **150** pounds, **500°** F. — **125** pounds, **750°** F.
14 to 24-inch — **150** pounds, **500°** F. — **100** pounds, **750°** F.
For working pressures at other temperatures, see page 301.


No. 556
Screwed Flange


No. 556½
Blind Flange


No. 558½
Reducing Screwed Flange

Prices include drilling to the 150-Pound American Steel Flange Standard, and spot facing. No deduction is made if flanges are ordered "faced only".

List Prices, Faced, Drilled, and Spot Faced

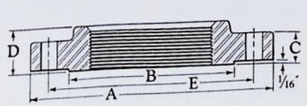
Size of pipe Inches	No. 556 Screwed Flanges Each	No. 556½ Blind Flanges Each	No. 558½, Reducing Screwed Flanges					
			Size Inches	Price Each	Size Inches	Price Each	Size Inches	Price Each
1	8.00	11.50	1 x 6	21.00	2 x 9	37.00	3 x 13½	63.00
1¼	9.00	11.50	1¼ x 6		2½ x 9		3½ x 13½	
1½	10.00	11.50	1½ x 6		3 x 9		4 x 13½	
2	11.00	12.60	1½ x 7	24.50	2 x 10	44.00	5 x 13½	
2½	13.00	14.70	2 x 7		2½ x 10		6 x 13½	
3	15.00	17.05	1½ x 7½	28.00	3 x 10		3½ x 16	86.00
3½	19.00	21.65	2 x 7½		3½ x 10		4 x 16	
4	20.00	23.70	2½ x 7½		4 x 10		5 x 16	
5	24.00	28.20	2 x 8½	35.00	2 x 11	49.00	6 x 16	
6	27.00	31.60	2½ x 8½		2½ x 11		8 x 16	
8	35.00	42.00	3 x 8½		3 x 11		5 x 19	108.00
10	48.00	58.00			3½ x 11		6 x 19	
12	60.00	76.00			4 x 11		8 x 19	
14 OD	80.00	126.00			5 x 11		10 x 19	
16 OD	100.00	147.00						
18 OD	125.00	210.00						
20 OD	150.00	252.00						
24 OD	240.00	320.00						

How to order reducing flanges: When ordering reducing flanges, the screwed or reduced size should be designated first, and then the outside diameter of the flange. For example, a 150-Pound Flange to connect a 6-inch pipe to a 10-inch valve or fitting (O.D. of flange, 16 inches) should be ordered

6″ x 16″ Reducing Flange.

Facing: 150-Pound Forged Steel Flanges are regularly furnished with a 1/16-inch raised face, finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

American Standard: The dimensions of these flanges conform to the 150-Pound American Steel Flange Standard (B16e-1932).



Dimensions, in Inches

Size of pipe	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14 OD	16 OD	18 OD	20 OD	24 OD
A	4¼	4⅝	5	6	7	7½	8½	9	10	11	13½	16	19	21	23½	25	27½	32
B	2	2½	2⅞	3⅝	4⅛	5	5½	6 3/16	7 5/16	8½	10⅝	12¾	15	16¼	18½	21	23	27¼
C	7/16	½	9/16	⅝	11/16	¾	13/16	15/16	15/16	1	1⅛	1 3/16	1¼	1⅜	1 7/16	1 9/16	1 11/16	1⅞
D	1 1/16	1 3/16	⅞	1	1⅛	1 3/16	1¼	1 5/16	1 7/16	1 9/16	1¾	1 15/16	2 3/16	2¼	2½	2 11/16	2⅞	3¼
E	3⅛	3½	3⅞	4¾	5½	6	7	7½	8½	9½	11¾	14¼	17	18¾	21¼	22¾	25	29½
No. of bolts	4	4	4	4	4	4	8	8	8	8	8	12	12	12	16	16	20	20
Dia. of bolts	½	½	½	⅝	⅝	⅝	⅝	⅝	¾	¾	¾	⅞	⅞	1	1	1⅛	1⅛	1¼

Templates for drilling . . . . page 372

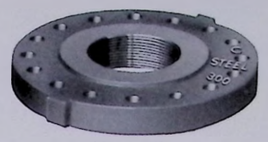
Flanges for welding . . . . pages 340 to 342

300-Pound Forged Steel Flanges

WORKING PRESSURE
300 pounds, **750°** F.
For working pressures at other temperatures, see page 301.


No. 291 E
Screwed Flange


No. 297 E
Blind Flange


No. 292 E
Reducing Screwed Flange

Prices include drilling to the 300-Pound American Steel Flange Standard, and spot facing. No deduction is made if flanges are ordered "faced only".

List Prices, Faced, Drilled, and Spot Faced

Size of pipe Inches	No. 291 E Screwed Flanges Each	No. 297 E Blind Flanges Each	No. 292 E, Reducing Screwed Flanges					
			Size Inches	Price Each	Size Inches	Price Each	Size Inches	Price Each
1	8.00	11.50	1 x 6½	21.00	2 x 11	44.00	3 x 15	63.00
1¼	9.00	11.50	1¼ x 6½		2½ x 11		3½ x 15	
1½	10.00	11.50	1½ x 6½		3 x 11		4 x 15	
2	11.00	12.60	1½ x 7½	24.50	3½ x 11		5 x 15	
2½	13.00	14.70	2 x 7½		4 x 11		6 x 15	
3	15.00	17.05	1½ x 8¼	28.00	2 x 12½	49.00	3½ x 17½	86.00
3½	19.00	21.65	2 x 8¼		2½ x 12½		4 x 17½	
4	20.00	23.70	2½ x 8¼		3 x 12½		5 x 17½	
5	24.00	28.20	2 x 9	35.00	3½ x 12½		6 x 17½	
6	27.00	31.60	2½ x 9		4 x 12½		8 x 17½	
8	35.00	42.00	3 x 9		5 x 12½		6 x 20½	108.00
10	48.00	58.00	2 x 10	37.00			8 x 20½	
12	60.00	76.00	2½ x 10				10 x 20½	
14 OD	80.00	126.00	3 x 10					
16 OD	100.00	147.00						
18 OD	125.00	210.00						
20 OD	150.00	252.00						
24 OD	240.00	320.00						

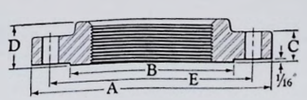
How to order reducing flanges: When ordering reducing flanges, the screwed or reduced size should be designated first, and then the outside diameter of the flange. For example, a 300-Pound Flange to connect a 6-inch pipe to a 10-inch valve or fitting (O.D. of flange, 17½ inches) should be ordered

6″ x 17½″ Reducing Flange.

Facing: 300-Pound Forged Steel Flanges are regularly furnished with a 1/16-inch raised face, finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

Flanges with male, female, tongue, or groove face are made to order at an additional price. See page 353 for prices and dimensions.

American Standard: The diameter, thickness, and drilling of sizes 1½-inch and smaller conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928); the dimensions of sizes 2-inch and larger conform to the 300-Pound American Steel Flange Standard (B16e-1932).



Dimensions, in Inches

Size of pipe	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14 OD	16 OD	18 OD	20 OD	24 OD
A	4⅞	5¼	6⅛	6½	7½	8¼	9	10	11	12½	15	17½	20½	23	25½	28	30½	36
B	2	2½	2⅞	3⅝	4⅛	5	5½	6 3/16	7 5/16	8½	10⅝	12¾	15	16¼	18½	21	23	27¼
C	11/16	¾	13/16	⅞	1	1⅛	1 3/16	1¼	1⅜	1 7/16	1⅝	1⅞	2	2⅛	2¼	2⅜	2½	2¾
D	1 1/16	1 1/16	1 3/16	1 5/16	1½	1 11/16	1¾	1⅞	2	2 1/16	2 7/16	2⅝	2⅞	3	3¼	3½	3¾	4 3/16
E	3½	3⅞	4½	5	5⅞	6⅝	7¼	7⅞	9¼	10⅝	13	15¼	17¾	20¼	22½	24¾	27	32
No. of bolts	4	4	4	8	8	8	8	8	8	12	12	16	16	20	20	24	24	24
Dia. of bolts	⅝	⅝	¾	⅝	¾	¾	¾	¾	¾	¾	⅞	1	1⅛	1⅛	1¼	1¼	1¼	1½

Templates for drilling . . . . page 373

Special facings . . . page 353

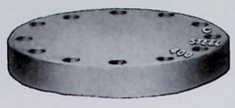
Flanges for welding . . . pages 340 to 342

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 185 of 402
Published by AsbestosClaims.Law
asbestosclaims.law/library/21275/185

400-Pound Forged Steel Flanges

WORKING PRESSURE
400 pounds, 750° F.
For working pressures at other temperatures, see page 301.


No. 651 E
Screwed Flange


No. 657 E
Blind Flange


No. 658 E
Reducing Screwed Flange

Prices include drilling to the 400-Pound American Steel Flange Standard, and spot facing. No deduction is made if flanges are ordered "faced only".

Furnished with male or female face, as ordered.

List Prices, Faced, Drilled, and Spot Faced

Size of pipe Inches	No. 651 E Screwed Flanges Each	No. 657 E Blind Flanges Each	No. 658 E, Reducing Screwed Flanges					
			Size Inches	Price Each	Size Inches	Price Each	Size Inches	Price Each
	For size 3½-inch and smaller, use 600-Pound Flanges, page 335.		For reducing flanges smaller than 10-inch O.D., use 600-Pound Flanges, page 335.					
4	20.00	23.70	2 x 10	37.00	2 x 12½	49.00	3½ x 17½	86.00
5	24.00	28.20	2½ x 10		2½ x 12½		4 x 17½	
6	27.00	31.60	3 x 10		3 x 12½		5 x 17½	
8	35.00	42.00	2 x 11	44.00	3½ x 12½		6 x 17½	
10	48.00	58.00	2½ x 11		4 x 12½		8 x 17½	
12	60.00	76.00	3 x 11		5 x 12½		6 x 20½	108.00
14 OD		126.00	3½ x 11		3 x 15	63.00	8 x 20½	
16 OD		147.00	4 x 11		3½ x 15		10 x 20½	
18 OD		210.00			4 x 15			
20 OD		252.00			5 x 15			
24 OD		320.00			6 x 15			

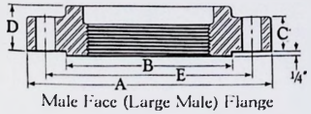
Facing: 400-Pound Flanges are regularly furnished with either a male face ¼-inch high (large male), finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish; or with a female face 3/16-inch deep (large female), having a smooth finish. Orders must specify whether male or female face is wanted.

Flanges with tongue or groove face are made to order at an additional price. See page 353 for prices and dimensions.

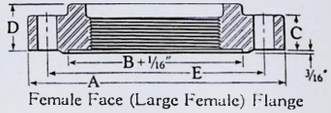
American Standard: The dimensions of these flanges conform to the 400-Pound American Steel Flange Standard (B16e-1932).

How to order reducing flanges: When ordering reducing flanges, the screwed or reduced size should be designated first, and then the outside diameter of the flange. For example, a 400-Pound Flange to connect a 6-inch pipe to a 10-inch valve or fitting (O.D. of flange, 17½ inches) should be ordered

6" x 17½" Reducing Flange.



Male Face (Large Male) Flange



Female Face (Large Female) Flange

Dimensions, in Inches

Size of pipe		4	5	6	8	10	12	14 OD	16 OD	18 OD	20 OD	24 OD
A	For sizes 3½-inch and smaller, use 600-Pound Flanges, page 335.	10	11	12½	15	17½	20½	23	25½	28	30½	36
B		6 3/16	7 5/16	8½	10 5/8	12¾	15	16¼	18½	21	23	27¼
C		1⅜	1½	1⅝	1⅞	2⅛	2¼	2⅜	2½	2⅝	2¾	3
D		2	2⅛	2¼	2 11/16	2⅞	3⅛					
E		7⅞	9¼	10⅝	13	15¼	17¾	20¼	22½	24¾	27	32
No. of bolts		8	8	12	12	16	16	20	20	24	24	24
Dia. of bolts		⅞	⅞	⅞	1	1⅛	1¼	1¼	1⅜	1⅜	1½	1¾

Templates for drilling . . . page 374 *Special facings . . . page 353* *Flanges for welding . . . pages 340 to 342*

600-Pound Forged Steel Flanges

WORKING PRESSURE
600 pounds, 750° F.
For working pressures at other temperatures, see page 301.


No. 856 E
Screwed Flange


No. 858 E
Blind Flange


No. 857 E
Screwed Reducing Flange

Furnished with male or female face, as ordered.

Prices include drilling to the 600-Pound American Steel Flange Standard, and spot facing. No deduction is made if flanges are ordered "faced only".

List Prices, Faced, Drilled, and Spot Faced

Size of pipe Inches	No. 856 E Screwed Flanges Each	No. 858 E Blind Flanges Each	No. 857 E, Reducing Screwed Flanges					
			Size Inches	Price Each	Size Inches	Price Each	Size Inches	Price Each
½	9.50	11.50	1 x 6½	21.00	2 x 10¾	57.00	3 x 16½	136.00
¾	9.50	11.50	1¼ x 6½		2½ x 10¾		4 x 16½	
1	10.00	11.50	1½ x 6½		3 x 10¾		5 x 16½	
1¼	10.75	11.50	1½ x 7½	24.50	2 x 13	79.00	6 x 16½	
1½	11.75	11.50	2 x 7½		2½ x 13		4 x 20	212.50
2	13.00	12.60	1½ x 8¼	28.00	3 x 13		5 x 20	
2½	15.00	14.70	2 x 8¼		4 x 13		6 x 20	
3	18.50	17.05	2½ x 8¼		2 x 14	94.00	8 x 20	
3½	22.50	21.65	2 x 9	35.00	2½ x 14		6 x 22	255.00
4	33.00	40.00	2½ x 9		3 x 14		8 x 22	
5	46.00	56.00	3 x 9		4 x 14		10 x 22	
6	55.00	66.00			5 x 14			
8	80.00	96.00						
10	125.00	150.00						
12	150.00	180.00						
14 OD		216.00						
16 OD		288.00						
18 OD		360.00						
20 OD		432.00						
24 OD		648.00						

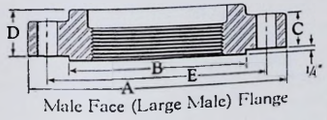
How to order reducing flanges: When ordering reducing flanges, the screwed or reduced size should be designated first, and then the outside diameter of the flange. For example, a 600-Pound Flange to connect a 6-inch pipe to a 10-inch valve or fitting (O.D. of flange, 20 inches) should be ordered

6" x 20" Reducing Flange.

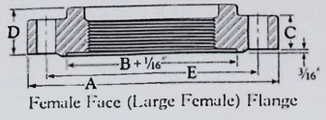
Facing: 600-Pound Flanges are regularly furnished with either a male face ¼-inch high (large male), finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish; or with a female face 3/16-inch deep (large female), having a smooth finish. Orders must specify whether male or female face is wanted.

Flanges with tongue or groove face are made to order at an additional price. See page 353 for prices and dimensions.

American Standard: The dimensions of these flanges conform to the 600-Pound American Steel Flange Standard (B16e-1932).



Male Face (Large Male) Flange



Female Face (Large Female) Flange

Dimensions, in Inches

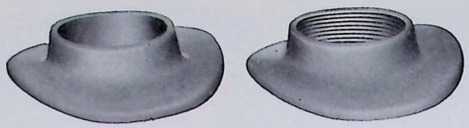
Size of pipe	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14 OD	16 OD	18 OD	20 OD	24 OD
A	3¾	4 5/8	4⅞	5¼	6⅛	6½	7½	8¼	9	10¾	13	14	16½	20	22	23¾	27	29¼	32	37
B	1⅜	1 11/16	2	2½	2⅞	3⅝	4⅛	5	5½	6 3/16	7 5/16	8½	10⅝	12¾	15	16¼	18½	21	23	27¼
C	9/16	⅝	11/16	13/16	⅞	1	1⅛	1¼	1⅜	1½	1¾	1⅞	2 3/16	2½	2⅝	2¾	3	3	3⅜	4
D	⅞	1	1 1/16	1⅛	1¼	1 7/16	1⅝	1 13/16	1 15/16	2⅛	2⅜	2⅝	3	3⅜	3⅝					
E	2⅝	3¼	3½	3⅞	4½	5	5⅞	6⅝	7¼	8½	10½	11½	13¾	17	19¼	20¾	23¾	25¾	28½	33
No. of bolts	4	4	4	4	4	8	8	8	8	8	8	12	12	16	20	20	20	20	24	24
Dia. of bolts	½	⅝	⅝	⅝	¾	⅝	¾	¾	⅞	⅞	1	1	1⅛	1¼	1¼	1⅜	1½	1⅝	1⅝	1⅞

Templates for drilling . . . page 375 *Special facings . . . page 353* *Flanges for welding . . . pages 340 to 342*

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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Forged Steel Boiler Flanges

WORKING PRESSURES
No. 287 — **125** pounds steam
No. 299 E or No. 289 E — **250** pounds steam

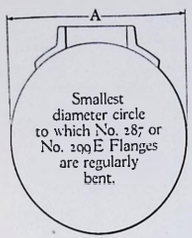


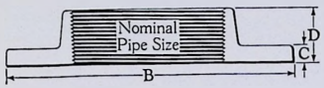
Plain Threaded

Boiler Flanges, for Riveting
No. 287, Standard
No. 299 E, Extra Heavy



Boiler Flange, for Welding
Threaded
No. 289 E

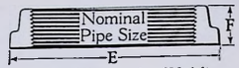




Boiler Flange for Riveting

Furnished plain or threaded, flat or bent, as ordered, and not drilled. Drilling is charged extra.

When ordering bent flanges, specify diameter of circle which flange must fit.



Boiler Flange for Welding

Furnished flat and threaded.

Can be bent to any reasonable radius; prices on application.

List Prices and Dimensions

Nominal Pipe Size	List Prices					A	Dimensions, in Inches							
	No. 287 Standard		No. 299 E Extra Heavy		No. 289 E Welding		No. 287 Standard			No. 299 E Extra Heavy			No. 289 E Welding	
	Flat or Bent		Flat or Bent		Flat Only									
Inches	Plain Each	Threaded Each	Plain Each	Threaded Each	Threaded Each	No. 287 or No. 299 E	B	C	D	B	C	D	E	F
¾	1.50	1.60					6	5/16	1					
1	1.60	1.70	1.85	2.00	1.10		6	5/16	1	6	⅜	1 1/16	2¾	⅝
1¼	1.70	1.85	2.15	2.30	1.30		6½	5/16	1	6½	⅜	1 1/16	3	⅝
1½	1.95	2.10	2.45	2.65	1.50		7	⅜	1¼	7	½	1⅜	3½	¾
2	2.25	2.40	2.80	3.00	1.70		8	⅜	1¼	8	½	1⅜	4	¾
2½	2.50	2.70	3.15	3.35	1.90	18	8½	⅜	1½	8½	½	1⅝	4½	⅞
3	2.80	3.00	3.50	3.75	2.15		9	⅜	1½	9	½	1⅝	5	1
3½	3.10	3.30	3.85	4.15	2.40		9½	7/16	1½	9½	9/16	1⅝	5½	1
4	3.45	3.70	4.30	4.65	2.85		10	7/16	1¾	10	9/16	1⅞	6½	1¼
5	4.50	4.80	5.60	6.00	3.40		11½	½	2	11½	⅝	2⅛	7½	1½
6	5.50	5.90	6.90	7.35	4.50		12½	½	2	12½	⅝	2⅛	8½	1½
8	11.00	11.75	13.65	14.65	8.20	24	15	⅝	2½	15	¾	2⅝	10½	1¾
10	21.75	23.00	27.00	28.65	15.50	36	17½	¾	2½	17½	⅞	2⅝	13	2
12	32.75	34.50	40.50	42.75	23.25		20	13/16	3	20	1	3 3/16	15	2

No. 287 and No. 299 E Flanges: The No. 287 and No. 299 E Flanges are fastened to boilers, pipe lines, tanks, and similar vessels by means of rivets. They are regularly furnished without rivet holes. When wanted drilled for rivets, specify whether for single, double, or staggered riveting, and give the pitch, spacing, and size of rivets. Drilling is charged extra; prices are furnished on application.

The list prices of the No. 287 and No. 299 E apply to both flat flanges and to flanges bent to fit any circle having a diameter of not less than that indicated by dimension "A" in the table above.

Sizes 6-inch and smaller when bent to circles having a smaller diameter, but not less than 14 inches, are charged at an advance of 50 per cent. When bent to circles having a diameter smaller than 14 inches, they are special; prices on application.

8, 10, and 12-inch flanges bent to circles having a diameter smaller than that indicated by dimension "A", are special; prices on application.

No. 289 E Flanges: The No. 289 E Flanges are fastened to boilers, pipe lines, tanks, and similar vessels by welding around the outer edge of the flange.

Although regularly furnished flat, these flanges can be bent to a reasonable radius; prices on application.

Special flanges for riveting: Flanges having larger outside diameters, flanges with straight thread, hillside flanges, or other irregular flanges can be made to order; prices on application.

Fittings and Flanges for Welding

Pages 338 to 342 illustrate Crane Fittings and Flanges for welded piping installations. These are suitable for a wide range of pressures and temperatures on steam, water, oil, air, gas, or gasoline lines, or for any other service where welded piping is adaptable. They are designed and built to exacting Crane standards; they combine all the features necessary to assure the user a satisfactory, economical piping system.

Welding Fittings: Crane Welding Fittings are always fully as strong as the pipe itself.

The inside of Crane Welding Elbows and Return Bends is truly circular, and of full diameter. This, combined with the easy radius, reduces resistance to flow and minimizes turbulence due to high velocities.

All Crane Welding Fittings are made with an ample tangent or straight portion at each end. The tangents provide space for applying clamps to line up and fasten the piping before welding, and they assure the welder ample space in which to work.

All Crane Welding Fittings have true, round, machine-beveled ends. This facilitates lining up, and gives the welder a clean, machined surface, enabling him to make perfect welds in minimum time.

Welding Flanges: The Crane line includes Cranelap Welding Nipples and Flanges, Welding Neck Flanges, and Slip-On Welding Flanges.

Crane Welding Flanges are made to American Standard dimensions. They are forged from a high grade steel especially selected to combine strength, resistance to temperature and shock, resistance to strains from pulling up the bolts, and easy weldability.

Working Pressure Ratings, Pounds per Square Inch

			Steam or hot oil				Cold water, oil, or gas non-shock
			500° F.	750° F.	900° F.	950° F.	
Welding Fittings, pages 338 and 339	Standard	¾ to 10-inch	500	400	200	150	670
		12-inch	420	350	175	130	580
		14 and 16-inch	375	300	150	115	500
		18-inch	300	250	125	90	415
		20-inch	275	225	115	85	375
		24-inch	210	175	90	65	290
	Extra Strong	1 to 3½-inch	1125	900	450	345	1500
		4 to 10-inch	750	600	300	230	1000
		12-inch	625	500	250	190	830
		14-inch	550	450	230	170	750
		16-inch	500	400	200	150	670
		18-inch	420	350	175	130	580
		20-inch	375	300	150	115	500
		24-inch	330	275	140	105	450
Cranelap Welding Nipples, page 340	Standard	1 to 10-inch	500	400	200	150	670
		12-inch	420	350	175	130	580
		14 and 16-inch	375	300	150	115	500
		18-inch	300	250	125	90	415
		20-inch	275	225	115	85	375
		24-inch	210	175	90	65	290
	Extra Strong	1 to 3½-inch	1125	900	450	345	1500
		4 to 10-inch	750	600	300	230	1000
		12-inch	625	500	250	190	830
		14-inch	550	450	230	170	750
		16-inch	500	400	200	150	670
		18-inch	420	350	175	130	580
		20-inch	375	300	150	115	500
		24-inch	330	275	140	105	450
	400-Pound	12-inch	500	400	200	150	670
	600-Pound	10 to 14-inch	750	600	300	230	1000
Flanges, pages 340 to 342	150-Pound	1 to 12-inch	150	125	75	60	300
		14 to 24-inch	150	100	70	55	230
	300-Pound	1 to 6-inch	410	300	275	250	600
		8 to 12-inch	410	300	275	225	600
		14 to 24-inch	410	300	225	165	600
	400-Pound	4 to 6-inch	550	400	375	350	800
		8 to 12-inch	550	400	375	300	800
		14 to 24-inch	550	400	300	220	800
	600-Pound	1 to 6-inch	820	600	475	450	1200
		8 to 12-inch	820	600	475	420	1200
		14 to 24-inch	820	600	420	330	1200

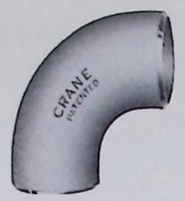
Working pressure ratings at other temperatures will be furnished on request.

The working pressure ratings specified above are based upon the actual strength of the fittings and flanges themselves, and provide an ample factor of safety. They are higher than the ratings that some inspection codes assign to the various types of welds.

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Seamless Steel Welding Fittings

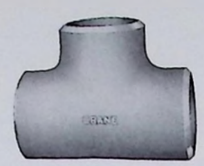
For working pressures, see page 337.



90° Elbow
No. 352 E
Standard
No. 452 E
Extra Strong



45° Elbow
No. 354 E
Standard
No. 454 E
Extra Strong



Tee
No. 353 E
Standard
No. 453 E
Extra Strong



Cap
No. 357 E
Standard
No. 457 E
Extra Strong



90° Elbow with long tangent on one end
No. 458 E, Extra Strong

List Prices

Size of pipe	Standard				Extra Strong				
	No. 352 E 90° Elbows	No. 354 E 45° Elbows	No. 353 E Tees	No. 357 E Caps	No. 452 E 90° Elbows	No. 454 E 45° Elbows	No. 453 E Tees	No. 457 E Caps	No. 458 E 90° Elbows with long tangent on one end
Inches	Each	Each	Each	Each	Each	Each	Each	Each	Each
¾	1.00								Prices do not include flange
1	1.20	1.08	2.15		1.50	1.35	2.15		
1¼	1.40	1.26	2.90		1.75	1.60	2.90		
1½	1.70	1.53	3.65		2.15	1.95	3.65		
2	2.10	1.90	5.00		2.65	2.40	5.00		4.65
2½	3.40	3.05	7.30		4.25	3.80	7.30		7.45
3	4.90	4.40		2.40	6.15	5.55		3.30	10.80
3½	6.35	5.70		3.20	7.95	7.15		4.25	14.00
4	7.65	6.90		3.70	9.55	8.60		4.90	16.70
5	10.85	9.80		4.90	13.55	12.20		5.85	23.70
6	15.80	14.25		5.95	19.75	17.80		7.50	34.50
8	30.00	27.00		10.10	37.50	33.75		12.20	65.50
10	53.40	48.00		14.60	67.00	60.50		18.50	117.00
12	80.70	72.75		20.85	101.00	91.00		25.00	177.00
14 OD	120.00	108.00		24.00	150.00	135.00		30.00	
16 OD	175.00	158.00		28.00	219.00	197.00		34.50	
18 OD	235.00	212.00		32.00	294.00	265.00		38.50	
20 OD				35.50				45.00	
24 OD				41.75				49.00	

Seamless Steel: Elbows, Return Bends, and Reducing Nipples are made from Seamless Steel pipe. The Caps are forged from steel plate. The Tees are forged solid, and the openings are drilled.

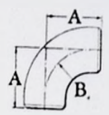
Thickness: In sizes 12-inch and smaller, Standard fittings are made for use with Standard pipe, and Extra Strong fittings for use with Extra Strong pipe. In sizes 14-inch and larger, Standard fittings are made for use with O.D. pipe ⅜-inch thick, and Extra Strong fittings for use with O.D. pipe ½-inch thick.

90° Elbows with long tangent: No. 458 E 90° Elbows have a long tangent on one end to permit welding on a Slip-On Welding Flange. This end is not beveled.

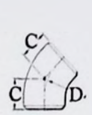
The other end is beveled for butt welding.

Dimensions, in Inches

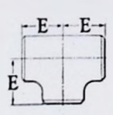
Standard and Extra Strong fittings have the same outside dimensions.



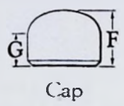
90° Elbow



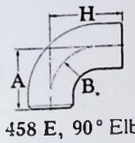
45° Elbow



Tee



Cap



No. 458 E, 90° Elbow

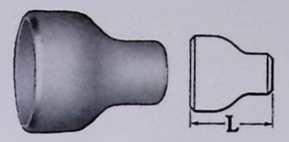
Size of pipe	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
A	1⅛	1½	1⅞	2¼	3	3¾	4½	5¼	6	7½	9	12	15	18	16	18	20		
B	1	15/16	1⅝	1⅞	2⅜	2⅞	3½	4¼	4⅞	6⅜	7⅞	10⅝	13½	16½	14	16	18		
C		1⅛	1⅜	1½	2	2¼	2½	2¾	3	3½	4	5	6	7	7¾	8½	9½		
D		15/16	1⅝	1⅞	2⅜	2⅞	3½	4	4½	5⅝	6⅝	8⅝	10¾	12¾	14	16	18		
E		1⅝	2	2¼	2¾	3												8	8¾
F							21/16	25/16	2⅝	3 1/16	3⅝	4⅝	5⅜	6¼	6¾	7½	7¾	8	8¾
G							¾	⅞	1	1¼	1½	2	2½	2½	2½	2½	2½	2½	2½
H					4¼	5	5¾	6¾	7½	9	10¾	13¾	17	20½					

Seamless Steel Welding Fittings

For working pressures, see page 337.

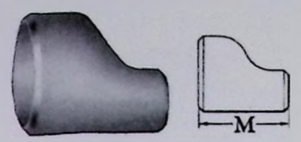


Return Bend
No. 355 E, Standard
No. 455 E, Extra Strong



Concentric Reducing Nipple
No. 359 E, Standard
No. 459 E, Extra Strong

Reducing Nipples are Iron Pipe Size.



Eccentric Reducing Nipple
No. 360 E, Standard
No. 460 E, Extra Strong

List Prices and Dimensions

No. 355 E, Return Bends, Standard								No. 455 E, Return Bends, Extra Strong							
Size of pipe	J Center to center	K Face to back	Price	Size of pipe	J Center to center	K Face to back	Price	Size of pipe	J Center to center	K Face to back	Price	Size of pipe	J Center to center	K Face to back	Price
Inches	Inches	Inches	Each	Inches	Inches	Inches	Each	Inches	Inches	Inches	Each	Inches	Inches	Inches	Each
				2½	7½	5 9/16	6.85					2½	7½	5 9/16	8.50
1	3	2 7/16	2.65	3	6	5¼	9.80	1	3	2 7/16	3.30	3	6	5¼	12.30
1¼	2½	2 5/16	2.80	3	9	6¾	10.80	1¼	2½	2 5/16	3.50	3	9	6¾	13.55
1¼	3¾	2 15/16	3.10	3½	10½	7¾	12.70	1¼	3¾	2 15/16	3.85	3½	10½	7¾	16.00
1½	3	2 13/16	3.40	4	8	6¾	15.30	1½	3	2 13/16	4.30	4	8	6¾	19.00
1½	4½	3 9/16	3.75	4	12	8¾	17.00	1½	4½	3 9/16	4.75	4	12	8¾	21.00
2	4	3 9/16	4.20	5	15	10 15/16	21.70	2	4	3 9/16	5.30	5	15	10 15/16	27.00
2	6	4 9/16	4.65	6	18	12 15/16	31.60	2	6	4 9/16	5.85	6	18	12 15/16	39.50

Concentric and Eccentric Reducing Nipples

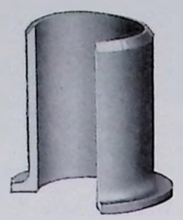
Size of pipe Inches	Price, Each Concentric or Eccentric		Length, Inches		Size of pipe Inches	Price, Each Concentric or Eccentric		Length, Inches	
	Standard	Extra Strong	L Concentric	M Eccentric		Standard	Extra Strong	L Concentric	M Eccentric
1 x ¾	1.50	2.75	3½	3½	5 x 2½	6.50	11.50	5	6
1¼ x 1	2.00	3.50	3½	3½	5 x 2	6.50	11.50	5	6½
1¼ x ¾	2.00	3.50	3½	3½	6 x 5	8.00	14.00	4½	5
1½ x 1¼	2.00	3.50	3½	3½	6 x 4	8.00	14.00	4½	6
1½ x 1	2.00	3.50	3½	3½	6 x 3½	9.00	15.75	4½	6½
1½ x ¾	2.50	4.50	3½	3½	6 x 3	9.00	15.75	5	6½
2 x 1½	2.25	3.75	3½	3½	6 x 2½	9.00	15.75	5¼	7¼
2 x 1¼	2.25	3.75	3½	3½	8 x 6	12.00	26.25	5½	7½
2 x 1	2.25	3.75	3½	3½	8 x 5	15.00	30.60	6	9
2 x ¾	2.75	4.75	3½	3½	8 x 4	15.00	30.60	6½	10½
2½ x 2	2.50	4.50	3½	3½	8 x 3½	15.00	30.60	6½	11
2½ x 1½	2.75	5.00	3½	3½	8 x 3	18.00	35.00	6½	11
2½ x 1¼	2.75	5.00	3½	3½	10 x 8	18.00	40.00	6½	8½
2½ x 1	2.75	5.00	3½	4	10 x 6	20.00	44.00	7½	11¾
3 x 2½	3.00	5.25	3½	3½	10 x 5	26.00	48.00	8	13¼
3 x 2	3.00	5.25	3½	3½	10 x 4	26.00	48.00	8	15¼
3 x 1½	3.25	5.70	3½	4	12 x 10	32.00	56.00	8	9
3 x 1¼	3.25	5.70	3½	4¼	12 x 8	36.00	63.00	8½	11
3 x 1	3.25	5.70	3½	4¾	12 x 6	36.00	63.00	9	13
3½ x 3	3.50	6.00	4	4	12 x 5	40.00	70.00	9½	14
3½ x 2½	3.50	6.00	4	4	12 x 4	40.00	70.00	10	15
3½ x 2	3.50	6.00	4	4¾	14 x 12	40.00	70.00	15	15
3½ x 1½	3.75	6.50	4¼	5½	14 x 10	40.00	70.00	15	18
4 x 3½	4.00	7.00	4	4¼	16 x 14	70.00	105.00	15	15
4 x 3	4.00	7.00	4	4¼	16 x 12	70.00	105.00	15	18
4 x 2½	4.00	7.00	4	4¾	18 x 16	85.00	148.00	15	15
4 x 2	4.00	7.00	4½	5½	18 x 14	85.00	148.00	15	18
4 x 1½	4.50	8.00	4½	6	18 x 12	95.00	166.00	18	18
4 x 1¼	4.50	8.00	4½	6¼	20 x 18	90.00	157.50	15	15
4 x 1	4.50	8.00	4½	6½	20 x 16	90.00	157.50	15	18
5 x 4	6.00	10.50	4½	4½	20 x 14	100.00	175.00	18	18
5 x 3½	6.50	11.50	4½	5	20 x 12	100.00	175.00	18	18
5 x 3	6.50	11.50	4½	5½					

Other reductions and larger sizes are made to order. Prices and dimensions on application.

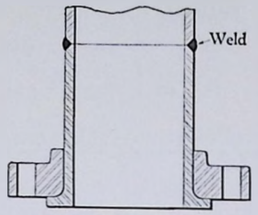
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Seamless Steel Cranelap Welding Nipples and Forged Steel Cranelap Flanges

For working pressures, see page 337.



Cranelap Welding Nipple
No. 574, Standard
No. 497 E, Extra Strong
No. 666 E, 400-Pound
No. 874 E, 600-Pound



Method of Welding



Cranelap Flange
No. 572, 150-Pound
No. 496 E, 300-Pound
No. 664 E, 400-Pound
No. 862 E, 600-Pound

Prices include drilling to the American Steel Flange Standard, and spot facing. No deduction is made if flanges are ordered "faced only".

List Prices

Size of pipe Inches	Cranelap Welding Nipples only: Length of nipple Inches	Standard No. 574 Each	Extra Strong No. 497 E Each	400 Pound No. 666 E Each	600 Pound No. 874 E Each	Cranelap Flanges only, Bored, Faced, Drilled, and Spot Faced: 150 Pound No. 572 Each	300 Pound No. 496 E Each	400 Pound No. 664 E Each	600 Pound No. 862 E Each
1	6	3.55	3.80			8.00	8.00		10.00
1¼	6	4.00	4.25			9.00	9.00		10.75
1½	6	4.45	4.70			10.00	10.00		11.75
2	6	5.75	6.25			11.00	11.00		13.00
2½	6	6.50	7.15			13.00	13.00		15.00
3	6	7.30	8.25			15.00	15.00		18.50
3½	6	8.10	9.40			19.00	19.00		22.50
4	6	9.30	10.90			20.00	20.00	20.00	33.00
5	8	10.75	13.50			24.00	24.00	24.00	46.00
6	8	12.75	16.35			27.00	27.00	27.00	55.00
8	8	16.00	24.00			35.00	35.00	35.00	80.00
10	10	22.75	35.75		52.00	48.00	48.00	48.00	125.00
12	10	30.75	48.75	40.00	72.00	60.00	60.00	60.00	150.00
14 OD	12	53.00	72.00	Use Extra Strong	96.00	80.00	80.00	80.00	180.00
16 OD	12	72.00	93.00		16 to 24-inch Prices on application	100.00	100.00	100.00	240.00
18 OD	12	92.00	114.00	18 to 24-inch Prices on application		125.00	125.00	125.00	300.00
20 OD	12	113.00	136.00			150.00	150.00	150.00	360.00
24 OD	12	138.00	162.00			240.00	240.00	240.00	540.00

For sizes below 12-inch, use Standard Welding Nipples

For sizes below 10-inch, use Extra Strong Welding Nipples

For sizes below 4-inch use 600 Pound flanges

Cranelap Welding Nipples: Cranelap Welding Nipples and Cranelap Flanges afford an ideal method of installing flanged equipment in a welded pipe line. The swivel flange eliminates the difficulty of aligning the bolt holes, and permits installing the equipment at any angle.

The nipples are made of Grade "A" Seamless Steel pipe, lapped on one end to the full thickness of the pipe wall, and beveled on the other end for welding. The back of the lap is faced, to assure even contact with the flange.

900 and 1500-Pound nipples can be made to order. Prices and dimensions will be furnished on application.

Forged Steel Cranelap Flanges: In sizes smaller than 2-inch, the diameter, thickness, and drilling of No. 496-E 300-Pound flanges conform to the 250-Pound American Cast Iron Flange Standard.

The dimensions of all other Cranelap flanges conform to the American Steel Flange Standard (B16e-1932).

900 and 1500-Pound Cranelap Flanges can be supplied on order. Prices on application.

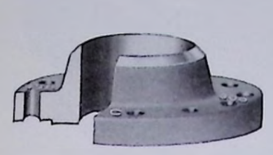
Suggested combinations: The following combinations of Welding Nipples and Flanges are suggested:

No. 572, 150-Pound Flanges and No. 574, Standard Welding Nipples.
No. 496 E, 300-Pound Flanges and No. 574, Standard Welding Nipples, 1 to 16-inch.
No. 497 E, Extra Strong Welding Nipples, 18 and 20-inch.
No. 664 E, 400-Pound Flanges and No. 574, Standard Welding Nipples, 1 to 10-inch.
No. 666 E, 400-Pound Welding Nipples, 12-inch.
No. 497 E, Extra Strong Welding Nipples, 14 and 16-inch.
No. 862 E, 600-Pound Flanges and No. 497 E, Extra Strong Welding Nipples, 1 to 8-inch.
No. 874 E, 600-Pound Welding Nipples, 10 to 14-inch.

Dimensions . . . . pages 344 and 345 *Templates for drilling . . . . pages 372 to 375*

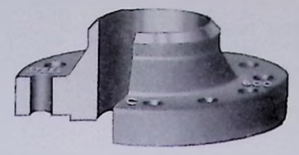
Forged Steel Welding Flanges

For working pressures, see page 337.



Welding Neck Flange
No. 568, 150-Pound
No. 296 E, 300-Pound

Furnished with a raised face 1/16-inch high.



Welding Neck Flange
No. 656 E, 400-Pound
No. 855 E, 600-Pound

Furnished with male or female face, as ordered.



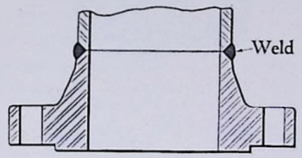
Slip-On Welding Flange
No. 554, 150-Pound
No. 294 E, 300-Pound

Furnished with a raised face 1/16-inch high.



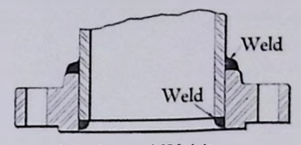
Slip-On Welding Flange
No. 694 E, 400-Pound
No. 854 E, 600-Pound

Furnished with male or female face, as ordered.



Method of Welding

Prices include drilling to the American Steel Flange Standard, and spot facing. No deduction is made if flanges are ordered "faced only".



Method of Welding

List Prices

Size of pipe Inches	Welding Neck Flanges, Bored, Faced, Drilled, and Spot Faced: 150-Pound No. 568 Each	300-Pound No. 296 E Each	400-Pound No. 656 E Each	600-Pound No. 855 E Each	Slip-On Welding Flanges, Bored, Faced, Drilled, and Spot Faced: 150-Pound No. 554 Each	300-Pound No. 294 E Each	400-Pound No. 694 E Each	600-Pound No. 854 E Each
1	11.00	11.00		16.30	8.00	8.00		10.00
1¼	11.00	11.00		16.30	9.00	9.00		10.75
1½	11.00	11.00		16.30	10.00	10.00		11.75
2	11.00	11.00		16.30	11.00	11.00		13.00
2½	13.00	13.00		19.00	13.00	13.00		15.00
3	15.00	15.00		23.00	15.00	15.00		18.50
3½	19.00	19.00		29.00	19.00	19.00		22.50
4	20.00	20.00	20.00	39.00	20.00	20.00	20.00	33.00
5	24.00	24.00	24.00	53.50	24.00	24.00	24.00	46.00
6	27.00	27.00	27.00	63.50	27.00	27.00	27.00	55.00
8	44.00	44.00	44.00	90.00	35.00	35.00	35.00	80.00
10	62.00	62.00	62.00	138.00	48.00	48.00	48.00	125.00
12	96.00	96.00	96.00	188.00	60.00	60.00	60.00	150.00
14 OD	130.00	130.00	130.00	200.00	80.00	80.00	80.00	180.00
16 OD	165.00	165.00	165.00	270.00	100.00	100.00	100.00	240.00
18 OD	220.00	220.00	220.00		125.00	125.00	125.00	300.00
20 OD	290.00	290.00	290.00		150.00	150.00	150.00	360.00
24 OD	380.00	380.00	380.00		240.00	240.00	240.00	540.00

For sizes below 4-inch use 600 Pound flanges

Bore of Welding Neck Flanges: Unless otherwise ordered, 150 and 300-Pound Welding Neck Flanges, in sizes 12-inch and smaller, are bored to match the inside diameter of Standard pipe.

Orders for 150 or 300-Pound Welding Neck Flanges 14-inch and larger, or for any sizes of 400 or 600-Pound Welding Neck Flanges, must specify the inside diameter of the pipe for which the flanges are to be bored.

Facing of flanges: 150 and 300-Pound Flanges are furnished with a raised face 1/16-inch high, finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

400 and 600-Pound Flanges are furnished with either a male face 1/4-inch high (large male), finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish; or with a female face 3/16-inch deep (large female), having a smooth finish. Orders must specify whether male or female face is wanted.

American Standard: In sizes smaller than 2-inch, the diameter, thickness, and drilling of 300-Pound Flanges conform to the 250-Pound American Cast Iron Flange Standard.

With this exception, the diameter, thickness, facing, and drilling of the flanges shown on this page conform to the American Steel Flange Standard (B16e-1932).

900 and 1500-Pound: 900 and 1500-Pound Flanges can be supplied on order; prices on application.

Dimensions . . . . pages 346 and 347 *Special facings . . . . page 353* *Templates for drilling . . . . pages 372 to 375*

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 189 of 402
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Forged Steel Reducing Slip-On Welding Flanges

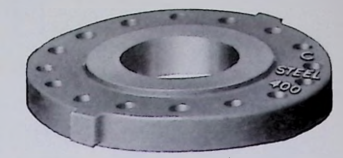


No. 554½, 150-Pound
No. 290 E, 300-Pound

Furnished with a raised face 1/16-inch high.

For working pressures, see page 337.

Prices include drilling to the American Steel Flange Standard, and spot facing. No deduction is made if flanges are ordered "faced only".



No. 693 E, 400-Pound
No. 853 E, 600-Pound

Furnished with male or female face, as ordered.

List Prices, Bored, Faced, Drilled, and Spot Faced

150-Pound—No. 554½		300-Pound—No. 290 E		400-Pound—No. 693 E		600-Pound—No. 853 E	
Size, Inches	Price, Each	Size, Inches	Price, Each	Size, Inches	Price, Each	Size, Inches	Price, Each
1 x 6	21.00	1 x 6½	21.00	For flange diameters smaller than 10-inch use 600-Pound flanges.		1 x 6½	21.00
1¼ x 6		1¼ x 6½				1¼ x 6½	
1½ x 6		1½ x 6½				1½ x 6½	
1½ x 7	24.50	1½ x 7½	24.50			1½ x 7½	24.50
2 x 7		2 x 7½				2 x 7½	
1½ x 7½	28.00	1½ x 8¼	28.00			1½ x 8¼	28.00
2 x 7½		2 x 8¼				2 x 8¼	
2½ x 7½		2½ x 8¼				2½ x 8¼	
2 x 8½	35.00	2 x 9	35.00			2 x 9	35.00
2½ x 8½		2½ x 9				2½ x 9	
3 x 8½		3 x 9				3 x 9	
2 x 9	37.00	2 x 10	37.00	2 x 10	37.00	2 x 10¾	57.00
2½ x 9		2½ x 10		2½ x 10		2½ x 10¾	
3 x 9		3 x 10		3 x 10		3 x 10¾	
2 x 10	44.00	2 x 11	44.00	2 x 11	44.00	2 x 13	79.00
2½ x 10		2½ x 11		2½ x 11		2½ x 13	
3 x 10		3 x 11		3 x 11		3 x 13	
3½ x 10		3½ x 11		3½ x 11		4 x 13	
4 x 10		4 x 11		4 x 11		2 x 14	94.00
2 x 11	49.00	2 x 12½	49.00	2 x 12½	49.00	2½ x 14	
2½ x 11		2½ x 12½		2½ x 12½		3 x 14	
3 x 11		3 x 12½		3 x 12½		4 x 14	
3½ x 11		3½ x 12½		3½ x 12½		5 x 14	
4 x 11		4 x 12½		4 x 12½		3 x 16½	136.00
5 x 11		5 x 12½		5 x 12½		4 x 16½	
3 x 13½	63.00	3 x 15	63.00	3 x 15	63.00	5 x 16½	
3½ x 13½		3½ x 15		3½ x 15		6 x 16½	
4 x 13½		4 x 15		4 x 15		4 x 20	212.50
5 x 13½		5 x 15		5 x 15		5 x 20	
6 x 13½		6 x 15		6 x 15		6 x 20	
3½ x 16	86.00	3½ x 17½	86.00	3½ x 17½	86.00	8 x 20	
4 x 16		4 x 17½		4 x 17½		6 x 22	255.00
5 x 16		5 x 17½		5 x 17½		8 x 22	
6 x 16		6 x 17½		6 x 17½		10 x 22	
8 x 16		8 x 17½		8 x 17½			
5 x 19	108.00	6 x 20½	108.00	6 x 20½	108.00		
6 x 19		8 x 20½		8 x 20½			
8 x 19		10 x 20½		10 x 20½			
10 x 19							

How to order: In ordering Reducing Flanges, the bored or reduced size should be designated first, and then the outside diameter of the flange. For example, a 150-Pound Flange to connect a 6-inch pipe to a 10-inch valve or fitting (O.D. of flange, 16 inches) should be ordered—6" x 16" Reducing Flange.

Facing of flanges: 150 and 300-Pound Flanges are furnished with a raised face 1/16-inch high, finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

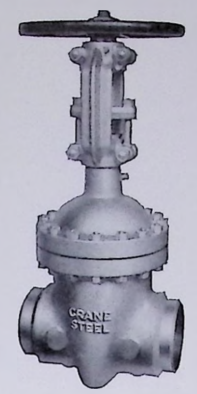
Templates for drilling . . . . pages 372 to 375

400 and 600-Pound Flanges are regularly furnished with either a male face ¼-inch high (large male), finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish; or with a female face 3/16-inch deep (large female), having a smooth finish. Orders must specify whether male or female face is wanted.

American Standard: The diameter, thickness, facing, and drilling of these flanges conform to the American Steel Flange Standard (B16e-1932).

Special facings . . . page 353

Cast Steel Valves
with Welding Ends

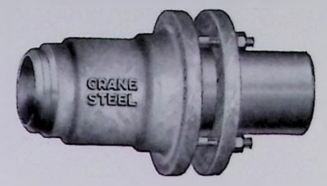


Crane Cast Steel Valves can be supplied with the ends specially finished and beveled for butt welding directly into the pipe line.

Exhaustive tests made in the Crane Laboratories have demonstrated that temperature increases during welding or cutting have no harmful effect on Crane Valves. Extended ends, cooling fins, or other devices intended to aid cooling are entirely unnecessary on Crane Welding Valves.

Prices and dimensions furnished on application.

Cast Steel Expansion Joints
with Welding Ends

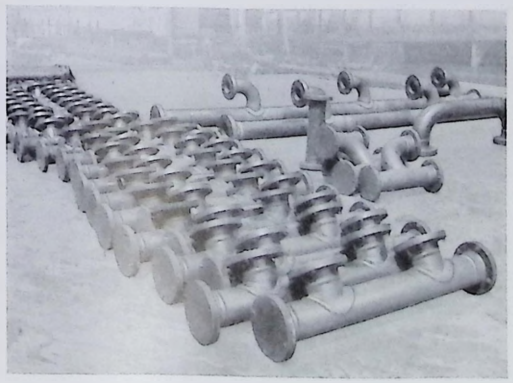


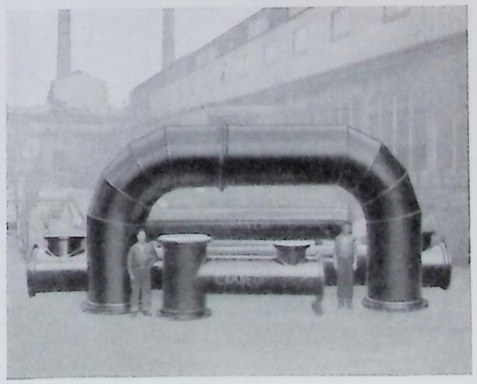
To provide for expansion and contraction in a welded piping system where insufficient space prevents the use of pipe bends, Crane Co. can supply Cast Steel Expansion Joints with the ends specially finished and beveled for butt welding.

These can be furnished with single or with double sleeve, with or without base, and for a wide range of steam working pressures.

Detailed information, prices, and dimensions will be furnished on request.

Welded Piping





The Crane shops are fully equipped to fabricate welded headers, welded receivers, and intricate welded piping of all sorts, to special dimensions. Users are assured the highest quality of workmanship and material and the strictest accuracy as to dimensions. Crane welded work eliminates the uncertainty that sometimes exists when piping of this sort is welded in the field.

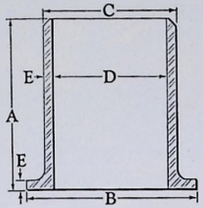
The illustrations above show only a few of the many special welded fittings and headers fabricated in the factories and Branch House shops of Crane Co.

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Seamless Steel Cranelap Welding Nipples

Dimensions, in Inches

For working pressures, see page 337



Cranelap Welding Nipple
No. 574, Standard
No. 497 E, Extra Strong
No. 666 E, 400-Pound
No. 874 E, 600-Pound

Size of pipe	A	B	C	No. 574 Standard D	No. 574 Standard E	No. 497 E Extra Strong D	No. 497 E Extra Strong E	No. 666 E 400-Pound D	No. 666 E 400-Pound E	No. 874 E 600-Pound D	No. 874 E 600-Pound E
1	6	2	1.315	1.049	.133	.957	.179				
1¼	6	2½	1.660	1.380	.140	1.278	.191				
1½	6	2⅞	1.900	1.610	.145	1.500	.200				
2	6	3⅝	2.375	2.067	.154	1.939	.218				
2½	6	4⅛	2.875	2.469	.203	2.323	.276				
3	6	5	3.500	3.068	.216	2.900	.300				
3½	6	5½	4.000	3.548	.226	3.364	.318				
4	6	6 3/16	4.500	4.026	.237	3.826	.337				
5	8	7 5/16	5.563	5.047	.258	4.813	.375				
6	8	8½	6.625	6.065	.280	5.761	.432				
8	8	10⅝	8.625	7.981	.322	7.625	.500				
10	10	12¾	10.75	10.020	.365	9.75	.500			9.564	.593
12	10	15	12.75	12.000	.375	11.75	.500	11.938	.406	11.376	.687
14 OD	12	16¼	14.0	13.250	.375	13.0	.500	Use Extra Strong Nipples		12.5	.750
16 OD	12	18½	16.0	15.250	.375	15.0	.500				
18 OD	12	21	18.0	17.250	.375	17.0	.500	18 to 24-inch Dimensions on request		16 to 24-inch Dimensions on request	
20 OD	12	23	20.0	19.250	.375	19.0	.500				
24 OD	12	27¼	24.0	23.250	.375	23.0	.500				

For sizes below 12-inch, use Standard Nipples

For sizes below 10-inch, use Extra Strong Nipples

Dimensions of 900 and 1500-Pound Welding Nipples will be furnished on request.

Suggested combinations: The following combinations of Welding Nipples and Flanges are suggested:

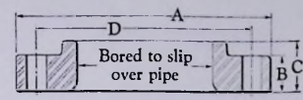
No. 572, 150-Pound Flanges and No. 574, Standard Welding Nipples.
No. 496 E, 300-Pound Flanges and No. 574, Standard Welding Nipples, 1 to 16-inch.
No. 497 E, Extra Strong Welding Nipples, 18 and 20-inch.
No. 664 E, 400-Pound Flanges and No. 574, Standard Welding Nipples, 1 to 10-inch.
No. 666 E, 400-Pound Welding Nipples, 12-inch.
No. 497 E, Extra Strong Welding Nipples, 14 and 16-inch.
No. 862 E, 600-Pound Flanges and No. 497 E, Extra Strong Welding Nipples, 1 to 8-inch.
No. 874 E, 600-Pound Welding Nipples, 10 to 14-inch.

List Prices . . . page 340

Forged Steel Cranelap Flanges

Dimensions, in Inches

For working pressures, see page 337.



Cranelap Flange
No. 572, 150-Pound
No. 496 E, 300-Pound
No. 664 E, 400-Pound
No. 862 E, 600-Pound

Size of pipe	No. 572, 150-Pound A	B	C	D	No. of bolts	Dia. of bolts	No. 496 E, 300-Pound A	B	C	D	No. of bolts	Dia. of bolts
1	4¼	7/16	11/16	3⅛	4	½	4⅞	11/16	11/16	3½	4	⅝
1¼	4⅝	½	13/16	3½	4	½	5¼	¾	1 1/16	3⅞	4	⅝
1½	5	9/16	⅞	3⅞	4	½	6⅛	13/16	1 3/16	4½	4	¾
2	6	⅝	1	4¾	4	⅝	6½	⅞	1 5/16	5	8	⅝
2½	7	11/16	1⅛	5½	4	⅝	7½	1	1½	5⅞	8	¾
3	7½	¾	1 3/16	6	4	⅝	8¼	1⅛	1 11/16	6⅝	8	¾
3½	8½	13/16	1¼	7	8	⅝	9	1 3/16	1¾	7¼	8	¾
4	9	15/16	1 5/16	7½	8	⅝	10	1¼	1⅞	7⅞	8	¾
5	10	15/16	1 7/16	8½	8	¾	11	1⅜	2	9¼	8	¾
6	11	1	1 9/16	9½	8	¾	12½	1 7/16	2 1/16	10⅝	12	¾
8	13½	1⅛	1¾	11¾	8	¾	15	1⅝	2 7/16	13	12	⅞
10	16	1 3/16	1 15/16	14¼	12	⅞	17½	1⅞	3¾	15¼	16	1
12	19	1¼	2 3/16	17	12	⅞	20½	2	4	17¾	16	1⅛
14 OD	21	1⅜	3⅛	18¾	12	1	23	2⅛	4⅜	20¼	20	1⅛
16 OD	23½	1 7/16	3 7/16	21¼	16	1	25½	2¼	4¾	22½	20	1¼
18 OD	25	1 9/16	3 13/16	22¾	16	1⅛	28	2⅜	5⅛	24¾	24	1¼
20 OD	27½	1 11/16	4 1/16	25	20	1⅛	30½	2½	5½	27	24	1¼
24 OD	32	1⅞	4⅜	29½	20	1¼	36	2¾	6	32	24	1½

Size of pipe	No. 664 E, 400-Pound A	B	C	D	No. of bolts	Dia. of bolts	No. 862 E, 600-Pound A	B	C	D	No. of bolts	Dia. of bolts
1	For sizes below 4-inch, use 600-Pound flanges.						4⅞	11/16	1 1/16	3½	4	⅝
1¼							5¼	13/16	1⅛	3⅞	4	⅝
1½							6⅛	⅞	1¼	4½	4	¾
2							6½	1	1 7/16	5	8	⅝
2½							7½	1⅛	1⅝	5⅞	8	¾
3							8¼	1¼	1 13/16	6⅝	8	¾
3½							9	1⅜	1 15/16	7¼	8	⅞
4	10	1⅜	2	7⅞	8	⅞	10¾	1½	2⅛	8½	8	⅞
5	11	1½	2⅛	9¼	8	⅞	13	1¾	2⅜	10½	8	1
6	12½	1⅝	2¼	10⅝	12	⅞	14	1⅞	2⅝	11½	12	1
8	15	1⅞	2 11/16	13	12	1	16½	2 3/16	3	13¾	12	1⅛
10	17½	2⅛	4	15¼	16	1⅛	20	2½	4⅜	17	16	1¼
12	20½	2¼	4¼	17¾	16	1¼	22	2⅝	4⅝	19¼	20	1¼
14 OD	23	2⅜	4⅝	20¼	20	1¼	23¾	2¾	5	20¾	20	1⅜
16 OD	25½	2½	5	22½	20	1⅜	27	3	5½	23¾	20	1½
18 OD	28	2⅝	5⅜	24¾	24	1⅜	29¼	3¼	6	25¾	20	1⅝
20 OD	30½	2¾	5¾	27	24	1½	32	3½	6½	28½	24	1⅝
24 OD	36	3	6¼	32	24	1¾	37	4	7¼	33	24	1⅞

Dimensions of 900 and 1500-Pound Cranelap Flanges will be furnished on request.

In sizes smaller than 2-inch, the diameter, thickness, and drilling of 300-Pound Cranelap Flanges conform to the 250-Pound American Cast Iron Flange Standard.

The dimensions of all other Cranelap Flanges conform to the American Steel Flange Standard (B16e-1932).

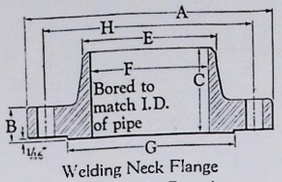
List Prices . . . page 340

Templates for drilling . . . pages 372 to 375

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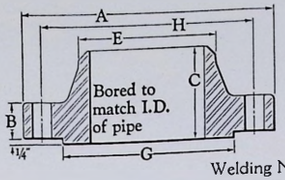
Forged Steel Welding Neck Flanges

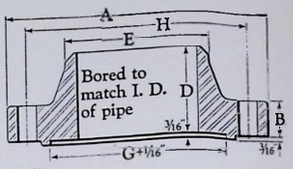
Dimensions, in Inches



Welding Neck Flange
No. 568, 150-Pound
No. 296 E, 300-Pound

Furnished with a raised face 1/16-inch high.





Welding Neck Flange
No. 656 E, 400-Pound
No. 855 E, 600-Pound

Furnished with male or female face, as ordered.

Size of pipe	No. 568, 150-Pound A	B	C	E	F	G	H	No. of bolts	Dia. of bolts	No. 296 E, 300-Pound A	B	C	E	F	G	H	No. of bolts	Dia. of bolts
1	4 1/4	7/16	2 3/16	1.32	1 1/16	2	3 1/8	4	1/2	4 1/8	1 1/16	2 7/16	1.32	1 1/16	2	3 1/2	4	5/8
1 1/4	4 5/8	1/2	2 1/4	1.66	1 3/8	2 1/2	3 1/2	4	1/2	5 1/4	3/4	2 9/16	1.66	1 3/8	2 1/2	3 7/8	4	5/8
1 1/2	5	9/16	2 7/16	1.90	1 5/8	2 7/8	3 7/8	4	1/2	6 1/8	13/16	2 11/16	1.90	1 5/8	2 7/8	4 1/2	4	3/4
2	6	5/8	2 1/2	2.38	2 1/16	3 5/8	4 3/4	4	5/8	6 1/2	7/8	2 3/4	2.38	2 1/16	3 5/8	5	8	5/8
2 1/2	7	11/16	2 3/4	2.88	2 15/32	4 1/8	5 1/2	4	5/8	7 1/2	1	3	2.88	2 15/32	4 1/8	5 7/8	8	3/4
3	7 1/2	3/4	2 3/4	3.50	3 1/16	5	6	4	5/8	8 1/4	1 1/8	3 1/8	3.50	3 1/16	5	6 5/8	8	3/4
3 1/2	8 1/2	13/16	2 13/16	4.00	3 9/16	5 1/2	7	8	5/8	9	13/16	3 3/16	4.00	3 9/16	5 1/2	7 1/4	8	3/4
4	9	15/16	3	4.50	4 1/32	6 3/16	7 1/2	8	5/8	10	1 1/4	3 3/8	4.50	4 1/32	6 3/16	7 7/8	8	3/4
5	10	15/16	3 1/2	5.56	5 1/16	7 5/16	8 1/2	8	3/4	11	1 3/8	3 7/8	5.56	5 1/16	7 5/16	9 1/4	8	3/4
6	11	1	3 1/2	6.63	6 1/16	8 1/2	9 1/2	8	3/4	12 1/2	1 7/16	3 7/8	6.63	6 1/16	8 1/2	10 5/8	12	3/4
8	13 1/2	1 1/8	4	8.63	8	10 5/8	11 3/4	8	3/4	15	1 5/8	4 3/8	8.63	8	10 5/8	13	12	7/8
10	16	1 3/16	4	10.75	10	12 3/4	14 1/4	12	7/8	17 1/2	1 7/8	4 5/8	10.75	10	12 3/4	15 1/4	16	1
12	19	1 1/4	4 1/2	12.75	12	15	17	12	7/8	20 1/2	2	5 1/8	12.75	12	15	17 3/4	16	1 1/8
14 OD	21	1 3/8	5	14.00	Bored as ordered	16 1/4	18 3/4	12	1	23	2 1/8	5 5/8	14.00	Bored as ordered	16 1/4	20 1/4	20	1 1/8
16 OD	23 1/2	1 7/16	5	16.00		18 1/2	21 1/4	16	1	25 1/2	2 1/4	5 3/4	16.00		18 1/2	22 1/2	20	1 1/4
18 OD	25	1 9/16	5 1/2	18.00		21	22 3/4	16	1 1/8	28	2 3/8	6 1/4	18.00		21	24 3/4	24	1 1/4
20 OD	27 1/2	1 11/16	5 11/16	20.00		23	25	20	1 1/8	30 1/2	2 1/2	6 3/8	20.00		23	27	24	1 1/4
24 OD	32	1 7/8	6	24.00		27 1/4	29 1/2	20	1 1/4	36	2 3/4	6 5/8	24.00		27 1/4	32	24	1 1/2

Size of pipe	No. 656 E, 400-Pound A	B	C	D	E	G	H	No. of bolts	Dia. of bolts	No. 855 E, 600-Pound A	B	C	D	E	G	H	No. of bolts	Dia. of bolts
1										4 7/8	1 1/16	2 11/16	2 7/16	1.32	2	3 1/2	4	5/8
1 1/4										5 1/4	13/16	2 7/8	2 5/8	1.66	2 1/2	3 7/8	4	5/8
1 1/2	For sizes smaller than 4-inch, use 600-Pound flanges									6 1/8	7/8	3	2 3/4	1.90	2 7/8	4 1/2	4	3/4
2										6 1/2	1	3 1/8	2 7/8	2.38	3 5/8	5	8	5/8
2 1/2										7 1/2	1 1/8	3 3/8	3 1/8	2.88	4 1/8	5 7/8	8	3/4
3										8 1/4	1 1/4	3 1/2	3 1/4	3.50	5	6 5/8	8	3/4
3 1/2										9	1 3/8	3 5/8	3 3/8	4.00	5 1/2	7 1/4	8	7/8
4	10	1 3/8	3 3/4	3 1/2	4.50	6 3/16	7 7/8	8	7/8	10 3/4	1 1/2	4 1/4	4	4.50	6 3/16	8 1/2	8	7/8
5	11	1 1/2	4 1/4	4	5.56	7 5/16	9 1/4	8	7/8	13	1 3/4	4 3/4	4 1/2	5.56	7 5/16	10 1/2	8	1
6	12 1/2	1 5/8	4 5/16	4 1/16	6.63	8 1/2	10 5/8	12	7/8	14	1 7/8	4 7/8	4 5/8	6.63	8 1/2	11 1/2	12	1
8	15	1 7/8	4 7/8	4 5/8	8.63	10 5/8	13	12	1	16 1/2	2 3/16	5 1/2	5 1/4	8.63	10 5/8	13 3/4	12	1 1/8
10	17 1/2	2 1/8	5 1/8	4 7/8	10.75	12 3/4	15 1/4	16	1 1/8	20	2 1/2	6 1/4	6	10.75	12 3/4	17	16	1 1/4
12	20 1/2	2 1/4	5 5/8	5 3/8	12.75	15	17 3/4	16	1 1/4	22	2 5/8	6 3/8	6 1/8	12.75	15	19 1/4	20	1 3/8
14 OD	23	2 3/8	6 1/8	5 7/8	14.00	16 1/4	20 1/4	20	1 1/4	23 3/4	2 3/4	6 3/4	6 1/2	14.00	16 1/4	20 3/4	20	1 1/2
16 OD	25 1/2	2 1/2	6 1/4	6	16.00	18 1/2	22 1/2	20	1 3/8	27	3	7 1/4	7	16.00	18 1/2	23 3/4	20	1 1/2
18 OD	28	2 5/8	6 3/4	6 1/2	18.00	21	24 3/4	24	1 3/8									
20 OD	30 1/2	2 3/4	6 7/8	6 5/8	20.00	23	27	24	1 1/2									
24 OD	36	3	7 1/8	6 7/8	24.00	27 1/4	32	24	1 3/4									

Dimensions of 900 and 1500-Pound Welding Neck flanges will be furnished on request.

Bore of flanges: Unless otherwise ordered, 150 and 300-Pound Flanges, in sizes 12-inch and smaller, are bored to match the inside diameter of Standard pipe.

Orders for 150 or 300-Pound Flanges 14-inch and larger, or for any sizes of 400 or 600-Pound Flanges, must specify the inside diameter of the pipe for which the flanges are to be bored.

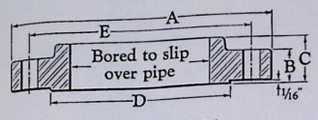
American Standard: In sizes smaller than 2-inch, the diameter, thickness, and drilling of 300-Pound Welding Neck Flanges conform to the 250-Pound American Cast Iron Flange Standard.

With this exception, the diameter, thickness, facing, and drilling of these flanges conform to the American Steel Flange Standard (B16e-1932).

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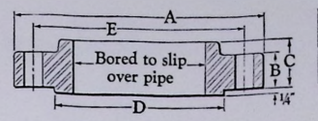
Forged Steel Slip-On Welding Flanges

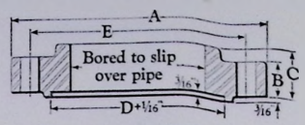
Dimensions, in Inches



Slip-On Welding Flange
No. 554, 150-Pound
No. 294 E, 300-Pound

Furnished with a raised face 1/16-inch high.





Slip-On Welding Flange
No. 694 E, 400-Pound
No. 854 E, 600-Pound

Furnished with male or female face, as ordered.

Size of pipe	No. 554, 150-Pound A	B	C	D	E	No. of bolts	Dia. of bolts	No. 294 E, 300-Pound A	B	C	D	E	No. of bolts	Dia. of bolts
1	4 1/4	7/16	1 1/16	2	3 1/8	4	1/2	4 7/8	1 1/16	1 1/16	2	3 1/2	4	5/8
1 1/4	4 5/8	1/2	1 3/16	2 1/2	3 1/2	4	1/2	5 1/4	3/4	1 1/16	2 1/2	3 7/8	4	5/8
1 1/2	5	9/16	7/8	2 7/8	3 7/8	4	1/2	6 1/8	13/16	1 3/16	2 7/8	4 1/2	4	3/4
2	6	5/8	1	3 5/8	4 3/4	4	5/8	6 1/2	7/8	1 5/16	3 5/8	5	8	5/8
2 1/2	7	11/16	1 1/8	4 1/8	5 1/2	4	5/8	7 1/2	1	1 1/2	4 1/8	5 7/8	8	3/4
3	7 1/2	3/4	1 3/16	5	6	4	5/8	8 1/4	1 1/8	1 11/16	5	6 5/8	8	3/4
3 1/2	8 1/2	13/16	1 1/4	5 1/2	7	8	5/8	9	1 3/16	1 3/4	5 1/2	7 1/4	8	3/4
4	9	15/16	1 5/16	6 3/16	7 1/2	8	5/8	10	1 1/4	1 7/8	6 3/16	7 7/8	8	3/4
5	10	15/16	1 7/16	7 5/16	8 1/2	8	3/4	11	1 3/8	2	7 5/16	9 1/4	8	3/4
6	11	1	1 9/16	8 1/2	9 1/2	8	3/4	12 1/2	1 7/16	2 1/16	8 1/2	10 5/8	12	3/4
8	13 1/2	1 1/8	1 3/4	10 5/8	11 3/4	8	3/4	15	1 5/8	2 7/16	10 5/8	13	12	7/8
10	16	1 3/16	1 15/16	12 3/4	14 1/4	12	7/8	17 1/2	1 7/8	2 5/8	12 3/4	15 1/4	16	1
12	19	1 1/4	2 3/16	15	17	12	7/8	20 1/2	2	2 7/8	15	17 3/4	16	1 1/8
14 OD	21	1 3/8	2 1/4	16 1/4	18 3/4	12	1	23	2 1/8	3	16 1/4	20 1/4	20	1 1/8
16 OD	23 1/2	1 7/16	2 1/2	18 1/2	21 1/4	16	1	25 1/2	2 1/4	3 1/4	18 1/2	22 1/2	20	1 1/4
18 OD	25	1 9/16	2 11/16	21	22 3/4	16	1 1/2	28	2 3/8	3 1/2	21	24 3/4	24	1 1/4
20 OD	27 1/2	1 11/16	2 7/8	23	25	20	1 1/8	30 1/2	2 1/2	3 3/4	23	27	24	1 1/4
24 OD	32	1 7/8	3 1/4	27 1/4	29 1/2	20	1 1/4	36	2 3/4	4 3/16	27 1/4	32	24	1 1/2

Size of pipe	No. 694 E, 400-Pound A	B	C	D	E	No. of bolts	Dia. of bolts	No. 854 E, 600-Pound A	B	C	D	E	No. of bolts	Dia. of bolts
1								4 7/8	1 1/16	1 1/16	2	3 1/2	4	5/8
1 1/4								5 1/4	13/16	1 1/8	2 1/2	3 7/8	4	5/8
1 1/2								6 1/8	7/8	1 1/4	2 7/8	4 1/2	4	3/4
2	For sizes smaller than 4-inch, use 600-Pound flanges							6 1/2	1	1 7/16	3 5/8	5	8	5/8
2 1/2								7 1/2	1 1/8	1 5/8	4 1/8	5 7/8	8	3/4
3								8 1/4	1 1/4	1 13/16	5	6 5/8	8	3/4
3 1/2								9	1 3/8	1 15/16	5 1/2	7 1/4	8	7/8
4	10	1 3/8	2	6 3/16	7 7/8	8	7/8	10 3/4	1 1/2	2 1/8	6 3/16	8 1/2	8	7/8
5	11	1 1/2	2 1/8	7 5/16	9 1/4	8	7/8	13	1 3/4	2 3/8	7 5/16	10 1/2	8	1
6	12 1/2	1 5/8	2 1/4	8 1/2	10 5/8	12	7/8	14	1 7/8	2 5/8	8 1/2	11 1/2	12	1
8	15	1 7/8	2 11/16	10 5/8	13	12	1	16 1/2	2 3/16	3	10 5/8	13 3/4	12	1 1/8
10	17 1/2	2 1/8	2 7/8	12 3/4	15 1/4	16	1 1/8	20	2 1/2	3 3/8	12 3/4	17	16	1 1/4
12	20 1/2	2 1/4	3 1/8	15	17 3/4	16	1 1/4	22	2 5/8	3 5/8	15	19 1/4	20	1 1/4
14 OD	23	2 3/8	3 5/16	16 1/4	20 1/4	20	1 1/4	23 3/4	2 3/4	3 11/16	16 1/4	20 3/4	20	1 3/8
16 OD	25 1/2	2 1/2	3 11/16	18 1/2	22 1/2	20	1 3/8	27	3	4 3/16	18 1/2	23 3/4	20	1 1/2
18 OD	28	2 5/8	3 7/8	21	24 3/4	24	1 3/8	29 1/4	3 1/4	4 5/8	21	25 3/4	20	1 5/8
20 OD	30 1/2	2 3/4	4	23	27	24	1 1/2	32	3 1/2	5	23	28 1/2	24	1 5/8
24 OD	36	3	4 1/2	27 1/4	32	24	1 3/4	37	4	5 1/2	27 1/4	33	24	1 7/8

Dimensions of 900 and 1500-Pound Slip-On Welding Flanges will be furnished on request.

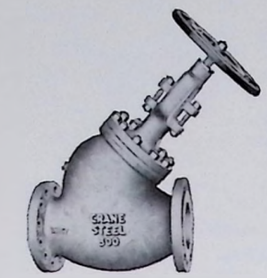
American Standard: In sizes smaller than 2-inch, the diameter, thickness, and drilling of 300-Pound Slip-On Welding Flanges conform to the 250-Pound American Cast Iron Flange Standard.

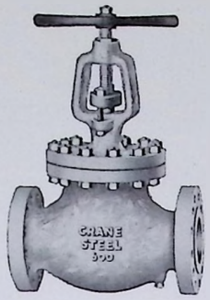
With this exception, the diameter, thickness, facing, and drilling of these flanges conform to the American Steel Flange Standard (B16e-1932).

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Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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Cast Steel Specialties

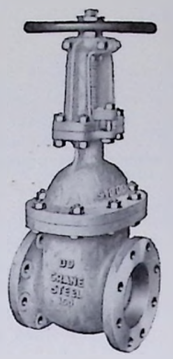




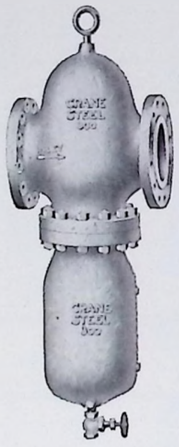
Cast Steel Stop Check Valves

No. 28 A — Straight Y Pattern
No. 30 A — Angle Y Pattern
For 300 pounds pressure

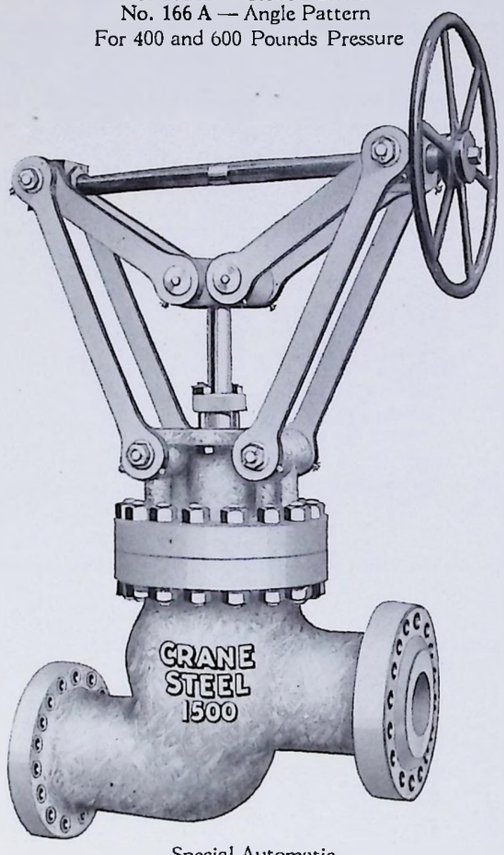
No. 164 A — Globe Pattern
No. 166 A — Angle Pattern
For 400 and 600 Pounds Pressure



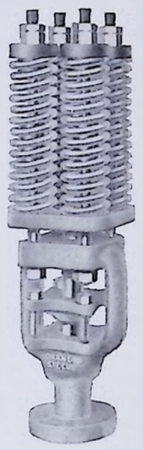
No. 45 X — Flanged Cast Steel
Double Disc Gate Valve



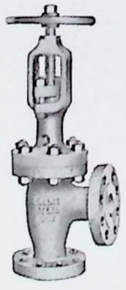
No. 011 S — Horizontal
Cast Steel
Steam Separator



Special Automatic
Stop-Check Valve
Offset Pattern



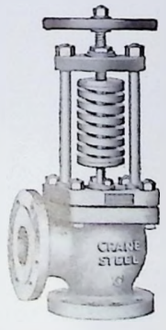
No. 3043 H
Hydraulic Cast Steel
Shock Absorber



No. 391 XR
Cast Steel
Blow-off Valve
Angle Pattern



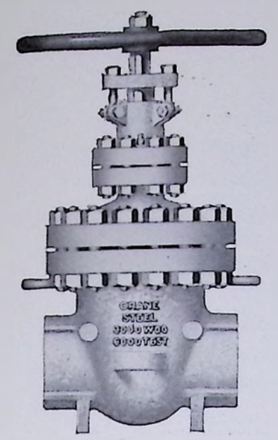
No. 983 D — Inverted Open
Float Cast Steel Steam Trap — Patented



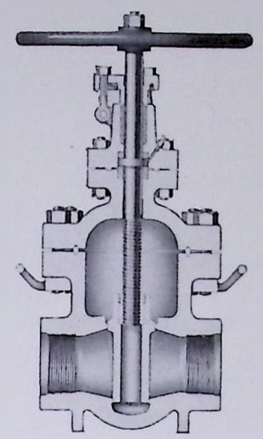
No. 1113 S — Cast Steel
Relief Valve

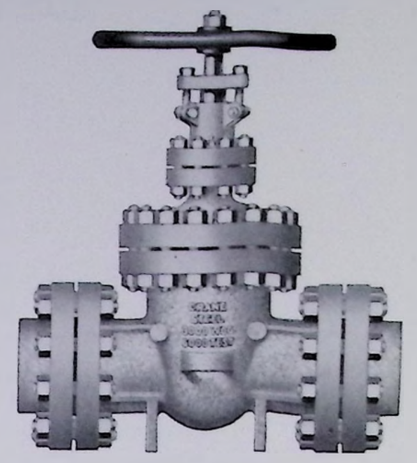
Steel Oil Field Valves and Fittings

Drilling-Through or Master Gate Valve



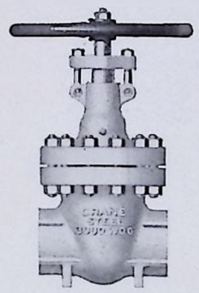
No. 1222 H, Screwed End



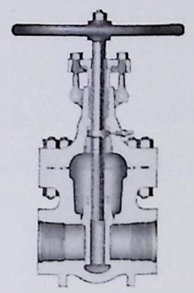


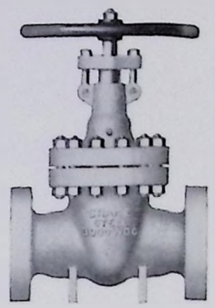
No. 1227 H, Flanged End

Flow Line or Manifold Valve

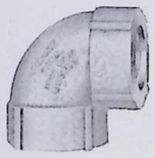


No. 86 S, Screwed End

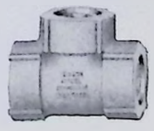




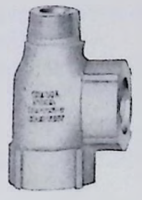
No. 86½ S, Flanged End



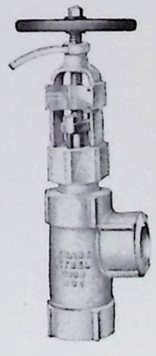
No. 3032 D
90° Elbow
Female Ends



No. 3033 D
Tee
Female Ends



No. 3034 D
Street Tee
Run Male and Female



No. 88½
Steel Adjustable
Flow Bean Valve
Screwed Ends



No. 3035 D
Cross, Female Ends



No. 3036 D
Cross
Run Female, Outlets Male



No. 3042 E
Bull Plug

Illustrated above are Valves and Fittings for Oil Field Service. Crane Co. is prepared to furnish material for a complete range of pressures and sizes.

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Steel Valves and Fittings

The preceding pages, numbers 298 to 349, indicated the scope of the Crane line of steel products. Certain articles and information on many subjects that are more closely allied to pipe and fabricated piping, even though they are frequently used or referred to in connection with steel material, have been covered in the section of this catalogue entitled "Pipe and Fabricated Piping".

It is unusually complete, including, among other things, data on Cranelap joints, Ring joints, Sarlun and Sargol joints, American Standard flange facings, flange finishes, welding, pipe bends, pipe coils, headers, and seamless steel pipe.

* * * * * * * * *

For greater convenience, several items of steel fittings have been grouped with fittings made of iron, in other sections of this catalogue. See the pages referred to below:

Steel Bushings....page 225
Steel Plugs....page 226
Wrought Couplings....page 227
Wrought Steel Nipples....pages 228 and 229
Forged Steel Unions and Union Fittings....pages 244 and 245
Forged Steel Flange Unions....pages 248 and 249

Bolts, Gaskets, Drilling Templates, Etc.

Pages 352 to 377 are devoted to a variety of subjects, not wholly related, but having in common the fact that they apply to nearly all Crane products and are referred to frequently by many customers. A complete list, with page references, is shown below.

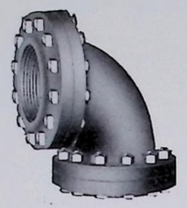
Bolting on Companion Flanges....page 352
Wooden Flange Protectors....page 352
Special Facings for Flanges and Flanged Valves and Fittings....page 353
Machine Bolts....page 354
Triplex Steel Bolt-Studs....page 355
Gaskets for Iron, Brass, and Steel Flanged Joints....pages 356 to 361
Kearsarge Gaskets....page 361
Ring Gaskets for Unions....page 362
Sheet Packing, Cranite and C. C. Rubber....page 363
Rod Packings....pages 364 to 365
Thread Lubricants....page 366
Normal Engagement Between Male and Female Threads....page 367
Threaded Pipe Joints....pages 367 to 368
Templates for Drilling, Brass, Iron, and Steel....pages 369 to 377

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See the section of this catalogue devoted to Fabricated Piping for complete information on American Standard flange facings, flange finishes, Cranelap joints, Ring joints, Sarlun and Sargol joints, pipe bends, welding, threading pipe, making-on, and refacing flanges, and on other subjects of a similar nature.

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Bolting On Companion Flanges



The table at the right shows the extra list prices per valve or fitting for bolting companion flanges on Cast Iron or Ferrosteel Valves or Fittings. They cover labor only, and do not include furnishing the flanges, bolts, or gaskets.

List prices for 400-Pound or 500-Pound W.O.G. Ferrosteel Double Disc Gate Valves are those specified for 175-Pound or 250-Pound Valves or Fittings.

List prices apply to straight or reducing fittings.

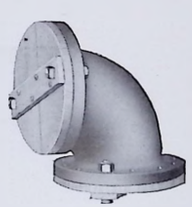
Extra List Prices for Labor Only

Size	Low Pressure, Light Standard, Standard, 125-Pound, 175-Pound, 250-Pound, or Ammonia Valve or Fitting			800-Pound Hydraulic Valve or Fitting		
Inches	With 2 Flanges	With 3 Flanges	With 4 Flanges	With 2 Flanges	With 3 Flanges	With 4 Flanges
¼	.55	.85	1.15			
⅜	.55	.85	1.15			
½	.55	.85	1.15			
¾	.65	1.00	1.35			
1	.65	1.00	1.35			
1¼	.75	1.15	1.55			
1½	.75	1.15	1.55			
2	.75	1.15	1.55	1.10	1.65	2.20
2½	.75	1.15	1.55	1.80	2.75	3.65
3	1.15	1.65	2.20	1.80	2.75	3.65
3½	1.15	1.65	2.20	1.80	2.75	3.65
4	1.15	1.65	2.20	1.80	2.75	3.65
5	1.15	1.65	2.20	2.20	3.30	4.40
6	1.55	2.20	2.85	2.20	3.30	4.40
8	1.55	2.20	2.85	2.55	3.85	5.15
10	1.55	2.20	2.85	2.85	4.40	5.85
12	1.95	2.75	3.65	2.85	4.40	5.85
14	1.95	2.75	3.65			
16	1.95	2.75	3.65			
18	1.95	2.75	3.65			
20	1.95	2.75	3.65			
24	1.95	2.75	3.65			

Wooden Flange Protectors

Extra List Prices

Size	Low Pressure, Light Standard, Standard, 125-Pound, 175-Pound, or 250-Pound Valve or Fitting			800-Pound Hydraulic Valve or Fitting		
Inches	With 2 Flanges	With 3 Flanges	With 4 Flanges	With 2 Flanges	With 3 Flanges	With 4 Flanges
1	1.55	2.20	2.85			
1¼	1.55	2.20	2.85			
1½	1.55	2.20	2.85			
2	1.55	2.20	2.85	1.55	2.20	2.85
2½	1.55	2.20	2.85	1.55	2.20	2.85
3	1.95	2.75	3.65	1.95	2.75	3.65
3½	1.95	2.75	3.65	1.95	2.75	3.65
4	1.95	2.75	3.65	1.95	2.75	3.65
5	1.95	2.75	3.65	2.20	3.25	4.30
6	1.95	2.75	3.65	2.20	3.25	4.30
8	2.20	3.25	4.30	2.50	3.75	5.00
10	2.50	3.75	5.00	2.50	3.75	5.00
12	2.50	3.75	5.00	2.85	4.30	5.75
14	2.85	4.30	5.75			
16	3.25	4.85	6.45			
18	3.25	4.85	6.45			
20	3.65	5.40	7.15			
24	3.65	5.40	7.15			



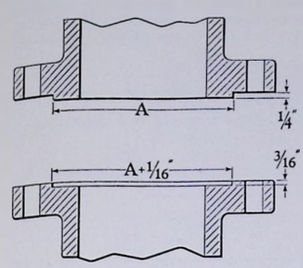
The table at the left shows the extra list prices per valve or fitting for furnishing and bolting on wooden flange protectors on Cast Iron or Ferrosteel Valves or Fittings. They include two bolts per protector.

List prices for 400-Pound or 500-Pound W.O.G. Ferrosteel Double Disc Gate Valves are those specified for 175-Pound or 250-Pound Valves or Fittings.

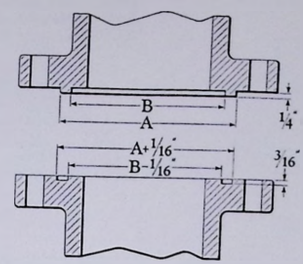
List prices apply to straight or reducing fittings.

Special Facings

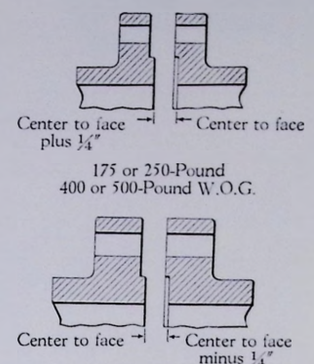
For Flanges, Flanged Valves, and Flanged Fittings



Large Male and Female



Large Tongue and Groove



Size	Extra List Prices				Dimensions, in Inches	
	Companion Flange	Valve or Fitting				
Inches		With 2 Flanges	With 3 Flanges	With 4 Flanges	A	B
½	1.50				1⅜	1
¾	1.50				1 11/16	1 5/16
1	1.75	3.60	4.50	6.25	2	1½
1¼	1.75	3.60	4.50	6.25	2½	1⅞
1½	1.75	3.60	4.50	6.25	2⅞	2⅛
2	1.75	3.60	6.25	8.00	3⅝	2⅞
2½	2.35	4.50	6.25	8.00	4⅛	3⅜
3	2.35	4.50	6.25	8.00	5	4¼
3½	2.35	4.50	6.25	8.00	5½	4¾
4	2.35	4.50	6.25	8.00	6 3/16	5 3/16
5	2.35	4.50	6.25	8.00	7 5/16	6 5/16
6	2.85	5.40	7.15	9.00	8½	7½
8	3.60	7.15	9.00	10.85	10⅝	9⅜
10	3.60	7.15	9.00	10.85	12¾	11¼
12	4.50	9.00	10.85	12.50	15	13½
14	5.75	11.65	14.35	18.00	16¼	14¾
16	7.15	14.35	18.00	21.75	18½	16¾
18	9.00	18.00	22.35	26.85	21	19¼
20	10.85	21.75	26.85	32.25	23	21
24	18.00	35.75	44.75	44.75	27¼	25¼

Center to face: The center to contact face dimension of a 175-Pound, 250-Pound, 400-Pound W.O.G., or 500-Pound W.O.G. valve or fitting with a male or tongue face is that given in the dimension table elsewhere in this catalogue *plus* ¼". For a female or groove face, the center to contact face dimension is that given in the table.

On an 800-Pound Hydraulic or 800-Pound W.O.G. valve or fitting, the center to contact face of a male or tongue face is that given in the dimension table. For a female or groove face, the center to contact face dimension is that given in the table *minus* ¼".

Companion flanges: The above list prices for Companion Flanges cover the extra charge per flange for a Large Male or Female, or a Large Tongue or Groove face on 250-Pound Cast Iron or Ferrosteel, or 300-Pound Forged Steel Flanges, or for a Large Tongue or Groove face on 800-Pound Hydraulic Ferrosteel, 400-Pound Forged Steel, or 600-Pound Forged Steel Flanges.

For a reducing flange, use the list price for the size corresponding to the outside diameter of the reducing flange.

Valves: The above list prices for Valves cover the extra charge per valve for a Large Male or Female, or a Large Tongue or Groove face on one or more flanges of 175-Pound, 250-Pound, 400-Pound W.O.G., or 500-Pound W.O.G. Ferrosteel Valves, or for a Large Female, or a Large Tongue or Groove face on one or more flanges of 800-Pound Hydraulic or 800-Pound W.O.G. Ferrosteel Valves.

Fittings: The above list prices for Fittings cover the extra charge per fitting for a Large Male or Female, or a Large Tongue or Groove face on one or more flanges of 250-Pound Cast Iron or Ferrosteel Flanged Fittings, or for a Large Female, or a Large Tongue or Groove face on one or more flanges of 800-Pound Hydraulic Ferrosteel Flanged Fittings.

For a reducing fitting, use the list price for the size corresponding to the size of the largest opening.

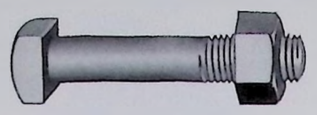
Finish: On Cast Iron or Ferrosteel Flanges, Flanged Valves, or Flanged Fittings, male faces are finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish; female, tongue, or groove faces have a smooth finish.

On Forged Steel Flanges, male faces are finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish; female, tongue, or groove faces have a smooth finish.

Drawings: To avoid errors, orders for valves or fittings with special facings should be accompanied by a sketch showing the type of facing for each flange.

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Machine Bolts



List prices in the upper table are for Cut Thread Bolts with American Standard Regular Unfinished Square Head and American Standard Regular Unfinished Hexagon Nut. See the lower tables for extras.

Length Inches	List Prices, Per 100							List Prices, Per 100 For quantities of 500 or more of one diameter					
	1/2" Dia.	5/8" Dia.	3/4" Dia.	7/8" Dia.	1" Dia.	1 1/8" Dia.	1 1/4" Dia.	1 3/8" Dia.	1 1/2" Dia.	1 5/8" Dia.	1 3/4" Dia.	1 7/8" Dia.	2" Dia.
1 1/4	5.30	9.25											
1 1/2	5.50	9.50	12.25	18.70	26.15								
2	5.85	10.00	12.90	19.60	27.30								
2 1/2	6.25	10.50	13.55	20.50	28.45								
3	6.65	11.00	14.20	21.40	29.60	49.70	59.45	72.30	87.15				
3 1/2	7.00	11.50	14.85	22.30	30.75	51.00	61.10	74.30	89.55				
4	7.35	12.00	15.50	23.20	31.90	52.30	62.75	76.30	91.90	119.75			
4 1/2	7.75	12.50	16.15	24.10	33.05	53.60	64.40	78.30	94.30	122.55			
5	8.15	13.00	16.80	25.00	34.20	54.90	66.05	80.30	96.65	125.30	153.80		
5 1/2	8.55	13.50	17.45	25.90	35.35	56.20	67.70	82.30	99.05	128.10	157.05		
6	8.95	14.00	18.10	26.80	36.50	57.50	69.35	84.30	101.40	130.85	160.30	202.70	
6 1/2	10.65	14.50	18.75	27.70	37.65	58.80	71.00	86.30	103.80	133.65	163.55	206.45	
7	11.10	15.00	19.40	28.60	38.80	60.10	72.65	88.30	106.15	136.40	166.80	210.20	
7 1/2	11.55	15.50	20.05	29.50	39.95	61.40	74.30	90.30	108.55	139.20	170.05	213.95	
8	12.00	16.00	20.70	30.40	41.10	62.70	75.95	92.30	110.90	141.95	173.30	217.70	258.55
8 1/2	12.45	16.50	21.35	31.30	42.25	64.00	77.60	94.30	113.25	144.75	176.55	221.45	262.80
9	12.90	17.00	22.00	32.20	43.40	65.30	79.25	96.30	115.65	147.50	179.80	225.20	267.05
9 1/2	13.35	17.50	22.65	33.10	44.55	66.60	80.90	98.30	118.05	150.30	183.05	228.95	271.30
10	13.80	18.00	23.30	34.00	45.70	67.90	82.55	100.30	120.40	153.05	186.30	232.70	275.55
11	15.20	19.00	24.60	35.80	48.00	70.50	85.85	104.30	125.15	158.60	192.80	240.20	284.05
12	16.10	20.00	25.90	37.60	50.30	73.10	89.15						
13	17.00	21.00	27.20	39.40	52.60	75.70	92.45						
14	17.90	22.00	28.50	41.20	54.90	78.30	95.75						
15	18.80	23.00	29.80	43.00	57.20	80.90	99.05						

For intermediate lengths, use the list price for the next longer length.

		Deductions from or Additions to List Prices, Per 100											
		1/2" Dia.	5/8" Dia.	3/4" Dia.	7/8" Dia.	1" Dia.	1 1/8" Dia.	1 1/4" Dia.	1 3/8" Dia.	1 1/2" Dia.	1 5/8" Dia.	1 3/4" Dia.	1 7/8" Dia.	2" Dia.
Deduct for	Amer. Std. Reg. Unfin. Sq. Nuts	.50	.90	1.30	2.00	2.90	3.80	5.00	2.30	3.15	4.55	5.80	7.70	8.55
	Amer. Std. Reg. Unfin. Sq. Hd. Bolts less Nuts	1.45	2.80	3.70	5.90	8.20	12.55	16.60						
Add for	Amer. Std. Reg. Unfin. C. P. Hex. Nuts	.00	.05	.35	1.25	1.60	1.45	1.50	5.50	7.40	10.65	17.40	18.15	27.75
	Amer. Std. Hvy. Unfin. C. P. Hex. Nuts	.80	.75	1.30	2.10	2.90	2.20	4.30						
	Amer. Std. Hvy. Semi-Fin. C. P. Hex. Nuts	1.10	1.30	2.00	2.80	3.80	3.30	5.70						
	Amer. Std. Reg. Unfin. Hex. Heads	.65	1.00	1.40	2.20	3.00	5.00	7.00						

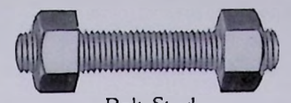
"American Standard Regular" was formerly known as "Manufacturers' Standard". "American Standard Heavy" was formerly known as "U. S. Standard".

In the Pipe and Fittings Industry, square head bolts with hexagon nuts are standard practice, and will always be furnished unless otherwise ordered.

Quantities	Extra List Prices, Per 100 For less than 500 of one diameter					
	1 3/8" Dia.	1 1/2" Dia.	1 5/8" Dia.	1 3/4" Dia.	1 7/8" Dia.	2" Dia.
400 to 499	2.00	2.25	2.50	2.75	3.00	3.25
300 to 399	3.20	3.50	3.80	4.10	4.40	4.70
200 to 299	7.20	7.50	7.80	8.10	8.40	8.70
100 to 199	19.20	19.60	20.00	20.40	20.80	21.20
50 to 99	44.00	44.50	45.00	45.50	46.00	46.50
25 to 49	92.00	92.50	93.00	93.50	94.00	94.50
10 to 24	240.00	241.00	242.00	243.00	244.00	245.00

Crane Triplex Steel Bolt-Studs

For High Pressures and Temperatures



Bolt-Stud
Threaded Entire Length
With Two Nuts

List prices include Bolt-Stud with 2 medium carbon, oil-quenched, semi-finished steel hexagon nuts.

The lengths given below are the lengths of the threads, and do not include the two crowned ends.

Length Inches	List Prices, Each				Length Inches	List Prices, Each					Length Inches	List Prices, Each				
	1/2" Dia.	5/8" Dia.	3/4" Dia.	7/8" Dia.		1" Dia.	1 1/8" Dia.	1 1/4" Dia.	1 3/8" Dia.	1 1/2" Dia.		1 5/8" Dia.	1 3/4" Dia.	1 7/8" Dia.	2" Dia.	2 1/2" Dia.
2	.39	.43	.49		3	.97	1.34				8 3/4			9.80		
2 1/8	.40				3 1/2	1.03	1.42	1.85			9	6.20				
2 1/4	.40				4	1.09	1.50	1.95			10	6.72			12.40	
2 3/8	.41				4 1/2	1.15	1.58	2.05			10 1/4	6.85	8.70			
2 1/2	.41	.45	.53	.68	5	1.21	1.66	2.15			10 1/2	6.98	8.85			
2 5/8	.42				5 1/4	1.24					10 3/4	7.11	9.00			
2 3/4	.42	.46			5 1/2	1.27	1.74	2.25			11	7.24	9.15		13.20	
2 7/8	.43	.47			5 3/4	1.30	1.78				11 1/4	7.37	9.30			
3	.43	.47	.57	.72	6	1.33	1.82	2.35			11 1/2	7.50	9.45	11.45		
3 1/8		.48			6 1/4	1.36	1.86				11 3/4	7.63	9.60	11.60		
3 1/4		.48	.59		6 1/2	1.39	1.90	2.45			12	7.76	9.75	11.75	14.00	
3 3/8		.49	.60		6 3/4	1.42	1.94	2.50			12 1/4	7.89				
3 1/2		.49	.61	.76	7	1.45	1.98	2.55			12 1/2	8.02		12.05		
3 5/8		.50	.62		7 1/4	1.48	2.02	2.60			12 3/4	8.15	10.20	12.20		
3 3/4		.50	.63		7 1/2	1.51	2.06	2.65	3.15		13	8.28		12.35	14.80	
3 7/8		.51	.64		7 3/4		2.10	2.70			13 1/4			12.50	15.00	
4		.51	.65	.80	8	1.57	2.14	2.75	3.31	4.15	13 1/2	8.54		12.65	15.20	
4 1/8		.52	.66		8 1/4		2.18	2.80			13 3/4	8.67		12.80	15.40	
4 1/4		.52	.67		8 1/2		2.22	2.85	3.47	4.35	14			12.95	15.60	
4 3/8			.68		8 3/4		2.26	2.90	3.55	4.45	14 1/4			13.10	15.80	
4 1/2		.53	.69	.84	9		2.30	2.95	3.63	4.55	14 1/2			13.25	16.00	
4 5/8			.70		9 1/4			3.00	3.71	4.65	14 3/4			13.40	16.20	
4 3/4		.54	.71	.86	9 1/2			3.05	3.79	4.75	15	9.32		13.55	16.40	
4 7/8			.72	.87	9 3/4			3.10	3.87	4.85	15 1/4			13.70		
5		.55	.73	.88	10			3.15	3.95	4.95	15 1/2				16.80	
5 1/4			.75	.90	10 1/4				4.03	5.05	15 3/4			14.00	17.00	
5 1/2		.57	.77	.92	10 1/2			3.25	4.11	5.15	16			14.15	17.20	
5 3/4			.79	.94	10 3/4				4.19	5.25	16 3/4					27.80
6		.59	.81	.96	11				4.27	5.35	17				18.00	28.00
6 1/4			.83	.98	11 1/4				4.35	5.45	17 1/4				18.20	28.20
6 1/2				1.00	11 1/2				4.43	5.55	17 1/2					28.40
6 3/4				1.02	12				4.59	5.75	18					28.80
7				1.04	12 1/4				4.67	5.85	18 1/4				19.00	29.00
7 1/4				1.06	12 1/2					5.95	18 1/2					29.20
					13				4.92	6.15	19 1/2					30.00
					13 1/4					6.25	19 3/4					30.20
					15					6.95	20					30.40
											21 1/4					31.40

Service recommendations: Crane Triplex Steel Bolt-Studs are recommended for use with Steel Valves, Fittings, and Flanges for high pressures or where the temperature exceeds 500° F.

Crane Triplex Steel complies with the requirements of A.S.T.M. Specification A96 for Class C Bolting, and of the American Steel Flange Standard, B16e-1932.

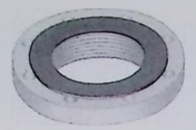
Threading: These Bolt-Studs are threaded their entire length. Diameters 1-inch and smaller are threaded with American National Standard Screw Threads, Coarse Thread Series (formerly known as the U. S. Standard). Diameters 1 1/8-inch and larger are threaded with American National Standard Screw Threads, 8-Pitch Series (8 threads per inch).

Nuts: Each Bolt-Stud is furnished with 2 medium carbon, oil-quenched, semi-finished steel hexagon nuts. These nuts comply with A.S.T.M. Specification A96 for Class 1 nuts.

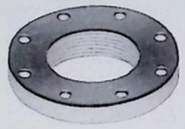
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Gaskets

For 25-Pound Cast Iron Flanged Joints



Ring Gaskets cover the face of the flange to the inside edge of the bolts, and will always be furnished unless otherwise ordered.



Full Face Gaskets are furnished without bolt holes unless otherwise ordered; an extra charge is made for punching bolt holes.

Size Inches	Ring Gaskets: List Prices, Each: 1/16-inch Cloth Inserted Rubber	Ring Gaskets: List Prices, Each: 1/16-inch "CC" Rubber	Ring Gaskets: List Prices, Each: 4-ounce Canvas	Ring Gaskets: Inside and Outside Diameters Inches	Full Face Gaskets: List Prices, Each: 1/16-inch Cloth Inserted Rubber	Full Face Gaskets: List Prices, Each: 1/16-inch "CC" Rubber	Full Face Gaskets: List Prices, Each: 4-ounce Canvas	Full Face Gaskets: Inside and Outside Diameters Inches
2	.07	.17	.06	2 x 4 1/8	.18	.34	.14	2 x 6
2 1/2	.09	.21	.07	2 1/2 x 4 7/8	.23	.42	.18	2 1/2 x 7
3	.12	.25	.09	3 x 5 3/8	.28	.50	.21	3 x 7 1/2
3 1/2	.14	.35	.10	3 1/2 x 6 3/8	.30	.67	.22	3 1/2 x 8 1/2
4	.16	.39	.11	4 x 6 7/8	.35	.75	.24	4 x 9
5	.19	.50	.13	5 x 7 7/8	.42	1.00	.28	5 x 10
6	.23	.59	.15	6 x 8 7/8	.47	1.20	.30	6 x 11
8	.30	.75	.18	8 x 11 1/8	.65	1.45	.40	8 x 13 1/2
10	.42	1.00	.25	10 x 13 5/8	.88	2.00	.55	10 x 16
12	.58	1.25	.35	12 x 16 3/8	1.15	2.50	.70	12 x 19
14	.70	1.56	.42	14 x 18	1.30	2.80	.80	14 x 21
16	.82	2.00	.49	16 x 20 1/2	1.65	3.55	1.00	16 x 23 1/2
18	.86	2.30	.52	18 x 22	1.85	4.00	1.12	18 x 25
20	1.02	2.50	.61	20 x 24 1/4	2.00	4.40	1.20	20 x 27 1/2
24	1.40	2.90	.85	24 x 28 3/4	2.55	5.25	1.55	24 x 32
30	2.10	4.40	1.27	30 x 35 1/8	3.80	8.90	2.30	30 x 38 3/4
36	2.90	6.80	1.75	36 x 41 7/8	5.10	13.55	3.10	36 x 46
42		8.05	2.10	42 x 48 1/2		16.15	3.75	42 x 53
48		9.40	2.75	48 x 55		18.75	4.85	48 x 59 1/2

For 125-Pound Cast Iron Flanged Joints

Size Inches	Ring Gaskets: List Prices, Each: 1/16-inch Cloth Inserted Rubber	Ring Gaskets: List Prices, Each: 1/16-inch "CC" Rubber	Ring Gaskets: List Prices, Each: 4-ounce Canvas	Ring Gaskets: List Prices, Each: 1/16-inch Oil Resisting	Ring Gaskets: Inside and Outside Diameters Inches	Full Face Gaskets: List Prices, Each: 1/16-inch Cloth Inserted Rubber	Full Face Gaskets: List Prices, Each: 1/16-inch "CC" Rubber	Full Face Gaskets: List Prices, Each: 4-ounce Canvas	Full Face Gaskets: List Prices, Each: 1/16-inch Oil Resisting	Full Face Gaskets: Inside and Outside Diameters Inches
1	.05	.09	.04	.55	1 x 2 5/8	.10	.17	.09	1.05	1 x 4 1/4
1 1/4	.07	.13	.06	.85	1 1/4 x 3	.14	.25	.12	1.65	1 1/4 x 4 5/8
1 1/2	.07	.13	.06	.90	1 1/2 x 3 3/8	.14	.25	.12	1.75	1 1/2 x 5
2	.07	.17	.06	1.35	2 x 4 1/8	.18	.34	.14	2.70	2 x 6
2 1/2	.09	.21	.07	1.90	2 1/2 x 4 7/8	.23	.42	.18	3.80	2 1/2 x 7
3	.12	.25	.09	2.40	3 x 5 3/8	.28	.50	.21	4.80	3 x 7 1/2
3 1/2	.14	.35	.10	3.50	3 1/2 x 6 3/8	.30	.67	.22	6.70	3 1/2 x 8 1/2
4	.16	.39	.11	4.25	4 x 6 7/8	.35	.75	.24	8.00	4 x 9
5	.19	.50	.13	5.25	5 x 7 3/4	.42	1.00	.28	10.50	5 x 10
6	.23	.59	.15	6.50	6 x 8 3/4	.47	1.20	.30	13.00	6 x 11
8	.30	.75	.18	8.75	8 x 11	.65	1.45	.40	17.00	8 x 13 1/2
10	.42	1.00	.25	12.00	10 x 13 3/8	.88	2.00	.55	24.00	10 x 16
12	.58	1.25	.35	15.75	12 x 16 1/8	1.15	2.50	.70	31.50	12 x 19
14	.70	1.56	.42		14 x 17 3/4	1.30	2.80	.80		14 x 21
16	.82	2.00	.49		16 x 20 1/4	1.65	3.55	1.00		16 x 23 1/2
18	.86	2.30	.52		18 x 21 5/8	1.85	4.00	1.12		18 x 25
20	1.02	2.50	.61		20 x 23 7/8	2.00	4.40	1.20		20 x 27 1/2
24	1.40	2.90	.85		24 x 28 1/4	2.55	5.25	1.55		24 x 32
30	2.10	4.40	1.27		30 x 34 3/4	3.80	8.90	2.30		30 x 38 3/4
36	2.90	6.80	1.75		36 x 41 1/4	5.10	13.55	3.10		36 x 46
42	3.50	8.05	2.10		42 x 48		16.15	3.75		42 x 53
48		9.40	2.75		48 x 54 1/2		18.75	4.85		48 x 59 1/2

Canvas Gaskets: Canvas Gaskets are furnished without any coating. We recommend that they be coated with Crane Thread Lubricant or with red lead and oil when installed.

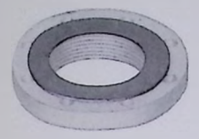
Oil Resisting Gaskets: Oil Resisting Gaskets are made of a special compound offering unusual resistance to the deteriorating action of oil.

Other materials: Gaskets made from other commercial sheet packings can be made to order; prices on application.

Sheet Packings . . . page 363

Gaskets

For 175-Pound or 250-Pound Cast Iron Flanged Joints



Ring Gaskets cover the face of the flange to the inside edge of the bolts.

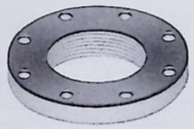


Corrugated Copper Gasket

Size Inches	Ring Gaskets: List Prices, Each: 1/16-inch "CC" Rubber	Ring Gaskets: List Prices, Each: 1/16-inch Cranite	Ring Gaskets: List Prices, Each: 27-gauge Corrugated Copper	Ring Gaskets: Inside and Outside Diameters Inches	Large Male and Female Gaskets: List Prices, Each: 1/16-inch "CC" Rubber	Large Male and Female Gaskets: List Prices, Each: 1/16-inch Cranite	Large Male and Female Gaskets: List Prices, Each: 27-gauge Corrugated Copper	Large Male and Female Gaskets: Inside and Outside Diameters Inches
1	.17	.14	.17	1 x 2 7/8	.11	.09	.16	1 x 2
1 1/4	.17	.17	.18	1 1/4 x 3 1/4	.11	.10	.17	1 1/4 x 2 1/2
1 1/2	.17	.21	.21	1 1/2 x 3 3/4	.11	.12	.18	1 1/2 x 2 7/8
2	.19	.26	.24	2 x 4 3/8	.11	.14	.19	2 x 3 5/8
2 1/2	.25	.33	.31	2 1/2 x 5 1/8	.13	.17	.21	2 1/2 x 4 1/8
3	.32	.41	.43	3 x 5 7/8	.17	.22	.29	3 x 5
3 1/2	.35	.46	.47	3 1/2 x 6 1/2	.21	.29	.32	3 1/2 x 5 1/2
4	.38	.57	.58	4 x 7 1/8	.23	.34	.38	4 x 6 3/16
5	.52	.77	.75	5 x 8 1/2	.32	.46	.55	5 x 7 5/16
6	.63	.95	1.00	6 x 9 7/8	.35	.52	.65	6 x 8 1/2
8	.90	1.25	1.35	8 x 12 1/8	.52	.77	.90	8 x 10 5/8
10	1.15	1.75	1.65	10 x 14 1/4	.67	1.05	1.20	10 x 12 3/4
12	1.50	2.15	2.15	12 x 16 5/8	.92	1.30	1.75	12 x 15
14	2.10	2.85	2.75	13 1/4 x 19 1/8	1.00	1.40	1.90	13 1/4 x 16 1/4
16	2.50	3.65	3.25	15 1/4 x 21 1/4	1.20	1.80	2.15	15 1/4 x 18 1/2
18	2.85	4.15	3.60	17 x 23 1/2	1.45	2.05	2.35	17 x 21
20	3.05	4.75	3.95	19 x 25 3/4	1.70	2.60	2.75	19 x 23
24	4.00	6.00	5.50	23 x 30 1/2	2.40	3.85	3.40	23 x 27 1/4

Large Tongue and Groove Gaskets . . . page 361

For Brass Flanged Joints



Full Face Gaskets are furnished without bolt holes unless otherwise ordered; an extra charge is made for punching bolt holes.

Size Inches	150-Pound MSS Standard Full Face Gaskets: List Prices, Each: 1/16-inch Cloth Inserted Rubber	150-Pound MSS Standard Full Face Gaskets: List Prices, Each: 1/16-inch "CC" Rubber	150-Pound MSS Standard Full Face Gaskets: List Prices, Each: 1/16-inch Cranite	150-Pound MSS Standard Full Face Gaskets: Inside and Outside Diameters Inches	300-Pound Crane Standard Full Face Gaskets: List Prices, Each: 1/16-inch "CC" Rubber	300-Pound Crane Standard Full Face Gaskets: List Prices, Each: 1/16-inch Cranite	300-Pound Crane Standard Full Face Gaskets: Inside and Outside Diameters Inches
1/2	.10	.17	.21	1/2 x 3 1/2	.36	.30	1/2 x 3 3/4
3/4	.10	.17	.21	3/4 x 3 7/8	.36	.30	3/4 x 4 5/8
1	.10	.17	.21	1 x 4 1/4	.38	.32	1 x 4 7/8
1 1/4	.14	.25	.28	1 1/4 x 4 5/8	.38	.38	1 1/4 x 5 1/4
1 1/2	.14	.25	.35	1 1/2 x 5	.38	.47	1 1/2 x 6 1/8
2	.18	.34	.42	2 x 6	.45	.60	2 x 6 1/2
2 1/2	.23	.42	.52	2 1/2 x 7	.55	.65	2 1/2 x 7 1/2
3	.28	.50	.65	3 x 7 1/2	.67	.87	3 x 8 1/4
3 1/2	.30	.67	.85	3 1/2 x 8 1/2	.75	1.05	3 1/2 x 9
4	.35	.75	1.05	4 x 9	.95	1.30	4 x 10
5	.42	1.00	1.20	5 x 10	1.05	1.55	5 x 11
6	.47	1.20	1.40	6 x 11	1.25	1.90	6 x 12 1/2
8	.65	1.45	1.90	8 x 13 1/2	1.70	2.50	8 x 15
10	.88	2.00	2.75	10 x 16	2.20	3.30	10 x 17 1/2
12	1.15	2.50	3.45	12 x 19	2.95	4.30	12 x 20 1/2

Cranite Gaskets: We recommend that the Cranite Gaskets shown on this page be coated with Crane Thread Lubricant when installed, to facilitate making tight joints.

Corrugated Copper Gaskets: Corrugated Copper Gaskets are recommended only when used with smooth faced flanges, and should be coated with Crane Thread Lubricant when installed.

Other materials: Gaskets made from other commercial gasket materials can be made to order; prices on application.

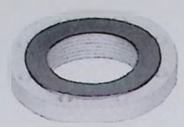
Gaskets for Brass Flanged Joints: Full face gaskets should always be used for Brass Flanged Joints. Metallic gaskets are not recommended.

When brass flanged material is bolted to iron or steel material which normally has a raised face, the raised face should be removed to provide a full face bearing for the gasket. Brass flanged material should not be bolted to Cranelap Flanged Pipe Joints.

Sheet Packings . . . page 363

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Gaskets



Ring Gaskets extend to the inside edge of the bolts.



Corrugated Metallic Gasket

For 800-Pound Hydraulic Cast Iron Flanged Joints

Size Inches	Ring Gaskets: List Prices, Each 1/16-inch Cranite	27-gauge Corrugated Copper	Corrugated Soft Iron	Inside and Outside Diameters Inches	Large Male and Female Gaskets: List Prices, Each 1/16-inch Cranite	27-gauge Corrugated Copper	Corrugated Soft Iron	Inside and Outside Diameters Inches
2	.26	.24	.24	2 x 4 3/8	.14	.19	.19	2 x 3 5/8
2 1/2	.33	.31	.31	2 1/2 x 5 1/8	.17	.21	.21	2 1/2 x 4 1/8
3	.41	.43	.43	3 x 5 7/8	.22	.29	.29	3 x 5
3 1/2	.46	.47	.47	3 1/2 x 6 3/8	.29	.32	.32	3 1/2 x 5 1/2
4	.65	.68	.68	4 x 7 5/8	.34	.38	.38	4 x 6 3/16
5	1.05	1.05	1.05	5 x 9 1/2	.46	.55	.55	5 x 7 5/16
6	1.20	1.20	1.20	6 x 10 1/2	.52	.65	.65	6 x 8 1/2
8	1.55	1.60	1.60	7 7/8 x 12 5/8	.77	.90	.90	7 7/8 x 10 5/8
10	2.50	2.40	2.40	9 3/4 x 15 3/4	1.05	1.25	1.25	9 3/4 x 12 3/4
12	3.10	2.90	2.90	11 3/4 x 18	1.30	1.75	1.75	11 3/4 x 15

For 150-Pound and 300-Pound Steel Flanged Joints

Size Inches	150-Pound Steel: Ring Gaskets: List Prices, Each 1/16-inch Cranite	27-gauge Corrugated Copper	Inside and Outside Diameters Inches	300-Pound Steel: Ring Gaskets: List Prices, Each 1/16-inch Cranite	27-gauge Corrugated Copper	Inside and Outside Diameters Inches	300-Pound Steel: Large Male and Female Gaskets: List Prices, Each 1/16-inch Cranite	27-gauge Corrugated Copper	Inside and Outside Diameters Inches
1	.10	.16	1 x 2 5/8	.14	.17	1 x 2 7/8	.09	.16	1 x 2
1 1/4	.14	.17	1 1/4 x 3	.17	.18	1 1/4 x 3 1/4	.10	.17	1 1/4 x 2 1/2
1 1/2	.17	.18	1 1/2 x 3 3/8	.21	.21	1 1/2 x 3 3/4	.12	.18	1 1/2 x 2 7/8
2	.20	.21	2 x 4 1/8	.26	.24	2 x 4 3/8	.14	.19	2 x 3 5/8
2 1/2	.25	.27	2 1/2 x 4 7/8	.33	.31	2 1/2 x 5 1/8	.17	.21	2 1/2 x 4 1/8
3	.35	.31	3 x 5 3/8	.41	.43	3 x 5 7/8	.22	.29	3 x 5
3 1/2	.45	.47	3 1/2 x 6 3/8	.46	.47	3 1/2 x 6 1/2	.29	.32	3 1/2 x 5 1/2
4	.50	.52	4 x 6 7/8	.57	.58	4 x 7 1/8	.34	.38	4 x 6 3/16
5	.60	.55	5 x 7 3/4	.77	.75	5 x 8 1/2	.46	.55	5 x 7 5/16
6	.70	.65	6 x 8 3/4	.95	1.00	6 x 9 7/8	.52	.65	6 x 8 1/2
8	.95	.90	8 x 11	1.25	1.35	8 x 12 1/8	.77	.90	8 x 10 5/8
10	1.40	1.30	10 x 13 3/8	1.75	1.65	10 x 14 1/4	1.05	1.20	10 x 12 3/4
12	1.75	1.90	12 x 16 1/8	2.15	2.15	12 x 16 5/8	1.30	1.75	12 x 15
14	2.15	2.05	13 1/4 x 17 3/4	2.85	2.75	13 1/4 x 19 1/8	1.40	1.90	13 1/4 x 16 1/4
16	3.00	2.40	15 1/4 x 20 1/4	3.65	3.25	15 1/4 x 21 1/4	1.80	2.15	15 1/4 x 18 1/2
18	3.25	2.40	17 1/4 x 21 5/8	4.15	3.60	17 x 23 1/2	2.05	2.35	17 x 21
20	3.60	2.75	19 1/4 x 23 7/8	4.75	3.95	19 x 25 3/4	2.60	2.75	19 x 23
24	4.80	3.50	23 1/4 x 28 1/4	6.00	5.50	23 x 30 1/2	3.85	3.40	23 x 27 1/4

Cranite Gaskets: Cranite Gaskets are not recommended for temperatures higher than 750° F.

Corrugated Copper Gaskets: Corrugated Copper Gaskets are recommended only when used with smooth faced flanges, and should be coated with Crane High Temperature Thread Lubricant when installed.

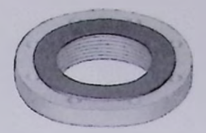
Corrugated Soft Iron Gaskets: These gaskets are made of Armco Iron terne plate. They are recommended only when used with smooth faced flanges, and should be coated with Crane High Temperature Thread Lubricant when installed.

Other materials: Gaskets made from other commercial gasket materials can be made to order; prices on application.

Sheet Packings . . . page 363

Large Tongue and Groove Gaskets . . . page 361

Gaskets



Ring Gaskets extend to the inside edge of the bolts.



Corrugated Metallic Gasket

For 400-Pound Steel Flanged Joints

Size Inches	Ring Gaskets: List Prices, Each 1/16-inch Cranite	27-gauge Corrugated Copper	Corrugated Soft Iron	Inside and Outside Diameters Inches	Large Male and Female Gaskets: List Prices, Each 1/16-inch Cranite	27-gauge Corrugated Copper	Corrugated Soft Iron	Inside and Outside Diameters Inches
	For sizes smaller than 4-inch, use Gaskets for 600-Pound Steel							
4	.57	.58	.58	4 x 7	.34	.38	.38	4 x 6 3/16
5	.77	.75	.75	5 x 8 3/8	.46	.55	.55	5 x 7 5/16
6	.95	1.00	1.00	6 x 9 3/4	.52	.65	.65	6 x 8 1/2
8	1.25	1.35	1.35	8 x 12	.77	.90	.90	8 x 10 5/8
10	1.75	1.65	1.65	10 x 14 1/8	1.05	1.20	1.20	10 x 12 3/4
12	2.15	2.15	2.15	12 x 16 1/2	1.30	1.75	1.75	12 x 15
14	2.85	2.75	2.75	13 1/8 x 19	1.45	1.95	1.95	13 1/8 x 16 1/4
16	3.65	3.25	3.25	15 x 21 1/8	1.90	2.25	2.25	15 x 18 1/2
18	4.15	3.60	3.60	17 x 23 3/8	2.05	2.35	2.35	17 x 21
20	4.75	3.95	3.95	18 7/8 x 25 1/2	2.70	2.85	2.85	18 7/8 x 23
24	6.00	5.50	5.50	22 5/8 x 30 1/4	4.10	3.65	3.65	22 5/8 x 27 1/4

For 600-Pound Steel Flanged Joints

Size Inches	Ring Gaskets: List Prices, Each 1/16-inch Cranite	27-gauge Corrugated Copper	Corrugated Soft Iron	Inside and Outside Diameters Inches	Large Male and Female Gaskets: List Prices, Each 1/16-inch Cranite	27-gauge Corrugated Copper	Corrugated Soft Iron	Inside and Outside Diameters Inches
1/2	.12	.16	.16	1/2 x 2 1/8	.07	.13	.13	1/2 x 1 3/8
3/4	.13	.17	.17	3/4 x 2 5/8	.08	.14	.14	3/4 x 1 11/16
1	.14	.17	.17	1 x 2 7/8	.09	.16	.16	1 x 2
1 1/4	.17	.18	.18	1 1/4 x 3 1/4	.10	.17	.17	1 1/4 x 2 1/2
1 1/2	.21	.21	.21	1 1/2 x 3 3/4	.12	.18	.18	1 1/2 x 2 7/8
2	.26	.24	.24	2 x 4 3/8	.14	.19	.19	2 x 3 5/8
2 1/2	.33	.31	.31	2 1/2 x 5 1/8	.17	.21	.21	2 1/2 x 4 1/8
3	.41	.43	.43	3 x 5 7/8	.22	.29	.29	3 x 5
3 1/2	.46	.47	.47	3 1/2 x 6 3/8	.29	.32	.32	3 1/2 x 5 1/2
4	.68	.68	.68	4 x 7 5/8	.34	.38	.38	4 x 6 3/16
5	1.05	1.05	1.05	5 x 9 1/2	.46	.55	.55	5 x 7 5/16
6	1.20	1.20	1.20	6 x 10 1/2	.52	.65	.65	6 x 8 1/2
8	1.55	1.60	1.60	7 7/8 x 12 5/8	.80	.95	.95	7 7/8 x 10 5/8
10	2.55	2.40	2.40	9 3/4 x 15 3/4	1.10	1.25	1.25	9 3/4 x 12 3/4
12	3.00	2.90	2.90	11 3/4 x 18	1.35	1.80	1.80	11 3/4 x 15
14	3.35	3.20	3.20	12 7/8 x 19 3/8	1.50	2.00	2.00	12 7/8 x 16 1/4
16	4.55	4.15	4.15	14 3/4 x 22 1/4	2.00	2.35	2.35	14 3/4 x 18 1/2
18	5.10	4.50	4.50	16 1/2 x 24 1/8	2.30	2.60	2.60	16 1/2 x 21
20	7.10	6.25	6.25	18 1/4 x 26 7/8	3.10	3.25	3.25	18 1/4 x 23
24	8.10	7.50	7.50	22 x 31 1/8	4.80	4.20	4.20	22 x 27 1/4

Cranite Gaskets: Cranite Gaskets are not recommended for temperatures higher than 750° F.

Corrugated Copper Gaskets: Corrugated Copper Gaskets are recommended only when used with smooth faced flanges, and should be coated with Crane High Temperature Thread Lubricant when installed.

Corrugated Soft Iron Gaskets: These gaskets are made of Armco Iron terne plate. They are recommended only when used with smooth faced flanges, and should be coated with Crane High Temperature Thread Lubricant when installed.

Other materials: Gaskets made from other commercial gasket materials can be made to order; prices on application.

Sheet Packings . . . page 363

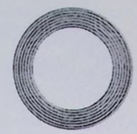
Large Tongue and Groove Gaskets . . . page 361

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Gaskets



Ring Gaskets extend to the inside edge of the bolts.



Corrugated Metallic Gasket

For 900-Pound Steel Flanged Joints

Size	Ring Gaskets: List Prices, Each: 1/16-inch Cranite	27-gauge Corrugated Copper	Corrugated Soft Iron	Ring Gaskets: Inside and Outside Diameters Inches	Large Male and Female Gaskets: List Prices, Each: 1/16-inch Cranite	27-gauge Corrugated Copper	Corrugated Soft Iron	Large Male and Female Gaskets: Inside and Outside Diameters Inches
Inches								
For sizes smaller than 3-inch, use Gaskets for 1500-Pound Steel								
3	.58	.59	.59	2 7/8 x 6 5/8	.23	.30	.30	2 7/8 x 5
3 1/2	.72	.73	.73	3 3/8 x 7 1/2	.31	.35	.35	3 3/8 x 5 1/2
4	.90	.88	.88	3 7/8 x 8 1/8	.40	.45	.45	3 7/8 x 6 3/16
5	1.20	1.25	1.25	4 3/4 x 9 3/4	.52	.60	.60	4 3/4 x 7 5/16
6	1.70	1.65	1.65	5 3/4 x 11 3/8	.60	.75	.75	5 3/4 x 8 1/2
8	2.50	2.40	2.40	7 1/2 x 14 1/8	.90	1.05	1.05	7 1/2 x 10 5/8
10	3.40	3.40	3.40	9 3/8 x 17 1/8	1.25	1.45	1.45	9 3/8 x 12 3/4
12	4.05	3.90	3.90	11 1/8 x 19 5/8	1.45	1.95	1.95	11 1/8 x 15
14	4.15	4.00	4.00	12 1/4 x 20 1/2	1.70	2.25	2.25	12 1/4 x 16 1/4
16	5.10	4.55	4.55	14 x 22 5/8	2.40	2.90	2.90	14 x 18 1/2
18	6.30	5.50	5.50	15 3/4 x 25 1/8	2.70	3.00	3.00	15 3/4 x 21
20	7.35	6.65	6.65	17 1/2 x 27 1/2	3.50	3.65	3.65	17 1/2 x 23
24	10.15	9.65	9.65	21 x 33	5.10	4.60	4.60	21 x 27 1/4

For 1500-Pound Steel Flanged Joints

Size	Ring Gaskets: List Prices, Each: 1/16-inch Cranite	27-gauge Corrugated Copper	Corrugated Soft Iron	Ring Gaskets: Inside and Outside Diameters Inches	Large Male and Female Gaskets: List Prices, Each: 1/16-inch Cranite	27-gauge Corrugated Copper	Corrugated Soft Iron	Large Male and Female Gaskets: Inside and Outside Diameters Inches
Inches								
1/2	.13	.16	.16	1/2 x 2 1/2	.05	.07	.07	1/2 x 1 3/8
3/4	.15	.18	.18	11/16 x 2 3/4	.06	.09	.09	11/16 x 1 11/16
1	.19	.20	.20	7/8 x 3 1/8	.07	.12	.12	7/8 x 2
1 1/4	.22	.24	.24	1 1/8 x 3 1/2	.08	.14	.14	1 1/8 x 2 1/2
1 1/2	.24	.26	.26	1 3/8 x 3 7/8	.11	.18	.18	1 3/8 x 2 7/8
2	.48	.50	.50	1 7/8 x 5 5/8	.15	.20	.20	1 7/8 x 3 5/8
2 1/2	.60	.62	.62	2 1/4 x 6 1/2	.19	.24	.24	2 1/4 x 4 1/8
3	.65	.67	.67	2 3/4 x 6 7/8	.24	.32	.32	2 3/4 x 5
4	.95	.95	.95	3 5/8 x 8 1/4	.43	.48	.48	3 5/8 x 6 3/16
5	1.30	1.35	1.35	4 3/8 x 10	.57	.68	.68	4 3/8 x 7 5/16
6	1.65	1.60	1.60	5 3/8 x 11 1/8	.67	.83	.83	5 3/8 x 8 1/2
8	2.50	2.40	2.40	7 x 13 7/8	1.00	1.18	1.18	7 x 10 5/8
10	3.60	3.60	3.60	8 3/4 x 17 1/8	1.45	1.65	1.65	8 3/4 x 12 3/4
12	4.95	4.75	4.75	10 3/8 x 20 1/2	1.75	2.35	2.35	10 3/8 x 15

Cranite Gaskets: Cranite Gaskets are not recommended for temperatures higher than 750° F.

Corrugated Copper Gaskets: Corrugated Copper Gaskets are recommended only when used with smooth faced flanges, and should be coated with Crane High Temperature Thread Lubricant when installed.

Corrugated Soft Iron Gaskets: These gaskets are made of Armco Iron terne plate. They are recommended only when used with smooth faced flanges, and should be coated with Crane High Temperature Thread Lubricant when installed.

Other materials: Gaskets made from other commercial gasket materials can be made to order; prices on application.

Sheet Packings . . . . page 363

Large Tongue and Groove Gaskets . . . . page 361

Gaskets

Rubber Gaskets: "CC" Rubber Tongue and Groove Gaskets are recommended only for 175-Pound and 250-Pound Cast Iron Flanged Joints.

Cranite Gaskets: Cranite Gaskets are not recommended for temperatures higher than 750° F.

Corrugated Copper Gaskets: Corrugated Copper Gaskets are recommended only when used with smooth faced flanges, and should be coated with Crane High Temperature Thread Lubricant when installed.

Corrugated Soft Iron Gaskets: These gaskets are made of Armco Iron terne plate. They are recommended only when used with smooth faced flanges, and should be coated with Crane High Temperature Thread Lubricant when installed.

Other materials: Gaskets made from other commercial gasket materials can be made to order; prices on application.

Sheet Packings . . . . page 363

For Large Tongue and Groove Flanged Joints

Size	List Prices, Each: 1/16-inch "CC" Rubber	1/16-inch Cranite	27-gauge Corrugated Copper	Corrugated Soft Iron	Inside and Outside Diameters Inches
Inches					
1/2	.05	.04	.13	.13	1 x 1 3/8
3/4	.05	.04	.13	.13	15/16 x 1 11/16
1	.06	.05	.15	.15	1 1/2 x 2
1 1/4	.07	.06	.17	.17	1 7/8 x 2 1/2
1 1/2	.07	.06	.18	.18	2 1/8 x 2 7/8
2	.07	.07	.19	.19	2 7/8 x 3 5/8
2 1/2	.07	.09	.21	.21	3 3/8 x 4 1/8
3	.11	.14	.29	.29	4 1/4 x 5
3 1/2	.11	.16	.35	.35	4 3/4 x 5 1/2
4	.13	.17	.42	.42	5 3/16 x 6 3/16
5	.13	.21	.55	.55	6 5/16 x 7 5/16
6	.15	.23	.65	.65	7 1/2 x 8 1/2
8	.23	.30	.90	.90	9 3/8 x 10 5/8
10	.32	.43	1.20	1.20	11 1/4 x 12 3/4
12	.38	.52	1.70	1.70	13 1/2 x 15
14	.40	.57	1.80	1.80	14 3/4 x 16 1/4
16	.55	.77	2.20	2.20	16 3/4 x 18 1/2
18	.60	1.00	2.35	2.35	19 1/4 x 21
20	.75	1.25	2.65	2.65	21 x 23
24	1.00	1.65	3.35	3.35	25 1/4 x 27 1/4

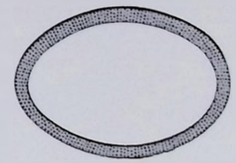
Kearsarge Gaskets



Handhole Gasket

Style No. 116
Boiler Handhole and Manhole Gaskets

Style No. 118
Jointless Tube Plate Gaskets



Manhole Gasket

Kearsarge Boiler Handhole and Manhole Gaskets, Style No. 116, are made by folding to the proper size and shape several plies of Asbesto-Metallic cloth, made from tightly twisted asbestos yarn with a fine wire insertion, which has been treated with a special heat-resisting compound. The finished gaskets are so formed that the edges of the folds are on the inner side, while on the outer side, where the gasket is exposed to pressure, there is an unbroken, rounded shoulder. They may be used repeatedly, if they are properly applied. Furnished in oval form to fit the plate for which they are intended.

Handhole gaskets have an average inside diameter between 3" and 6"; manhole gaskets have an average inside diameter of 6" or over. Shapes other than oval can be furnished on order.

The minimum flange width is 3/8". The thickness varies according to the number of plies of fabric, each ply being approximately 1/16" thick. Best results are generally obtained through the use of gaskets three or four plies thick. Gaskets thicker than four-ply are unnecessary, because the thicker the gasket the greater the tendency to blow out. A two-ply gasket is usually not efficient.

In ordering Kearsarge gaskets, specify the two inside diameters, the width of the flange, and the number of plies desired in the gasket.

Kearsarge Jointless Tube Plate Gaskets, Style No. 118, are recommended for tube plate work. Their advantage lies in the fact that there are no taped joints to interfere with perfect seating, so necessary when gaskets with a very narrow flange are used.

Made in the following sizes only:

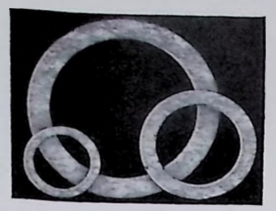
For B. & W. boilers: Size, inches	Thickness of gasket
4 15/32 x 5 13/32 x 1/4 or 5/16 (oval)	3-ply or 4-ply
4 29/32 x 4 31/32 x 1/4 or 5/16 (square)	3-ply or 4-ply
For Heine boilers: Size, inches	**Thickness of gasket**
3 1/2 i. d. x 3/8 flange (round)	3-ply or 4-ply
3 1/2 x 4 1/2 i. d. x 3/8 flange (oval)	3-ply or 4-ply

In ordering, specify the size desired, and the make of boiler upon which the gaskets are to be used.

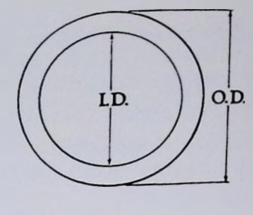
Prices on application

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Ring Gaskets for Unions



When ordering, always specify the gasket material, and state size and kind of union.



Gaskets for Screwed Unions and Union Fittings

List Prices and Dimensions

Size of union or union fitting		Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Standard Malleable Iron Unions and Union Fittings and *Circulating Boiler Fittings	Rubber	Per 100	.70	.90	1.10	1.30	1.60	2.00	2.40	3.00	4.00	5.25	6.75	8.50	11.00
	Cranite	Per 100	1.00	1.25	1.55	1.85	2.25	2.80	3.35	4.20	5.60	7.35	9.50	12.00	15.50
	I. D.	Inches	15/32	17/32	21/32	13/16	1	1 1/4	1 19/32	1 27/32	2 5/16	2 3/4	3 3/8	3 7/8	4 7/16
	O. D.	Inches	25/32	29/32	1 1/16	1 1/4	1 1/2	1 27/32	2 1/8	2 15/32	3 1/32	3 5/8	4 7/32	4 7/8	5 1/2

Gaskets for Flange Unions

List Prices and Dimensions

Size of union	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12
Standard Brass Flange Unions	CC Rubber Each			.05	.05	.06	.07	.07	.08	.09	.11	.13	.15	.20	.30	.42		
	I. D. Inches			1	1 1/16	1 1/4	1 11/16	1 15/16	2 3/8	2 7/8	3 1/2	4	4 1/2	5 9/16	6 5/8	8 5/8		
	O. D. Inches			1 1/2	1 11/16	1 27/32	2 3/8	2 7/8	3 1/2	3 7/8	4 5/8	5 1/4	5 3/4	7	8 1/4	10 1/2		
250-Pound Brass Flange Unions	CC Rubber Each				.05	.06	.07	.07	.08	.09	.11	.13	.15	.20	.30	.42		
	Cranite Each				.06	.07	.08	.08	.10	.13	.16	.18	.21	.27	.42	.60		
	I. D. Inches				1 1/16	1 5/16	1 11/16	1 15/16	2 3/8	2 7/8	3 1/2	4	4 1/2	5 9/16	6 5/8	8 5/8		
	O. D. Inches				1 7/8	2 1/8	2 5/8	2 7/8	3 1/2	3 7/8	4 5/8	5 1/4	5 3/4	7	8 1/4	10 1/2		
Standard Cast Iron Flange Unions	CC Rubber Each			.05	.05	.06	.07	.07	.08	.09	.11	.13	.15	.20	.30	.42	.55	.80
	I. D. Inches			13/16	1 1/16	1 5/16	1 11/16	1 15/16	2 3/8	2 7/8	3 1/2	4	4 1/2	5 9/16	6 5/8	8 5/8	10 3/4	12 3/4
	O. D. Inches			1 3/8	1 7/8	2 1/8	2 5/8	2 7/8	3 1/2	3 7/8	4 5/8	5 1/4	5 3/4	7	8 1/4	10 1/2	12 13/16	15 1/16
250-Pound Cast Iron Flange Unions	CC Rubber Each			.05	.05	.06	.07	.07	.08	.09	.11	.13	.15	.20	.30	.42		
	Cranite Each			.06	.06	.07	.08	.08	.10	.13	.16	.18	.21	.27	.42	.60		
	I. D. Inches			1 1/16	1 1/16	1 5/16	1 11/16	1 15/16	2 3/8	2 7/8	3 1/2	4	4 1/2	5 9/16	6 5/8	8 5/8		
	O. D. Inches			1 7/8	1 7/8	2 1/8	2 5/8	2 7/8	3 1/2	3 7/8	4 5/8	5 1/4	5 3/4	7	8 1/4	10 1/2		
5-Bolt Cast Iron Union	Rubber Each	(Cloth inserted rubber gasket)					.07											
	I. D. Inches						2 1/4											
	O. D. Inches						3 3/8											
Standard Mall. Iron Flange Unions	CC Rubber Each				.05	.06	.07	.07	.08	.09	.11	.13	.15	.20	.30	.42	.55	.80
	Cranite Each				.06	.07	.08	.08	.10	.13	.16	.18	.21	.27	.42	.60	.75	1.10
	I. D. Inches				1 1/16	1 1/4	1 11/16	1 15/16	2 3/8	2 7/8	3 1/2	4	4 1/2	5 9/16	6 5/8	8 5/8	10 3/4	12 3/4
	O. D. Inches				1 11/16	1 27/32	2 3/8	2 7/8	3 1/2	3 7/8	4 5/8	5 1/4	5 3/4	7	8 1/4	10 1/2	12 13/16	15 1/16
Tongue & Groove Unions	Cranite Dozen	.25	.30	.30	.40	.40	.50	.50	.55	.60	.70	.85	1.00	1.20	1.50	2.40	3.00	3.75
	Lead Dozen	.45	.50	.50	.70	.90	1.25	1.25	1.50	1.70	1.85	2.15	2.40	2.70	3.50	4.80	5.60	6.50
	I. D. Inches	19/32	23/32	7/8	1 1/8	1 3/8	1 11/16	1 15/16	2 7/16	2 15/16	3 9/16	4 1/16	4 9/16	5 5/8	6 11/16	9 3/8	11 1/4	13 1/2
	O. D. Inches	31/32	1 3/32	1 7/32	1 15/32	1 25/32	2 7/32	2 15/32	3 3/32	3 21/32	4 9/32	4 27/32	5 15/32	6 27/32	7 27/32	10 5/8	12 3/4	15

***Gaskets for Circulating Boiler Fittings:** Circulating Boiler Fittings use the following size gaskets:

No. 585 Elbows —
1/2 x 1/2 x 3/4 and 1/2 x 1/2 x 1" ..... 1/2" gasket
3/4 x 1/2 x 3/4, 3/4 x 1/2 x 1, and 3/4 x 3/4 x 1" .. 3/4" gasket

No. 586 Elbows and No. 589 Couplings —all sizes ..... 3/4" gasket

Thickness of gaskets: All gaskets listed on this page are 1/16-inch thick.

"CC" Rubber gaskets: "CC" Rubber is a superior grade of rubber packing, unusually tough and durable. It is made to a special formula and is given frequent and careful tests to assure the finest quality. CC Rubber is recommended for all pressures on services such as saturated steam, hot and cold water, air, and gas.

"Cranite" gaskets: "Cranite", the highest grade of sheet packing obtainable, is an exceptionally strong and durable asbestos composition that does not deteriorate with age. Only especially selected long fibre is used in its manufacture. It is recommended for service on saturated and superheated steam, oil, gas, air, gasoline, ammonia, and similar fluids.

Cranite packing has been inspected and is listed by the Underwriters' Laboratories (National Board of Fire Underwriters), Chicago, for use on hazardous liquids.

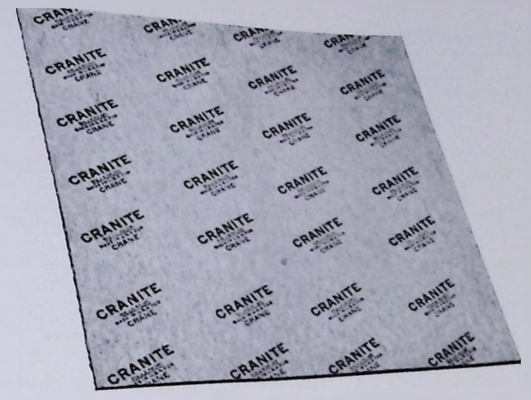
Cranite Sheet Packing

Asbestos Composition

Manufactured Solely for Crane Co.

CRANITE Is the Highest Grade of Sheet Packing Obtainable

The name "CRANITE" is registered in the United States Patent Office



Cranite is a packing for severe service, such as superheated steam, dry air, acids, oils, ammonia, alkali, gases, etc.

Cranite gaskets are used on all Crane valves for high pressure, saturated or superheated steam.

Cranite is an asbestos packing, and only selected long fiber is used in its manufacture, giving it added strength.

As **Cranite** does not deteriorate with age. it will be found economical to purchase it in quantities.

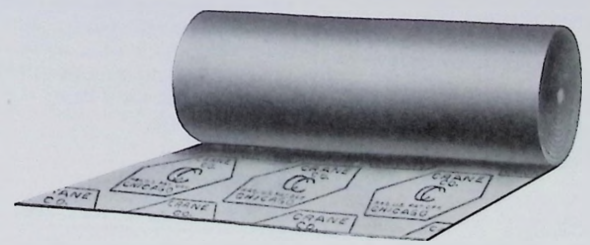
Regularly, the packing comes in sheets. 1/16-inch thick, size 36x36 inches. also 48x48 inches.

If sufficient time is allowed, this packing will be made to order in any thickness from 1/64 to 1/4 inch and in sizes up to 120 inches square.

Cranite Packing has been inspected and is listed by the Underwriters' Laboratories (National Board of Fire Underwriters), Chicago, for use on hazardous liquids.

C. C. Rubber Sheet Packing

Manufactured Solely for Crane Co.



Adapted for all pressures of saturated steam, hot and cold water, air, gases, etc. Made in rolls 36 inches wide, containing about 200 pounds and in thicknesses of 1/16 and 1/8-inch. Can be furnished in rolls up to 72 inches wide.

List Prices

Cranite Packing	Per Pound	1.00
C. C. Packing	Per Pound	.50

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Rod Packings

Kearsarge Rod Packing



List Prices and Dimensions

Kearsarge Lubricated		Coil Form Per Pound	Ring Form 1½ I.D. and up Per Pound
C166	½-inch and up	3.00	4.30
	¼, 5/16, ⅜ and 7/16-inch	3.40	

Unless specified, C166 will be shipped lubricated

Kearsarge Rod, Style No. 166, for service against steam, air and gas up to 500° F. Where packing space is ⅜ inch or more, it retains its efficiency for long periods due to the special folded construction of the center block and the rubber expansion cushion. Furnished in following forms: spiral (S 166); ring (R 166); coil (C 166). Style No. 15 is furnished without the rubber expansion cushion, in spiral, ring and coil forms.

Centripac Packing



List Prices and Dimensions

Centripac		Coil Form Per Pound	Ring Form 1½ I.D. and up Per Pound
C7	½-inch and up	2.40	3.40
	3/16 through 7/16-inch	2.80	
C11	½-inch and up	2.40	3.40
	3/16 through 7/16-inch	2.80	
C18	½-inch and up	3.00	4.10
	3/16 through 7/16-inch	3.40	

Centripac Packing, with plaited construction, is especially designed for any centrifugal service. Furnished in following forms: without wire, coil (C 7), ring (R 7); wire inserted, coil (C 11), ring (R 11); without wire and with a special lubricant for service against gasoline and other cold mineral oils, in coil form (C 18), and ring form (R 18).

Mogul Twist Packings



List Prices

Mogul		Coil Form Per Pound
C193	3/16-inch and up	2.20
	1/16 to ⅛-inch	2.40
C222	3/16-inch and up	2.60
	⅛-inch	3.10

⅛ to ½-inch furnished on 1-pound spools
Other sizes on 5, 10, 25 and 50-pound reels

Mogul Packings, excellent utility packings for general service, retain their original density, since they contain no wax to be lost in the heat of the stuffing box. Twisted Mogul, unstranded into smaller sizes, and Braided Mogul, in coil forms, are especially adapted for use on reciprocating rods where packing space is small.

Palmetto Twist Packings



Sizes ¼ to 2-Inches

List Prices

Palmetto Packing		Coil Form Per Pound	How Shipped
Twist and Round Braided	⅛ to ¼-inch	4.80	¼ pound spools
Twist and Round Braided	⅛ to ½-inch	4.20	1 pound spools
Braided only	¼ to ⅝-inch	4.20	2 pound boxes
Braided only	¼-inch and up	4.20	5 pound boxes

This packing is especially designed to meet the exacting conditions of steam, super steam, air and ammonia. It is made of a material that cannot char or burn and owing to a peculiar method of lubrication it does not get hard in service. Boxes contain about 5 pounds each.

Interlocked Braided Asbestos



Interlocked Braided Asbestos, Nos. 255 and 257, for packing against saturated or superheated steam, all kinds of water, oils and caustics or acids, unlike other braided packings, have an integral braided structure which assures unusually long life. Furnished in following forms: without wire, coil (C 255), ring (R 255); with wire, coil (C 257), ring (R 257). Sizes ¼" and up.

List Prices and Dimensions

Interlocked		Coil Form Per Pound	Ring Form 1½ I.D. and up Per Pound
C255	½-inch and up	2.40	3.40
	¼, 5/16, ⅜ and 7/16-inch	2.80	
C257	½-inch and up	2.40	3.40
	¼, 5/16, ⅜ and 7/16-inch	2.80	

⅛ to ½-inch furnished on 1-pound spools
Other sizes on 5, 10, 25 and 50-pound reels

Rod Packings

Cross Diagonal Packing



List Prices and Dimensions

Cross Diagonal		Per Pound	Form	How Shipped
S271	½-inch and up	2.40	Spiral	1 length per box
	¼, 5/16, ⅜ and 7/16-inch	2.70	Spiral	
C271	½-inch and up	2.30	Coil	
	¼, 5/16, ⅜ and 7/16-inch	2.60	Coil	
R271	1½-inch I.D. and up	3.40	Ring	

¼ to 1-inch sizes in 10 to 12 pound boxes
Larger sizes in boxes in proportion to size of packing

Cross Diagonal Rod Packing, for service against hot and cold water, low-pressure steam, ammonia, light oils, and mineral seal oil, in use on reciprocating rods and plungers, allows for the unusual expansion incident to hot-water and ammonia service. Furnished in following forms: spiral (S 271), coil (C 271), and ring (R 271). Sizes ¼-inch and up.

Universal Piston Packing



List Prices and Dimensions

Universal		Per Pound	Form
S33	½-inch and up	5.40	Spiral
	⅜ to 7/16-inch	5.80	Spiral
C33	½-inch and up	5.10	Coil
	⅜ to 7/16-inch	5.50	Coil
R33	2-inch I.D. and up	5.90	Ring
	Step Joint Cemented, 2-inch I.D. and up	8.10	Ring

Universal Piston Packing for service against hot and cold water, brine, air, and oils, in use on inside-packed pumps, assures increased economy, longer life, greater flexibility and resiliency. Furnished in spiral form (S 33), coil (C 33), and ring form (R 33). Sizes ⅜-inch and up.

Flax Packings

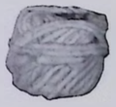


List Prices and Dimensions

Flax		Per Pound	Form
C189	½-inch and up	1.80	Coil
	¼, 5/16, ⅜ and 7/16-inch	2.00	Coil
R189	1½-inch I.D. and up	2.60	Ring

Flax Packings are recommended for service against cold water, either fresh or salt and brine and are available in regularly lubricated styles in coil and ring form. Can be furnished graphited throughout when required, and with more lubrication than standard if ordered double-dipped. W.P.H. Flax Packings are available for severe service conditions requiring W.P.H. Flax, in hard, medium and soft densities.

Asbestos Wick Packing



List Prices and Dimensions

Asbestos Wick		Per Pound
4202	Standard 3-ply, approx. ¼-inch	1.00
	1-ply Special, approx. 5/32-inch	1.30
	2-ply Special, approx. 7/32-inch	1.30

Asbestos Wick Packings are made in nine standard styles, for the many service conditions which call for the use of asbestos wick. These include packings of various combinations of pure and commercially pure asbestos roving twisted together; pure blue African roving twisted together for acid work; pure felted asbestos with a small cotton yarn in the center for added strength; loose twisted; and hard finished.

Twisted Asbestos Rope Packing



List Prices and Dimensions

Asbestos Twisted Rope		Per Pound
4200	⅜-inch	1.40
	½-inch and up	1.20

Twisted Asbestos Rope Packings are made in six standard styles, in sizes ⅜-inch in diameter and up, for various service conditions, including a stranded pure blue African asbestos rope for acid work (½-inch and up). **Braided Asbestos Rope** is made in ten standard styles in sizes ¼-inch and up; round, square, plain, and wire-inserted.

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Crane Thread Lubricants

For Making Tight Threaded Joints



Crane Black Thread Lubricant

Sold in 1, 5, 10, and 20-Pound Cans



Crane White Thread Lubricant

Sold in 1 and 5-Pound Cans



Crane High-Temperature Thread Lubricant

Sold in 1½ and 7½-Pound Cans

Crane Co. has developed three lubricants for use in making up threaded joints:

Crane "BLACK" Thread Lubricant for industrial purposes.

Crane "WHITE" Thread Lubricant for plumbing installations, or where the black color is objectionable.

Crane "HIGH-TEMPERATURE" Thread Lubricant for threaded joints used under high temperatures.

List Prices

Crane Black Thread Lubricant	Per Pound	.50
Crane White Thread Lubricant	Per Pound	.50
Crane High-Temperature Thread Lubricant	Per Pound	1.00

In the making of tight threaded pipe joints it is necessary that the threads on pipe as well as fittings be smooth and of the proper taper and pitch in order to form a substantial metal to metal joint. As the making up of threaded joints causes the pipe and fitting to generate heat due to the friction incidental to the assembly, it is desirable to use a lubricant having the proper qualities to reduce such friction to a minimum in order to establish metal to metal contact of the threads. Crane Thread Lubricants are not recommended for conditions requiring a material that will harden and cement, or provide a seal against leakage due to imperfect threading.

Crane "BLACK" Thread Lubricant (formerly known as Crane Cement) has been used successfully for industrial pipe thread applications for the past fifty years and has been ordered in ton lots for use in making up threaded joints on piping for oil and gas service.

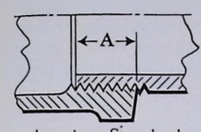
Crane "WHITE" Thread Lubricant has been developed particularly for plumbing installations where a black lubricant has been objectionable. It has exceptionally good lubricating qualities and is unaffected by hot and cold water, steam and gas. It has very good spreading quality and goes twice as far as ordinary commercial thread lubricants. The ingredients used in making this lubricant are non-poisonous.

Crane "HIGH-TEMPERATURE" Thread Lubricant is the result of years of development work in an endeavor to find a suitable lubricant having low frictional qualities and which, when subjected to high temperature service, will minimize the tendency of the metal to gall when being unscrewed. Threaded joints after having been subjected to a temperature of 1000° F. can be taken apart without difficulty and without resulting in the seizing or galling of the threads. For flange bolting subjected to high temperature service this lubricant is ideal in that it permits maximum stress to be obtained in a bolt with a minimum amount of power applied to the nut. Furnace fittings used in oil refineries when made up with this lubricant have been subjected to extremely high temperatures and it was found possible to break the joints without difficulty and use the same bolting material repeatedly.

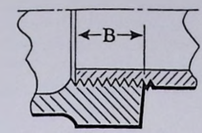
Crane Black and Crane White Thread Lubricants always are furnished in 1-Pound Cans unless otherwise ordered. Crane High-Temperature Thread Lubricant always is furnished in 1½-Pound Cans unless otherwise ordered.

Normal Engagement

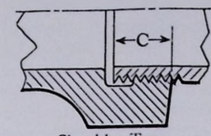
Between Male and Female Threads to Make Tight Joints



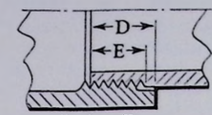
American Standard Pipe Threads



A.P.I. Line Pipe Threads



Shoulder Type Drainage Fitting Threads



Railing Fitting Threads

Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10	11	12	14
A	¼	⅜	⅜	½	9/16	11/16	11/16	11/16	¾	15/16	1	1 1/16	1⅛	1 3/16	1¼	1 5/16	1⅜	1 7/16	1½	1⅝	1 11/16	1¾	
B*	¼	⅜	⅜	½	9/16	11/16	11/16	11/16	11/16	1	1	1¼	1¼		1½	1 9/16		1 11/16		1⅞		2	
C†						9/16	⅝	⅝	⅝	⅞	15/16	1	1 1/16		1 3/16	1¼		1⅜		1 9/16		1 11/16	1⅞
D§				½	½	⅝	11/16	¾	¾	1	1 1/16	1⅛	1 3/16										
E	Length of thread on pipe, see the section of this catalogue devoted to Pipe.																						

Dimensions given do not allow for variations in tapping or threading.

* Using an A.P.I. Line Pipe Male Thread and an American Standard Pipe Threaded Fitting. American Standard Pipe Threaded Fittings may be used providing there are no obstructions in the thread chambers to interfere with the longer A.P.I. Male Threads.

† Using American Standard Taper Male Thread with Crane shoulder type Drainage Fittings. The male thread, however, should not be threaded small to gauge and not more than one turn large.

§ Using a special male thread, shown in the section of this catalogue devoted to Pipe, with Crane Railing Fittings. The male thread is basically the same as the American Standard Taper Pipe Thread except it is much shorter.

For detail of thread dimensions, see the section of this catalogue devoted to Pipe.

Threaded Pipe Joints

Threads

In screwed joints having strength, tightness, and durability, it is necessary to have clean-cut and uniform threads.

The threads should be tapered and smooth, cut with the correct taper, lead, thread angle, and diameters. Reasonable manufacturing tolerances are allowed on all of the thread elements mentioned to take care of variations in threading. The diameters should be such as to allow sufficient hand engagement and yet allow enough threads for wrench or power make-up.

The thread lengths should be long enough to compensate for pipe strains usually present in the various types of thread joint services. A short thread is satisfactory for joints where little or no pipe strains exist, but longer threads are required where extreme pipe strains are encountered, such as in Oil Field Casing Thread joints.

Standardized Threads

Several Standards have been established covering pipe threads for various purposes. The oldest and probably most commonly used is the American Standard for Pipe Threads, known as A.S.A. Standard B2-1910. There are also the American Petroleum Institute Standards No. 5A and 5L covering Oil Field Tubular Goods, such as Line Pipe and Casing Threads. The general dimensions and details of these threads are given in the section of this catalogue devoted to Pipe.

Continued on page 368

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Thread Assembling

In making up screwed pipe joints it is very important that the threads in both parts be thoroughly cleaned. Any threads which may have become burred or bent should be straightened or removed and afterward a good grade of lubricant should be applied to the threads. The lubricant reduces the friction which allows the two parts to be pulled up further, resulting in a more effective pipe joint. Pipe joints should not be screwed together too rapidly and thereby avoid objectionably raising the temperature of the two parts. For Crane Thread Lubricants, see page 366.

Normal Engagements

The normal amount of engagement to make a tight joint for various types of screwed material is given in the table on page 367. These dimensions have been established from tests made under practical working conditions.

The normal engagement specified for American Standard Pipe Thread joints is based on both parts being threaded to the American Standard for Pipe Threads, and for A.P.I. Line Pipe Threads it has been based on using A.P.I. Line Pipe Thread for the male thread and American Standard Pipe Thread for the female thread. The shoulder type Drainage Fitting Thread engagement is based on using Crane Fittings and American Standard Pipe Thread dimensions on the male thread but holding the male thread to a special tolerance as covered in the foot note of the table.

The Railing Fitting thread engagement is based on using Crane fittings and a special male thread as detailed in the section of this catalogue devoted to Pipe. This thread is basically the same as the American Standard Pipe Thread, except that it is much shorter.

In order to obtain the thread engagements listed in the table it is necessary to vary the torque or power applied according to the size, metal and weight of material used. For example, it requires considerably less power to make up a screwed joint using a light brass valve than a high pressure steel valve.

Screwed Companion Flanges

The normal length of thread engagement listed in the table on page 367 does not apply to Screwed Companion Flanges. The length of thread engagement for Screwed Companion Flanges depends upon the weight of the flange, considering pressure, and the type of thread joint employed.

There are two types of threaded flange joints in general use; one where the pipe and the flange are refaced after assembly as distinguished from the other in which the pipe and the flange are not refaced. Pipe threaded for a refaced job should have a thread sufficiently long to extend slightly beyond the face of the flange when assembled, to allow for refacing. For the joint which is not to be refaced, the thread on the pipe should be slightly shorter so that the end of the threaded pipe will be about one thread from the face of the flange when assembled.

Leaky Joints

Leaky joints can usually be traced either to faulty threading or an improper lubricant. Frequently the trouble lies in the thread on the pipe which may have been cut with dull or improperly adjusted threading tools resulting in wavy, shaved, rough or chewed threads.

Wavy threads are noticeable both to the eye and touch, due to circumferential waves or longitudinal flats of slightly helical form rather than the desired true circular form.

Shaved threads appear to have been threaded with two dies, one not matching the other, giving a double thread appearance at the start of the thread.

Rough or chewed threads are noticeably rough and torn.

Should the threads have any of these defects it is possible that leaky joints might result.

Crane Screwed Materials

Crane threaded materials have smooth, accurately cut threads properly gauged and carefully inspected for taper, lead, thread angle and alignment.

They are threaded in compliance with the American Standard for Pipe Threads or the American Petroleum Institute Standards as the requirements may be and the start of each thread is properly chamfered for ease in assembling.

Crane Co. has taken extraordinary precautions to insure satisfactory thread joints by maintaining constantly careful inspection of not only the product itself but the threading equipment as well, which is the best available.

A complete gauging system has also been established which includes Master Gauges approved by the National Bureau of Standards, Reference Gauges and Working Gauges. These gauges are checked periodically and frequently so as to keep them well within the allowable tolerances. In fact, Crane threading is held to much closer tolerances than actually required to make a tight joint.

Templates for Drilling

Brass Flanged Valves, Flanged Fittings, and Flanges

Dimensions, in Inches

Size	150-Pound MSS Standard							300-Pound Crane Standard						
	Diameter of Flange	Thickness of Flange	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	Length of Bolts	Length of Bolt-Studs with 2 Nuts	Diameter of Flange	Thickness of Flange	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	Length of Bolts	Length of Bolt-Studs with 2 Nuts
½	3½	5/16	2⅜	4	½	1¼	1⅞							
¾	3⅞	11/32	2¾	4	½	1½	1⅞	4⅝	17/32	3¼	4	⅝	2	2½
1	4¼	⅜	3⅛	4	½	1½	2	4⅞	19/32	3½	4	⅝	2	2⅝
1¼	4⅝	13/32	3½	4	½	1½	2	5¼	⅝	3⅞	4	⅝	2	2¾
1½	5	7/16	3⅞	4	½	1½	2⅛	6⅛	11/16	4½	4	¾	2¼	3⅛
2	6	½	4¾	4	⅝	1¾	2½	6½	¾	5	8	⅝	2¼	3
2½	7	9/16	5½	4	⅝	2	2⅝	7½	13/16	5⅞	8	¾	2½	3⅜
3	7½	⅝	6	4	⅝	2	2¾	8¼	29/32	6⅝	8	¾	2¾	3½
3½	8½	11/16	7	8	⅝	2¼	2⅞	9	31/32	7¼	8	¾	3	3⅝
4	9	11/16	7½	8	⅝	2¼	2⅞	10	1 1/16	7⅞	8	¾	3	3⅞
5	10	¾	8½	8	¾	2½	3¼	11	1⅛	9¼	8	¾	3¼	4
6	11	13/16	9½	8	¾	2½	3⅜	12½	13/16	10⅝	12	¾	3¼	4⅛
8	13½	15/16	11¾	8	¾	2¾	3⅝	15	1⅜	13	12	⅞	3¾	4¾
10	16	1	14¼	12	⅞	3¼	4⅛							
12	19	1 1/16	17	12	⅞	3¼	4¼							

150-Pound MSS Standard: This Standard is known as MSS 150-Pound SP Bronze Flange Standard (No. SP-2a-1930). It was developed and adopted as "Standard Practice" by the Manufacturers' Standardization Society of the Valve and Fittings Industry.

The flange diameter, bolt circle, and number and diameter of bolts are the same as for the 125-Pound Cast Iron and 150-Pound Steel American Standards, but the thickness and facing of the flanges are different.

300-Pound Crane Standard: Except for flange thickness, bolt lengths, and bolt-stud lengths, the dimensions of this Standard conform to the MSS 250-Pound SP Bronze Flange Standard (No. SP-2b-1930). The thickness is greater than that specified by the MSS 250-Pound Standard, and the bolt and bolt-stud lengths are correspondingly longer.

The flange diameter, bolt circle, and number and diameter of bolts are the same as for the 250-Pound Cast Iron and 300-Pound Steel American Standards, but the thickness and facing of the flanges are different.

Facing: Flange faces are plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

Bolt holes: On sizes 2-inch and smaller, bolt holes are drilled 1/16-inch larger than the diameter of bolts; on sizes 2½-inch and larger, they are drilled ⅛-inch larger than the diameter of bolts.

Bolt holes are in multiples of four, so that valves or fittings can be turned to face in any quarter when being installed. Bolt holes straddle the center line unless otherwise ordered.

Spot facing: Bolt holes in all Crane Brass Flanged Valves, Flanged Fittings, and Flanges are spot faced.

Gaskets: Full face gaskets should be used. For list prices of gaskets, see page 357.

When brass flanged material is bolted to iron or steel flanges that normally have a raised face, the raised face should be removed to provide a full face bearing for the gasket. Brass flanged material should not be bolted to Cranelap Flanged Pipe Joints.

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Templates for Drilling

25-Pound and 125-Pound Cast Iron Standards

Dimensions, in Inches

Size	25-Pound Cast Iron Standard							125-Pound Cast Iron Standard						
	Diameter of Flange	Thickness of Flange	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	Length of Bolts A	Length of Bolts B	Diameter of Flange	Thickness of Flange	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	Length of Bolts	Length of Bolt-Studs with 2 Nuts
1								4¼	7/16	3⅛	4	½	1½	
1¼								4⅝	½	3½	4	½	1¾	
1½								5	9/16	3⅞	4	½	1¾	
2	6	½	4¾	4	⅝	1¾	2	6	⅝	4¾	4	⅝	2	
2½	7	9/16	5½	4	⅝	2	2	7	11/16	5½	4	⅝	2¼	
3	7½	⅝	6	4	⅝	2	2¼	7½	¾	6	4	⅝	2¼	
3½	8½	11/16	7	8	⅝	2¼	2¼	8½	13/16	7	8	⅝	2½	
4	9	¾	7½	8	⅝	2¼	2½	9	15/16	7½	8	⅝	2¾	
5	10	¾	8½	8	⅝	2¼	2½	10	15/16	8½	8	¾	2¾	
6	11	¾	9½	8	⅝	2¼	2½	11	1	9½	8	¾	3	
8	13½	¾	11¾	8	⅝	2¼	2¾	13½	1⅛	11¾	8	¾	3¼	
10	16	⅞	14¼	12	⅝	2½	3	16	13/16	14¼	12	⅞	3½	
12	19	1	17	12	⅝	2¾	3	19	1¼	17	12	⅞	3¾	
14	21	1⅛	18¾	12	¾	3¼	3½	21	1⅜	18¾	12	1	4	
16	23½	1⅛	21¼	16	¾	3¼	3½	23½	17/16	21¼	16	1	4¼	
18	25	1¼	22¾	16	¾	3½	3¾	25	1 9/16	22¾	16	1⅛	4½	
20	27½	1¼	25	20	¾	3½	4	27½	1 11/16	25	20	1⅛	4¾	
24	32	1⅜	29½	20	¾	3¾	4¼	32	1⅞	29½	20	1¼	5¼	
30	38¾	1½	36	28	⅞	4¼		38¾	2⅛	36	28	1¼	5¾	
36	46	1⅝	42¾	32	⅞	4¾		46	2⅜	42¾	32	1½	6½	
42	53	1¾	49½	36	1	5		53	2⅝	49½	36	1½	7¼	
48	59½	2	56	44	1	5½		59½	2¾	56	44	1½	7½	
54	66¼	2¼	62¾	44	1	6		66¼	3	62¾	44	1¾		10¼
60	73	2¼	69¼	52	1⅛	6¼		73	3⅛	69¼	52	1¾		10½
72	86½	2½	82½	60	1⅛	6¾		86½	3½	82½	60	1¾		11¼
84	99¾	2¾	95½	64	1¼	7¼		99¾	3⅞	95½	64	2		12½
96	113¼	3	108½	68	1¼	7¾		113¼	4¼	108½	68	2¼		13¾

Length of Bolts

A — Valve or fitting to valve or fitting.
B — Valve or fitting to screwed companion flange.

25-Pound Cast Iron Standard: In sizes 4-inch and larger, the 25-Pound templates for drilling conform to the American Tentative Standard for Cast Iron Pipe Flanges and Flanged Fittings for 25 pounds steam working pressure (B16b2-1931). In sizes 3½-inch and smaller, they are Crane Standard, proportioned from the American Tentative Standard.

Screwed Companion Flanges, sizes 24-inch and smaller, are 125-Pound Standard thickness, with 25-Pound Standard diameter and drilling. See page 289.

125-Pound Cast Iron Standard: The 125-Pound templates for drilling conform to the American Standard for Cast Iron Pipe Flanges and Flanged Fittings for 125 pounds steam working pressure (B16a-1928).

Facing: The flanges are plain faced.

Bolt holes: For bolts smaller than 1¾-inch diameter, bolt holes are drilled ⅛-inch larger than the diameter of the bolt. For bolts 1¾-inch diameter and larger, bolt holes are drilled ¼-inch larger than the diameter of the bolt.

Drilling templates are in multiples of four, so that valves or fittings may be turned to face in any quarter when being installed. Bolt holes straddle the center line unless otherwise ordered.

Spot facing: Bolt holes are not spot faced unless so ordered. An extra charge is made for spot facing.

Templates for Drilling

250-Pound and 800-Pound Hydraulic Cast Iron Standards

Dimensions, in Inches

Size	250-Pound Cast Iron Standard							800-Pound Hydraulic Cast Iron Standard						
	Diameter of Flange	Thickness of Flange	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	Length of Bolts A	Length of Bolt-Studs with 2 Nuts A	Diameter of Flange	Thickness of Flange	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	Length of Bolts B	Length of Bolts C
1	4⅞	11/16	3½	4	⅝	2¼		For sizes smaller than 2-inch, use 600-Pound Steel material.						
1¼	5¼	¾	3⅞	4	⅝	2¼								
1½	6⅛	13/16	4½	4	¾	2½								
2	6½	⅞	5	8	⅝	2½		6½	1¼	5	8	⅝	3¾	3½
2½	7½	1	5⅞	8	¾	3		7½	1⅜	5⅞	8	¾	4¼	4
3	8¼	1⅛	6⅝	8	¾	3¼		8¼	1½	6⅝	8	¾	4½	4¼
3½	9	13/16	7¼	8	¾	3¼		9	1⅝	7¼	8	⅞	5	4¾
4	10	1¼	7⅞	8	¾	3½		10¾	1⅞	8½	8	⅞	5½	5¼
5	11	1⅜	9¼	8	¾	3¾		13	2⅛	10½	8	1	6	5¾
6	12½	17/16	10⅝	12	¾	3¾		14	2¼	11½	12	1	6¼	6
8	15	1⅝	13	12	⅞	4½		16½	2½	13¾	12	1⅛	7	6¾
10	17½	1⅞	15¼	16	1	5		20	2⅞	17	16	1¼	7¾	7½
12	20½	2	17¾	16	1⅛	5½		22	3	19¼	20	1¼	8	7¾
14	23	2⅛	20¼	20	1⅛	5¾		For sizes larger than 12-inch, use 600-Pound Steel material.						
16	25½	2¼	22½	20	1¼	6								
18	28	2⅜	24¾	24	1¼	6¼								
20	30½	2½	27	24	1¼	6½								
24	36	2¾	32	24	1½	7½								
30	43	3	39¼	28	1¾		10¼							
36	50	3⅜	46	32	2		11½							
42	57	3 11/16	52¾	36	2		12							
48	65	4	60¾	40	2		12¾							

Length of Bolts or Bolt-Studs

A — 1/16″ raised face to 1/16″ raised face valve, fitting, or companion flange
B — ¼″ male to ¼″ male valve, fitting, or companion flange
C — ¼″ large male to 3/16″ large female valve, fitting, or companion flange; ¼″ tongue to 3/16″ groove valve, fitting, or companion flange

250-Pound Cast Iron Standard: The 250-Pound templates for drilling conform to the American Standard for Cast Iron Pipe Flanges and Flanged Fittings for 250 pounds steam working pressure (B16b-1928).

These templates apply also to 175-Pound Ferrosteel Gate, Globe, Angle, and Cross Valves, and to 400-Pound W.O.G. and 500-Pound W.O.G. Ferrosteel Double Disc Gate Valves.

The flanges have a 1/16-inch raised face. The raised face is included in the dimension for thickness of flange.

Large male, large female, large tongue, or large groove facing can be supplied to order.

In sizes 24-inch and smaller, these templates are the same as for the 300-Pound Steel American Standard.

800-Pound Hydraulic Cast Iron Standard: The 800-Pound Hydraulic templates for drilling conform to the American Standard for Cast Iron Pipe Flanges and Flanged Fittings for a maximum non-shock hydraulic working pressure of 800 pounds at ordinary air temperatures (B16b1-1931).

Valves and fittings are regularly furnished with a ¼-inch male (large male) face on the flanges.

Companion flanges are regularly furnished with a ¼-inch male (large male) or a 3/16-inch female (large female) face, as ordered.

The height of the male (¼″) is not included in the dimension for thickness of flange.

Valves or fittings with large female, large tongue, or large groove faces, and companion flanges with large tongue or large groove faces can be supplied to order.

Except for flange thickness and length of bolts, these templates are the same as for the 600-Pound Steel American Standard.

Bolt holes: For bolts smaller than 1¾-inch diameter, bolt holes are drilled ⅛-inch larger than the diameter of the bolt. For bolts 1¾-inch diameter and larger, bolt holes are drilled ¼-inch larger than the diameter of the bolt.

Drilling templates are in multiples of four, so that valves or fittings may be turned to face in any quarter when being installed. Bolt holes straddle the center line unless otherwise ordered.

Spot facing: Bolt holes are not spot faced unless so ordered. An extra charge is made for spot facing.

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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Published by AsbestosClaims.Law
asbestosclaims.law/library/21275/204

Templates for Drilling
150-Pound Steel Standard

Dimensions, in Inches

Size	Diameter of Flange	Thickness of Flange	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	For Raised Face Joints: Length of Bolts A	B	C	Length of Bolt-Studs with 2 Nuts A	B	C	Seamless Steel Pipe Thickness
½	3½	3/8	2⅜	4	½	1½	1½	1¾	2	2⅛	2¼	.109
¾	3⅞	7/16	2¾	4	½	1½	1¾	2	2⅛	2¼	2⅜	.113
1	4¼	7/16	3⅛	4	½	1½	1¾	2	2⅛	2¼	2⅜	.133
1¼	4⅝	½	3½	4	½	1¾	2	2	2¼	2⅜	2½	.140
1½	5	9/16	3⅞	4	½	1¾	2	2¼	2⅜	2½	2⅝	.145
2	6	⅝	4¾	4	⅝	2	2¼	2½	2¾	2⅞	3	.154
2½	7	11/16	5½	4	⅝	2¼	2½	2¾	2⅞	3⅛	3¼	.203
3	7½	¾	6	4	⅝	2¼	2½	2¾	3	3¼	3⅜	.216
3½	8½	13/16	7	8	⅝	2½	2¾	3	3⅛	3⅜	3⅝	.226
4	9	15/16	7½	8	⅝	2¾	3	3¼	3⅜	3⅝	3⅞	.237
5	10	15/16	8½	8	¾	2¾	3	3¼	3⅝	3⅞	4⅛	.258
6	11	1	9½	8	¾	3	3¼	3½	3¾	4	4¼	.280
8	13½	1⅛	11¾	8	¾	3¼	3½	3¾	4	4⅜	4⅝	.277
10	16	1 3/16	14¼	12	⅞	3½	4	4¼	4½	5	5¼	.307
12	19	1¼	17	12	⅞	3¾	4	4¼	4¾	5	5¼	.330
14	21	1⅜	18¾	12	1	4	4¼	4¾	5¼	5½	5¾	.312
16	23½	1 7/16	21¼	16	1	4¼	4½	4¾	5¼	5¾	6	.312
18	25	1 9/16	22¾	16	1⅛	4½	5	5¼	5¾	6¼	6½	.312
20	27½	1 11/16	25	20	1⅛	4¾	5¼	5½	6	6½	6¾	.375
24	32	1⅞	29½	20	1¼	5¼	5¾	6	6¾	7¼	7½	.375

Length of Bolts or Bolt-Studs

A — 1/16″ raised face to 1/16″ raised face valve, fitting, or companion flange
B — 1/16″ raised face valve or fitting to Cranelap Joint (see note below)
C — Cranelap Joint to Cranelap Joint (see note below)

Note: Lengths "B" and "C" are calculated for plain laps of the thickness specified in the column headed "Seamless Steel Pipe Thickness". If thicker or thinner pipe is used, a corresponding allowance must be made in the length of bolts or bolt-studs.

150-Pound Steel Standard: In sizes 1-inch and larger, the 150-Pound Steel templates for drilling conform to the American Standard for Steel Flanged Fittings and Companion Flanges (B16e-1932) for 150 pounds steam working pressure. In sizes ½ and ¾-inch, they are Crane Standard, proportioned from the American Standard.

In sizes 1 to 24-inch, these templates are the same as for the 125-Pound Cast Iron Standard except for the facing of the flanges.

Facing: The flanges have a 1/16-inch raised face. The raised face is included in the dimension for thickness of flange.

Bolt holes: Bolt holes are drilled ⅛-inch larger than the diameter of the bolt.

Drilling templates are in multiples of four, so that valves or fittings may be turned to face in any quarter when being installed. Bolt holes straddle the center line unless otherwise ordered.

Spot facing: The bolt holes are spot faced.

Templates for Drilling
300-Pound Steel Standard

Dimensions, in Inches

Size	Diameter of Flange	Thickness of Flange	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	For Raised Face Joints: Length of Bolts A	B	C	Length of Bolt-Studs with 2 Nuts A	B	C	Seamless Steel Pipe Thickness	For Male and Female or Tongue and Groove Joints: Length of Bolt-Studs with 2 Nuts D	E	F	G	H	Seamless Steel Pipe Thickness
½	3¾	9/16	2⅝	4	½	1¾	2	2	2⅜	2½	2⅝	.109	2⅝	2⅝	2¾	2¾	2⅞	.147
¾	4⅝	⅝	3¼	4	⅝	2	2¼	2¼	2¾	2⅞	3	.113	3	3	3⅛	3⅛	3¼	.154
1	4⅞	11/16	3½	4	⅝	2¼	2½	2½	2⅞	3	3⅛	.133	3⅛	3⅛	3¼	3¼	3½	.179
1¼	5¼	¾	3⅞	4	⅝	2¼	2½	2¾	3	3⅛	3¼	.140	3¼	3¼	3½	3½	3⅝	.191
1½	6⅛	13/16	4½	4	¾	2½	2¾	3	3⅜	3½	3⅝	.145	3⅝	3⅝	3⅞	3⅞	4	.200
2	6½	⅞	5	8	⅝	2½	2¾	3	3¼	3⅜	3½	.154	3½	3½	3¾	3¾	3⅞	.218
2½	7½	1	5⅞	8	¾	3	3¼	3½	3¾	4	4⅛	.203	4	4	4¼	4¼	4½	.276
3	8¼	1⅛	6⅝	8	¾	3¼	3½	3¾	4	4¼	4⅜	.216	4¼	4¼	4½	4½	4¾	.300
3½	9	13/16	7¼	8	¾	3¼	3½	3¾	4⅛	4⅜	4⅝	.226	4⅜	4⅜	4⅝	4¾	5	.318
4	10	1¼	7⅞	8	¾	3½	3¾	4	4¼	4½	4¾	.237	4½	4⅝	4¾	4⅞	5¼	.337
5	11	1⅜	9¼	8	¾	3¾	4	4¼	4½	4¾	5	.258	4¾	4⅞	5	5¼	5½	.375
6	12½	1 7/16	10⅝	12	¾	3¾	4¼	4½	4⅝	4⅞	5¼	.280	4⅞	5	5¼	5½	5¾	.432
8	15	1⅝	13	12	⅞	4½	4¾	5	5¼	5¾	6	.277	5½	5¾	6	6¼	6½	.500
10	17½	1⅞	15¼	16	1	5	5½	5¾	6	6½	6¾	.307	6¼	6½	6¾	7	7¼	.500
12	20½	2	17¾	16	1⅛	5½	5¾	6¼	6½	7	7¼	.330	6¾	7	7¼	7½	7¾	.500
14	23	2⅛	20¼	20	1⅛	5¾	6	6½	6¾	7¼	7½	.375	7	7¼	7½	7¾	8	.500
16	25½	2¼	22½	20	1¼	6	6½	6¾	7½	8	8¼	.375	7¾	8	8¼	8½	8¾	.500
18	28	2⅜	24¾	24	1¼	6¼	6¾	7¼	7¾	8¼	8¾	.437	8	8¼	8½	8¾	9	.500
20	30½	2½	27	24	1¼	6½	7	7½	8	8½	9	.500	8¼	8½	8¾	9	9¼	.500
24	36	2¾	32	24	1½	7½	8	8½	9	9½	10	.562	9¼	9½	9¾	10	10¼	.562

Length of Bolts or Bolt-Studs

A — 1/16-inch raised face to 1/16-inch raised face valve, fitting, or companion flange
B — 1/16-inch raised face valve or fitting to plain Cranelap Joint (see note below)
C — Plain Cranelap Joint to plain Cranelap Joint (see note below)
D — Large male to large female valve, fitting, or companion flange; Tongue to groove valve, fitting, or companion flange
E — Male Cranelap Joint to large female valve or fitting (see note below)
F — Female Cranelap Joint to large male valve or fitting (see note below); Tongue Cranelap Joint to groove valve or fitting (see note below); Groove Cranelap Joint to tongue valve or fitting (see note below)
G — Male Cranelap Joint to female Cranelap Joint (see note below)
H — Tongue Cranelap Joint to groove Cranelap Joint (see note below)

Note: Lengths "B", "C", "E", "F", "G", and "H" are calculated for full thickness laps for the pipe specified in the columns headed "Seamless Steel Pipe Thickness". If thicker or thinner pipe is used, a corresponding allowance must be made in the length of bolts and bolt-studs.

300-Pound Steel Standard: In sizes 2-inch and larger, the 300-Pound Steel templates for drilling conform to the American Standard for Steel Flanged Fittings and Companion Flanges (B16e-1932) for 300 pounds steam working pressure. In sizes 1 to 1½-inch, they are the same as the 250-Pound Cast Iron Standard. In sizes ½ and ¾-inch, they are Crane Standard, proportioned from the American Standard. In sizes 1 to 24-inch, these templates are the same as for the 250-Pound Cast Iron Standard.

Facing: The flanges have a 1/16-inch raised face. The raised face is included in the dimension for thickness of flange.

Large male or female, large tongue or groove, small tongue or groove, Ring Joint, or Sarlun facings can be supplied.

Bolt holes: Bolt holes are drilled ⅛-inch larger than the diameter of the bolt.

Drilling templates are in multiples of four, so that valves or fittings may be turned to face in any quarter when being installed. Bolt holes straddle the center line unless otherwise ordered.

Spot facing: The bolt holes are spot faced.

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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Templates for Drilling
400-Pound Steel Standard

Dimensions, in Inches

Size	Diameter of Flange	Thickness of Flange	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	For Male to Male Joints: Length of Bolt-Studs with 2 Nuts A	B	C	Seamless Steel Pipe Thickness	For Male and Female or Tongue and Groove Joints: Length of Bolt-Studs with 2 Nuts D	E	F	G	H	Seamless Steel Pipe Thickness
½				4	½	2⅞	2¾	2⅝	.109	2⅝	2⅝	2¾	2¾	2⅞	.147
¾				4	⅝	3¼	3⅛	3	.113	3	3	3⅛	3⅛	3¼	.154
1	In sizes smaller than 4-inch, the dimensions and drilling of the flanges are the same as for 600-Pound Steel (see page 375).			4	⅝	3⅜	3¼	3⅛	.133	3⅛	3⅛	3¼	3¼	3½	.179
1¼				4	⅝	3⅝	3½	3⅜	.140	3⅜	3⅜	3⅝	3⅝	3¾	.191
1½				4	¾	4	3⅞	3¾	.145	3¾	3¾	4	4	4⅛	.200
2				8	⅝	4	3⅞	3¾	.154	3¾	3¾	4	4	4⅛	.218
2½				8	¾	4½	4½	4⅜	.203	4¼	4¼	4½	4½	4¾	.276
3				8	¾	4¾	4¾	4⅝	.216	4½	4½	4¾	4¾	5	.300
3½				8	⅞	5¼	5½	5¼	.226	5	5¼	5½	5½	5¾	.318
4	10	1⅜	7⅞	8	⅞	5¼	5¼	5¼	.237	5	5¼	5½	5½	5¾	.337
5	11	1½	9¼	8	⅞	5½	5½	5½	.258	5¼	5½	5¾	5¾	6	.375
6	12½	1⅝	10⅝	12	⅞	5¾	6	6	.280	5½	5¾	6	6¼	6½	.432
8	15	1⅞	13	12	1	6½	6¾	6¾	.322	6¼	6½	6¾	7	7¼	.500
10	17½	2⅛	15¼	16	1⅛	7¼	7½	7½	.365	7	7¼	7½	7¾	8	.500
12	20½	2¼	17¾	16	1¼	8	8¼	8¼	.406	7¾	8	8¼	8½	8¾	.500
14	23	2⅜	20¼	20	1¼	8¼	8½	8½	.437	8	8¼	8½	8¾	9	.500
16	25½	2½	22½	20	1⅜	8¾	9	9¼	.500	8½	8¾	9	9¼	9½	.500
18	28	2⅝	24¾	24	1⅜	9	9½	9¾	.562	8¾	9¼	9½	9¾	10	.562
20	30½	2¾	27	24	1½	9½	9¾	10¼	.593	9¼	9½	9¾	10¼	10½	.593
24	36	3	32	24	1¾	10½	11	11½	.687	10¼	10¾	11	11½	11¾	.687

Length of Bolt-Studs

A — ¼″ large male to ¼″ large male valve, fitting, or companion flange
B — ¼″ large male valve or fitting to plain Cranelap Joint (see note below)
C — Plain Cranelap Joint to plain Cranelap Joint (see note below)
D — Large male to large female valve, fitting, or companion flange; Tongue to groove valve, fitting, or companion flange
E — Male Cranelap Joint to large female valve or fitting (see note below)
F — Female Cranelap Joint to large male valve or fitting (see note below); Tongue Cranelap Joint to groove valve or fitting (see note below); Groove Cranelap Joint to tongue valve or fitting (see note below)
G — Male Cranelap Joint to female Cranelap Joint (see note below)
H — Tongue Cranelap Joint to groove Cranelap Joint (see note below)

Note: Lengths "B", "C", E", "F", "G", and "H" are calculated for full thickness laps for the pipe specified in the columns headed "Seamless Steel Pipe Thickness". If thicker or thinner pipe is used, a corresponding allowance must be made in the length of bolt-studs.

400-Pound Steel Standard: The 400-Pound Steel templates for drilling conform to the American Standard for Steel Flanged Fittings and Companion Flanges (B16e-1932) for 400 pounds steam working pressure.

Facing: Valves and fittings are regularly furnished with a ¼-inch male (large male) face on the flanges. Companion flanges are regularly furnished with a ¼-inch male (large male) or a 3/16-inch female (large female) face, as ordered.

The height of the male (¼″) is not included in the dimension for thickness of flange.

Large male or female, large tongue or groove, small tongue or groove, Ring Joint, or Sarlun facings can be supplied.

Bolt holes: Bolt holes are drilled ⅛-inch larger than the diameter of the bolt.

Drilling templates are in multiples of four, so that valves or fittings may be turned to face in any quarter when being installed. Bolt holes straddle the center line unless otherwise ordered.

Spot facing: The bolt holes are spot faced.

Templates for Drilling
600-Pound Steel Standard

Dimensions, in Inches

Size	Diameter of Flange	Thickness of Flange	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	For Male to Male Joints: Length of Bolt-Studs with 2 Nuts A	B	C	For Male and Female or Tongue and Groove Joints: Length of Bolt-Studs with 2 Nuts D	E	F	G	H	Seamless Steel Pipe Thickness
½	3¾	9/16	2⅝	4	½	2⅞	2¾	2⅝	2⅝	2⅝	2¾	2¾	2⅞	.147
¾	4⅝	⅝	3¼	4	⅝	3¼	3⅛	3	3	3	3⅛	3⅛	3¼	.154
1	4⅞	11/16	3½	4	⅝	3⅜	3¼	3¼	3⅛	3⅛	3¼	3¼	3½	.179
1¼	5¼	13/16	3⅞	4	⅝	3⅝	3⅝	3½	3⅜	3⅜	3⅝	3⅝	3¾	.191
1½	6⅛	⅞	4½	4	¾	4	4	3⅞	3¾	3¾	4	4	4⅛	.200
2	6½	1	5	8	⅝	4	4	3⅞	3¾	3¾	4	4	4⅛	.218
2½	7½	1⅛	5⅞	8	¾	4½	4½	4½	4¼	4¼	4½	4½	4¾	.276
3	8¼	1¼	6⅝	8	¾	4¾	4¾	4¾	4½	4½	4¾	4¾	5	.300
3½	9	1⅜	7¼	8	⅞	5¼	5½	5½	5	5¼	5½	5½	5¾	.318
4	10¾	1½	8½	8	⅞	5½	5¾	5¾	5¼	5½	5¾	5¾	6	.337
5	13	1¾	10½	8	1	6¼	6½	6½	6	6¼	6½	6½	6¾	.375
6	14	1⅞	11½	12	1	6½	6¾	7	6¼	6½	6¾	7	7¼	.432
8	16½	2 3/16	13¾	12	1⅛	7½	7¾	8	7¼	7½	7¾	8	8¼	.500
10	20	2½	17	16	1¼	8½	8¾	9¼	8¼	8½	8¾	9¼	9½	.593
12	22	2⅝	19¼	20	1¼	8¾	9¼	9½	8½	9	9¼	9½	9¾	.687
14	23¾	2¾	20¾	20	1⅜	9¼	9¾	10¼	9	9½	9¾	10¼	10½	.750
16	27	3	23¾	20	1½	10	10½	11¼	9¾	10¼	10½	11¼	11½	.843
18	29¼	3¼	25¾	20	1⅝	10¾	11½	12	10½	11¼	11½	12	12¼	.937
20	32	3½	28½	24	1⅝	11¼	12	12¾	11	11¾	12	12¾	13	1.031
24	37	4	33	24	1⅞	12¾	13¾	14¾	12½	13½	13¾	14¾	15	1.218

Length of Bolt-Studs

A — ¼″ large male to ¼″ large male valve, fitting, or companion flange
B — ¼″ large male valve or fitting to plain Cranelap Joint (see note below)
C — Plain Cranelap Joint to plain Cranelap Joint (see note below)
D — Large male to large female valve, fitting, or companion flange; Tongue to groove valve, fitting, or companion flange
E — Male Cranelap Joint to large female valve or fitting (see note below)
F — Female Cranelap Joint to large male valve or fitting (see note below); Tongue Cranelap Joint to groove valve or fitting (see note below); Groove Cranelap Joint to tongue valve or fitting (see note below)
G — Male Cranelap Joint to female Cranelap Joint (see note below)
H — Tongue Cranelap Joint to groove Cranelap Joint (see note below)

Note: Lengths "B", "C", "E", "F", "G", and "H" are calculated for full thickness laps for the pipe specified in the column headed "Seamless Steel Pipe Thickness". If thicker or thinner pipe is used, a corresponding allowance must be made in the length of bolt-studs.

600-Pound Steel Standard: The 600-Pound Steel templates for drilling conform to the American Standard for Steel Flanged Fitting and Companion Flanges (B16e-1932) for 600 pounds steam working pressure.

In sizes 2 to 12-inch, these templates, except for flange thickness and length of bolt-studs, are the same as for the 800-Pound Hydraulic Cast Iron Standard.

Facing: Valves and fittings are regularly furnished with a ¼-inch male (large male) face on the flanges. Companion flanges are regularly furnished with a ¼-inch male (large male) or a 3/16-inch female (large female) face, as ordered.

The height of the male (¼″) is not included in the dimension for thickness of flange.

Large male or female, large tongue or groove, small tongue or groove, Ring Joint, or Sarlun facings can be supplied.

Bolt holes: Bolt holes are drilled ⅛-inch larger than the diameter of the bolt.

Drilling templates are in multiples of four, so that valves or fittings may be turned to face in any quarter when being installed. Bolt holes straddle the center line unless otherwise ordered.

Spot facing: The bolt holes are spot faced.

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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Templates for Drilling
900-Pound Steel Standard

Dimensions, in Inches

Size	Diameter of Flange	Thickness of Flange	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	For Male to Male Joints: Length of Bolt-Studs with 2 Nuts A	B	C	For Male and Female or Tongue and Groove Joints: Length of Bolt-Studs with 2 Nuts D	E	F	G	H	Seamless Steel Pipe Thickness
½	For sizes smaller than 3-inch, the dimensions and drilling of the flanges are the same as for 1500-Pound Steel (see page 377).			4	¾	4	4	3⅞	3¾	3¾	4	4	4⅛	.147
¾				4	¾	4¼	4¼	4¼	4	4	4¼	4¼	4½	.154
1				4	⅞	4¾	4¾	4¾	4½	4½	4¾	4¾	5	.179
1¼				4	⅞	4¾	4¾	4¾	4½	4½	4¾	4¾	5	.191
1½				4	1	5¼	5¼	5¼	5	5	5¼	5¼	5½	.200
2				8	⅞	5½	5½	5½	5¼	5¼	5½	5½	5¾	.218
2½				8	1	6	6¼	6¼	5¾	6	6¼	6¼	6½	.276
3	9½	1½	7½	8	⅞	5½	5¾	5¾	5¼	5½	5¾	5¾	6	.300
3½	10¾	1⅝	8½	8	1	6	6¼	6¼	5¾	6	6¼	6¼	6½	.318
4	11½	1¾	9¼	8	1⅛	6½	6¾	7	6¼	6½	6¾	7	7¼	.437
5	13¾	2	11	8	1¼	7¼	7½	7¾	7	7¼	7½	7¾	8	.500
6	15	2 3/16	12½	12	1⅛	7½	7¾	8	7¼	7½	7¾	8	8¼	.562
8	18½	2½	15½	12	1⅜	8¾	9	9½	8½	8¾	9	9½	9¾	.593
10	21½	2¾	18½	16	1⅜	9¼	9¾	10¼	9	9½	9¾	10¼	10½	.718
12	24	3⅛	21	20	1⅜	10	10½	11¼	9¾	10¼	10½	11¼	11½	.843
14	25¼	3⅜	22	20	1½	10¾	11½	12	10½	11¼	11½	12	12¼	.937
16	27¾	3½	24¼	20	1⅝	11¼	12	12¾	11	11¾	12	12¾	13	1.031
18	31	4	27	20	1⅞	12¾	13¾	14¾	12½	13½	13¾	14¾	15	1.156
20	33¾	4¼	29½	20	2	13½	14½	15½	13¼	14¼	14½	15½	15¾	1.250
24	41	5½	35½	20	2½	17	18¼	19½	16¾	18	18¼	19½	19¾	1.500

Length of Bolt-Studs

A — ¼″ large male to ¼″ large male valve, fitting, or companion flange
B — ¼″ large male valve or fitting to plain Cranelap Joint (see note below)
C — Plain Cranelap Joint to plain Cranelap Joint (see note below)
D — Large male to large female valve, fitting, or companion flange; Tongue to groove valve, fitting, or companion flange
E — Male Cranelap Joint to large female valve or fitting (see note below)
F — Female Cranelap Joint to large male valve or fitting (see note below); Tongue Cranelap Joint to groove valve or fitting (see note below); Groove Cranelap Joint to tongue valve or fitting (see note below)
G — Male Cranelap Joint to female Cranelap Joint (see note below)
H — Tongue Cranelap Joint to groove Cranelap Joint (see note below)

Note: Lengths "B", "C", "E", "F", "G", and "H" are calculated for full thickness laps for the pipe specified in the column headed "Seamless Steel Pipe Thickness". If thicker or thinner pipe is used, a corresponding allowance must be made in the length of bolt-studs.

900-Pound Steel Standard: Except for the 3½-inch size, the 900-Pound Steel templates for drilling conform to the American Standard for Steel Flanged Fittings and Companion Flanges (B16e-1932) for 900 pounds steam working pressure. The 3½-inch size is Crane Standard, proportioned from the American Standard.

Facing: Valves and fittings are regularly furnished with a ¼-inch male (large male) face on the flanges. Companion flanges are regularly furnished with a ¼-inch male (large male) or a 3/16-inch female (large female) face, as ordered.

The height of the male (¼″) is not included in the dimension for thickness of flange.

Large male or female, large tongue or groove, small tongue or groove, Ring Joint, or Sarlun facings can be supplied.

Bolt holes: Bolt holes are drilled ⅛-inch larger than the diameter of the bolt.

Drilling templates are in multiples of four, so that valves or fittings may be turned to face in any quarter when being installed. Bolt holes straddle the center line unless otherwise ordered.

Spot facing: The bolt holes are spot faced.

Templates for Drilling
1500-Pound Steel Standard

Dimensions, in Inches

Size	Diameter of Flange	Thickness of Flange	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	For Male to Male Joints: Length of Bolt-Studs with 2 Nuts A	B	C	For Male and Female or Tongue and Groove Joints: Length of Bolt-Studs with 2 Nuts D	E	F	G	H	Seamless Steel Pipe Thickness
½	4¾	⅞	3¼	4	¾	4	4	3⅞	3¾	3¾	4	4	4⅛	.187
¾	5⅛	1	3½	4	¾	4¼	4¼	4¼	4	4	4¼	4¼	4½	.218
1	5⅞	1⅛	4	4	⅞	4¾	4¾	4¾	4½	4½	4¾	4¾	5	.250
1¼	6¼	1⅛	4⅜	4	⅞	4¾	4¾	4¾	4½	4½	4¾	4¾	5	.250
1½	7	1¼	4⅞	4	1	5¼	5½	5½	5	5¼	5½	5½	5¾	.281
2	8½	1½	6½	8	⅞	5½	5¾	5¾	5¼	5½	5¾	5¾	6	.343
2½	9⅝	1⅝	7½	8	1	6	6¼	6½	5¾	6	6¼	6½	6¾	.375
3	10½	1⅞	8	8	1⅛	6¾	7	7¼	6½	6¾	7	7¼	7½	.437
4	12¼	2⅛	9½	8	1¼	7¾	8	8¼	7½	7¾	8	8¼	8½	.531
5	14¾	2⅞	11½	8	1½	9¾	10	10½	9½	9¾	10	10½	10¾	.625
6	15½	3¼	12½	12	1⅜	10¼	10¾	11¼	10	10½	10¾	11¼	11½	.718
8	19	3⅝	15½	12	1⅝	11½	12¼	12¾	11¼	12	12¼	12¾	13	.906
10	23	4¼	19	12	1⅞	13¼	14¼	15	13	14	14¼	15	15¼	1.125
12	26½	4⅞	22½	16	2	14¾	16	17	14½	15¾	16	17	17¼	1.312
*14	29½	5¼	25	16	2¼	Dimensions on application								
*16	32½	5¾	27¾	16	2½									
*18	36	6⅜	30½	16	2¾									
*20	38¾	7	32¾	16	3									
*24	46	8	39	16	3½									

*Tentative dimensions.

Length of Bolt-Studs

A — ¼″ large male to ¼″ large male valve, fittings, or companion flange
B — ¼″ large male valve or fitting to plain Cranelap Joint (see note below)
C — Plain Cranelap Joint to plain Cranelap joint (see note below)
D — Large male to large female valve, fitting, or companion flange; Tongue to groove valve, fitting, or companion flange
E — Male Cranelap Joint to large female valve or fitting (see note below)
F — Female Cranelap Joint to large male valve or fitting (see note below); Tongue Cranelap Joint to groove valve or fitting (see note below); Groove Cranelap Joint to tongue valve or fitting (see note below)
G — Male Cranelap Joint to female Cranelap Joint (see note below)
H — Tongue Cranelap Joint to groove Cranelap Joint (see note below)

Note: Lengths "B", "C", "E", "F", "G", and "H" are calculated for full thickness laps for the pipe specified in the column headed "Seamless Steel Pipe Thickness". If thicker or thinner pipe is used, a corresponding allowance must be made in the length of bolt-studs.

1500-Pound Steel Standard: Except for ½ and ¾-inch sizes, the 1500-Pound Steel templates for drilling conform to the American Standard for Steel Flanged Fittings and Companion Flanges (B16e-1932) for 1500 pounds steam working pressure. The ½ and ¾-inch sizes are Crane Standard, proportioned from the American Standard.

Facing: Valves and fittings are regularly furnished with a ¼-inch male (large male) face on the flanges. Companion flanges are regularly furnished with a ¼-inch male (large male) or a 3/16-inch female (large female) face, as ordered.

The height of the male (¼″) is not included in the dimension for thickness of flange.

Large male or female, large tongue or groove, small tongue or groove, Ring Joint, or Sarlun facings can be supplied.

Bolt holes: Bolt holes are drilled ⅛-inch larger than the diameter of the bolt.

Drilling templates are in multiples of four, so that valves or fittings may be turned to face in any quarter when being installed. Bolt holes straddle the center line unless otherwise ordered.

Spot facing: The bolt holes are spot faced.

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Technical and Engineering Data

The preceding pages, numbers 352 to 377, are devoted to information which applies to nearly all Crane products and which is referred to frequently by many customers. Other sections of this catalogue cover subjects of a somewhat similar nature, but which are more specialized and more technical.

The section on Pipe and Fabricated Piping includes data on pipe, pipe bends, Cranelap joints, Ring joints, Sarlun and Sargol joints, American Standard flange facings, flange finishes, welding, threading ends of pipe, making on screwed flanges, pipe coils, railings, flange drilling details, taps and drains for iron and steel flanged fittings and valves, threads and threading, and on many other allied subjects.

The section on Engineering Data is devoted to standard reference tables and charts, and in addition, to authoritative information that will assist the engineer in the study and solution of piping problems. Design of pipe bends, Crane bolting, properties of air, ammonia, steam, and water, pressure drop in elbows and bends, discharge of water through pipes, orifices, and valves, circumferences and areas of circles, and natural trigonometric functions are a few of the subjects that are included in the section.

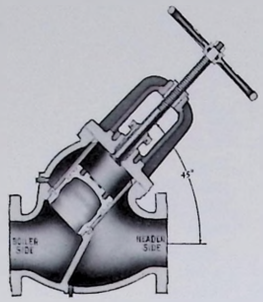
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Butterfly Valves ..... page 383
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Ferrosteel
Automatic Stop-Check Valves

WORKING PRESSURE
250 pounds steam



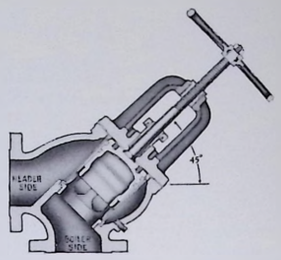
No. 28 E, Straight Y-Pattern
Disc in closed position

The simplest of all stop-check valves.

Only one moving part — the disc.

All wearing parts quickly and easily renewable without removing valve from line.

Durability insured by proper design, careful choice of materials, and accurate machining.



No. 30 E, Angle Y-Pattern
Disc in wide-open position

Boiler service: An automatic stop-check valve should be installed in the pipe line between each boiler and the main steam header when more than one boiler is connected to the same header.

Fundamental duties: The stop-check valve is intended primarily to perform four important functions in boiler steam piping:

First: To act as an automatic non-return valve, preventing a back flow of steam from the main steam header into the boiler in the event of a failure in that boiler.

Second: To act as a manually operated stop valve, which may be closed when it is necessary to cut a boiler out of service temporarily without drawing the fire.

Third: To assist in automatically cutting a boiler into service after it has been shut down. This operation requires considerable care when performed manually, but the stop-check valve performs it automatically, without pressure fluctuations and attendant troubles in the system.

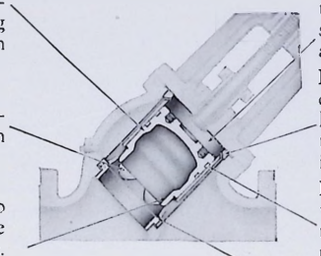
Fourth: To act as a "safety first" valve in preventing back flow of steam from the header into a boiler which has been shut down for inspection or repair.

Features of the Crane Automatic Stop-Check Valve

Disc: The only moving part. Cylindrical in shape with ample guiding surface. Free of wing guides which cause "spinning" and rapid wear.

Ports: Scientifically designed to insure proper movement of disc with minimum pressure loss.

Throttling lip: Long throttling lip on disc closes seat opening before disc reaches limit of closing stroke. Prevents pounding or chattering and reduces wire-drawing to a minimum.



Enlarged section showing disc in partly opened position

Dashpot: Self contained. Effectively cushions disc on upward stroke. Prevents slamming of disc against bonnet.

Liner: Quickly removable. Guides disc throughout its entire travel. Free from expansion strains and distortion. Effectively prevents binding or cramping.

Friction ring: Required only when valves are to be used on rapidly fluctuating loads. Prevents too rapid movement of disc and reduces sensitiveness.

Seat: Retained in liner. Quickly and easily renewable.

Proper size is important: The size of stop-check valves should always be based on boiler capacity and not on the size of existing boiler nozzles or piping. To determine the proper size for any boiler, calculate the number of pounds of steam the boiler will generate per hour at its nominal horse power rating. Use a velocity of steam flow of 4000 feet per minute and figure the size of valve required from the following formula:

$$C = \frac{A \times B \times 2.4}{V} \text{ in which}$$

C = Area of pipe in square inches

A = Pounds of steam per hour

B = Volume in cubic feet of 1 pound of steam at the given pressure

V = Velocity in feet per minute.

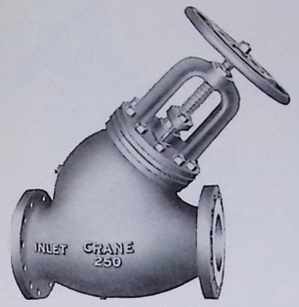
Reduced area liners: It sometimes happens that stop-check valves must be installed on boiler nozzles or in piping which is too large to permit efficient operation of the valves. For such cases, Crane Co. can supply on special order valves having liners with reduced areas in the ports. Such valves will operate much more efficiently than oversized valves.

List prices . . . page 381

Dimensions . . . page 381

Ferrosteel
Automatic Stop-Check Valves

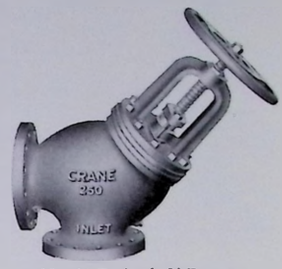
WORKING PRESSURE
250 pounds steam



No. 28 E, Straight Y-Pattern

SERVICE RECOMMENDATIONS

An automatic stop-check valve should always be used in the pipe line between each boiler and the main steam header, when more than one boiler is connected to the same header. In addition, they render excellent service when used in boiler feed lines, in the discharge lines from high pressure pumps, and in the discharge lines from air compressors.



No. 30 E, Angle Y-Pattern

List Prices

Size	Inches	2½	3	4	5	6	8	10
No. 28 E, Flanged, Faced and Drilled	Each	45.00	50.00	60.00	80.00	95.00	145.00	240.00
No. 30 E, Flanged, Faced and Drilled	Each	45.00	50.00	60.00	80.00	95.00	145.00	240.00

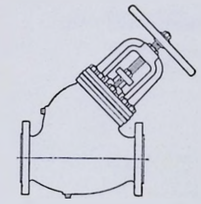
Proper size is important: The size of stop-check valves should be based on boiler capacity and not on the size of existing boiler nozzles or piping. For detailed information on the correct method of selecting stop-check valves which will operate at full efficiency, see page 380.

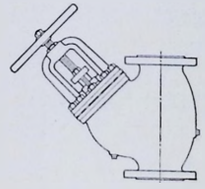
A. S. M. E. Boiler Code: These valves conform to the requirements of the boiler code formulated by the American Society of Mechanical Engineers.

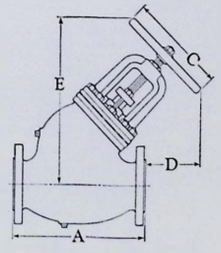
Flange dimensions: The end flange dimensions conform to the American (A. S. A.) 250-Pound Cast Iron Flange Standard, No. B-16b-1928. Flanges have a 1/16-inch raised face.

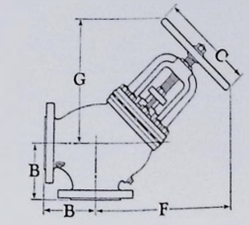
Drilling: Stop-Check Valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American 250-pound Cast Iron Flange Standard. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

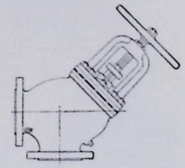
Cast steel Automatic Stop-Check Valves: In addition to the valves shown on this page, Crane Co. manufactures a complete line of cast steel stop-check valves for pressures up to 1500 pounds at total temperatures up to 850 degrees.

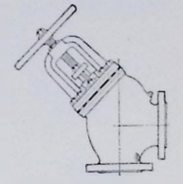












Dimensions, in Inches

Size		2½	3	4	5	6	8	10
A		13	14¾	17	19	21½	26	30
B		5¾	6¼	7	7⅞	8¾	10½	12¼
C		9	10	10	14	16	20	24
D — Open		6	7	8	10¾	12	16¼	20
E — Open		17	19	23	26¾	29¾	36¾	44¼
F — Open		14	16½	18	22½	26	33	40
G — Open		12½	14½	16½	19½	23	28	35
Flange dimensions	Diameter of flanges	7½	8¼	10	11	12½	15	17½
	Thickness of flanges	1	1⅛	1¼	1⅜	1 7/16	1⅝	1⅞
	Bolt circle	5⅞	6⅝	7⅞	9¼	10⅝	13	15¼
	Number of bolts	8	8	8	8	12	12	16
	Diameter of bolts	¾	¾	¾	¾	¾	⅞	1

No. 28 E Straight Y-Pattern Stop-Check Valves may be used in horizontal lines or in vertical lines for upward flow, as shown in the illustrations above.

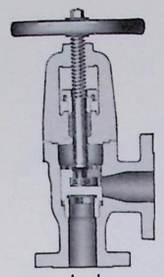
No. 30 E Angle Y-Pattern Stop-Check Valves may be used for upward-horizontal flow or for horizontal-downward flow, as shown in the illustrations above.

General description . . . page 380

Drilling templates . . . page 371

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250-Pound Ferrosteel Blow-off Valves



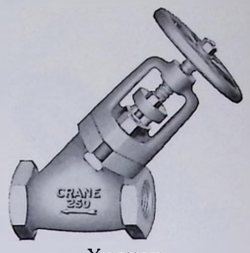
Angle
No. 390, Screwed
No. 391, Flanged

250 pounds steam working pressure

List Prices

Size	Inches	1½	2	2½
No. 390	Each	12.00	15.00	20.00
No. 391, Flanged, Faced and Drilled	Each	12.00	15.00	20.00
No. 393	Each	12.00	15.00	20.00
No. 393½, Flanged, Faced and Drilled	Each	12.00	15.00	20.00

Boiler Code requirements: The No. 393 and No. 393½ Y-pattern Blow-off Valves do not comply with the requirements of the 1933 edition of the A.S.M.E. Boiler Code. No. 390 and No. 391 Valves comply with the Code, except that the maximum allowable working pressure under the Code is 200 pounds instead of 250 pounds.



Y-pattern
No. 393, Screwed
No. 393½, Flanged

Service recommendations: These valves have been particularly designed for boiler blow-off service, but are also well suited for blow-off service on tanks or receivers where dirty, gritty water is to be handled.

Features of construction: These valves are made with renewable seats and slip-on discs, in order to permit quick repair. Contrary to ordinary globe valve construction, the seating surface in these valves is on the outside of the seat ring where it is protected from the cutting effect of the water passing the seat.

Bonnets are held to the bodies with two bolts, which facilitates dismantling the valves for inspection and repair. The outside screw and yoke construction is used in order to keep the stem threads outside the flow of water. This design greatly improves the life of the stem threads and prevents the valves from becoming inoperative due to scale and foreign matter jamming the threads.

All parts of these valves are sturdily constructed. Stuffing boxes are unusually deep and hold ample packing to eliminate frequent repacking.

Materials: Bodies and bonnets are made of ferrosteel, an exceptionally high grade cast iron, discs and seat rings are of cast iron, which has proven very satisfactory for blow-off service, and stems are of brass. Packing glands are made of brass, while the gland flanges are of malleable iron.

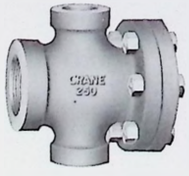
Flange dimensions: End flanges of these valves conform to the American (A.S.A.) 250-Pound Cast Iron Flange Standard No. B16b-1928. They have a 1/16-inch raised face.

Drilling: These valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American 250-Pound Cast Iron Flange Standard. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

Dimensions, in Inches

Size		Inches	1½	2	2½
No. 390 Angle	Center to top, open		12¼	13½	15¼
	Center to end of inlet		4	4½	5
	Center to end of outlet		4	4½	5
	Diameter of wheel		8	9	10
No. 391 Angle	Center to top, open		12¼	13½	15¼
	Center to face of inlet		4½	5	5¾
	Center to face of outlet		4½	5	5¾
	Diameter of wheel		8	9	10

Size		Inches	1½	2	2½
No. 393 Y-pattern	Center to top, open		15¼	16¼	18¼
	End to end		7¼	8	9⅛
	Center to rim of wheel, open		12¾	13¼	15¼
	Diameter of wheel		8	9	10
No. 393½ Y-pattern	Center to top, open		15¼	16¼	18¼
	Face to face		9⅞	11	12¼
	Center to rim of wheel, open		12¾	13¼	15¼
	Diameter of wheel		8	9	10



WORKING PRESSURES
Standard — 125 pounds steam
250-Pound — 250 pounds steam

Standard and 250-Pound Cast Iron Blow-off Crosses

List Prices

Size	Inches	2½ x 1½	2½ x 2	2½ x 2½	3 x 2	4 x 2	4 x 2½
Standard	Each	9.00	9.00	9.00	10.00	12.00	12.00
250-Pound,	Each			12.00	13.50	16.00	16.00

Service recommendations: These special fittings are used in boiler blow-off piping to provide a connection when an auxiliary means of feeding the boiler is wanted, and also to provide a readily accessible clean-out. The blind flange on the run is removable for cleaning purposes. The large opening is connected to the boiler and the reduced openings, which are of one size, are used for blowing down or feeding the boiler.

Flanges: List prices on both the standard and 250-Pound blow-off crosses include the blind flanges bolted on. Body of the fitting and the blind flange are both of cast iron.

Brass and Iron Butterfly Valves

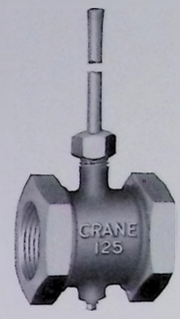


Brass
No. 44, Screwed

WORKING PRESSURES
12-inch and smaller
125 pounds steam; 200 pounds cold water, oil, or gas
14-inch and larger
100 pounds steam; 150 pounds cold water, oil, or gas

Butterfly Valves provide easy operation in approximately one-quarter turn from the wide open to the closed position. They are not made to close steam tight; they should be used to control or regulate flow and cannot be expected to be tight when shut.

These valves can be furnished with malleable iron operating levers when so ordered, at an advance in price. All valves are regularly made with steel stems.



Iron Body
No. 380, Screwed
No. 381, Flanged

List Prices, No. 44

Size	Inches	¾	1	1¼	1½	2	2½	3
Price	Each	3.10	4.40	5.65	6.75	10.00	13.75	21.00
End to end	Inches	2	2½	2¾	3	4	4¼	5⅛

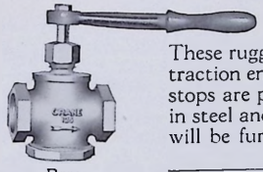
List Prices, No. 380 and No. 381

Size	Inches	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
No. 380	Each	8.00	9.50	12.00	16.00	18.50	28.50	42.50								
End to end	Inches	4¼	4¾	5¼	5½	6	6¾	7½								
No. 381, F. & D.	Each	9.50	11.50	15.00	19.00	22.00	32.00	47.00	90.00	125.00	160.00	275.00	350.00	425.00	525.00	700.00
Face to face	Inches	4¼	4¾	5¼	5½	6	6¾	7½	9¼	10¾	12½	14	16	17½	19	22

End flanges conform to the American (A.S.A.) 125-Pound Cast Iron Flange Standard, No. B16a-1928. Flanged valves are furnished faced and drilled (F. & D.) unless ordered faced only.

List prices include facing and drilling to the American 125-Pound Cast Iron Flange Standard. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

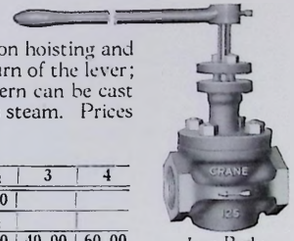
Brass and Iron Quick Acting Throttle Valves



Brass
No. 46

125 pounds steam working pressure

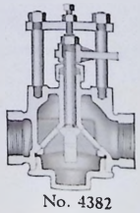
These ruggedly built throttle valves are used extensively on hoisting and traction engines. They open completely in one-quarter turn of the lever; stops are provided to limit the travel. The No. 382 pattern can be cast in steel and the valve will then be suitable for 250 pounds steam. Prices will be furnished on application.



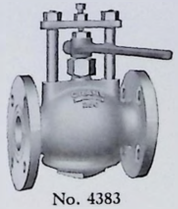
Iron Body
No. 382

List Prices

Size	Inches	¾	1	1¼	1½	2	2½	3	4
No. 46	Each	10.00	11.50	14.00	20.00	25.00	35.00		
End to end	Inches	2¾	3⅜	4	4½	5½	6½		
No. 382	Each						30.00	40.00	60.00
End to end	Inches						7⅛	8	9¾



No. 4382



No. 4383

250-Pound Brass Chronometer Valves

250 pounds steam working pressure

These valves are designed for regulating and governing purposes and should not be used as stop valves. They open or close completely in one-eighth turn of the lever. The adjusting screw at the stem end is used to vary the pressure of the disc against the seat bearing, so that easy operation can be obtained when desired. With proper adjustment, these valves can be operated by a float.

List Prices

Size	Inches	½	¾ and 1	1¼ and 1½	2	2½
No. 4382	Each	51.00	51.00	75.00	150.00	225.00
End to end	Inches	5¼	5¼	6½	8¾	10¾
No. 4383, F. & D.	Each		68.00	100.00	195.00	290.00
Face to face	Inches		6	7	9¾	11¾

When valves are wanted for marine service, orders should so specify. Larger sizes can be furnished on special order.

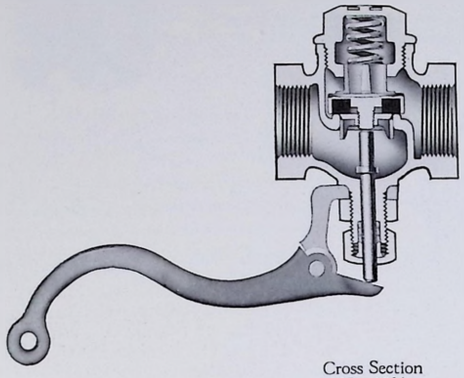
Sizes 1½-inch and smaller have screwed caps; 2-inch and larger have bolted caps. End flanges conform to the MSS 250-Pound SP-Bronze Flange Standard, No. SP-2b-1930.

Flanged valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the above standard. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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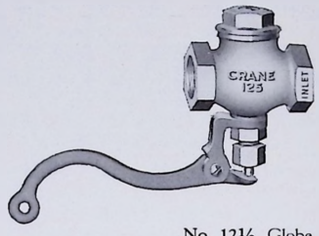
125-Pound
Brass Globe Valves
Quick-Opening — Self-Closing

WORKING PRESSURE
125 pounds steam, air, or gas



Cross Section
No. 12½

FEATURES
Quick-Opening
Self-Closing
Composition Disc



No. 12½, Globe
Screwed

List Prices

Size	Inches	¼	⅜	½	¾	1	1¼	1½
No. 12½	Each	3.25	3.50	4.00	5.00	6.25	8.00	10.75

For list prices of Composition Discs, see page 168.

Service recommendations: The No. 12½ Valves are recommended for saturated steam and for air or gas at atmospheric temperature. They are ideal where quick-opening self-closing valves are desired, as on cooking vats, soot blowers, can and bottle sterilizers, and on similar service.

Operation: A short pull on the lever lifts the disc off its seat, opening the valve. When the lever is released, the spring above the disc automatically closes the valve.

Materials and construction: Bodies, stems, and disc holders are made of brass. Levers are made of malleable iron, and can be turned to any desired position by loosening the locknut which holds the bracket to the valve body. The spring is made of stainless steel.

The valves have a stuffing box filled with high grade packing. It is equipped with a gland.

Discs: Unless otherwise ordered, these valves are furnished with a No. 1 Steam Disc, suitable for steam service. When ordered for air or gas service, they are furnished with a No. 3 Cold Water Disc.

For description and dimensions of discs, see page 168.

Installation: No. 12½ Quick-Opening Self-Closing Valves always should be installed with the pressure above the disc. The valve bodies are marked with the word "Inlet" on the inlet end.

Special valves: When quick-opening self-closing valves for steam, air, or gas are wanted in sizes larger than 1½-inch or for higher pressures, special pilot operated valves can be furnished; prices are furnished on application.

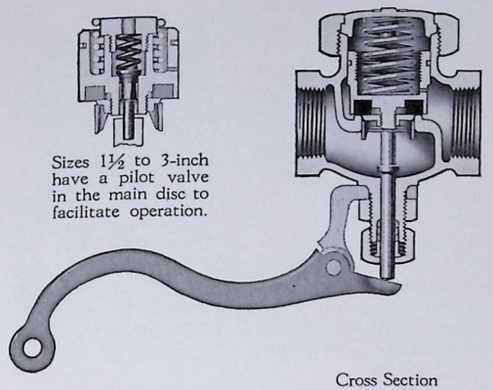
Dimensions, in Inches

Size	¼	⅜	½	¾	1	1¼	1½
End to end of body	2⅛	2 11/16	2¾	3¼	3 3/4	4¼	4 15/16
Center to top of cap	17/16	1 9/16	1 13/16	2	2 3/16	2 9/16	2 15/16
Center of port to bottom of lever, open	3½	3½	5	5½	6¾	7¼	8
Center of stem to end of lever, closed	3½	3½	4¼	5½	6¾	8½	8¾

Quick-Opening Self-Closing Valves for water, oil, or gasoline . . . page 385

200-Pound
Brass Globe Valves
Quick-Opening — Self-Closing

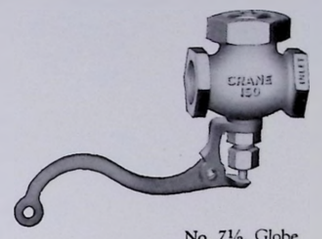
WORKING PRESSURE
200 pounds water, oil, or gasoline



Sizes 1½ to 3-inch have a pilot valve in the main disc to facilitate operation.

Cross Section
No. 7½

FEATURES
Quick-Opening — Self-Closing
Cushioned Action
Composition Disc
Union Cap



No. 7½, Globe
Screwed

List Prices

Size	Inches	½	¾	1	1¼	1½	2	2½	3
No. 7½	Each	7.00	9.00	11.00	14.00	19.00	26.00	40.00	60.00

For list prices of Composition Discs, see page 168.

Service recommendations: The No. 7½ Valves are recommended for hot or cold water and for oil or gasoline at atmospheric temperature. They can be used wherever quick-opening self-closing valves are wanted for these services at pressures not exceeding 200 pounds, as on gasoline and oil loading racks, showers in public bath houses, etc.

Operation: A short pull on the lever lifts the disc off the seat, opening the valve. When the lever is released, the spring above the disc automatically closes the valve.

Construction: The top of the disc holder is a piston, fitting into the upper part of the body. It forms a dash pot that effectively cushions the disc when closing, and prevents destructive shock.

Sizes 1½-inch and larger have a pilot valve in the main disc. When the valve is operated, the pilot valve opens first, equalizing the pressure around the main disc, thereby facilitating easy operation.

The levers on these valves can be turned to any desired position by merely loosening the locknut which holds the bracket to the valve body.

The valves have a stuffing box filled with high grade packing. It is equipped with a gland.

Materials: Bodies, disc holders, and stems are brass. Levers are malleable iron; springs are stainless steel.

Discs: Unless otherwise ordered, these valves are furnished with a No. 2 Hot Water Disc, suitable for hot water, oil, or gasoline. When ordered for cold water, they are furnished with a No. 3 Cold Water Disc. For description and dimensions of discs, see page 168.

Installation: No. 7½ Valves always should be installed with the pressure above the disc. The valve bodies are marked to indicate the inlet end.

Flanged valves: These valves can be made to order with flanged end bodies; prices on application.

Dimensions, in Inches

Size	½	¾	1	1¼	1½	2	2½	3
End to end of body	2 11/16	3 3/16	3¾	4¼	4¾	5¾	6¾	8
Center to top of cap	1¾	2	2¼	2⅝	3	3½	4	4⅝
Center of port to bottom of lever, open	5	5½	6¾	7¼	8	11	12½	13
Center of stem to end of lever, closed	4¼	5½	6¾	8½	8¾	10	12½	13

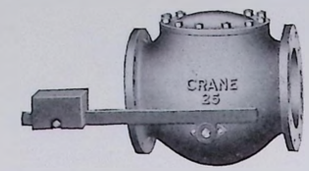
Quick-Opening Self-Closing Valves for steam, air, or gas . . . page 384

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Iron Body Back Pressure Valves

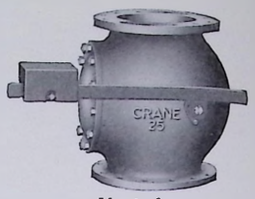
No. 384, Screwed No. 385, Flanged

Weighted for back pressures up to 5 pounds



Horizontal
Only sizes 4-inch and larger can be used in a horizontal position

Service recommendations: These back pressure valves are recommended for use on ordinary non-condensing engine installations, where the exhaust steam is largely used for heating during the cold season, and where the valve, therefore, is not called upon to operate frequently. They should preferably be mounted in a vertical position, since there is less wear on the moving parts in this position.



Vertical
All sizes can be used in a vertical position

List Prices and Dimensions

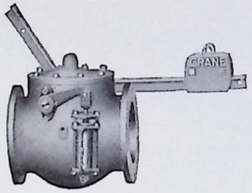
Size	Inches	2	2½	3	3½	4	5	6	8	10	12
No. 384	Each	11.00	13.00	15.00	19.00	22.50	33.50	43.00			
No. 385, Faced and Drilled	Each					26.00	37.00	47.00	90.00	130.00	200.00
End to end, screwed	Inches	6½	7	8	9	10	11¼	12½			
Face to face, flanged	Inches					11½	13	14	19½	24½	27½

Features of design: Sizes 3½-inch and smaller have the lever and weight mounted on the cap, and can only be used in the vertical position. Sizes 4-inch and larger have these parts mounted on the side of the body and can be used in either the horizontal or vertical position. No dashpots are used in these valves.

Flanges: End flanges of the No. 385 Valves conform to the American (A.S.A.) 125-Pound Cast Iron Flange Standard, No. B16a-1928.

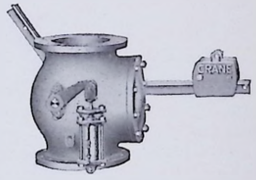
Drilling: These valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American 25-Pound Cast Iron Flange Standard. When ordered "faced only", they will be furnished at the same price as for "faced and drilled".

Iron Body
Combination Back Pressure and Exhaust Relief Valves



No. 415 H Horizontal

Features of design: These valves are sturdily constructed and perform equally well in either type of service. They are equipped with dashpots of proven design which effectively cushion the discs, and prevent pounding or hammering. The design is such that foreign matter cannot collect in them and interfere with proper operation.



No. 415 V Vertical

List Prices and Dimensions

Size	Inches	4	5	6	8	10	12	14	16	18	20	24	30	36
No. 415 H, Faced and Drilled	Each	64.00	88.00	120.00	195.00	310.00	385.00	475.00	575.00	675.00	775.00	1350.00	2100.00	3000.00
No. 415 V, Faced and Drilled	Each	64.00	88.00	120.00	195.00	310.00	385.00	475.00	575.00	675.00	775.00			
Face to face	Inches	11½	13	14	19½	24½	27½	31	36	36	40	48	60	72

Exhaust relief valves for condensing engines: When the weight is located on the vertical arm of the outside lever, the valve acts as an exhaust relief valve for condensing engine installations. It remains closed while the vacuum is maintained in the condenser, but will open if the vacuum is lost, due to pressure being exerted on the disc by the exhaust steam. The engine will then exhaust to atmosphere until the valve is closed by hand. A means of water sealing the valve seat is provided in these valves.

Back pressure valves for non-condensing engines: When the weight is located on the horizontal arm of the outside lever, as shown in the illustrations above, these valves may be used as back pressure valves for non-condensing engine installations, when the back pressure does not exceed 5 pounds. These valves have a more positive action than ordinary back pressure valves, and therefore may be used on installations where live steam is admitted into the exhaust lines as a make up when the exhaust steam is insufficient for the requirements. In such cases, ordinary back pressure valves with their large blow-down of pressure are extremely wasteful.

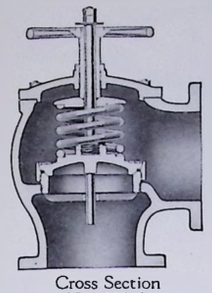
Flange dimensions: The end flanges of these valves in sizes 12-inch and smaller conform to the American (A.S.A.) 125-Pound Cast Iron Flange Standard, No. B16a-1928. On sizes 14-inch and larger, end flange dimensions conform to the American (A.S.A.) 25-Pound Tentative Cast Iron Flange Standard, No. B16b2-1931.

Drilling: These valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American 25-Pound Cast Iron Flange Standard. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

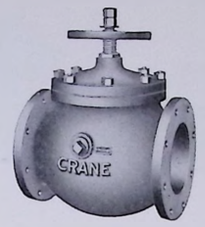
Spring Loaded
Iron Body Relief and Back Pressure Valves

Inside Spring Valves

Set Pressure Range
Nos. 386 H and 386 A — 3 to 20 pounds



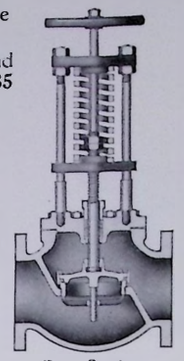
Cross Section
No. 386 A



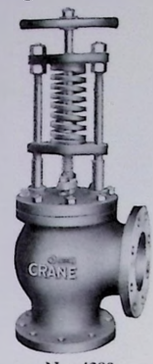
No. 386 H
Horizontal

Outside Spring Valves

Set Pressure Range
Nos. 4387 and 4389 — 10 to 35 pounds



Cross Section
No. 4387, Horizontal



No. 4389
Angle

List Prices

Size	Inches	2½	3	4	5	6	8	10	12
No. 386 H, Horizontal, Faced and Drilled	Each	85.00	95.00	120.00	155.00	183.00	255.00	335.00	445.00
No. 386 A, Angle, Faced and Drilled	Each	85.00	95.00	120.00	155.00	183.00	255.00	335.00	445.00
No. 4387, Horizontal, Faced and Drilled	Each	79.00	88.00	113.00	155.00	183.00	275.00	345.00	475.00
No. 4389, Angle, Faced and Drilled	Each	79.00	88.00	113.00	155.00	183.00	275.00	345.00	475.00

Service recommendations: Nos. 386 H and 386 A Valves are designed for service on exhaust steam lines where a relatively high back pressure is to be maintained, and as exhaust relief valves on large low pressure vessels, such as condensers, etc.

Nos. 4387 and 4389 Valves are primarily intended for marine service for use as back pressure valves between the exhaust of auxiliary engines and the main condenser, and as exhaust relief valves on the condenser, should the vacuum be lost. They are also suitable for use in stationary plants wherever valves are required to exhaust into a vacuum, or where back pressures above 20 pounds are required.

Features of design: These valves have adjustable popping chambers which insure a high lift for the discs, large discharging capacities, and definite opening and closing pressures. The blow-down of pressure can be regulated without dismantling the valves or the piping.

When desired, these valves can be opened and left in that position; turning the handwheel to the left gradually releases the tension from the spring, and when it is no longer under compression, further turning of the wheel lifts the disc from its seat.

No. 4387 and No. 4389 Valves have stuffing boxes around the stems which makes them suitable for service in discharging into a vacuum.

Pressure setting: Nos. 386 H and 386 A Valves may be set at any pressure specified from 3 to 20 pounds. Nos. 4387 and 4389 Valves may be set for any pressure from 1 to 20 pounds when discharging into a vacuum, and from 10 to 35 pounds when relieving to atmosphere.

Flange dimensions: End flanges of these valves conform to the American (A.S.A.) 125-Pound Cast Iron Flange Standard, No. B16a-1928.

Drilling: These valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American 125-Pound Cast Iron Flange Standard. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

Dimensions, in Inches

Size		2½	3	4	5	6	8	10	12
No. 386 H	Face to face	9½	10	12	14	16	19½	24½	27½
	Center to top of handwheel (open)	8½	9½	11½	13	14½	18½	22	24
	Diameter of handwheel	5½	7	8	9	9	10	14	14
No. 386 A	Center to face	4¾	5	6	7	8	9¾	12¼	13¾
	Center to top of handwheel (open)	7½	8½	10½	11½	13	15½	18½	21
	Diameter of handwheel	5½	7	8	9	9	10	14	14
No. 4387	Face to face	9½	10	12	14	16	19½	24½	27½
	Center to top of handwheel (open)	14	16	21	25½	28	34	40	46
	Diameter of handwheel	5½	6	8	10	10	12	14	16
No. 4389	Center to face	4¾	5	6	7	8	9¾	12¼	13¾
	Center to top of handwheel (open)	14	16	21	25½	28	34	40	46
	Diameter of handwheel	5½	6	8	10	10	12	14	16

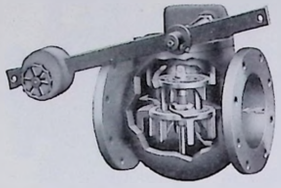
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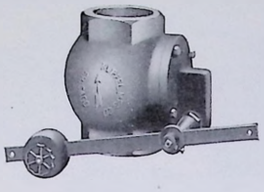
Klipfel

Back Pressure Valves

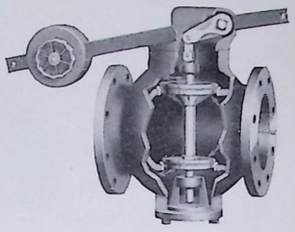
For Non-Condensing Engines



Cross Section
No. 417, Flanged



No. 416, Screwed



Cross Section
No. 417½, Flanged

List Prices, Nos. 416 and 417

Size	Inches	2	2½	3	3½	4	5	6
No. 416, Screwed	Each	60.00	70.00	80.00	90.00	100.00	135.00	155.00
No. 417, Flanged, Faced and Drilled	Each	70.00	80.00	90.00	100.00	110.00	145.00	165.00

List Prices, No. 417½

Size	Inches	8	10	12	14	16	18	20
No. 417½, Flanged, Faced and Drilled	Each	320.00	430.00	640.00	800.00	1000.00	1200.00	1500.00

Service recommendations: These back pressure valves are designed for use on the exhaust lines from engines, turbines, pumps, etc., where it is desired to maintain a back pressure of not less than 1 pound. They should only be used on non-condensing service.

Installation: These valves can be installed in either the horizontal or vertical positions, but it is recommended that the horizontal position be used wherever possible. In this position, a greater pressure adjustment is possible, the inner valve opens and closes without friction, and consequently the valve has greater sensitiveness as well as greater durability.

Back pressure: These valves are weighted for back pressures as follows:

Size	Vertical	Horizontal
2 and 2½-inch	4 to 20 pounds	1 to 20 pounds
3 to 6-inch	3 to 10 pounds	1 to 10 pounds
8 to 12-inch	2 to 8 pounds	2 to 8 pounds
14 to 20-inch	2 to 6 pounds	2 to 6 pounds

Construction: No. 416 Screwed and No. 417 Flanged Valves are made with semi-steel bodies and brass trimmings, in sizes 2 to 6-inch. These valves have one disc of an area equal to that of the pipe inlet, and to it is attached a smaller balancing disc. A series of tubes connect the balancing chamber above the smaller disc with the valve inlet; the restricted flow of steam to and from this chamber through the tubes creates a cushioning effect which stabilizes the movement of the disc assembly. This construction eliminates pounding and renders the valve noiseless in operation. The main disc is of the seatless type and consequently there may be a very slight leakage of steam through the valve even when in the closed position.

No. 417½ Valves are made with semi-steel bodies and brass trimmings, flanged end only, in sizes from 8 to 20-inch. These valves are of the semi-balanced type and have two bevel seated discs equal in combined area to the pipe inlet. Perfect alignment of the discs is assured, as the steel valve stem passes through two brass bushed guide yokes which are cast integral with the upper and lower covers. The discs in these valves seat tightly when in the closed position and therefore there is no leakage of steam.

Flange dimensions: End flange dimensions conform to the American (A.S.A.) 125-Pound Cast Iron Flange Standard, No. B16a-1928.

Drilling: Flanged valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American 125-Pound Flange Standard. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

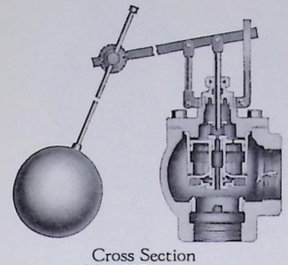
When ordering: State catalogue number of valve, pipe size, minimum and maximum back pressure, and whether for horizontal or vertical installation.

Klipfel

Tank Float Valves

Single Seated Type

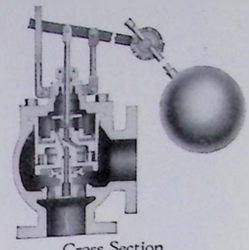
150 pounds cold water working pressure



Cross Section
No. 997, Angle



No. 997, Globe



Cross Section
No. 997½, Angle

List Prices

Size	Inches	¾	1	1¼	1½	2	2½	3	4	5	6	8
No. 997, Globe or Angle, Screwed	Each	36.00	40.00	45.00	50.00	60.00						
No. 997½, Globe or Angle, Screwed	Each						90.00	110.00	155.00	215.00	235.00	
No. 997½, Globe or Angle, Flanged F. & D.	Each						95.00	115.00	160.00	220.00	240.00	500.00

Service recommendations: These float valves are used to maintain a constant water level in open tanks. They have auxiliary operated inner valves and renewable composition discs; the seat area is equal to the area of the inlet pipe. While operating, the valves utilize not only the power of the float and its lever arm, but also the power exerted by the pressure of the water in the valve. When closed, these valves are perfectly tight.

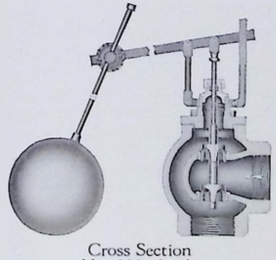
No. 997 Valves, made in sizes ¾ to 2-inch only, must be installed with the inlet pressure above the disc. No. 997½ Valves, made in sizes 2½ to 8-inch, must be installed with the inlet pressure under the disc.

Materials: All valves 1½-inch and smaller are made with brass bodies, while sizes 2-inch and larger have semi-steel bodies. Internal trimmings of all valves are made of brass.

Flange dimensions: End flange dimensions conform to the American (A.S.A.) 125-Pound Cast Iron Standard, No. B16a-1928.

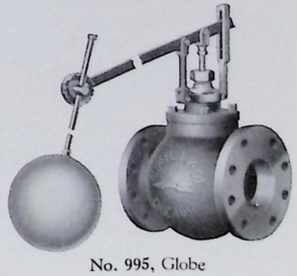
Drilling: Flanged valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American 125-Pound Cast Iron Flange Standard. When ordered "faced only", they will be furnished at the same price as for "faced and drilled"

Balanced Type



Cross Section
No. 993, Angle

Service recommendations: Balanced float valves may be used in general open tank service, where a tight seating valve is not necessary. The inner valve consists of two brass plungers which are perfectly balanced, and therefore are not affected by the water pressure. These plungers have no positive seating and slight leakage may take place past them even when they are in the closed position.



No. 995, Globe

List Prices, Screwed Ends

Size	Inches	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6
No. 993, Globe or Angle	Each	30.00	30.00	30.00	35.00	38.00	45.00	50.00	65.00	80.00	95.00	110.00	160.00	190.00

List Prices, Flanged Ends

Size	Inches	2	2½	3	3½	4	5	6	8	10	12
No. 995, Globe or Angle, Faced and Drilled	Each	55.00	70.00	85.00	100.00	115.00	165.00	195.00	305.00	390.00	540.00

Materials: All valves 1½-inch and smaller have brass bodies; sizes 2-inch and larger, have semi-steel bodies. Internal trimmings in all sizes are made of brass.

Flange dimensions: End flange dimensions conform to the American (A.S.A.) 125-Pound Cast Iron Flange Standard, No. B16a-1928.

Drilling: Flanged valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American 125-Pound Cast Iron Flange Standard. When ordered "faced only", they will be furnished at the same price as for "faced and drilled".

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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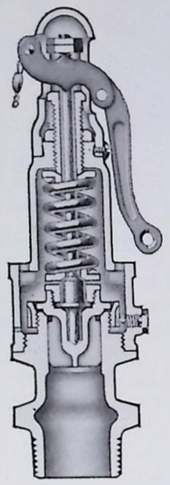
Brass Pop Safety Valves
for Steam

Inside Spring Valves for Saturated Steam

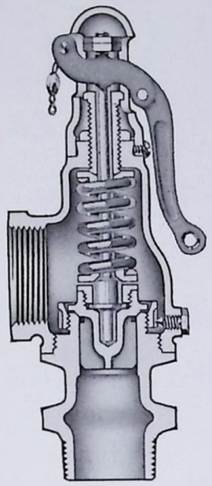
WORKING PRESSURES — 250 pounds steam
350 pounds steam

Outside Spring Valves for Superheated Steam

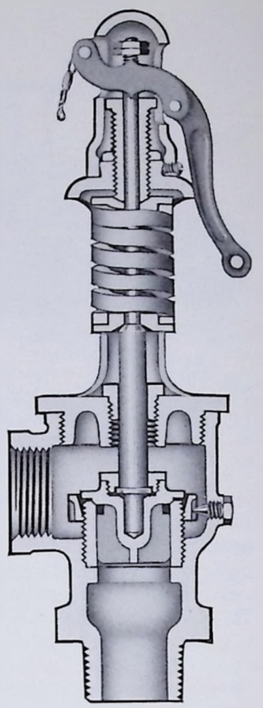
WORKING PRESSURE—250 pounds, 550° F.



Cross Section
Top Outlet Valve



Cross Section
Side Outlet Valve



Cross Section
Outside Spring Valve

Features of design: These valves are of the single disc type, and in all sizes, except the ⅜-inch, are equipped with adjustable blow-back regulating rings which provide a means for adjusting the blow-back when changing or regulating the set pressure. The adjustment of this ring may be made from the outside without interfering with the setting of the valve. Lifting levers are of the reversible type, which can be arranged for up-pull or down-pull operation. Regulating adjustments for the main spring permit the set pressure to be increased or decreased 10 per cent. Particular note should be taken of this fact, because one spring will not cover the complete range of working pressures at which the valve may be set.

Installation: Pop safety valves should always be installed in an upright position directly on the apparatus to be relieved. If they are installed in a horizontal position or at an angle, the disc may not seat properly, resulting in a leaky valve and subsequent cutting of the seating surfaces. Outlet piping should always be as short as possible, with a minimum number of turns, and never smaller in size than the outlet of the valve. Inlet piping, if necessary, should be full size and not longer than six times the diameter of the seat opening in the valve.

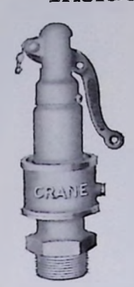
Outside spring valves: These valves are made in sizes from ⅜ to 2 inches, with male or female screwed inlets, and with side outlets. They are equipped with wire seals to prevent tampering with the adjustment of the main spring. They have been particularly designed for use on superheated steam, where the high temperatures to which the valve is exposed would have a deteriorating effect on an enclosed spring. Interior parts of these valves are of the same general design as the inside spring valves, and they possess all of the high qualities of these latter valves.

Capacities, in Pounds of Steam per Hour

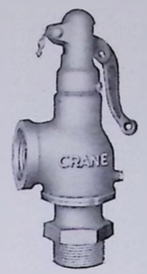
Set Pressure	Size, Inches							
	⅜	½	¾	1	1¼	1½	2	2½
10	45	95	160	240	310	480	540	700
25	75	150	273	399	532	667	920	1000
50	90	185	331	484	661	847	1218	1450
75	110	220	389	569	790	1027	1516	1900
100	125	255	447	654	919	1207	1814	2350
125	145	290	505	739	1048	1387	2112	2800
150	160	325	563	824	1177	1567	2410	3200
175	180	360	621	909	1306	1747	2708	3600
200	195	395	679	994	1435	1927	3006	4000
225	215	430	737	1079	1564	2107	3304	4400
250	230	465	795	1164	1693	2287	3602	4800
275		420	620	860	1260	2020	3330	
300		460	660	920	1350	2160	3610	
325		500	700	980	1440	2300	3900	
350		540	740	1040	1530	2440	4180	

Brass Pop Safety Valves
for Steam

Inside Spring Valves for Saturated Steam



Top Outlet
with Wire Seal
No. 2500, 250 Pounds
No. 2510, 350 Pounds



Side Outlet
with Wire Seal
No. 2501, 250 Pounds
No. 2511, 350 Pounds



Top Outlet
with Lock
No. 2502, 250 Pounds
No. 2512, 350 Pounds



Side Outlet
with Lock
No. 2503, 250 Pounds
No. 2513, 350 Pounds

Outside Spring Valves for Superheated Steam 250 pounds, 550° F.



Male Inlet
Side Outlet
No. 2521



Female Inlet
Side Outlet
No. 2524

List Prices

Size			Inches	⅜	½	¾	1	1¼	1½	2	2½
Inside Spring	250 Pounds	No. 2500	Each	13.50	13.50	14.50	17.50	20.00	25.00	35.00	50.00
		No. 2501	Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00	55.00
		No. 2502	Each	14.75	14.75	16.00	19.25	22.00	27.50	38.00	55.00
		No. 2503	Each	15.00	15.00	16.50	20.00	23.00	29.00	40.00	60.00
	350 Pounds	No. 2510	Each		13.50	14.50	17.50	20.00	25.00	35.00	
		No. 2511	Each		13.75	15.00	18.25	21.00	26.50	37.00	
		No. 2512	Each		14.75	16.00	19.25	22.00	27.50	38.00	
		No. 2513	Each		15.00	16.50	20.00	23.00	29.00	40.00	
Outside Spring	250 Pounds	No. 2521	Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00	
		No. 2524	Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00	

Valves for superheated steam service should always be of the outside spring type, since the springs in these valves are exposed to the cooling effect of the surrounding air, and therefore are less subject to deterioration from high temperatures.

Service recommendations: These brass pop safety valves are suitable for use on fire tube boilers, miniature boilers, on unfired pressure vessels, such as receivers, pipe lines, etc., and in Marine service in sizes ½-inch to 2 inches.

Pressure setting: No. 2500, No. 2501, No. 2502, No. 2503, No. 2521, and No. 2524 Valves may be set for any pressure specified from 3 pounds to 250 pounds. No. 2510, No. 2511, No. 2512, and No. 2513 Valves may be set for any pressure specified from 251 pounds to 350 pounds. Orders must specify the set pressure wanted as well as the catalogue number.

Boiler Code requirements: These valves comply with the A.S.M.E. construction codes for Fire Tube Boilers, for Miniature Boilers, and for Unfired Pressure Vessels. They also comply with the requirements of the A. P. I. Field Boiler Code. Regular valves do not comply with the A.S.M.E. Low Pressure Heating Boiler Code unless equipped with limit collar and seal. Such valves are made to order only, with prices on application.

Dimensions, in Inches

Size		⅜	½	¾	1	1¼	1½	2	2½
250 Pound Inside Spring Valves	Size of inlet	⅜	½	¾	1	1¼	1½	2	2½
	Size of outlet	½	½	¾	1	1¼	1½	2	2½
	Height over all	6	6	6½	7⅞	7⅞	9⅛	10⅝	12¾
	Center to top	3¾	3¾	3¾	4⅝	4⅜	5¼	6⅛	7¾
	Center to end of male inlet	2¼	2¼	2¾	3¼	3½	3⅞	4½	5
	Center to end of side outlet	1⅛	1⅛	1⅜	1⅝	1¾	2⅛	2 7/16	2⅞
350 Pound Inside Spring Valves	Size of inlet		½	¾	1	1¼	1½	2	
	Size of outlet		¾	¾	1	1½	2	2½	
	Height over all		6⅛	6½	7⅞	9⅛	10⅝	12¼	
	Center to top		3¾	3¾	4⅝	5¼	6⅛	7½	
	Center to end of male inlet		2⅜	2¾	3¼	3⅞	4½	4¾	
	Center to end of side outlet		1⅜	1⅜	1⅝	2⅛	2 7/16	2⅞	
250 Pound Outside Spring Valves	Size of inlet	⅜	½	¾	1	1¼	1½	2	
	Size of outlet	½	½	¾	1	1¼	1½	2	
	Center to top	5⅝	5⅝	5⅞	7	8¼	9¼	11½	
	Center to end of male inlet	2¼	2⅜	2⅞	3¼	3⅝	4	4⅝	
	Center to end of female inlet	1⅝	1⅝	2	2¼	2⅝	2⅞	3½	
	Center to end of side outlet	1	1	1¼	1⅝	2	2⅜	2¾	

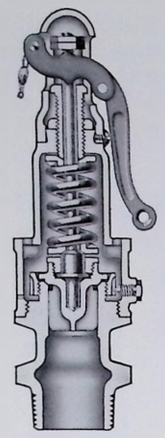
Capacities . . . . page 390

Description . . . . page 390

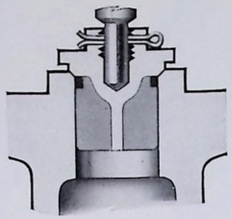
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Brass Pop Safety Valves

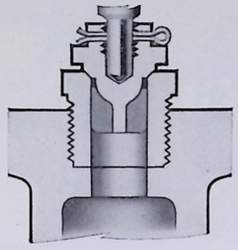
For Air and Gas



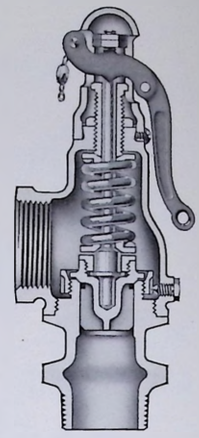
Cross Section
250 and 350-Pound
Top Outlet Valves



Enlarged section showing seat and disc construction of all 600-Pound valves.



Enlarged section showing seat and disc construction of all 1000-Pound valves.



Cross Section
250 and 350-Pound
Side Outlet Valves

A complete line: Crane Brass Safety Valves for Air and Gas are made for 250 pounds pressure, in sizes from ⅜ to 2½-inch; for 350 pounds pressure, in sizes from ½ to 2-inch; for 600 pounds pressure, in sizes from ½ to 1½-inch; for 1000 pounds pressure, in sizes from ¼ to 1½-inch; and for 2500 pounds pressure in sizes from ¼ to 1-inch.

Features of design: These valves are of the single disc type. In the 250 and 350-pound classes, all sizes, except the ⅜-inch 250-pound valves, are equipped with blow-back regulating rings, which provide a means for adjusting the blow-back when changing or regulating the set pressure. The regulating ring has the further effect of forming a huddling or pop chamber under the extended lip of the disc, and causes a high lift of the disc with a consequent high discharging capacity. For pressures above 350 pounds, the capacities of such valves would be excessive, and therefore the regulating ring is not used in Crane safety valves for air and gas in the 600, 1000, and 2500-pound classes. All valves have reversible lifting levers, which may be arranged for up-pull or down-pull operation.

Regulating adjustments for the main spring permit the set pressure to be increased or decreased by 10 per cent. Particular note should be taken of this fact, because one spring will not cover the entire range of pressures at which the valve may be set.

Seat tightness: It is always more difficult to keep valves tight on air and gas than it is on steam or water. The seating surfaces of these safety valves are carefully ground to insure absolute tightness at all pressures up to 80 per cent of the set pressure. Since safety valves for air or gas should always be set at a pressure 25 per cent higher than the normal working pressure, no leakage will be experienced with Crane safety valves if they are properly installed and given ordinary care.

Code requirements: These valves comply with the requirements of the A.S.M.E. Code for Unfired Pressure Vessels for pressures above 30 pounds.

Installation: All safety valves should be installed with the stem in a vertical position. If they are installed in a horizontal position or at an angle, the discs may not seat properly, resulting in a leaky valve, and eventual cutting of the seating surfaces. Safety valves for air or gas should preferably be installed in an upside down position, in order to allow moisture to collect and seal the seating surfaces.

Capacities in Cubic Feet of Free Air per Minute

Set Pressure	Size, Inches								
	¼	⅜	½	¾	1	1¼	1½	2	2½
10		7	14	36	58	75	112	140	190
25		10	20	45	70	90	130	170	240
50		15	30	60	90	115	160	220	320
75		20	40	75	110	140	190	270	400
100		25	50	90	130	165	220	320	480
125		30	60	105	150	190	250	370	560
150		35	70	120	170	215	280	420	630
175		40	80	135	190	240	310	470	700
200		45	90	150	210	265	340	520	770
225		50	100	165	230	290	370	570	840
250		55	110	180	250	315	400	620	910
275			65	125	195	275	385	640	
300			70	130	205	295	405	670	
325			75	135	215	310	425	700	
350			80	140	225	325	450	740	
400			111	176	248	350	460		
500			129	224	286	374	472		
600			147	232	324	420	540		
800	84	130	177	242	390	509	634		
1000	97	150	205	346	450	600	750		
1200	109	170	230	386	500				
1600	128	195	270	423	586				
2000	147	215	304	474	650				
2400	160	230	330	518	700				

Brass Pop Safety Valves

For Air and Gas

Top Outlet



With Wire Seal
No. 2550, 250 pounds
No. 2560, 350 pounds
No. 2570, 600 pounds
No. 2580, 1000 pounds
No. 2590, 2500 pounds

With Lock
No. 2552, 250 pounds
No. 2562, 350 pounds

List Prices

Size Inches	¼	⅜	½	¾	1	1¼	1½	2	2½
No. 2550 Each		13.50	13.50	14.50	17.50	20.00	25.00	35.00	50.00
No. 2551 Each		13.75	13.75	15.00	18.25	21.00	26.50	37.00	55.00
No. 2552 Each		14.75	14.75	16.00	19.25	22.00	27.50	38.00	55.00
No. 2553 Each		15.00	15.00	16.50	20.00	23.00	29.00	40.00	60.00
No. 2560 Each			13.50	14.50	17.50	20.00	25.00	35.00	
No. 2561 Each			13.75	15.00	18.25	21.00	26.50	37.00	
No. 2562 Each			14.75	16.00	19.25	22.00	27.50	38.00	
No. 2563 Each			15.00	16.50	20.00	23.00	29.00	40.00	
No. 2570 Each			13.50	14.50	17.50	20.00	25.00		
No. 2571 Each			13.75	15.00	18.25	21.00	26.50		
No. 2580 Each	13.50	13.50	13.50	14.50	17.50	20.00	25.00		
No. 2581 Each	13.75	13.75	13.75	15.00	18.25	21.00	26.50		
No. 2590 Each	13.50	13.50	13.50	14.50	17.50				
No. 2591 Each	13.75	13.75	13.75	15.00	18.25				

Side Outlet



With Wire Seal
No. 2551, 250 pounds
No. 2561, 350 pounds
No. 2571, 600 pounds
No. 2581, 1000 pounds
No. 2591, 2500 pounds

With Lock
No. 2553, 250 pounds
No. 2563, 350 pounds

Service recommendations: These safety valves may be recommended to handle compressed air and gases on receivers, tanks, pipe lines, etc., where the temperature does not exceed 450° F. For compressed air, either the top outlet or the side outlet type may be used, but for gases, the side outlet type should be recommended, so that the exhaust can be piped away. For noxious gases, side outlet valves with pressure-tight bodies, caps and lever mechanisms should be specified. An extra charge is made for valves having these features.

Pressure setting: Safety valves for use on air and gases should always be set 25% higher than the normal operating pressure. These valves may be set at any pressure specified within the following ranges:

Nos. 2550, 2551, 2552, and 2553	—3 to 250 pounds
Nos. 2560, 2561, 2562, and 2563	—251 to 350 pounds
No. 2570 and No. 2571	—351 to 600 pounds
No. 2580 and No. 2581	—601 to 1000 pounds
No. 2590 and No. 2591	—1001 to 2500 pounds

Orders must specify the set pressure wanted.

Dimensions, in Inches

Size		¼	⅜	½	¾	1	1¼	1½	2	2½
250 Pound	Inlet		⅜	½	¾	1	1¼	1½	2	2½
	Side Outlet		½	½	¾	1	1¼	1½	2	2½
	Height		6	6	6½	7⅞	7⅞	9⅛	10⅝	12¾
	Center to Top		3¾	3¾	3¾	4⅝	4⅜	5¼	6⅛	7¾
	Center to Inlet		2¼	2¼	2¾	3¼	3½	3⅞	4½	5
	Center to Outlet		1⅛	1⅛	1⅜	1⅜	1⅝	2⅛	2 7/16	2⅞
350 Pound	Inlet			½	¾	1	1¼	1½	2	
	Side Outlet			¾	¾	1	1½	2	2½	
	Height			6⅛	6½	7⅞	9⅛	10⅝	12¼	
	Center to Top			3¾	3¾	4⅝	5¼	6⅛	7½	
	Center to Inlet			2⅜	2¾	3¼	3⅞	4½	4¾	
	Center to Outlet			1⅜	1⅜	1⅝	2⅛	2 7/16	2⅞	
600 Pound	Inlet			½	¾	1	1¼	1½		
	Side Outlet			½	1	1½	2	2½		
	Height			6	7⅞	9⅛	10⅝	12¾		
	Center to Top			3¾	4⅝	5¼	6⅛	7¾		
	Center to Inlet			2¼	3¼	3⅞	4½	5		
	Center to Outlet			1⅛	1⅝	2⅛	2 7/16	2⅞		
1000 Pound	Inlet	¼	⅜	½	¾	1	1¼	1½		
	Side Outlet	½	½	¾	1	1½	2	2½		
	Height	6	6	6½	7⅞	9⅛	10⅝	12¾		
	Center to Top	3¾	3¾	3¾	4⅝	5¼	6⅛	7¾		
	Center to Inlet	2¼	2¼	2¾	3¼	3⅞	4½	5		
	Center to Outlet	1⅛	1⅛	1⅜	1⅝	2⅛	2⅜	2⅞		
2500 Pound	Inlet	¼	⅜	½	¾	1				
	Side Outlet	½	¾	¾	1½	2				
	Height	6	6½	6½	9⅛	10⅝				
	Center to Top	3¾	3¾	3¾	5¼	6⅛				
	Center to Inlet	2¼	2¾	2¾	3⅞	4½				
	Center to Outlet	1⅛	1⅜	1⅜	2⅛	2⅜				

Capacities . . . page 392

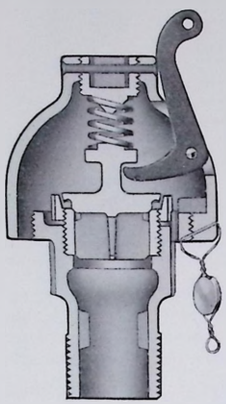
Description . . . page 392

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 215 of 402
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asbestosclaims.law/library/21275/215

Low Pressure Iron Body Pop Safety Valves

For Steam Heating Boilers

When set at pressures not exceeding 15 pounds, these valves comply with the requirements of the A.S.M.E. Code for Low Pressure Heating Boilers.



Cross Section
No. 1166

Service Recommendations

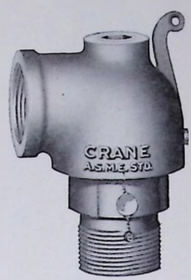
These pop safety valves have been particularly designed for service on low pressure heating boilers. They can also be used as safety valves on tanks, pipe lines, receivers, etc., where the pressure does not exceed 25 pounds.



No. 1165
Up Discharge



No. 1166
Down Discharge



No. 1168
Side Outlet

List Prices and Dimensions

Size	Inches	¾	1	1¼	1½	2	2½	3	3½	4
No. 1165	Each		6.00	6.75	8.25	11.25				
No. 1166	Each	5.00	5.75	6.75	8.25	10.00				
No. 1168	Each	5.25	6.00	7.00	8.50	11.00	19.00	25.00	45.00	65.00
Height over all, No. 1165	Inches		5¼	5½	6¾	7¼				
Height over all, No. 1166	Inches	4¾	5¼	5½	6¾	7¼				
Height over all, No. 1168	Inches	4¾	5⅛	5¼	5½	6⅞	10¾	11⅜	13⅛	13¾
Center to end of inlet, No. 1168	Inches	3	3¼	3⅜	3⅝	4⅛	6	6⅞	7¾	8½
Center to end of outlet, No. 1168	Inches	1⅝	1¾	2	2¼	2¾	3¼	3¾	4¼	4¾

Features of design: These valves are of the single disc type and are equipped with blow-back regulating rings which provide a means of adjusting the amount of steam the valve will relieve. The regulating ring has the further effect of forming a huddling or pop chamber under the extended lip of the disc, which insures a high lift of the disc and a consequent high capacity. Bodies and bases in all valves 2-inch and smaller are made of malleable iron. In sizes 2½-inch and larger bodies and bases are of cast iron. In sizes 2-inch and smaller, the bodies are screwed onto the bases as shown in the cross-section above, while in the larger sizes the joint between bodies and bases is flanged and bolted. Seats and discs in these valves are made of brass.

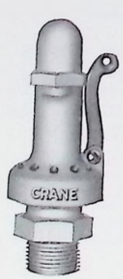
Pressure setting: These valves are non-adjustable; they are locked after being set in the factory, and the popping pressure cannot be increased. Valves are regularly set at 5, 10 or 15 pounds, and therefore orders must specify the set pressure wanted as well as the catalogue number. Valves may be furnished set at any other pressure specified, from 5 to 25 pounds, at an increased price.

Installation: Pop safety valves should always be installed in an upright position. When side outlet valves are used in order that the discharge may be piped away, it is essential that the outlet piping be made the full size of the outlet tapping of the valve. In the No. 1168 Valves, the ¾ and 1-inch sizes have outlets one size larger than the inlet or nominal size, while in sizes 1¼-inch and larger the outlets are the same size as the inlets.

Low Pressure Brass Pop Safety Valves

List Prices and Dimensions

Size	Inches	½	¾
No. 1160, Rough body	Each	5.25	5.25
No. 1164, Finished and nickel plated	Each	6.75	6.75
Height over all, No. 1160 and No. 1164	Inches	4⅝	4⅝



No. 1160
Rough Body

No. 1164
Finished and
Nickel-Plated

Service recommendations: These pop safety valves have been particularly designed for use on jacketed kettles, cookers, and similar low pressure steam-heated apparatus, where the working pressure does not exceed 20 pounds, and extremely high capacities are not required.

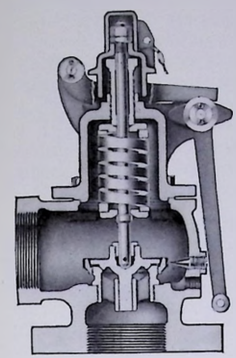
Features: These valves are made entirely of brass, except for the spring which is of steel, and the lifting lever which is malleable iron. They are of the single disc type and are designed for up-discharge only. They are simple and sturdy in construction, made of high grade materials throughout, and will give excellent service if given ordinary care.

Pressure setting: These valves are regularly set for 10 pounds pressure, but can be furnished set at any other pressure specified, from 3 to 20 pounds. Orders must specify the catalogue number and the set pressure wanted. Valves arranged for Inspector's Seal will be furnished when so ordered, at an extra charge.

Inside Spring

Iron Body Pop Safety Valves

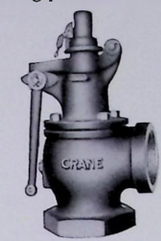
200 pounds steam working pressure



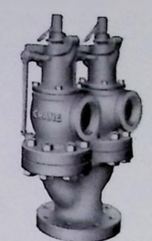
Cross Section
No. 1104



No. 1104
Flanged Inlet, Screwed Outlet



No. 1110
Screwed Inlet, Screwed Outlet



No. 1106, Twin Valves
Flanged Inlet, Screwed Outlet

List Prices

Size	Inches	2½	3	3½	4	4½
No. 1104, Faced and Drilled	Each	42.00	50.00	68.00	75.00	100.00
No. 1110	Each	42.00	50.00	68.00	75.00	100.00
No. 1106, Twin Valves, Faced and Drilled	Each	118.00	142.00	186.00	210.00	290.00

Service recommendations: These pop safety valves have been particularly designed to meet the A.S.M.E. Power Boiler Code requirements for fire tube boiler service. They offer the advantages of the high disc-lift construction without having excessive capacities. They can be applied to fire tube boilers having nozzle sizes in accordance with the Code, with the assurance that they will be neither too large nor too small for the required service.

Advantages: Like all Crane pop safety valves, these valves have a fast, positive action, without simmering, chattering, or pounding. The huddling or pop chamber formed under the extended lip of the disc insures a snappy action in opening, and a cushioning effect in closing. Wire-drawing of the seating surfaces is reduced to a minimum; abnormal wear caused by pounding of the disc in closing is entirely absent. With proper installation and ordinary care, they will give many years of satisfactory service.

Pressure setting: These valves can be set for any pressure specified from 5 pounds to 200 pounds. Orders must specify the set pressure wanted.

Seats and discs: The seats and discs in these valves are regularly made of brass.

Inlet connections: No. 1104 Valves are regularly made with combination flanged and screwed bases. No. 1110 Valves have hexagon screwed bases.

Twin Valves: No. 1106 Twin Valves consist of two No. 1104 Valves bolted on a Y-base.

Locking: These valves can be furnished locked up, including locks, at an extra price.

Flange dimensions: The inlet flange dimensions of these valves conform to the American (A.S.A.) 250-Pound Cast Iron Flange Standard No. B16b-1928, except that a plain face is used.

Drilling: These valves are furnished faced and drilled (F. & D.) unless ordered faced only. Bolt holes are spot faced. List prices include facing, spot facing, and drilling to the American 250-Pound Cast Iron Flange Standard. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

Boiler Code Requirements

These valves comply with the A.S.M.E. Power Boiler Code requirements for Fire Tube Boilers when set for pressures between 16 pounds and 200 pounds. They also comply with the A.S.M.E. Unfired Pressure Vessel Code when set for pressures between 30 pounds and 200 pounds. Regular valves do not comply with the A.S.M.E. Low Pressure Heating Boiler Code unless equipped with limit collar and seal. Such valves are made to order only, with prices on application.

Capacities of Single Valves in Pounds of Steam per Hour

Size Inches	Set Pressure, in Pounds per Square Inch							
	25	50	75	100	125	150	175	200
2½	971	1586	2202	2822	3442	4062	4682	5302
3	1425	2335	3239	4140	5039	5939	6854	7769
3½	1953	3201	4441	5676	6913	8160	9407	10654
4	2620	4275	5936	7601	9276	10953	12633	14314
4½	3336	5453	7575	9700	11820	13940	16071	18208

Dimensions, in Inches, of No. 1104 and No. 1110 Pop Safety Valves

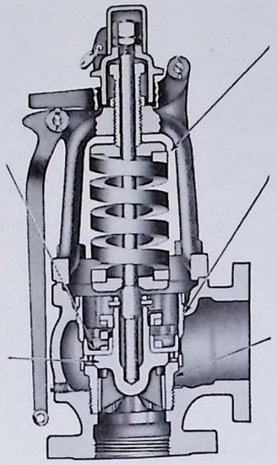
Size		2½	3	3½	4	4½
Size of Inlet		2½	3	3½	4	4½
Size of Outlet		2½	3	3½	4	4½
Center to top		8½	10¼	11½	13	14¼
Center to face of inlet flange		4	4½	5	5½	6
Center to end of screwed inlet		4	4½	5	5½	6
Center to end of outlet		4	4¾	5¼	5¾	6¼
Inlet Flange Dimensions	Diameter of flange	7½	8¼	9	10	10½
	Thickness of flange	1	1⅛	1³⁄₁₆	1¼	1⁵⁄₁₆
	Bolt circle	5⅞	6⅝	7¼	7⅞	8½
	Number of bolts	8	8	8	8	8
	Diameter of bolts	¾	¾	¾	¾	¾

Drilling Templates . . . page 371

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Outside Spring and Yoke
Ferrosteel Pop Safety Valves

These valves have been particularly designed to meet the exacting requirements of modern high pressure service in steam power plants. They embody in their construction all the Crane features that have proved so satisfactory in the past; notably, the patented auxiliary disc and spring, and the adjustable blow-back regulator. They are of the high-lift type and are noteworthy for the following qualities:—high discharging capacity, small blow-down of pressure, minimum waste of steam, absence of wiredrawing at the seat, and prompt seating without hammering.



Auxiliary disc: Seats on the upper side of the main disc through the action of the auxiliary disc spring, and closes ports from the huddling chamber. Used to prevent an excessive blow-back. Closes ahead of the main disc, thus trapping steam in the huddling chamber and cushioning the closing of the main disc.

Main disc: Accurately guided in the seat ring and in the encasing sleeve of the blow-back regulator. The overhanging lip of the disc forms a huddling or pop chamber below the disc, which insures a snappy action of the disc in opening and cushions it in closing.

Main disc spring: Practically outside the body and free of the deteriorating effects of high temperatures.

Blow-back regulating sleeve: Provides an easily adjustable control for the amount of steam the pop valve will relieve. Turning the sleeve down will decrease the blow-back; turning it up, will increase the blow-back. Adjustment may be made from the outside, without disturbing the setting of the valve.

Seat ring: Accurately guides the disc. Seating surface high above the body and therefore free of any possibility of distortion.

The Crane Outside Spring and Yoke Ferrosteel Pop Safety Valves meet the requirements of the following boiler rules:

The A. S. M. E. Boiler Code and the inspection laws of the states and cities that have adopted this code.

The Boiler Inspection Law of the State of Massachusetts and the Boiler Ordinance of all other states and cities in the United States that have any set regulations.

The Canadian Interprovincial Boiler Inspection Laws (as registered).

The United States Navy Department—Bureau of Engineering (as approved).

The rules of the Hartford Steam Boiler Inspection and Insurance Co.

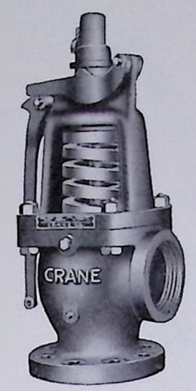
Capacities of Single Valves in Pounds of Steam per Hour at 3 Per Cent Over the Set Pressure

Set Pressure	Size, Inches						
	1½	2	2½	3	3½	4	4½
20	1060	1760	2600	3460	4390	5490	6880
25	1220	2000	2950	3900	4950	6200	7750
30	1380	2240	3300	4340	5510	6910	8620
35	1540	2480	3650	4780	6070	7620	9490
40	1700	2720	4000	5220	6630	8330	10360
45	1860	2960	4350	5660	7190	9040	11230
50	2020	3200	4700	6100	7750	9750	12100
55	2160	3410	4990	6480	8220	10330	12810
60	2300	3620	5280	6860	8690	10910	13520
65	2440	3830	5570	7240	9160	11490	14230
70	2580	4040	5860	7620	9630	12070	14940
75	2720	4250	6150	8000	10100	12650	15650
80	2860	4460	6440	8380	10570	13230	16360
85	2995	4670	6730	8760	11040	13810	17070
90	3130	4880	7020	9140	11510	14390	17780
95	3265	5090	7310	9520	11980	14970	18490
100	3400	5300	7600	9900	12450	15550	19200
105	3520	5480	7840	10190	12830	16005	19750
110	3640	5660	8080	10480	13210	16460	20300
115	3760	5840	8320	10770	13590	16915	20850
120	3880	6020	8560	11060	13970	17370	21400
125	4000	6200	8800	11350	14350	17825	21950
130	4120	6380	9040	11640	14730	18280	22500
135	4240	6560	9280	11930	15110	18735	23050

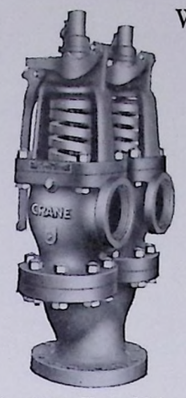
Set Pressure	Size, Inches						
	1½	2	2½	3	3½	4	4½
140	4360	6740	9520	12220	15490	19190	23600
145	4480	6920	9760	12510	15870	19645	24150
150	4600	7100	10000	12800	16250	20100	24700
155	4705	7240	10180	13050	16535	20470	25125
160	4810	7380	10360	13300	16820	20840	25550
165	4915	7520	10540	13550	17105	21210	25975
170	5020	7660	10720	13800	17390	21580	26400
175	5125	7800	10900	14050	17675	21950	26825
180	5230	7940	11080	14300	17960	22320	27250
185	5335	8080	11260	14550	18245	22690	27675
190	5440	8220	11440	14800	18530	23060	28100
195	5545	8360	11620	15050	18815	23430	28525
200	5650	8500	11800	15300	19100	23800	28950
205	5735	8610	11930	15475	19335	24050	29285
210	5820	8720	12060	15650	19570	24300	29620
215	5905	8830	12190	15825	19805	24550	29955
220	5990	8940	12320	16000	20040	24800	30290
225	6075	9050	12450	16175	20275	25050	30625
230	6160	9160	12580	16350	20510	25300	30960
235	6245	9270	12710	16525	20745	25550	31295
240	6330	9380	12840	16700	20980	25800	31630
245	6415	9490	12970	16875	21215	26050	31965
250	6500	9600	13100	17050	21450	26300	32300

Outside Spring and Yoke
Ferrosteel Pop Safety Valves

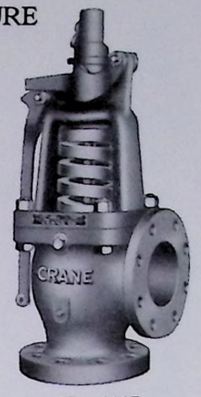
WORKING PRESSURE
250 pounds steam



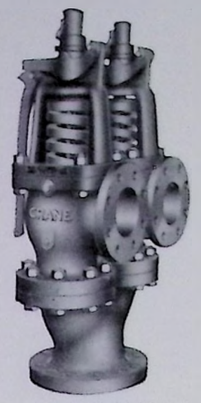
No. 1116
Flanged Inlet,
Screwed Outlet



No. 1120, Twin Valves
Flanged Inlet,
Screwed Outlet



No. 1117
Flanged Inlet,
Flanged Outlet



No. 1121, Twin Valves
Flanged Inlet,
Flanged Outlet

List Prices

Size	Inches	1½*	2	2½	3	3½	4	4½
Nos. 1116, 1117, with Brass Seat, Faced and Drilled	Each	75.00	100.00	120.00	135.00	160.00	170.00	225.00
Nos. 1116, 1117, with Monel Seat, Faced and Drilled	Each	81.00	106.00	126.00	142.00	167.00	182.00	240.00
Nos. 1120, 1121, Twin Valves with Brass Seats, Faced and Drilled	Each	171.00	230.00	276.00	312.00	370.00	400.00	540.00
Nos. 1120, 1121, Twin Valves with Monel Seats, Faced and Drilled	Each	183.00	242.00	288.00	326.00	384.00	424.00	570.00

*1½-inch valves are made screwed outlet only.

Pressure setting: These valves can be set for any pressure specified between 16 pounds and 250 pounds. Orders must specify the set pressure wanted.

Seats: Valves with brass seats will always be furnished unless monel seats are specified. All valves have brass discs.

Inlet connection: No. 1116 and No. 1117 Valves are regularly furnished with combination flanged and screwed base. Hexagon screwed bases can be furnished when so ordered.

Locking: These valves are regularly furnished locked up, and the list price includes the locks.

Twin Valves: No. 1120 Twin Valves consist of two No. 1116 Valves bolted on a Y-base. No. 1121 Twin Valves consist of two No. 1117 Valves bolted on a Y-base.

Flange dimensions: The inlet flange dimensions of these valves on all sizes, except the 1½-inch, conform to the American (A.S.A.) 250-Pound Cast Iron Flange Standard, No. B16b-1928. The 1½-inch valves have a square inlet flange. Flanges have a 1/16-inch raised face.

Outlet flange dimensions conform to the American (A.S.A.) 125-Pound Cast Iron Flange Standard, No. B16a-1928.

Drilling: These valves are furnished faced and drilled (F. & D.) unless ordered faced only. Bolt holes on inlet flanges are also spot faced. List prices include facing, drilling, and spot facing. Drilling of the inlet flanges is in accordance with the American 250-Pound Cast Iron Flange Standard. Drilling of the outlet flanges is in accordance with the American 125-Pound Cast Iron Flange Standard. When valves are ordered "faced only", they will be furnished at the same price as for "faced and drilled".

Dimensions, in Inches, of No. 1116 and No. 1117 Pop Safety Valves

Size		1½	2	2½	3	3½	4	4½
Size of Inlet		1½	2	2½	3	3½	4	4½
Size of Outlet		2	2½	3	3½	4	4½	5
Center to top		9 3/16	12⅛	14	15⅞	17½	19¾	20⅞
Center to face of inlet flange		3 5/16	4⅜	4¾	5⅜	6	6½	7⅛
Center to face of outlet flange			4¾	5½	6	6½	7	7½
Center to end of screwed outlet		3	3 15/16	4½	5	5 9/16	6	6½
Inlet Flange Dimensions	Diameter of flanges	*4 11/16	6½	7½	8¼	9	10	10½
	Thickness of flanges	⅞	⅞	1	1⅛	1 3/16	1¼	1 5/16
	Bolt circle	4½	5	5⅞	6⅝	7¼	7 7/8	8½
	Number of bolts	4	8	8	8	8	8	8
	Diameter of bolts	¾	⅝	¾	¾	¾	¾	¾
Outlet Flange Dimensions	Diameter of flanges		7	7½	8½	9	9¼	10
	Thickness of flanges		11/16	¾	13/16	15/16	15/16	15/16
	Bolt circle		5½	6	7	7½	7¾	8½
	Number of bolts		4	4	8	8	8	8
	Diameter of bolts		⅝	⅝	⅝	⅝	¾	¾

*All 1½-inch valves are made with square inlet flanges and with screwed outlets only.

Drilling templates . . . pages 370 and 371

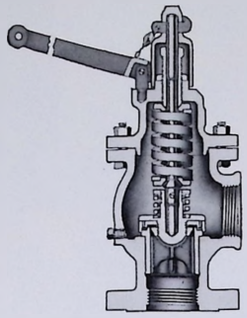
Dimensions of Y-Bases . . . page 401

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 217 of 402
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Iron Body Pop Safety Valves

for Air and Gas

Set Pressure Range, **5** to **150** pounds



Cross Section
No. 1102

List Prices and Dimensions

Size	Inches	2½	3	3½	4
No. 1102, Faced and Drilled	Each	65.00	75.00	100.00	110.00
Size of Inlet	Inches	2½	3	3½	4
Size of Outlet	Inches	2½	3	3½	4
Center to top	Inches	11	12	14	14½
Center to face of inlet	Inches	5¼	5¾	6⅛	6¾
Center to end of outlet	Inches	3⅞	4¼	4⅝	5

Capacity, in Cubic Feet of Free Air per Minute

Size, Inches	Set Pressure				
	25	50	75	100	150
2½	425	695	965	1230	1770
3	510	835	1160	1480	2130
3½	595	975	1350	1730	2490
4	685	1110	1550	1980	2840

Service recommendations: These valves are designed for use on air and gas receivers, pipe lines, etc. where pressures do not exceed 150 pounds. For higher pressures, No. 1116 Pop Safety Valves, as shown on page 397, specially ground and tested for air, are recommended.

Construction: These valves have composition discs and the patented Crane auxiliary disc and spring, which insures high capacities, tight seating, small blow-back, and absence of wire-drawing.

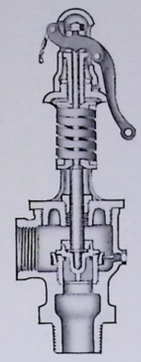
Pressure setting: These valves should be set at pressures 25 per cent above the normal working pressure in the system. Orders must specify the set pressure wanted.

Flange dimensions: Inlet flange dimensions conform to the American (A.S.A.) 250-Pound Cast Iron Flange Standard, No. B16b-1928.

Drilling: Valves are regularly furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American 250-Pound Cast Iron Flange Standard. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

Outside Spring and Yoke

Cast Steel Pop Safety Valves



Cross Section
No. 2531

350 pounds steam working pressure. **750°** F.

Features: This line of valves has been particularly designed to meet the need for small, high capacity pop safety valves for high pressures and high temperatures. They are made in sizes from ⅜ to 2-inch, with either male or female inlets, and female outlets. They are of the high lift type and are noteworthy for the following features: high discharging capacity, small blow-down of pressure, absence of wire-drawing at the seating surfaces, and prompt seating without hammering.



No. 2531
Male Inlet



No. 2534
Female Inlet

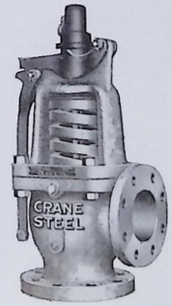
Construction: These valves are of the single disc type and all sizes, except the ⅜-inch, have adjustable blow-back regulating rings, which provide a means for adjusting the blow-down of pressure when changing or regulating the set pressure. The adjustment of this ring may be made from the outside without interfering with the setting of the valve. Regulating adjustments of the spring permit the set pressure to be increased or decreased by 10 per cent.

Materials: Bodies and bonnets of these valves are made of cast steel, while the discs and seats are of Crane 18-8 Chrome-Nickel Alloy Steel. Springs are made of chromium-vanadium steel.

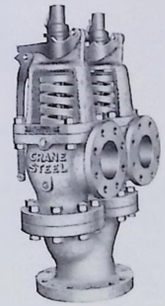
Boiler Code requirements: These pop safety valves comply with the requirements of the A.S.M.E. construction codes for fire-tube boilers, for miniature boilers, and for unfired pressure vessels.

Prices on Application

325 pounds steam working pressure, **500°** F.

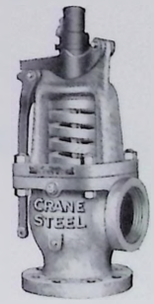


No. 1117A
Flanged Outlet



No. 1121A
Twin Valves

Features of construction: These valves have been designed to meet the exacting requirements of modern high pressure service. They embody in their construction all of the Crane features which have proven so successful in the past; notably, the patented auxiliary disc and spring, and the adjustable blow-back regulator. They are of the high lift type, and are noteworthy for the following qualities: high discharging capacity, small blow-down of pressure, absence of wire-drawing at the seat, and prompt seating without hammering.



No. 1116A
Screwed Outlet

Materials: These valves are made with combination flanged and screwed inlets and with either flanged or screwed outlets. Bodies and yokes are of cast steel, discs and seats are of forged monel, and springs are of crucible steel.

Boiler Code requirements: These valves meet the requirements of the following boiler rules:

The A.S.M.E. Boiler Code and the inspection laws of the states and cities that have adopted this code.

The Boiler Inspection Law of the State of Massachusetts and the Boiler Ordinances of all other states and cities in the United States that have any set regulations.

The Canadian Interprovincial Boiler Inspection Laws (as registered).

The requirements of the U. S. Board of Supervising Inspectors of Steam Vessels (all flanged outlet types).

The United States Navy Department — Bureau of Engineering (as approved).

The rules of the Hartford Steam Boiler Inspection & Insurance Co.

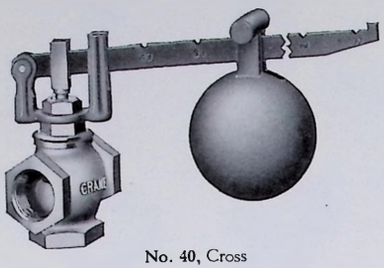
Prices on Application

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Lever and Weight Safety Valves

Brass Body

WORKING PRESSURE
15 to 100 pounds steam



No. 40, Cross

List Prices and Dimensions

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2
No. 40, Cross	Each	2.20	2.50	3.25	3.90	4.70	7.15	9.00	12.50
No. 42, Angle	Each		2.50	3.25	3.90	4.70	7.15	9.00	12.50
Center to end	Inches	⅞	1	1⅛	1⅜	1⅝	1⅞	2⅛	2½
Center to top	Inches	2¾	3⅛	3¼	3½	4⅛	4⅝	5	5⅜
Center to end of lever	Inches	7½	7½	10½	12½	16¼	16¼	18½	17½

Service recommendations: These valves are suitable for ordinary low pressure relief valve service where a simple inexpensive valve is wanted, but they should not be confused with modern spring-loaded pop safety and relief valves. They have no positive opening and closing points and must be set at least 20 per cent higher than the normal working pressure in the system in order to avoid continual leakage past the seating surfaces.

The blow-down of pressure is large with valves of this type, and therefore they are wasteful in operation. They should never be used on compressed air or gas service.

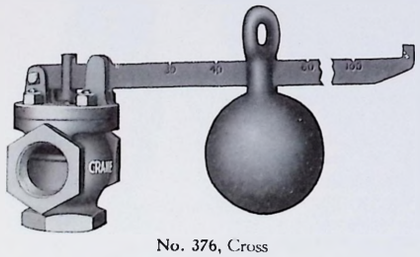
Bodies of cross valves have two inlet openings and one outlet, and therefore can be installed either on vertical or horizontal lines. In either case, however, the stems must be vertical and the levers in a horizontal position.

Pressure range: These valves are regularly furnished with levers graduated for pressures from 15 to 40 pounds, or with levers graduated for pressures from 41 to 100 pounds. Orders must specify the set pressure wanted.

Materials: Bodies, bonnets, discs, and stems of these valves are made of brass. Yokes and weights are of cast iron and levers are of steel. All iron parts are japanned maroon.

Iron Body

WORKING PRESSURE
15 to 100 pounds steam



No. 376, Cross

List Prices and Dimensions

Size	Inches	1¼	1½	2	2½	3	4
No. 376, Cross	Each	5.00	5.80	7.80	13.25	17.25	28.75
Center to end	Inches	2	2⅜	3¼	3½	4	5
Center to top	Inches	14½	17½	17	17¼	22½	23½
Center to end of lever	Inches	18	22¼	21¼	27¾	35½	42¾

Service recommendations: Lever and weight safety valves are suitable for ordinary low pressure relief valve service, where protection against an overpressure is desired, and where a simple, inexpensive valve is wanted. They differ from modern spring-loaded pop safety and relief valves in that they have low capacities, have no positive opening and closing points, and the blow-down of pressure is large.

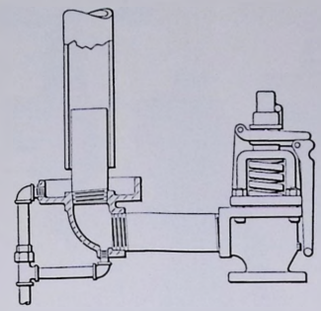
Valves of this type should always be set at least 20 per cent higher than the normal working pressure in the system in order to avoid continual leakage past the seating surfaces. They should never be used on compressed air or gas service.

Bodies of these valves are made with two inlet openings and one outlet. They can be installed on either horizontal or vertical lines, but in either case the stems must be vertical and the levers horizontal.

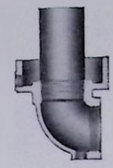
Pressure range: These valves are regularly furnished with levers graduated for pressures from 15 to 30 pounds, or with levers graduated for pressures from 31 to 100 pounds. Orders must specify the set pressure wanted.

Materials: Bodies of these valves are made of cast iron. Bonnets in sizes 2-inch and smaller are of brass, screwed into the bodies. In sizes 2½-inch and larger, bonnets are cast iron and are bolted to the bodies. Stems, discs, and seats are of brass. Levers are made of steel and the weights are cast iron.

Cast Iron Drip Pan Elbows



Application of Drip Pan Elbow to Safety Valve Piping



No. 1100

List Prices and Dimensions

Size	Inches	2	2½	3	3½	4	4½	5
No. 1100	Each	6.00	6.75	7.50	8.50	10.00	11.75	12.50
Center to inlet end	Inches	2¼	2¾	3⅛	3½	3¾	4⅛	4½
Center to top of pan	Inches	4¾	5¼	5⅝	6¼	6¾	7	7½
Diameter of pan	Inches	5	7	7½	8½	9	10	11
Size of drain tapping	Inches	¾	¾	¾	¾	¾	¾	¾

Service recommendations: These special fittings have been designed for use in the outlet piping from boiler safety valves, where they accomplish the following results:

They permit the use of a slip joint in the vertical run of outlet piping, thus removing the weight of the vertical piping from the body of the safety valve and eliminating the strains which are ordinarily set up in the valve.

They provide means for collecting and removing condensate and rain water from the outlet piping.

When more than one safety valve discharges into the same outlet piping, the leakage of vapor from the drip pan will indicate if any one of the valves requires attention.

Ferrosteel Y-Bases

250 pounds steam working pressure



No. 1122

List Prices and Dimensions

Size	Inches	1½	2	2½	3	3½	4	4½	5
No. 1122, F. & D.	Each	16.25	24.00	29.00	35.00	42.00	50.00	75.00	95.00
Size of inlet	Inches	2½	3½	4	4½	5	6	7	7
Size of outlets	Inches	1½	2	2½	3	3½	4	4½	5
Inlet flange diameter	Inches	7½	9	10	10½	11	12½	14	14
Outlet flange diameter	Inches	*4 11/16	6½	7½	8¼	9	10	10½	11
Center to center, outlets	Inches	5	7⅛	7⅝	8¾	9⅛	10⅛	11⅛	11¼
Face to face	Inches	5¼	7	7¾	8½	9	9¾	10¼	11

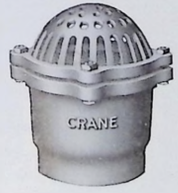
*Rectangular flange.

These special fittings are designed for convenience in mounting two pop safety or relief valves.

Flange dimensions conform to the American (A.S.A.) 250-Pound Cast Iron Flange Standard No. B16b-1928.

These fittings are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American 250-Pound Cast Iron Flange Standard. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

Cast Iron Muffler Attachments



List Prices

Size	Inches	2	2½	3	3½	4	4½	5
Screwed	Each	10.00	12.00	14.00	16.00	19.00	25.00	30.00
Flanged, Faced and Drilled	Each	13.00	15.00	17.00	20.00	23.00	30.00	38.00

Service recommendations: These muffler attachments are designed to effectively subdue the objectionable noise of the steam being discharged from safety valves, without interfering with the operation of the valves, or retarding the free escape of the steam.

Installation: They may be attached directly to the outlet of the valve or at the end of the discharge pipe.

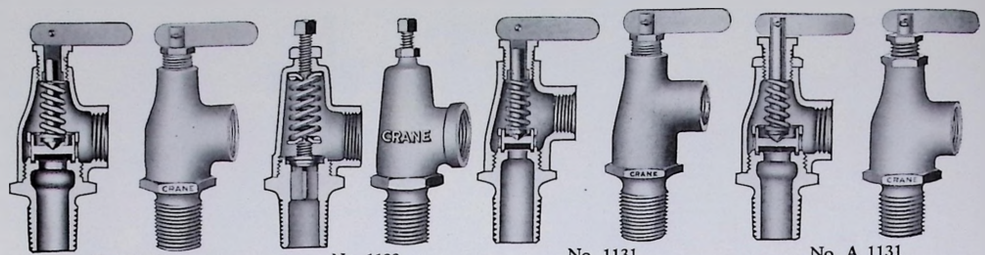
Flanges: Inlet flanges conform to the American (A.S.A.) 125-Pound Cast Iron Flange Standard, No. B16a-1928.

Drilling: Flanged mufflers are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American 125-Pound Cast Iron Flange Standard. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

Drilling templates . . . pages 370 and 371

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Low Pressure Brass Relief Valves



No. 1133½ For Cold Water — No. 1133 For Steam and Cold Water — No. 1131 For Hot Water — No. A 1131 For Air

List Prices and Dimensions

Size	Inches	List Prices Each				Dimensions, in Inches: Height over all, closed				Center to Inlet				Center to Outlet			
		¾	½	¾	1	⅜	½	¾	1	⅜	½	¾	1	⅜	½	¾	1
No. 1131	Each	3.50	3.50	4.25	5.00	4	4⅜	4⅝	5⅛	1¾	2⅜	2 11/16	2 11/16	⅞	1¼	1¼	1¼
No. A 1131	Each	3.50	3.50	4.25		4	4⅜	4⅞		1¾	2⅜	2⅜		⅞	1¼	1¼	
No. 1133	Each		3.50	4.25			3⅞	5⅛			1⅞	2¼			1	1 3/16	
No. 1133½	Each	3.50	3.50	4.25		4	4⅜	4⅞		1¾	2⅜	2⅜		⅞	1¼	1¼	

Service recommendations: No. 1131 Relief Valves have been particularly designed for use on domestic hot water heaters, but will give excellent service on any hot water lines. They should not be used on steam, air, or cold water.

No. A 1131 valves are intended for use on air compressors in garages, service stations, etc., where a simple, inexpensive relief valve is wanted. They should not be used on steam or water service.

No. 1133 valves can be recommended for use on steam or cold water, when metal disc valves without lifting levers are wanted. They should not be used on air or hot water.

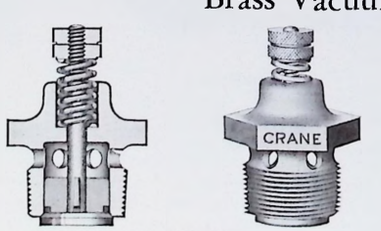
No. 1133½ valves have been particularly designed for use on domestic water pumping systems, and will give excellent service on cold water lines. They should not be used on hot water, steam, or air.

Features: These relief valves are made of high-grade materials throughout, are simple in design, inexpensive in first cost, and will give excellent service under all ordinary conditions. Nos. 1131, A 1131, and 1133½ valves have composition discs specially selected for the service each type is designed to be used on. Discs in these valves are cemented in the disc holders with a special cement and are not readily renewable. In case it is desired to replace the discs, disc holders complete with discs can be furnished. These valves all have lifting levers, so that the discs may be raised from the seats manually.

No. 1133 valves are made with brass discs and without lifting levers. They can be used either on steam or general cold water service. For domestic water pumping systems, the No. 1133½ valves are usually recommended.

Pressure setting: No. 1133½ and No. 1131 valves are regularly set for 50, 75, 100, or 125 pounds pressure, and are non-adjustable. No. A 1131 and No. 1133 valves are regularly set for 25, 75, and 125 pounds pressure, adjustable through the following pressure ranges: 10 to 25 pounds, 30 to 75 pounds and 80 to 125 pounds. Orders must specify the set pressure wanted.

Brass Vacuum Relief Valves



No. 1155 V

List Prices

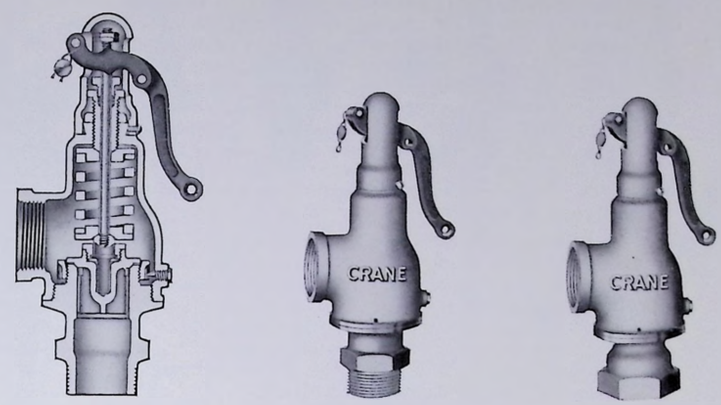
Size	Inches	½	¾	1	1¼	1½	2	2½	3
No. 1155 V	Each	14.00	14.00	15.00	19.00	25.00	30.00	36.00	45.00

Service recommendations: These valves are designed for use as vacuum breakers on light low pressure tanks, steam jacketed kettles, and similar apparatus, where there is a possibility of a vacuum forming which might cause injury to the apparatus because of the effect of atmospheric pressure upon it. In service the disc of the valve is normally held to its seat, both by spring tension and by the pressure in the apparatus to which the valve is attached. When the pressure in the vessel falls below atmosphere, the spring tension is overcome, and the disc is forced from its seat. Air is then admitted through the valve, thus preventing the vacuum from reaching a dangerous point.

Pressure setting: These valves are regularly furnished with springs for 10 inches of vacuum. They are set to open at 5 inches of vacuum but are adjustable for higher or lower vacuums. Valves are regularly tested for tightness at the seat with 50 pounds steam pressure.

Brass Relief Valves for Water Heaters

PRESSURE RANGE
5 to 250 pounds, 400° F.



Cross Section No. 2606 — No. 2606 Male Inlet Side Outlet — No. 2607 Female Inlet Side Outlet

List Prices

Size	Inches	⅜	½	¾	1	1¼	1½	2
No. 2606	Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00
No. 2607	Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00

Service recommendations: These brass relief valves have been particularly designed for use on water heaters, where high grade, sturdy valves having a fast, positive action with a minimum wastage of water are required.

Features: These valves are similar in design and appearance to the regular brass relief valves for steam and water, shown on pages 404 and 405, except that they have lifting levers, caps and wire seals. All sizes, except the ⅜-inch, have pop chambers and blow-back regulating rings, which give them a positive action and a means of adjusting the blow-down of pressure. All valves have stuffing boxes around the stems to prevent hot water being discharged at the top of the valve.

Pressure setting: Relief valves on liquid service should always be set twenty-five per cent above the normal working pressure in the system, in order to avoid wastage due to valves opening when minor fluctuations of pressure occur. These valves may be readjusted for pressures twenty per cent above or below the original set pressure, but not exceeding the maximum given above. For greater changes in the set pressure, new springs may be required, since one spring will not cover the entire range of pressures at which the valves may be set.

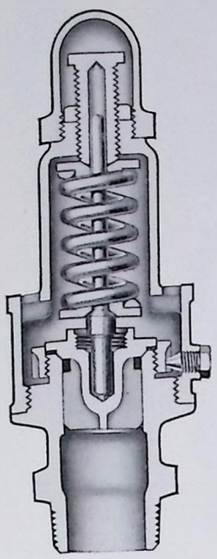
Orders must specify the set pressure wanted.

Dimensions, in Inches

Size	Inches	⅜	½	¾	1	1¼	1½	2
Size of Inlet	Inches	⅜	½	¾	1	1¼	1½	2
Size of Outlet	Inches	½	½	¾	1	1¼	1½	2
Center to Top	Inches	3¾	3¾	3¾	4⅝	5¼	6⅛	7¾
Center to Male Inlet	Inches	2¼	2¼	2¾	3¼	3¾	4⅜	4½
Center to Female Inlet	Inches	1⅞	2	2⅜	2¾	3⅜	3⅞	4⅜
Center to Outlet	Inches	1⅛	1⅛	1⅜	1⅝	2	2⅜	2¾

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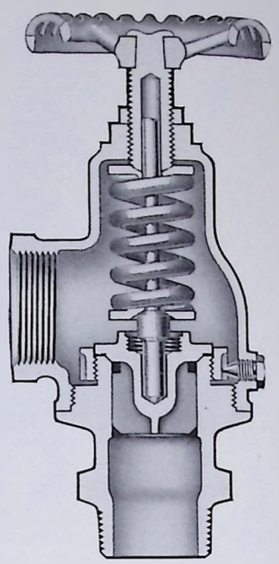
Brass Relief Valves
for Steam and Water



Cross Section
Top Outlet Valve
With Cap

Features of design: These relief valves are of the single disc type and in all sizes, except the ⅜-inch, are equipped with adjustable blow-back regulating rings, which provide a means for adjusting the blow-down of pressure when changing or regulating the set pressure. The adjustment of this ring may be made from the outside without interfering with the setting of the valve. Regulating adjustments for the main spring permit the set pressure to be increased or decreased by 20 per cent. Particular note should be made of this fact, because a new spring may be required if a greater change in the set pressure is to be made. One spring will not cover the entire range of pressures at which a valve may be set.

Installation: Relief valves should always be installed with the stems in a vertical position, in order to insure that the discs will seat properly. Outlet piping should always be as short as possible, and never smaller than the outlet of the valve. For relieving against low head pressures or in handling dangerous fluids, No. 1156 Valves should be used since they have pressure tight bodies.



Cross Section
Side Outlet Valve
With Wheel

Capacities, in Pounds of Steam per Hour

Set Pressure	Size, Inches: ⅜ At Set Pressure	⅜ At 10% over Set Pressure	½ At Set Pressure	½ At 10% over Set Pressure	¾ At Set Pressure	¾ At 10% over Set Pressure	1 At Set Pressure	1 At 10% over Set Pressure	1¼ At Set Pressure	1¼ At 10% over Set Pressure	1½ At Set Pressure	1½ At 10% over Set Pressure	2 At Set Pressure	2 At 10% over Set Pressure	2½ At Set Pressure	2½ At 10% over Set Pressure	3 At Set Pressure	3 At 10% over Set Pressure	4 At Set Pressure	4 At 10% over Set Pressure
25	35	65	70	130	95	150	160	300	260	400	370	500	600	850	900	1100	1100	1600	2000	2800
50	58	100	115	200	190	330	280	470	400	630	540	810	850	1250	1280	1700	1800	2400	3200	4500
75	80	130	160	265	300	510	380	630	530	850	700	1110	1100	1650	1680	2300	2400	3200	4300	6200
100	100	160	200	325	400	670	460	780	650	1060	850	1390	1340	2050	2030	2900	2900	4000	5200	7700
125	115	190	230	380	490	810	540	920	760	1260	1000	1650	1560	2400	2330	3400	3300	4700	5900	9000
150	130	210	260	425	570	930	620	1050	860	1450	1140	1890	1760	2750	2580	3900	3600	5400	6500	10000
175	145	230	290	465	640	1030	700	1160	960	1620	1260	2110	1950	3050	2830	4400	3900	6000	6900	10800
200	158	250	315	500	700	1120	760	1260	1050	1770	1360	2310	2110	3350	3030	4800	4100	6600	7200	11600
225	170	265	340	530	750	1200	820	1350	1130	1900	1450	2490	2240	3600	3180	5200	4300	7200	7400	12200
250	180	280	360	560	790	1280	880	1440	1200	2000	1530	2650	2340	3850	3280	5600	4400	7700	7600	12800

Capacities, in Gallons of Water per Minute

25	4.0	8.5	4.0	8.5	5.0	10.5	9.0	17.0	13.0	25.0	19.0	36.0	21	44	45	90	60	110	100	180
50	5.5	9.5	5.5	9.5	7.0	12.0	11.5	20.0	16.5	29.0	23.0	40.0	27	51	57	102	75	135	120	210
75	6.5	10.5	6.5	10.5	8.0	13.5	13.0	22.0	19.0	32.0	26.0	44.0	32	57	67	112	87	155	135	235
100	7.0	11.5	7.0	11.5	9.0	14.5	14.0	23.5	21.0	34.5	28.0	48.0	36	62	75	120	97	170	147	255
125	8.0	12.5	8.0	12.5	10.0	15.5	15.0	25.0	22.5	37.0	30.0	52.0	39	66	81	127	102	180	157	270
150	8.5	13.5	8.5	13.5	10.5	16.5	16.0	26.5	24.0	39.0	31.5	55.0	41	69	85	133	105	188	165	285
175	9.0	14.0	9.0	14.0	11.0	17.5	17.0	28.0	25.0	41.0	33.0	58.0	43	72	88	138	108	194	171	295
200	9.5	14.5	9.5	14.5	11.5	18.5	17.5	29.5	26.0	43.0	34.0	60.0	44	75	91	142	110	198	176	303
225	10.0	15.5	10.0	15.5	12.0	19.5	18.0	31.0	27.0	44.5	34.5	62.0	45	77	93	145	112	200	180	310
250	10.5	16.0	10.5	16.0	12.5	20.0	18.5	32.0	28.0	46.0	35.0	64.0	46	79	95	147	113	201	182	316
275	11.0	16.5	11.0	16.5	13.0	20.5	19.0	33.0	29.0	47.0	35.5	65.5	47	81	96	149	114	202	184	321
300	11.5	17.0	11.5	17.0	13.5	21.0	19.5	34.0	29.5	48.0	36.0	67.0	48	83	97	150	115	203	185	325

Brass Relief Valves
for Steam and Water

WORKING PRESSURES Sizes ½ to 2-inch — 250 pounds steam, 300 pounds water
Sizes 2½ to 4-inch — 200 pounds steam, 250 pounds water



No. 2602
Male Inlet
Side Outlet
With Wheel



No. 2601
Male Inlet
Side Outlet
With Cap



No. 2600
Male Inlet
Top Outlet
With Cap



No. 2605
Female Inlet
Side Outlet
With Wheel



No. 2604
Female Inlet
Side Outlet
With Cap



No. 2603
Male Inlet
Side Outlet
With Lock-up Cap

List Prices

Size	Inches	⅜	½	¾	1	1¼	1½	2	2½	3	4
No. 2600	Each	13.50	13.50	14.50	17.50	20.00	25.00	35.00			
No. 2601	Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00			
No. 2602	Each	13.50	13.50	14.50	17.50	20.00	25.00	35.00			
No. 2603	Each	15.00	15.00	16.50	20.00	23.00	29.00	40.00			
No. 2604	Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00	55.00	110.00	200.00
No. 2605	Each	13.50	13.50	14.50	17.50	20.00	25.00	35.00	50.00	105.00	190.00

Service recommendations: These relief valves can be recommended for use on pipe lines, presses, pumps, cylinders, etc., where a pressure drop (blow-back) of 10% is permissible. Where a smaller drop is required on steam service, pop safety valves should be recommended. Relief valves are intended to relieve excessive pressures, but should not be used in an attempt to relieve shock pressures in hydraulic lines. When valves are wanted to discharge fluids into piping systems where back pressure exists, No. 2601 or No. 2604 Valves should be recommended, since these valves have pressure tight outlets.

Fire Protection service: Relief valves used for this class of service ordinarily must comply with various Underwriters' specifications. A careful study of any such specifications which apply in the locality where the valves are to be used should be made before orders are placed, in order to insure that suitable valves are used.

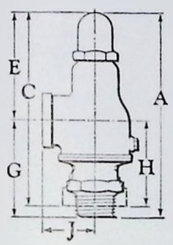
Pressure setting: These relief valves, in sizes from ⅜-inch to 2-inch, may be set for any steam pressure specified from 5 to 250 pounds provided the maximum temperature does not exceed 400° F.; and for liquid pressures from 5 to 300 pounds when the temperature does not exceed 100° F. In sizes 2½ to 4-inch, they may be set for steam pressures from 5 to 200 pounds at 400° F. maximum temperature, and from 5 to 250 pounds liquid pressure at 100° F. maximum temperature. Valves set for any specific pressure may be adjusted for a variation of pressures 20% above or below the original set pressure, but not exceeding the maximum rated pressure of the valve.

Relief valves for steam service should always be set at least 10% higher than the normal working pressure in the system. On liquid service, they should be set at a pressure 25% above the normal working pressure in the system.

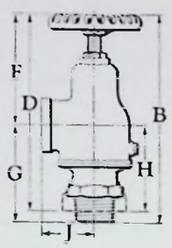
Orders must specify the set pressure wanted.

Marine service: These valves may be used in marine service in sizes from ½ to 2-inch, but sizes 2½-inch and larger do not conform to marine requirements. The letters "MS" will appear on all 2-inch valves, when wanted for this service.

Dimensions, in Inches

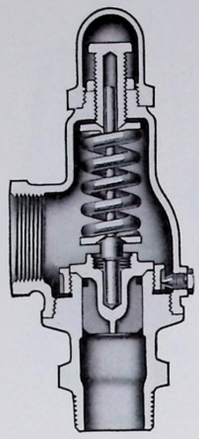


Size	⅜	½	¾	1	1¼	1½	2	2½	3	4
Size of Inlet	⅜	½	¾	1	1¼	1½	2	2½	3	4
Size of Outlet	½	½	¾	1	1¼	1½	2	2½	3	4
A	5 3/8	5 3/8	6	6 7/8	8	9 3/4	11 1/8			
B	5 5/8	5 5/8	6 1/8	7 1/8	8 1/8	9 1/2	11 1/4			
C	5	5 1/8	5 5/8	6 3/8	7 5/8	9 1/4	11	12 1/2	13 3/4	17 1/4
D	5 1/4	5 3/8	5 3/4	6 5/8	7 3/4	9	11 1/8	12 1/2	13 3/4	17 1/4
E	3 1/8	3 1/8	3 1/4	3 5/8	4 1/4	5 3/8	6 5/8	7 5/8	8 1/2	11
F	3 3/8	3 3/8	3 3/8	3 7/8	4 3/8	5 1/8	6 3/4	7 5/8	8 1/2	11
G	2 1/4	2 1/4	2 3/4	3 1/4	3 3/4	4 3/8	4 1/2			
H	1 7/8	2	2 3/8	2 3/4	3 3/8	3 7/8	4 3/8	4 7/8	5 1/4	6 1/4
J	1 1/8	1 1/8	1 3/8	1 5/8	2 1/16	2 7/16	2 3/4	3	3 1/2	4 3/8

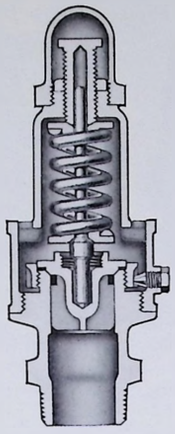


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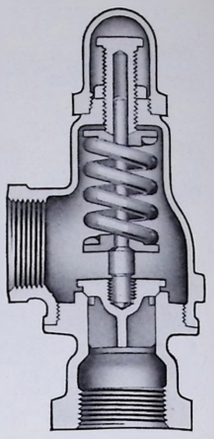
Brass Relief Valves
for Air and Gas



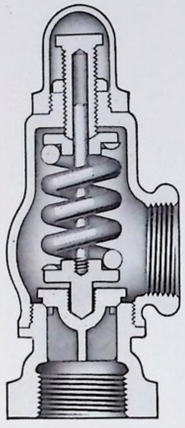
Cross Section
No. 2651



Cross Section
No. 2650



Cross Section
No. 2664

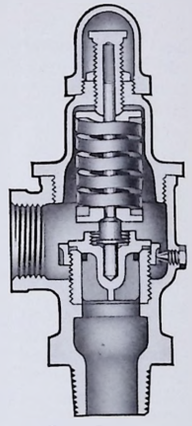


Cross Section
No. 2674
No. 2684

A complete line: Crane Brass Relief Valves for Air and Gas are made for 250 pounds pressure in sizes from ⅜ to 2-inch; for 300 pounds pressure, in sizes from ⅜ to 2-inch; for 500 pounds pressure, in sizes from ½ to 2-inch; and for 800 pounds pressure, in sizes from ¾ to 2-inch.

Features of design: These valves are all of the single disc type. In the 250-pound class, all sizes except the ⅜-inch are equipped with blow-back regulating rings, which provide a means for adjusting the blow-down when changing or regulating the set pressure. The regulating ring has the further effect of forming a huddling or pop chamber under the extended lip of the disc, and causes a high lift of the disc, with a consequent high discharging capacity.

Relief valves for pressures above 250 pounds are not equipped with regulating rings, since the capacities of such valves would be excessive, and the adjustment and setting would be much more difficult. The area through the seating surfaces of these high pressure valves is considerably reduced.



Cross Section
No. 2668

Seat tightness: It is always more difficult to keep relief valves tight on air and gas than it is on steam or water. The seating surfaces of these valves are carefully ground to insure absolute tightness at all pressures up to 80 per cent of the set pressure. Since relief valves should always be set at a pressure 25 per cent higher than the normal working pressure in the system, no leakage will be experienced with Crane Relief Valves if they are properly installed and given reasonable care.

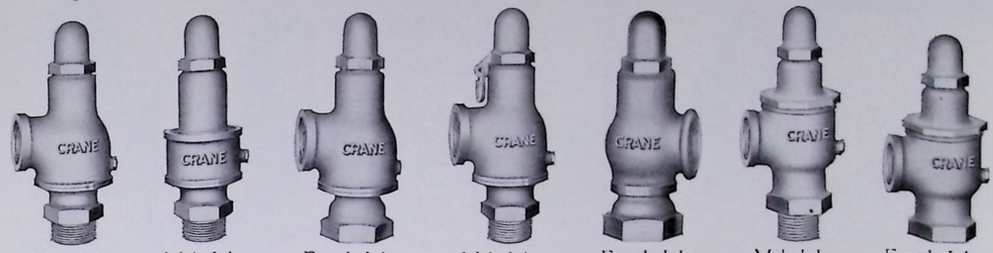
Installation: Relief valves should always be installed with the stems in a vertical position. If they are installed in a horizontal position or at an angle, the discs may not seat properly, resulting in a leaky valve and eventual cutting of the seating surfaces. For air and gas service, these valves should preferably be installed in an upside-down position in order to allow moisture to collect and seal the seating surfaces.

Noxious Gases: Relief valves used on noxious gases or inflammable liquids should always have bodies that are pressure tight on the outlet side. Nos. 2668 and 2669 Valves have been particularly designed for this service and should always be specified. These valves have the further advantage that they may be dismantled for inspection or repair without disturbing the piping connections to and from the valve.

Brass Relief Valves for Air and Gas

WORKING PRESSURES

Nos. 2650, 2651, 2653, and 2654 — 250 pounds
No. 2664 — 300 pounds
No. 2674 — 500 pounds
No. 2684 — 800 pounds
No. 2668 and No. 2669 — 300 pounds



Male Inlet Side Outlet No. 2651 | Male Inlet Top Outlet No. 2650 | Female Inlet Side Outlet No. 2654 No. 2664 | Male Inlet Side Outlet With Lock Cap No. 2653 | Female Inlet Side Outlet No. 2674 No. 2684 | Male Inlet Side Outlet No. 2668 | Female Inlet Side Outlet No. 2669

List Prices

Size		Inches	⅜	½	¾	1	1¼	1½	2
250-Pound Valves	No. 2650	Each	13.50	13.50	14.50	17.50	20.00	25.00	35.00
	No. 2651	Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00
	No. 2653	Each	15.00	15.00	16.50	20.00	23.00	29.00	40.00
	No. 2654	Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00
300-Pound Valves	No. 2664	Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00
500-Pound Valves	No. 2674	Each		13.75	15.00	18.25	21.00	26.50	37.00
800-Pound Valves	No. 2684	Each			15.00	18.25	21.00	26.50	37.00
300-Pound Valves for Noxious Gases	No. 2668	Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00
	No. 2669	Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00

Service recommendations: These relief valves are recommended for use on air and gas compressors, cylinders, pipe lines, etc., where a blow-down of pressure of 10% is not objectionable. They should not be used on tanks. Nos. 2668 and 2669 valves should be recommended for use on gasoline, oils, and noxious gases. The maximum temperature rating on all these valves is 400° F.

Features: These relief valves are similar in design and appearance to the regular brass steam and water relief valves shown on pages 404 and 405. Nos. 2650, 2651, 2653, 2654, 2668 and 2669, except in the ⅜-inch size, have pop chambers and blow-back regulating rings. Nos. 2668 and 2669, when in service, may be dismantled for inspection and cleaning without disturbing the inlet and outlet piping connections.

Pressure setting: Relief valves should always be set at least 25 per cent above the normal working pressure in the system.

These valves may be readjusted for pressures 20 per cent above or below the original set pressure, but not exceeding the maximums given above. For greater changes in the set pressure, new springs may be required, since no one spring will cover the entire range of pressures at which the valves may be set.

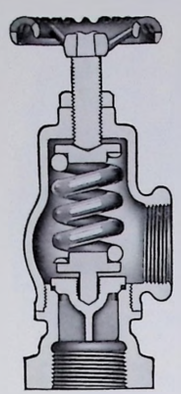
Orders must specify the set pressure wanted.

Dimensions, in Inches

Size		⅜	½	¾	1	1¼	1½	2
250 and 300-Pound Valves Nos. 2650, 2651, 2653, 2654, and 2664	Size of Inlet	⅜	½	¾	1	1¼	1½	2
	Size of Outlet	½	½	¾	1	1¼	1½	2
	Center to Top	3⅛	3⅛	3¼	3⅝	4¼	5⅜	6⅝
	Center to End of Male Inlet	2¼	2¼	2¾	3¼	3¾	4⅜	4½
	Center to End of Female Inlet	1⅞	2	2⅜	2¾	3⅜	3⅞	4⅜
	Center to End of Outlet	1⅛	1⅛	1⅜	1⅝	2 1/16	2 7/16	2¾
500 and 800-Pound Valves Nos. 2674 and 2684	Size of Inlet		½	¾	1	1¼	1½	2
	Size of Outlet		¾	¾	1	1¼	1½	2
	Center to Top		3¼	3¼	3½	4¼	5⅜	6¼
	Center to End of Female Inlet		2⅛	2⅛	2½	3	3⅛	3⅝
	Center to End of Outlet		1⅜	1⅜	1⅝	1¾	2	2½
300-Pound Valves for Noxious Gases Nos. 2668 and 2669	Size of Inlet	⅜	½	¾	1	1¼	1½	2
	Size of Outlet	½	½	¾	1	1¼	1½	2
	Center to Top	3¼	3¼	3⅜	4	4⅞	6¼	7⅜
	Center to End of Male Inlet	2¼	2⅜	2⅞	3¼	3¾	4	4¾
	Center to End of Female Inlet	1⅝	1⅝	2	2¼	2⅝	2⅞	3½
	Center to End of Outlet	1	1	1¼	1⅝	2	2⅜	2¾

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Brass Hydraulic Relief Valves



Cross Section
No. 1128



No. 1128
No. 1128½

SET PRESSURE RANGE

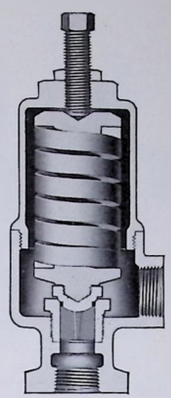
No. 1128
All sizes 300 to 600 pounds

No. 1128½
All sizes 300 to 800 pounds

No. 1130
½-inch valves 800 to 6000 pounds
¾-inch valves 800 to 4500 pounds
1-inch valves 800 to 2500 pounds
1¼-inch valves 800 to 2500 pounds
1½-inch valves 800 to 1800 pounds
2-inch valves 800 to 1600 pounds
2½-inch valves 800 to 1600 pounds



No. 1130



Cross Section
No. 1130

List Prices

Size	Inches	½	¾	1	1¼	1½	2	2½
No. 1128	Each	13.50	14.50	17.50	20.00	25.00	35.00	50.00
No. 1128½	Each		14.50	17.50	20.00	25.00	35.00	50.00
No. 1130	Each	50.00	50.00	55.00	85.00	90.00	130.00	225.00

Service recommendations: These valves have been particularly designed to safeguard apparatus employing high hydraulic pressures at atmospheric temperatures, such as hydraulic presses, high pressure pumping systems, hydraulic elevators, pipe lines, etc. They can be recommended for use on high pressure oil lines, providing the outlet drains to atmospheric pressure. They should never be used in an attempt to relieve shock in hydraulic lines, since no valve is adequate for this service.

Features: This line of valves is characterized by its rugged construction, simple design and high-grade materials. Bodies are cast in Crane Hard Metal, an exceptionally strong and durable copper-tin bronze. Discs in Nos. 1128 and 1128½ Valves are also made of Crane Hard Metal, while in No. 1130 Valves discs are made of Crane 18-8 Chrome-Nickel Alloy Steel. These latter valves have renewable screwed-in seat rings made of Crane No. 49 Nickel Alloy. Springs are exceptionally long and made of the best quality steel.

No. 1128 and No. 1128½ Valves are provided with hand-wheels for easy adjustment of the set pressure, while No. 1130 Valves have a squared end on the adjusting screw for wrench engagement. In both types, a lock-nut is provided so that the adjustment may be locked at the desired point.

Pressure setting: All hydraulic relief valves can be readjusted for pressures 20 per cent above or below the original set pressure, but should never be set at pressures in excess of the maximum rating for which the valve was designed. If a greater change in the set pressure is to be made, a new spring may be required, since one spring will not cover the entire range of pressures at which a valve may be set.

Relief valves should always be set at least 25 per cent higher than the normal working pressure in the system in order to avoid wasting water or oil when minor fluctuations of pressure occur in the system. The function of these valves is to safeguard piping and apparatus against excessive pressures and they should not be used in an attempt to maintain pressure at a maximum point. Relief valves operated continuously at pressures close to the popping point tend to leak easily and are difficult to maintain in good order.

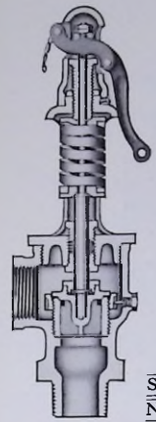
Orders for relief valves must always give the set pressure wanted.

Dimensions, in Inches

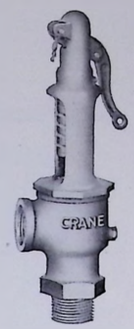
Size		½	¾	1	1¼	1½	2	2½
No. 1128 No. 1128½	Size of Inlet	½	¾	1	1¼	1½	2	2½
	Size of Outlet	½	¾	1	1¼	1½	2	2½
	Center to Top	3½	3½	4¼	4½	5¼	6½	7⅝
	Center to Inlet	2⅛	2⅛	2½	2 15/16	3⅛	3⅝	4⅞
	Center to Outlet	1⅜	1⅜	1⅝	1¾	2	2½	3
No. 1130	Size of Inlet	½	¾	1	1¼	1½	2	2½
	Size of Outlet	½	¾	1	1¼	1½	2	2½
	Center to Top	7¼	7¼	7¼	9½	9½	11¾	14¼
	Center to Inlet	3	3	3	3⅝	3⅝	4⅛	4¾
	Center to Outlet	2 11/16	2 11/16	2 11/16	3 3/16	3 3/16	3 13/16	4 9/16

Marine Brass Relief Valves

Outside Spring Type

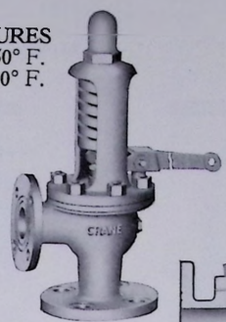


Cross Section
No. 2621

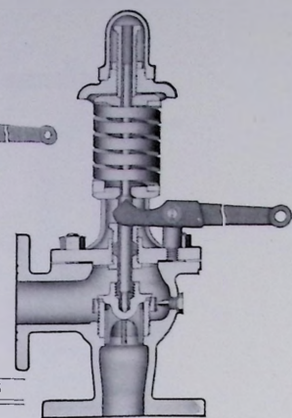


Male Inlet, No. 2621
Female Inlet, No. 2624

WORKING PRESSURES
250 pounds steam, 550° F.
300 pounds water, 200° F.



Flanged Inlet
Flanged Outlet
No. 2628



Cross Section
No. 2628

List Prices

Size	Inches	½	¾	1	1¼	1½	2	2½	3
No. 2621	Each	13.75	15.00	18.25	21.00	26.50	37.00		
No. 2624	Each	13.75	15.00	18.25	21.00	26.50	37.00		
No. 2628, F. & D.	Each					100.00	125.00	160.00	200.00

Service recommendations: These valves have been particularly designed for marine service, but are suitable for general use on steam at pressures up to 250 pounds at 550° F. total temperature, and water or oil at pressures up to 300 pounds and temperatures up to 200° F.

Features of design: These valves have exposed springs, which make them suitable for high temperature service, since the springs are not subjected to the deteriorating effects of the high temperatures existing within the valves.

An adjustable blow-back regulating ring is provided for adjusting the blow-down of pressure when changing or regulating the set pressure. The adjustment of this ring may be made from the outside, without interfering with the setting of the valve.

A huddling or pop chamber is formed under the extended lip of disc, insuring a snappy action in opening and a cushioning effect in closing. Wire-drawing of seating surfaces is reduced to a minimum.

All valves have renewable seats. Valves for steam service have steel stems and no stuffing boxes. Valves for oil or water have rolled naval brass stems, and have stuffing boxes around the stems. Lifting levers are provided so that the discs may be manually raised from the seats.

Pressure setting: Relief valves on steam service should always be set 10 per cent above the normal working pressure. On liquid service, they should be set at a pressure 25 per cent above the normal working pressure in the system. These valves may be readjusted for pressures 20 per cent above or below the original set pressure, but not exceeding the maximums given above. For a greater change, new springs may be required, since no one spring will cover the range in pressures at which these valves may be set.

Orders must always specify the set pressure as well as the service the valve is to be used on.

Flanges: Inlet flange dimensions on No. 2628 Valves conform to the MSS 250-pound SP Bronze Flange Standard No. SP-2b-1930, except that the thickness is greater than specified in the standard. Outlet flange dimensions conform to the MSS 150-pound SP Bronze Flange Standard No. SP-2a-1930.

Drilling: No. 2628 Valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the standards listed above. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

Dimensions, in Inches

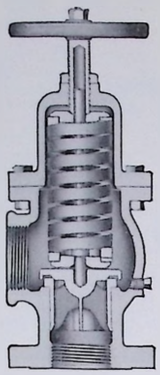
Size	½	¾	1	1¼	1½	2	2½	3
Size of Inlet	½	¾	1	1¼	1½	2	2½	3
Size of Outlet	½	¾	1	1¼	1½	2	2½	3
Center to top, screwed valves	5⅝	5⅞	7	8¼	9¼	11½		
Center to top, flanged valves					10⅝	13⅛	16⅛	18
Center to end of male inlet	2⅜	2⅞	3¼	3⅝	4	4⅝		
Center to end of female inlet	1⅝	2	2¼	2⅝	2⅞	3½		
Center to face of flanged inlet					4	4¾	5½	6
Center to end of screwed outlet	1	1¼	1⅝	2	2⅜	2¾		
Center to face of flanged outlet					4	4¾	5½	6

Drilling templates . . . page 369

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Iron Body Relief Valves

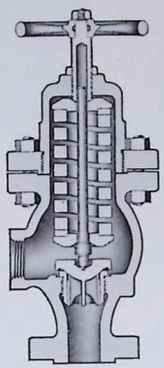
SET PRESSURE RANGE
No. 1123 — 10 to 300 pounds
No. 1124 — 301 to 600 pounds
No. 841 H — 601 to 950 pounds



Cross Section
No. 1123



No. 1123
No. 1124
No. 841 H



Cross Section
No. 1124
No. 841 H

List Prices

Size	Inches	1½	2	2½	3	3½	4	5
No. 1123, Faced and Drilled	Each			42.00	50.00	68.00	75.00	120.00
No. 1124, Faced and Drilled	Each			105.00	125.00	165.00	210.00	
No. 841 H, Faced and Drilled	Each	120.00	140.00	170.00	205.00			

Service recommendations: Nos. 1123, 1124 and 841 H Relief Valves are designed for service on water or oil, where the temperature does not exceed 100° F. They are commonly used on pump discharge lines, on standpipes, pipe lines, cylinders, oil lines, etc.

Pressure setting: Relief valves on liquid service should always be set 25% above the normal working pressure in the system. These valves may be readjusted for pressures 20% above or below the original set pressure, but not exceeding the maximum given above. For a greater readjustment, new springs may be required, since one spring will not cover the entire range of pressures at which the valves may be set. Orders must always specify the set pressure wanted.

Seats and discs: These valves are regularly furnished with brass seats and discs. Monel seats, or monel seats and discs can be furnished at an advance in price.

Inlet connections: These valves are made with combination flanged and screwed inlets.

Flange dimensions: Inlet flanges on No. 1123 and 1124 valves conform to the American (A.S.A.) 250-pound Cast Iron Flange Standard, No. B16b-1928. Flanges have a 1/16-inch raised face.

Inlet flanges on the 1½-inch No. 841 H valves conform to the American (A.S.A.) 600-pound Cast Steel Flange Standard. On sizes 2-inch and larger, they conform to the American (A.S.A.) 800-pound Hydraulic Flange Standard. All flanges have a 1/16-inch raised face.

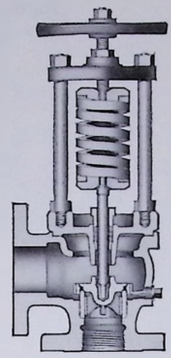
Drilling: Flanges on these valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the particular standard applying, as listed above. When ordered "faced only" they will be furnished at the same price as for faced and drilled.

Dimensions, in Inches

Size	No. 1123					No. 1124				No. 841 H			
	2½	3	3½	4	5	2½	3	3½	4	1½	2	2½	3
Size of inlet	2½	3	3½	4	5	2½	3	3½	4	1½	2	2½	3
Size of outlet	2½	3	3½	4	5	2½	3	3½	4	1½	2	2½	3
Center to top	12⅝	13⅛	14¼	14⅜	15¾	12¾	13¼	14¼	15½	11½	15	17	19½
Center to face of inlet	5¼	5¾	6¼	6¾	7⅜	5¼	5¾	6¼	6¾	5¼	6¼	7	7⅞
Center to end of outlet	3⅞	4¼	4⅝	5	6⅜	3⅞	4¼	4⅝	5	3¾	4⅜	5	5¾

Iron Body Outside Spring and Yoke Relief Valves

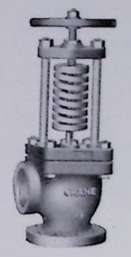
SET PRESSURE RANGE
10 to 250 pounds steam
10 to 300 pounds water or oil



Cross Section
No. 1113
No. 1114



No. 1113
Flanged Inlet
Flanged Outlet



No. 1114
Flanged Inlet
Screwed Outlet

List Prices

Size	Inches	2	2½	3	3½	4
Nos. 1113 or 1114, Brass Seats, F. & D.	Each	63.00	84.00	100.00	136.00	155.00
Nos. 1113 or 1114, Monel Seats, F. & D.	Each	68.00	90.00	107.00	143.00	167.00

Service recommendations: Nos. 1113 and 1114 valves are of the outside spring and yoke construction, which insures that the springs will not be directly exposed to the deteriorating effects of high temperatures existing in the apparatus to which the valves are attached. They are suitable, therefore, for use on saturated steam and hot water or oil. In addition, these valves have pop chambers and blow-back regulating rings, which gives them a more positive action than ordinary relief valves, as well as a means of adjusting the blow-down of pressure.

Pressure setting: Relief valves on steam service should always be set at least 10% above the normal working pressure in the system. On liquid service, they should be set 25% above the normal working pressure in the system. These valves may be readjusted for pressures 20% above or below the original set pressure, but not exceeding the maximums given above. For a greater readjustment, new springs may be required, since one spring will not cover the entire range of pressures at which these valves may be set. Orders must always state the set pressure wanted.

Seats and discs: Discs in these valves are regularly made of brass. Seat rings may be of brass or monel, but brass will always be furnished unless monel is specifically ordered. Monel discs are furnished only at an advance in price.

Inlet connections: These valves are made with a combination flanged and screwed inlet.

Flange dimensions: Inlet flanges on these valves conform to the American (A.S.A.) 250-pound Cast Iron Flange Standard, No. B16b-1928. Flanges have a 1/16-inch raised face.

Outlet flanges on No. 1113 valves conform to the American (A.S.A.) 125-Pound Cast Iron Flange Standard, No. B16a-1928.

Drilling: Flanges on these valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the particular standard applying, as listed above. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

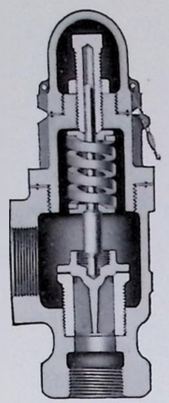
Dimensions, in Inches

Size	2	2½	3	3½	4
Size of inlet	2	2½	3	3½	4
Size of outlet	2½	3	3½	4	4½
Center to top	14¾	16¾	19	21	23
Center to face of inlet	4⅜	4¾	5⅜	6	6½
Center to end of outlet	4	4½	5	5½	6
Center to face of outlet	4¾	5½	6	6½	7

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All-Iron Relief Valves

SET PRESSURE RANGE
No. 1118 and No. 1118½ — 10 to 300 pounds



Cross Section
No. 1118



No. 1118
Screwed Inlet
and Outlet



No. 1118½
Flanged Inlet
and Outlet

List Prices

Size	Inches	½	¾	1	1¼	1½	2	2½	3
No. 1118, Screwed	Each	16.50	17.50	21.00	25.00	37.00	45.00		
No. 1118½, Flanged, Faced and Drilled	Each	22.00	23.50	28.00	34.00	48.00	60.00	115.00	170.00
Extra for Companion Flanges Bolted on, per Valve		2.25	2.80	3.35	3.90	4.50	6.00	10.00	14.50

Service recommendations: These relief valves have been particularly designed for ammonia service, but may also be used wherever all-iron construction is acceptable, as in handling air, gas, and chemicals which are corrosive to brass. They should not be used on temperatures exceeding 400° F.

Features: These valves are of sturdy construction and simple design. Bodies and bonnets are of Crane Ferrosteel; body seat rings are of steel; discs in sizes ½-inch to 1¼-inch are of cast iron, while in sizes 1½-inch and larger, they are of forged steel.

The seating surfaces can be easily reground when necessary; the top of the discs are tapped with pipe threads to permit insertion of a pipe nipple for rotating the discs when regrinding.

Pressure setting: Relief valves should always be set at least 25 per cent above the normal working pressure in the system in order to prevent wastage of fluid when minor fluctuations of pressure occur in the system. Pressure setting of these valves can be readjusted 20 per cent above or below the original set pressure, but not in excess of the maximum given above. If a greater change in the set pressure is to be made, new springs may be required, since one spring cannot cover the entire range of pressures at which the valves can be set.

Orders must always state the set pressure wanted.

Flanges: Flanged valves are regularly made with ammonia tongue and groove facings. Inlet flanges are grooved and outlet flanges are tongued. ½-inch and ¾-inch valves have oval flanges on inlets and outlets; 1, 1¼, 1½ and 2-inch valves have square flanges on inlets and outlets; 2½-inch valves have square flanges on the inlets and round flanges on the outlets; 3-inch valves have round flanges on both inlets and outlets.

Drilling: All flanged end valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include drilling. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

Dimensions, in Inches

Size			½	¾	1	1¼	1½	2	2½	3
Size of Inlet			½	¾	1	1¼	1½	2	2½	3
Size of Outlet			¾	1	1¼	1½	2	2½	3	3½
No. 1118	Center to top		3⅜	4⅛	5⅜	6⅞	6⅞	7½		
	Center to end of inlet		2¼	2⅝	3⅛	3¾	3 5/16	4⅜		
	Center to end of outlet		1⅜	1⅝	2	2½	3	4		
No. 1118½	Center to top		3⅜	4⅛	5⅜	6⅞	6⅞	7½	10¾	12½
	Center to face of inlet		2¾	3	3¼	3 9/16	3 13/16	4 9/16	4¾	5½
	Center to face of outlet		3⅛	3⅜	3¾	4	4¾	5¾	6½	7
	Inlet Flange	Oval flange dimensions	4	4¾						
		Square flange dimensions			3 9/16	3 15/16	4 11/16	5 1/16	5 13/16	
		Round flange diameter								8¼
	Outlet Flange	Oval flange dimensions	4¾	4¾						
		Square flange dimensions			3 15/16	4 11/16	5 1/16	5 13/16		
		Round flange diameter							8¼	9

Drilling Templates . . . . page 522

Tongue and groove dimensions . . . page 522

Cast Steel Relief Valves

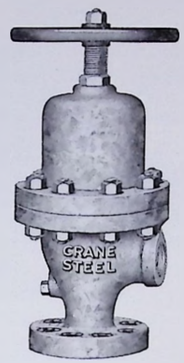
Inside Spring Valves For Cold Water and Oil

Outside Spring Valves For Steam and Hot Water

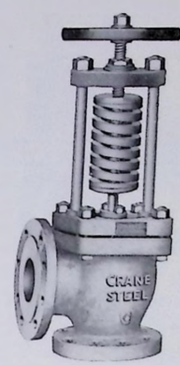
MAXIMUM SET PRESSURES

No. 1124 A — 600 pounds
No. 1241 H — 1200 pounds
No. 3041 H — 3600 pounds

No. 1113 S — 350 pounds
No. 1113½ S — 900 pounds



No. 1124 A
No. 1241 H
No. 3041 H



No. 1113 S
No. 1113½ S

Service recommendations: Nos. 1124 A, 1241 H, and 3041 H Relief Valves are designed for service on water or oil where the temperature of the fluid does not exceed 100 degrees F. They are commonly used on pump discharge lines, on stand pipes, pipe lines, cylinders, hydraulic presses, oil lines, etc.

Nos. 1113 S and 1113½ S Relief Valves are of the outside spring and yoke type, in which the spring is not directly exposed to the temperature of the fluid within the body. Therefore, they may be used in high temperature service where the maximum temperature does not exceed 1000 degrees F. They may be used on steam, hot water, gas, and oil service.

Sizes: No. 1124 A Valves are made in sizes from 2½ to 5-inch; and Nos. 1241 H and 3041 H Valves, in sizes from 1½ to 3-inch. Nos. 1113 S and 1113½ S Valves are made in sizes from 2 to 4-inch.

Materials: Nos. 1124 A, 1241 H, and 3041 H Valves have cast steel bodies and bonnets and Crane Hard Metal discs and seat rings. Springs in these valves are made high grade open hearth steel.

Nos. 1113 S and 1113½ S Valves are made with cast steel bodies and bonnets, Crane Exelloy discs, and steel seat rings. Springs in these valves are of crucible steel.

Construction: Nos. 1124 A, 1241 H, and 3041 H Valves are of the single disc type. A pop chamber is formed under the overhanging lip of the disc, which insures a high lift for the disc with a consequent high capacity, absence of wiredrawing at the seating surfaces and prompt seating without hammering. These valves can be furnished with bodies pressure tight on the outlet side when so ordered.

Nos. 1113 S and 1113½ S Valves are also of the single disc type with pop chambers, but in addition No. 1113 S Valves have adjustable blow-back regulating rings. This provides a means for adjusting the blow-down of pressure when changing or regulating the set pressure. These valves have bodies which are pressure tight on the outlet side and are suitable for use when discharging into a line operating under low head pressures, or for handling noxious or inflammable gases and fluids.

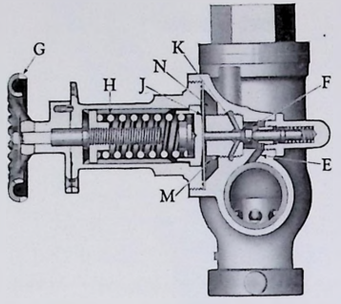
Pressure setting: Relief valves on steam service should always be set at least 10 per cent above the normal working pressure in the system. On liquid service, they should be set at a pressure 25 per cent above the normal working pressure in the system. These valves may be readjusted for pressures 20 per cent above or below the original set pressure, but not exceeding the maximums given above. For a greater readjustment, new springs may be required, since one spring will not cover the entire range of pressures at which these valves may be set.

Prices on Application

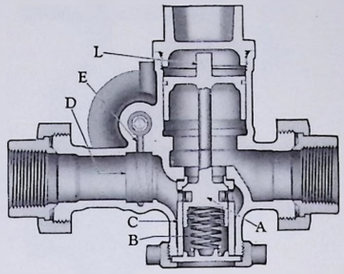
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Brass Pressure Regulators

Crane pressure regulators are composed of two essential but separate mechanisms—the auxiliary valve assembly and the main valve assembly—which are inter-connected for the transmission of pressure, but independent of each other mechanically. For convenience, these two units are usually contained in the same body, but the regulator would function just as well if they were entirely separated except for the necessary pipe connections. The auxiliary valve assembly contains a device for manually setting the regulator for the desired service pressure, an auxiliary valve to control the operation of the main valve, and a mechanism to operate the auxiliary valve itself. The main valve assembly consists of the main valve disc and seat and a piston actuated by pressure from the auxiliary valve, which controls the movement of the main valve disc. The illustrations and description below present a clear picture of the operation of the Crane regulator.



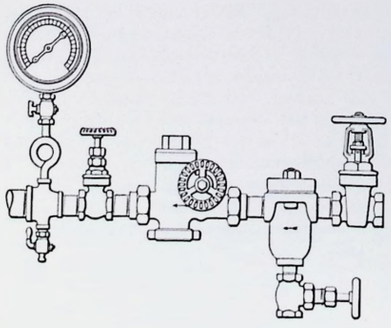
At the left is a sectional view of the auxiliary valve assembly and at the right is a sectional view of the main valve assembly of the Crane No. 960 Pressure Regulator.



Operation: Starting with the regulator properly installed in the line and ready to go into service, the successive steps which take place in its operation are as follows:

Steam (or air) from the high pressure line flows into the inlet side of the regulator as far as the main disc A, which is held lightly to its seat by the main disc spring B. This high pressure then passes into the main disc spring chamber through the ports in the liner C and acts to hold the main disc tightly to its seat. A portion of the high pressure steam in the regulator inlet passes through the screen D into the high pressure port E and fills the chamber around the auxiliary valve F, which is held lightly to its seat by the auxiliary valve spring.

When the handwheel G is turned in a clockwise direction, the regulating spring H is compressed and deflects the diaphragm J. This deflection of the diaphragm moves the auxiliary valve F off its seat and allows pressure to flow through the intermediate pressure port K into the chamber above the piston L.

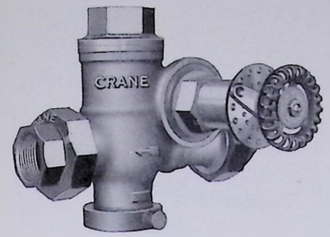


The piston then moves downward, overcoming the resistance of the main disc A and forces it off its seat. Steam then flows past this disc and fills the outlet or service piping system. Pressure from the outlet of the regulator is transmitted back through the low pressure port M to the diaphragm chamber N. As the pressure builds up in this chamber, it finally overcomes the tension on the diaphragm caused by the regulating spring, and forces the diaphragm back to its original position.

Just as soon as the diaphragm returns to its original position, the auxiliary valve closes, thus cutting off the pressure to the top of the piston L. The high pressure in the main disc spring chamber then forces the main disc back to its seat, cutting off the steam supply to the outlet side of the regulator. As the outlet or service pressure falls, the pressure in the diaphragm chamber also falls, with the result that the regulating spring tension again deflects the diaphragm and moves the auxiliary valve off its seat. The entire cycle of operations is then repeated.

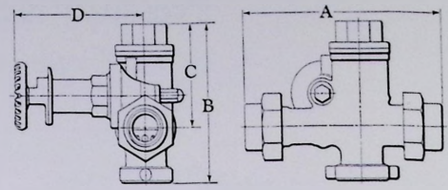
It will be seen from this description of the operation of the Crane regulator, that with the handwheel set to obtain any desired service pressure, this pressure will automatically be maintained regardless of the quantity of steam being used. While each step in the automatic operation of the regulator has been described as taking place at a definite point in the cycle, the entire cycle is performed practically instantaneously and there is no lag in any of the operations. When steam is being used in the service system, the regulator actually operates in a "floating" position, that is, both the auxiliary valve and the main disc move back and forth within the limits of their travel without coming to rest at any one position, and thus continually proportion the flow of steam to the service requirements.

Brass Pressure Regulators



No. 960 Pressure Regulator

WORKING PRESSURE — 250 pounds steam or air



List Prices and Dimensions

Size Inches	Price Each	Overall Dimensions A	B	C	D
½	43.00	7 7/16	6	3 7/8	6 1/4
¾	48.00	8 3/8	6	3 7/8	6 1/4
1	54.00	9 1/8	6 3/4	4 3/8	7 1/4
1¼	67.00	9 3/4	7 3/8	4 7/8	7 1/2
1½	83.00	10 3/4	8 5/8	5 5/8	7 5/8
2	104.00	12 1/8	9 3/4	6 1/4	7 1/2

Service recommendations: Crane Pressure Regulators have been specifically designed to provide accurate, automatic pressure regulation on steam and air. They are particularly suitable for use in modern process work, on vulcanizers, cookers, dryers, paper machines, heating systems, air tools, air blasts, and a variety of other services. They may be used to reduce the pressure to engines and pumps if ample receiver capacity to eliminate pulsations is provided between the engine or pump and the regulator.

Fundamental characteristics: These regulators should not be confused with ordinary reducing valves. The Crane valve will reduce the initial pressure accurately and positively, will maintain the reduced pressure at the desired point, regardless of the quantity of steam or air being used, and will not allow the reduced pressure to build up to the initial pressure when no steam is being used in the service piping. The service or reduced pressure will not be affected by reasonable fluctuations in the initial pressure.

Features: These regulators are featured by reliability, a wide range of available reduced pressures, simplicity of operation, accessibility for inspection, and convenience in making repairs.

Union connections: All regulators are regularly furnished with malleable iron union rings and tailpieces on inlet and outlet ends.

Location of regulating wheel: Regulators are regularly furnished with the pilot valve on the left hand side when facing the inlet. On special order, they can be furnished with the pilot valve on the right hand side.

Steam
Capacity in Pounds per Hour

Initial Pressure	Size, Inches ½	¾	1	1¼	1½	2
30	56	95	190	350	460	935
40	69	115	231	410	552	1165
50	78	137	272	490	645	1400
60	88	162	300	550	735	1600
70	100	180	340	625	828	1800
80	115	200	395	700	920	1985
90	125	225	435	763	1010	2195
100	134	237	475	825	1100	2400
125	159	288	570	1000	1320	2920
150	187	338	680	1160	1540	3400
175	212	388	750	1325	1770	3880
200	240	437	900	1500	2000	4360
250	280	575	1010	1800	2300	5150

Locking: Regulators are regularly furnished with a locking device, so that the pressure setting may be protected against tampering. Locks are not furnished with regulators, except on special order, and then at an advance in price.

Service pressure ranges: Regulators are fitted with regulating springs and diaphragms to suit two distinct ranges of service pressure, as follows:

Low pressure — 5 pounds to 30 pounds
High pressure — 31 pounds to 200 pounds

Orders must always specify the reduced pressure wanted in order that proper springs and diaphragms may be furnished.

Valves for extra low pressure service: Crane Co. can supply, on special order, pressure regulators particularly designed to give accurate regulation for reduced pressures ranging from ½ pound to 4 pounds.

Valves for air service: When regulators are wanted for use on compressed air, orders must so specify.

Maximum service pressure: These regulators should not be used when the reduced pressure wanted is more than 80 per cent of the initial pressure.

High pressures: On special order, Crane Co. can furnish pressure regulators of this same design, in sizes from 1½-inch to 2-inch, for steam pressures up to 350 pounds.

Air
Capacity in Cubic Feet of Free Air per Minute

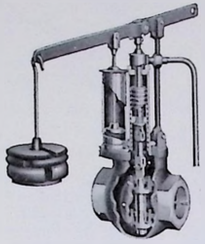
Initial Pressure	Size, Inches ½	¾	1	1¼	1½	2
40	7.0	19.5	38.0	66.0	116	250
50	7.5	21.0	40.0	72.0	124	270
60	8.0	22.5	44.0	78.0	132	290
70	8.5	24.0	48.0	86.0	140	310
80	9.0	26.0	52.0	94.0	148	330
90	9.5	28.0	56.0	100	156	350
100	10.0	30.0	60.0	108	166	370
125	11.0	34.0	68.0	128	184	420
150	12.5	38.0	77.0	146	204	470
175	14.0	42.0	86.0	164	224	520
200	15.0	48.0	96.0	182	244	590
250	17.0	56.0	114	220	284	670

Description....page 414

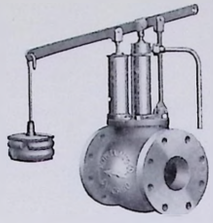
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Klipfel
Pressure Reducing Valves

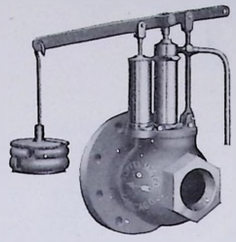
WORKING PRESSURE
Standard — Screwed Ends — 150 pounds steam
Standard — Flanged Ends — 125 pounds steam
Extra Heavy — 250 pounds steam



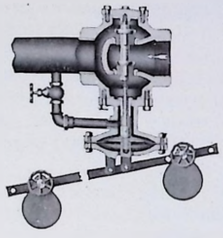
No. 972, Screwed
Piston Type



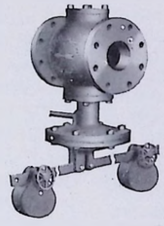
No. 972, Flanged
Piston Type



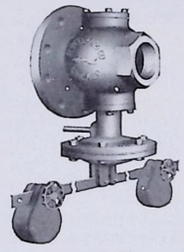
No. 973
Screwed Inlet
Flanged Outlet



Cross Section
No. 975, Screwed
Low Pressure Type



No. 975, Flanged
Low Pressure Type



No. 975½
Screwed Inlet
Flanged Outlet

Service recommendations: No. 972 and No. 973 Pressure Reducing Valves are designed for general service on steam where the desired reduced pressure is above 5 pounds. These valves are of the balanced, seatless type, and therefore, should not be used on "dead end" service where the valve must close tightly when no steam is being used in the system. Sudden changes in the demand for steam do not affect their operation objectionably, as the oil dashpot overcomes any tendency of the valve to vibrate or chatter. They are simple, direct-acting, and require no springs, packing, or pilot valves.

No. 974 Pressure Reducing Valves (Marine Type) are similar to the No. 972, except that they have movable ball weights which are rigidly fastened to the levers by means of set screws. They are especially adapted for marine service, as their operation is not affected by the swaying motion of the ship.

No. 975 and No. 975½ Pressure Reducing Valves are intended for use on vacuum or low pressure steam heating systems, but can also be used to control other fluids at low and medium pressures. Due to the large diaphragm area the valve responds to very small changes in the reduced pressure which is transmitted from the low pressure side of the line through a feeler pipe to the diaphragm.

Water, Oil and Gas: Several types of Klipfel Reducing Valves not shown above, such as pilot operated and spring loaded types, are available for the control of water, oil, and gas, as well as for steam. Prices and information on application.

Expanded outlet valves: Reducing valves having expanded outlets should be used when high pressure steam is being reduced to a pressure low enough to require a low pressure pipe of larger size than the inlet piping. In such cases, the use of expanded outlet valves results in closer regulation of pressure and a greater convenience in piping.

Klipfel
Pressure Reducing Valves

List Prices

Size Inches	No. 972 and No. 974 Standard Screwed Each	No. 972 and No. 974 Standard Flanged Each	No. 972 and No. 974 Extra Heavy Flanged Each	No. 975 Standard Screwed Each	No. 975 Standard Flanged Each	No. 975 Extra Heavy Flanged Each	Size Inches	No. 973 Expanded Outlet Standard Both ends Screwed Each	No. 973 Expanded Outlet Standard Both ends Flanged Each	No. 973 Expanded Outlet Extra Heavy Both ends Flanged Each	No. 975½ Expanded Outlet Standard Both ends Screwed Each	No. 975½ Expanded Outlet Standard Both ends Flanged Each	No. 975½ Expanded Outlet Extra Heavy Both ends Flanged Each
⅜	45.00			45.00			1 x 2	55.00			55.00		
½	45.00			45.00			1¼ x 2½	60.00			60.00		
¾	45.00			45.00			1½ x 3	70.00	75.00	80.00	70.00	75.00	80.00
1	50.00			50.00			2 x 3	80.00	85.00	90.00	80.00	85.00	90.00
1¼	55.00			55.00			2 x 4	85.00	90.00	95.00	85.00	90.00	95.00
1½	60.00			60.00			2½ x 5		105.00	110.00		105.00	110.00
2	70.00	75.00	80.00	70.00	75.00	80.00	3 x 5		120.00	125.00		120.00	125.00
2½	85.00	90.00	95.00	85.00	90.00	95.00	3 x 6		130.00	135.00		130.00	135.00
3	100.00	105.00	110.00	100.00	105.00	110.00	4 x 6		175.00	185.00		165.00	175.00
3½	120.00	125.00	130.00	120.00	125.00	130.00	4 x 8		200.00	210.00		175.00	185.00
4	140.00	145.00	150.00	140.00	145.00	150.00	5 x 8		250.00	265.00		200.00	210.00
5	170.00	175.00	185.00	170.00	175.00	185.00	5 x 10		300.00	315.00		250.00	265.00
6	220.00	225.00	235.00	195.00	200.00	210.00	6 x 8		350.00	365.00		285.00	300.00
8		375.00	400.00		325.00	350.00	6 x 10		400.00	415.00		325.00	340.00
							6 x 12		425.00	440.00		350.00	365.00

The above Reducing Valves can be furnished in larger sizes — prices upon application.

When ordering, always state catalogue number, sizes of inlets and outlets, the initial and desired reduced pressure, and whether for the control of steam, air, or water.

Nos. 972, 974, and 975 Valves in sizes 1½-inch and smaller are made with brass bodies and screwed ends only; sizes 2 to 6-inch are made with semi-steel bodies and either screwed or flanged ends; and the 8-inch size is made with semi-steel bodies and flanged ends only. The inner valves and trimmings of all sizes are made of brass.

Unless otherwise specified, Nos. 972 and 975 Valves up to and including the 6-inch size will be furnished with screwed ends, while the No. 974 will be furnished with flanged ends in sizes 2-inch and larger.

Nos. 973 and 975½ Valves in sizes 1 × 2 and 1¼ × 2½-inch, are made with brass bodies and screwed ends only; in sizes 1½ × 3 to 2 × 4-inch, with semi-steel bodies and both ends screwed, both ends flanged, or screwed inlet and flanged outlet; in sizes 2½ × 5 to 4 × 6-inch, with semi-steel bodies and both ends flanged or with screwed inlets and flanged outlets; and in sizes 4 × 8-inch and larger, with semi-steel bodies and flanged ends only.

Expanded outlet valves having screwed inlets and flanged outlets take the same list prices as valves of the same size having both ends flanged.

Flange dimensions: The end flange dimensions of all standard flanged reducing valves conform to the American (A.S.A.) 125-Pound Cast Iron Flange Standard, No. B16a-1928.

The end flanges of all extra heavy flanged reducing valves conform to the American (A.S.A.) 250-Pound Cast Iron Flange Standard, No. B16b-1928.

Drilling: Flanged reducing valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the particular standard applying as listed above. When valves are wanted "faced only" they will be furnished at the same price as for "faced and drilled".

Working pressures: All of the above valves are made with screwed ends for 150 pounds steam pressure, and with flanged ends for 125 pounds and for 250 pounds steam pressure.

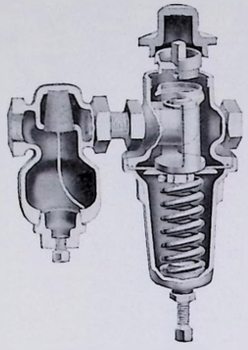
The maximum reduced or outlet pressures for No. 975 straight size valves is as follows: ⅜ to 1½-inch, 20 pounds; 2 to 4-inch, 15 pounds; 5 and 6-inch, 10 pounds; and 8-inch, 5 pounds.

The maximum reduced or outlet pressures for No. 975½ expanded outlet valves is as follows: 1 × 2 and 1¼ × 2½, 20 pounds; 1½ × 3 to 3 × 6, 15 pounds; 4 × 6 to 5 × 10, 10 pounds; and 6 × 12, 5 pounds.

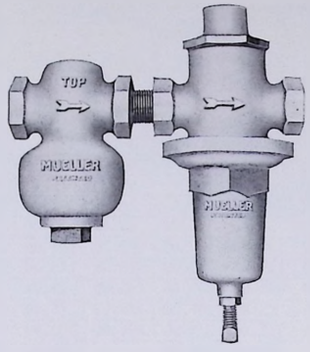
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Mueller

Water Pressure Regulators



Cross Section
No. H 9000



No. H 9000

List Prices and Dimensions

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½
No. H 9000, screwed	Each	17.28	18.00	18.00	19.36	31.14	54.00	72.70	105.30	136.00
End to end, assembly	Inches	5 1/16	6⅜	7 7/16	8 15/16	9 13/16	12 11/16	14½	17⅜	20
Center to top	Inches	1 7/16	2¼	2¼	3½	3⅛	3½	4	4 13/16	5⅜
Center to bottom	Inches	4 15/16	5½	7	8	8	10¼	10 13/16	14 3/16	16¼

Service recommendations: These water pressure regulators are suitable for use on both hot and cold water, air, and liquid soap lines. They are particularly adapted for residence, apartment building, and industrial service.

Pressure range: Valves are regularly made for initial pressures ranging from 40 to 250 pounds and for delivery pressures ranging from 25 to 75 pounds. Valves can be furnished on special order for any initial pressure up to 250 pounds or delivery pressures ranging from 5 to 125 pounds. Special springs are necessary for the latter ranges.

All valves are set for 45 pounds delivery pressure, unless otherwise specified.

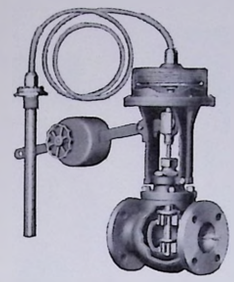
Construction: All regulators are furnished with strainers, completely assembled as shown in the illustrations above. The regulating valve is made entirely of brass and bronze. It has full seat opening and is capable of supplying a full volume of water at the reduced pressure. The diaphragm is of a special composition reinforced material capable of withstanding a pressure of 800 pounds per square inch. The disc is likewise of a special composition and is not affected by hot water.

All parts subject to wear are readily accessible. The removable seat ring, disc, and diaphragm makes repair possible without removing the valve from the line.

Ordering: In ordering, figure number, size, inlet and outlet pressure and the kind of service should be specified.

Klipfel

Vapor Thermostats

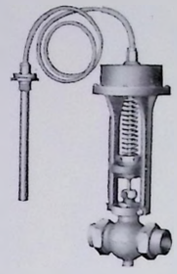


No. 976
Union Ends — ½ to 1½ inch
Flanged Ends — 2 to 8 inch

Steam supply pressures: These vapor thermostats are designed for maximum steam supply pressures as follows:

Size	Pressure	Size	Pressure
½ and ¾-inch	— 200 pounds	3-inch	— 70 pounds
1-inch	— 150 pounds	3½-inch	— 70 pounds
1¼-inch	— 150 pounds	4-inch	— 60 pounds
1½-inch	— 150 pounds	5-inch	— 50 pounds
2-inch	— 125 pounds	6-inch	— 40 pounds
2½-inch	— 100 pounds	8-inch	— 12 pounds

Temperature Range: These vapor thermostats are regularly furnished adjustable through a range of 40° F. The standard for hot water service is 140 to 180° F.



No. 977
Union Ends — 1½ to 1½ inch
Flanged Ends — 2 and 2½ in.

List Prices

Size	Inches	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
No. 976, Union Ends	Each	110.00	115.00	125.00	135.00	145.00								
No. 976, Flanged, F. & D.	Each						160.00	170.00	180.00	200.00	220.00	300.00	400.00	500.00
No. 977, Union Ends	Each	110.00	115.00	125.00	135.00	145.00								
No. 977, Flanged, F. & D.	Each						160.00	170.00						

All Vapor Thermostats are regularly furnished with 8 feet of armored flexible tubing. Extra lengths can be furnished at 30c net per foot.

Bulbs are regularly furnished for horizontal installation; if wanted for vertical installation, specify whether closed end will be up or down.

Service recommendations: These vapor thermostats are generally used to maintain hot water in steam heated tanks at the temperature required. On special order, they can be furnished with sensitive bulbs of the finned type which makes them suitable for use in controlling the temperature of air in closed chambers.

Construction: The Klipfel Vapor Thermostat is of all metal construction. The metals used are of the highest quality and will give long and continuous service under severe operating conditions. The metal bellows is of large diameter for greater power and sensitivity.

No. 976 Lever Type Thermostat is adapted for easy adjustment of temperature by shifting the weight on the lever.

No. 977 Spring Type Thermostat is compact and well adapted to installations where space is limited and frequent adjustment of temperature is not required.

Operation: The semi-balanced bevel seated inner valve is normally held open by the lever and weight or the spring. The temperature sensitive bulb is installed in contact with the medium which is to be controlled as to temperature. An increase in the bulb temperature increases the pressure of the volatile fluid hermetically sealed in the bulb and bellows. The pressure generated in the bulb is transmitted through armored flexible copper tubing to the all-metal bellows. This pressure expands the bellows and thus moves the stem and inner valve toward the closed position against the resistance of the weight or spring. The spring or weight is adjusted so that when a predetermined temperature is reached, the valve will be completely closed and shut off the steam flow. As the temperature of the heated medium falls, the pressure acting in the bellows drops, permitting the spring or weight to open the valve gradually.

Materials: All valves in sizes 1½-inch and smaller have brass bodies and union ends. Sizes 2-inch and larger are made with semi-steel bodies, brass trimmed, and are flanged end only.

Flange dimensions: End flanges conform to the American (A.S.A.) 125-Pound Cast Iron Flange Standard, No. B16a-1928.

Drilling: All flanged valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American 125-Pound Cast Iron Flange Standard. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

When ordering: Specify catalogue number of valve wanted, pipe size, liquid to be controlled, minimum and maximum temperatures to be maintained, and the steam supply pressure.

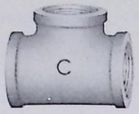
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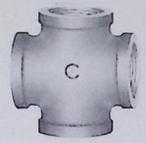
Crane No. 18-8 Chrome-Nickel Alloy Steel

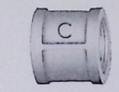
Fittings, Unions, and Flanges


No. 18860
90° Elbow


No. 18862
45° Elbow

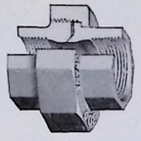

No. 18868
Tee

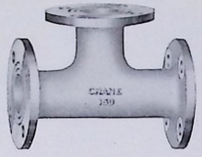

No. 18872
Cross


No. 18882
Coupling


No. 18878
Cap


No. 18886
Bushing


No. 18890
Union


No. 18869
Flanged Tee


No. 18861
Flanged Elbow


No. 18884
Plug

List Prices

Size		Inches	¼	⅜	½	¾	1	1¼	1½	2
Screwed Fittings and Unions	No. 18860, 90° Elbows	Each	1.15	1.30	1.50	1.75	2.25	3.00	3.75	5.50
	No. 18862, 45° Elbows	Each	1.40	1.60	1.85	2.25	2.65	3.50	4.50	6.50
	No. 18868, Tees	Each	1.60	1.80	2.10	2.50	3.25	4.25	5.25	7.75
	No. 18872, Crosses	Each	2.30	2.60	3.00	3.50	4.50	6.00	7.50	11.00
	No. 18878, Caps	Each	1.05	1.20	1.40	1.60	2.00	2.60	3.25	4.50
	No. 18882, Couplings	Each	1.15	1.30	1.50	1.70	2.15	2.80	3.50	5.00
	No. 18884, Plugs	Each	.70	.80	.95	1.10	1.40	1.80	2.25	3.10
	No. 18886, Bushings	Each	.90	.95	1.05	1.20	1.50	1.95	2.45	3.40
	No. 18890, Unions	Each	3.20	3.20	3.20	4.20	5.60	7.80	10.20	13.60

Size		Inches	1½	2	2½	3	4	5	6
Flanged Fittings and Flanges	No. 18861, 90° Elbows	Each	21.00	27.00	37.00	49.00	70.00	90.00	118.00
	No. 18863, 45° Elbows	Each	22.00	29.00	39.00	51.00	74.00	97.00	124.00
	No. 18869, Tees	Each	32.00	41.00	56.00	73.00	105.00	135.00	177.00
	No. 18889, Screwed Companion Flanges	Each	9.00	11.00	13.00	16.00	25.00	30.00	37.50
	No. 18891, Blind Flanges	Each	11.25	13.75	16.25	20.00	31.25	37.50	47.00

Materials: Crane 18-8 Chrome-Nickel Alloy Steel is an exceptionally high grade stainless steel, a typical analysis of which is as follows:

Chromium 20%
Nickel 9.5%
Carbon 10%

All castings made of this alloy are produced in Crane foundries under the constant supervision of expert metallurgists. Bar stock material used in the valves is purchased under rigid specifications which insure the use of material adequate in physical as well as chemical properties to provide uninterrupted service under the most severe conditions.

Service recommendations: Crane No. 18-8 Chrome-Nickel Alloy fittings and valves are recommended for service in handling acetic acid, nitric acid, alum solutions, alkalies (such as caustic soda, soda ash, etc.), limes, bleaching solutions, corrosive mine waters, fatty acids, food products, fruit juices, sulphite liquors and vapors in paper mills, sulphurous acid, tanning liquors, and a large number of other industrial chemicals.

Screwed fittings: The dimensions of all screwed fittings are the same as those of Crane Standard Malleable Iron Fittings as shown on page 172.

Unions: The union rings on No. 18890 Unions are made of malleable iron, galvanized. These rings can be furnished of Crane No. 18-8 Chrome-Nickel Alloy when so ordered, at a special price.

The dimensions of No. 18890 Unions are the same as those of Crane 300-Pound Malleable Iron Unions shown on page 239.

Flanged fittings: The dimensions of all flanged fittings are the same as those of Crane Standard Brass Flanged Fittings shown on page 262.

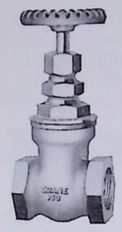
Flanges: The dimensions of all companion flanges and blind flanges are the same as those of Crane Standard Brass Companion and Blind Flanges shown on page 262.

Flange dimensions: The dimensions of all flanges conform to the MSS 150-Pound SP Bronze Flange Standard, No. SP-2a-1930. Flanges are plain faced with two V-shaped concentric grooves between the port and the bolt holes. Full faced gaskets should be used.

Drilling: All flanges and flanged fittings are furnished faced, drilled, and spot faced unless ordered faced only. List prices include drilling and spot facing to the MSS 150-Pound Standard. When ordered "faced" only, they will be furnished at the same price as for "faced, drilled, and spot faced".

Crane No. 18-8 Chrome-Nickel Alloy Steel

Gate, Globe, Angle, Check, and Relief Valves

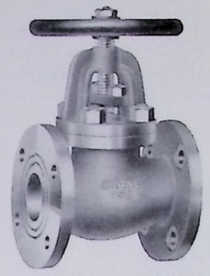

No. 18840
Gate Valve

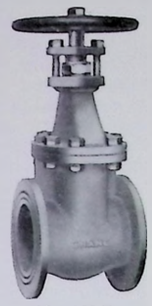

No. 18801
Globe Valve


No. 18859
Relief Valve


No. 18820
Check Valve


No. 18821
Check Valve


No. 18803
Globe Valve


No. 18841
Gate Valve

Size		Inches	¼	⅜	½	¾	1	1¼	1½	2
Screwed Valves	No. 18801, Globe	Each	12.50	15.50	19.00	22.50	27.00	33.00	40.00	50.00
	No. 18802, Angle	Each	12.50	15.50	19.00	22.50	27.00	33.00	40.00	50.00
	No. 18820, Horizontal Check	Each	9.50	12.00	15.00	17.50	21.00	26.00	32.00	40.00
	No. 18840, Gate	Each			25.00	29.00	35.00	42.00	51.00	63.00
	No. 18859, Relief	Each		36.00	38.00	45.00	55.00	81.00	100.00	125.00

Size		Inches	1½	2	2½	3	4	5	6
Flanged Valves	No. 18803, Globe	Each	62.00	75.00	140.00	180.00	255.00	340.00	415.00
	No. 18805, Angle	Each	62.00	75.00	140.00	180.00	255.00	340.00	415.00
	No. 18821, Horizontal Check	Each	52.00	63.00	115.00	150.00	215.00	285.00	357.00
	No. 18841, Gate	Each	75.00	90.00	160.00	200.00	280.00	370.00	450.00

Gate Valves: Screwed end Gate Valves have non-rising stems and screwed bonnets. The dimensions of these valves are the same as those of Crane No. 437 Brass Gate Valves as shown on page 41.

All Flanged Gate Valves have non-rising stems. Sizes 1½ and 2-inch have screwed bonnets and the dimensions of these valves are the same as those of Crane No. 437½ Brass Gate Valves shown on page 41. Sizes 2½-inch and larger have bolted bonnets and renewable seats.

Globe and Angle Valves: Screwed end Globe and Angle Valves in sizes ¼ and ⅜-inch are made of 18-8 Chrome-Nickel Alloy Steel bar stock.

Screwed Globe and Angle Valves in sizes ½ to 2-inch have union bonnets. The dimensions of these valves are the same as those of Crane No. 70 Brass Globe and Angle Valves shown on page 19.

Flanged Globe and Angle Valves in sizes 1½ and 2-inch have union bonnets. The dimensions of these valves are the same as those of Crane No. 71 Brass Globe and Angle Valves shown on page 19.

In sizes 2½-inch and larger, Flanged Globe and Angle Valves are of the outside screw and yoke type, with bolted bonnets and renewable seats.

Check Valves: Screwed end Check Valves in sizes ¼ and ⅜-inch are made of 18-8 Chrome-Nickel Alloy Steel bar stock.

Screwed end Check Valves in sizes ½ to 2-inch have union bonnets. The dimensions of these valves are the same as those of Crane No. 72 Brass Check Valves shown on page 34.

Flanged Check Valves, in sizes 1½ and 2-inch, have union bonnets.

In sizes 2½-inch and larger, Flanged Check Valves have bolted caps and renewable seats.

Relief Valves: No. 18850 Relief Valves have outside springs and lifting levers. A stuffing box around the stem prevents the escape of the fluid when the valve is discharging.

These valves can be supplied for pressures up to 250 pounds and a maximum temperature of 600° F. Orders should specify the set pressure and the fluid for which the valves will be used.

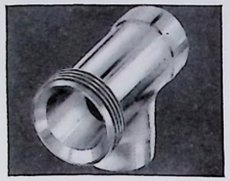
Flange dimensions: End flange dimensions of flanged valves conform to the MSS 150-Pound SP Bronze Flange Standard, No. SP-2a-1930. Flanges are plain faced with two V-shaped concentric grooves between the port and the bolt holes. Full faced gaskets should be used.

Drilling: Flanged valves are furnished faced, drilled, and spot faced unless ordered faced only. List prices include drilling and spot facing to the MSS 150-Pound Standard. When ordered "faced only" they will be furnished at the same price as for "faced, drilled and spot faced".

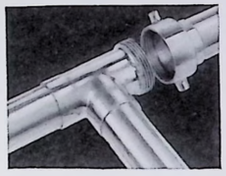
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asbestosclaims.law/library/21275/229

No. 18-8 Chrome-Nickel Alloy Steel
Sanitary Fittings and Valves

Crane Co. manufactures a complete line of sanitary fittings and valves in 18-8 chrome-nickel alloy, for use with 1-inch and 1½-inch O.D. 18 gauge, and 2-inch, 2½-inch and 3-inch O.D. 16 gauge tubing. These fittings and valves are designed for service wherever food, food products, and beverages must be conveyed in piping permanently immune to corrosion, contamination and discoloration. They are distinguished from all ordinary pipe fittings in that they are completely and carefully machined on the inside to eliminate all pockets where food might lodge and decay.



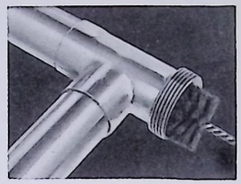
No Food Pockets



Quickly Demountable

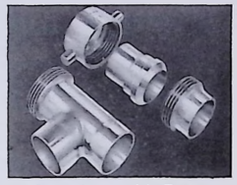
Joints between fittings and tubing are made by inserting the tubing into the recessed end of the fitting, and soldering or brazing it into place. The bore of the body of the fittings is the same as the inside diameter of the tubing, which insures that when the joints are properly made up there will be no shoulders or pockets formed where solid material can lodge. Union end fittings are provided in a variety of styles to permit ease of demounting the piping, and to provide ready access to the interiors for cleaning. Threaded ends of union fittings comply with the standards of the International Association of Milk Dealers (I.A.M.D.).

All castings are made in Crane Co.'s own foundries under rigid laboratory control, and are carefully annealed to insure maximum corrosion resistance. Recessed ends of all fittings have the external surfaces of the recessed ends machined to insure uniform wall thickness, which facilitates soldering and improves the entire appearance of the fitting. All fittings are furnished either with all exterior surfaces polished or with a fine sand blast finish.



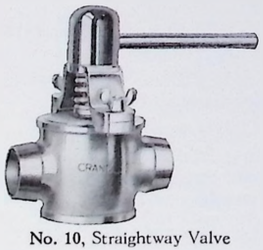
Easily Cleaned

All CRANE sanitary fittings and valves offer excellent resistance to chemical action, and to discoloration by milk, milk products, lactic and butyric acids, fruit juices, vegetable juices, vinegar, and practically all cooked or prepared food products.

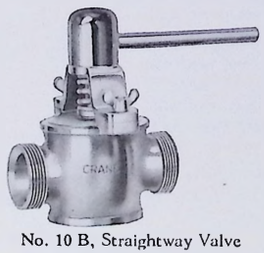


Interchangeable Parts

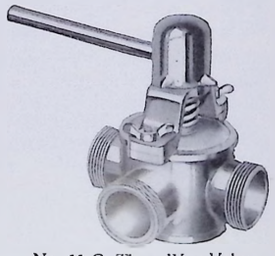
Sanitary Valves



No. 10, Straightway Valve



No. 10 B, Straightway Valve



No. 11 C, Three-Way Valve

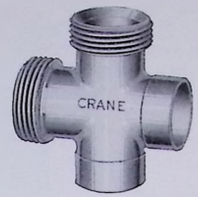
Crane sanitary valves have been particularly designed to overcome the galling, or seizing action, which takes place between the body and plug of ordinary plug cocks when made of 18-8 chrome-nickel alloy. They operate with extreme ease, without leakage, and with negligible wear on the seating surfaces.

A patented automatic plug lifting mechanism insures these advantages. When at rest in any position, the plug is automatically held to its seat; when turned to open or close, the plug is automatically and imperceptibly lifted from its seat to permit easy operation.

These valves are of the standard full roundway plug type, with the plug chamber in the body open at the top and bottom, and with no internal pockets where food can collect. They are easily taken apart for cleaning by merely unscrewing two wing nuts, after which the plug and the lifting mechanism can be removed from the body as a unit. The lifting mechanism is properly adjusted at the factory and need not be disturbed during routine cleaning operations.

These valves are made in the straightway and the three-way type. Straightway valves have both ends recessed, one end recessed and the other end threaded for I.A.M.D. union ring, or both ends threaded for I.A.M.D. union ring. Three-way valves have all ends recessed, or all ends threaded for I.A.M.D. union ring.

18-8 Chrome-Nickel Alloy
Sanitary Fittings



No. 8, Cross
Two adjacent ends recessed, other ends union ring threads.



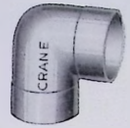
No. 9, Cross
All ends with union ring threads.



No. 26, 45° Elbow
Both ends recessed.



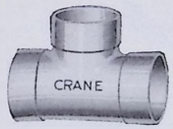
No. 26 C, 45° Elbow
One end recessed, other end union ring thread.



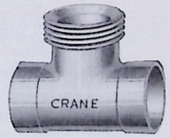
No. 26 A, 90° Elbow
Both ends recessed.



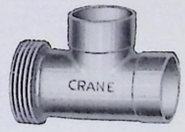
No. 26 B, 90° Elbow
One end recessed, other end union ring thread.



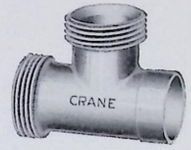
No. 3, Tee
All ends recessed.



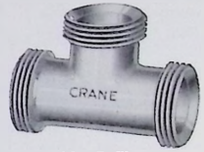
No. 4, Tee
Both ends of run recessed, outlet union ring thread.



No. 5, Tee
One end of run union ring thread, other ends recessed.



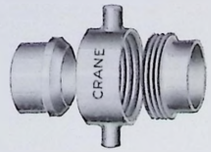
No. 6, Tee
One end of run recessed, other ends union ring threads.



No. 7, Tee
All ends with union ring threads.



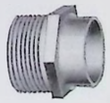
No. 12, Union



Component Parts of No. 12 Union. No. 14 Tailpiece, No. 13 Union Ring and No. 15 Threadpiece. No. 13 Union Ring and No. 14 Tailpiece may be used with any union end fitting.



No. 18, Adapter
One end recessed, other end female pipe thread.



No. 19 A, Adapter
One end recessed, other end male pipe thread.



No. 16 A, Flat Plug
Used with No. 13 union ring to blank off any union end fitting.



No. 23 A, Thermometer Cap
Used with No. 13 union ring to allow insertion of thermometer.



No. 14 A, Tailpiece
Made with plain male shank.



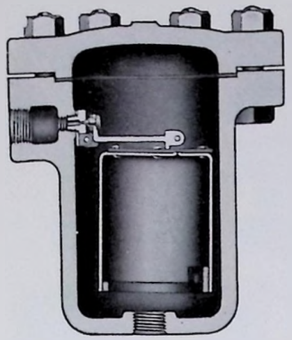
No. 31, Tailpiece
Reducing one or more sizes.



No. 17, Coupling
Both ends recessed.

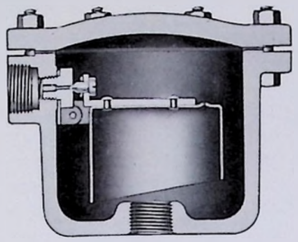
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Inverted Open Float Steam Traps



Cross Section
No. 981 — 1-inch and larger
No. 981A — ¾-inch
No. 982 — All Sizes

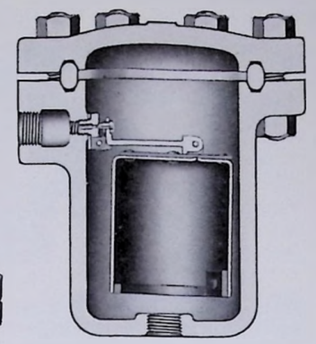
WORKING PRESSURES
Nos. 981, 981½ and 981 A — 200 pounds steam
No. 982 — 300 pounds steam
No. 983 D — 600 pounds steam



Cross Section
No. 981 — ½-inch
No. 981½ — ½-inch



No. 981 — ½-inch
No. 981½ — ½-inch



Cross Section
No. 983 D — All sizes

Materials
No. 981, Cast Iron
No. 981A, Cast Iron
No. 981½, Cast Iron
No. 982, Ferrosteel
No. 983D, Cast Steel

List Prices, Dimensions and Capacities

Size	½	½	¾	1	1¼	1½ and 2
Catalogue No.	981	981½	981 A	981	981	981
List Price	6.50	10.00	16.00	24.00	35.00	50.00
Height	4¼	7	10⅜	11½	13½	15¾
Diameter	5¼	7½	8½	9⅞	11¾	13½
Max. Pressure	200	200	200	200	200	200
Capacities						
Effective Pressure at Trap 5	915	3050	10400	12300	20000	26000
10	880	3500	9200	14000	20800	31800
15	1080	4300	11300	17500	24800	39800
20	790	3100	7130	12500	20000	39100
25	845	3350	7900	13400	21200	41600
30	960	3800	8600	15300	24000	47200
40	610	2450	6940	9800	17600	39900
50	680	2700	7750	10500	19400	43800
60	530	2050	6660	8250	11800	21100
75	600	2250	4550	9060	13100	23800
90	385	2450	4950	9800	14300	25400
100	405	2650	5200	10450	15000	29600
125	450	1850	4000	7370	11700	22600
150	460	2050	4500	8000	12500	24600
200	325	1300	3540	7000	11500	20500

Size	¾	1 and 1¼	¾	1 and 1¼
Catalogue No.	982	982	983 D	983 D
List Price	18.00	31.00	37.00	60.00
Height	9½	11½	10⅛	11⅛
Diameter	8⅜	9⅞	8⅜	9⅞
Max. Pressure	300	300	600	600
Capacities				
Effective Pressure at Trap 200	2280	5100		
225	2360	5300		
250	2500	5650		
275	1470	4050		
300	1500	4250		
325			1550	4320
350			1600	4500
375			1650	4650
400			1700	4800
450			1250	3160
500			1300	3350
550			1350	3450
600			1400	3600

Capacities of Inverted Open Float Traps: The capacity of any trap in pounds of water discharged per hour depends upon the effective pressure at the trap and the area of the discharge valve. By effective pressure is meant the difference between the inlet pressure at the trap and the pressure in the discharge line from the trap, which is composed of the actual pressure existing in the discharge line plus the pressure due to the head of water which may exist in this line.

The only force available to open the valve in a trap of this type against the effective pressure in the trap is the weight of the float multiplied by the compound lever arms which attach it to the valve, and this is a fixed quantity for any one trap. It follows, therefore, that as the effective pressure in the trap is increased, the area through the discharge valve must be decreased. If the area is too large, the valve will not open and the trap will fail to function. If the area is too small, the trap will function properly, but its capacity will be greatly reduced.

Crane Inverted Open Float Traps are designed to employ a number of discharge valve bushings of varying areas depending upon the pressure they are to be used on. Therefore, orders must always specify the working pressure wanted.

Inverted Open Float Steam Traps

At very low cost, these traps provide a complete and efficient method of removing condensate from piping, coils, heaters, and steam heated equipment of many kinds. Compared with the complex construction of most steam traps, their design is surprisingly simple. There is only one moving part; no by-passes, thermostats, air vents, or pet cocks are necessary.

Their operation is based entirely on the rise and fall of a float resting on the accumulated condensate. When filled with incoming steam, the float is buoyant and keeps the water outlet closed. But when incoming condensate fills the float, it sinks, thereby opening the outlet, permitting condensate to discharge.

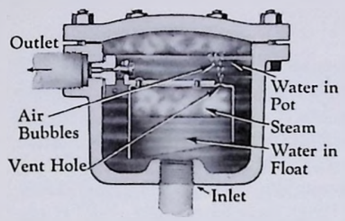
Air or other non-condensable gas entering the float passes through the small vent hole in the top of the float and collects in the upper part of the trap. At each operation, this air or gas is discharged first.

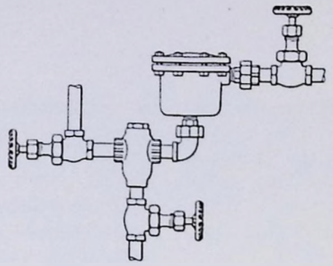
The entire cycle of operation is practically instantaneous. Action is so fast that danger of wiredrawing is eliminated.

We recommend installing a Crane Sediment Separator at the inlet of each trap. Otherwise, scale, sediment, and other foreign material entering the trap might interfere with its operation.

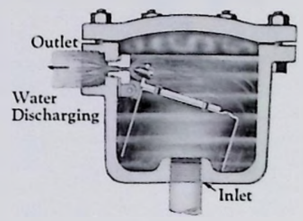
Trap Closed: Incoming steam under the float buoys it up, keeping the outlet closed.

Method of Installing



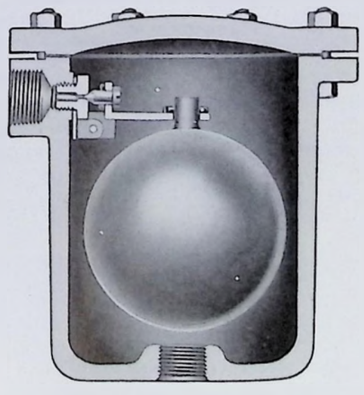


Trap Open: Incoming condensate has filled the float, permitting it to sink and open the outlet.



Cast Iron Automatic Air Vent Valves

Ball Float Type



Cross Section
No. 984

Service recommendations: Crane No. 984 Automatic Air Vent Valves are the simplest and most economical of all devices for removing air from water mains, hot water heating systems, condensation return lines, water tanks, hot water storage tanks, oil storage tanks, Diesel engine water jackets, centrifugal pump casings and various pressure vessels and tanks. They are not suitable for venting steam lines.

Operation: These air vents must be located at highest point in the system where air will collect. So long as water fills the system, the float remains buoyed up and holds the valve disc to its seat. As air accumulates, it displaces the water in the body of the valve and the float falls as the water recedes, thus pulling the disc off its seat. The accumulated air is then discharged by the pressure in the system. As the water rises in the body, the float returns the disc to its seat, and prevents water from escaping. When air collects again, the cycle is repeated.

Pressure range: These air vents are furnished for two ranges of working pressures; from 1 to 30 pounds and from 30 to 150 pounds. Orders must specify the working pressure in order that the proper valve may be furnished.

List Prices

Size	Inches	½	¾
No. 984	Each	8.00	16.50

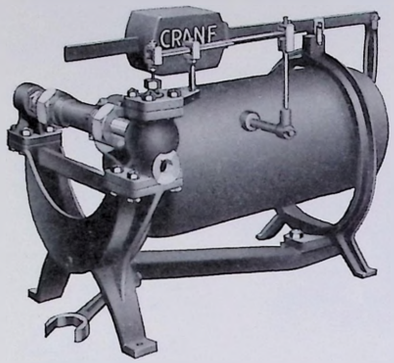
Capacities, in Cubic Feet of Free Air Discharged per Minute

Effective Pressure	1	2	5	10	15	20	25	30	40	50	60	75	90	100	125	150
½-inch No. 984	.76	1.48	3.80	5.36	6.56	7.68	8.80	10.32	3.14	3.60	4.28	4.98	5.70	6.35	7.70	9.15
¾-inch No. 984	1.20	2.40	6.05	8.48	10.40	12.10	13.90	16.40	7.12	8.16	9.76	11.32	12.92	14.52	17.68	20.84

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Cranetilt Non-Return Steam Traps

250 pounds steam working pressure



List Prices and Dimensions

Catalogue Number	Price Each	Size of Pipe Connections		Extreme Length Inches	Extreme Width Inches	Extreme Height Inches
		Inlet Inches	Discharge Inches			
32	69.00	1	½	25	15	25
33	94.00	1¼	¾	28	18½	28
34	125.00	1½	1	33½	20¾	31
35	181.00	2	1¼	36	23	34

Service recommendations: Cranetilt Non-Return Traps may be used for draining condensation from all pipe lines and apparatus operating under steam pressure, such as separators, cooking kettles, stills, drip pockets, pipe coils, heating systems, etc. They cannot be used to discharge condensation and make-up water into a boiler.

Economy and efficiency: The Cranetilt Non-Return Trap is the most economical, simple, and practical device that can be used for automatically disposing of large quantities of condensation collected from steam under pressure. Its construction is strong and durable. Varying pressures have no effect upon its operation, which is always smooth and quiet. It will not air bind. It has a large capacity, many times greater than bucket or float-traps having the same size pipe connections, and will handle small or large quantities of water with equal efficiency.

Durability: The discharge valve is of the pilot type. Only the pilot valve is operated directly by the movement of the trap tank; the main valve is actuated, upon operation of the pilot valve, by the pressure in the tank. Consequently, the action of the main valve is very snappy both in opening and closing, and wiredrawing is reduced to a minimum. Metals for both pilot and main valve are carefully selected for strength and hardness, and will successfully withstand wear and the cutting effects of steam and water.

Simplicity: Cranetilt Non-Return Traps are characterized by simplicity. Neither floats nor buckets are employed. All operating parts are on the outside where they are readily accessible for inspection, cleaning, adjustment, and repair, when necessary. The action of the trap is visible; a glance shows whether it is operating. Its operation is automatic.

Testing: Before shipment, each trap is carefully tested under actual operating conditions for tightness of valves and stuffing boxes, location of weights, and general adjustment and operation. A comprehensive instruction book, covering installation, operation, and maintenance is furnished with each trap.

Capacities

The capacity of any non-return trap depends upon the effective pressure at the trap, which is the difference between the pressures in the inlet line and in the discharge line at the trap. Pressure in the discharge line is due to back pressure in the return line into which the trap discharges and to the head of water which accumulates in the vertical discharge piping. In making allowance for such head water, figure that two feet of head is equivalent to one pound of pressure.

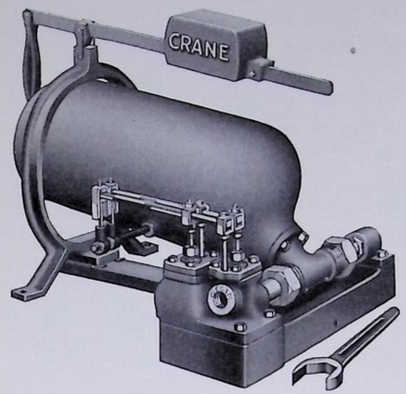
Cranetilt Non-Return Traps should be purchased on the basis of their capacity. To determine the proper size, use the table below. Find the effective pressure in the first horizontal column and follow the vertical column down to the quantity of water to be handled per hour. At the left hand end of the horizontal line corresponding to this quantity will be found the catalogue number of the proper size of trap.

Capacity in Pounds of Water per Hour

Catalogue Number	Effective Pressure at Trap in Pounds per Square Inch															
	5	10	15	20	25	30	40	50	60	75	100	125	150	175	200	250
32	2050	2740	3450	3730	4200	4600	5450	6080	6450	7250	8350	9200	10000	10600	11350	12600
33	4590	6170	7750	8360	8900	10700	12250	13650	14400	16300	18700	20700	22400	23800	25400	28100
34	8200	11000	13700	14800	16850	19200	21900	24400	25800	29200	33500	37000	40000	42500	45500	50400
35	12750	17100	21450	23200	26200	29800	34000	37800	40000	45200	51900	57400	62200	66000	70700	78000

Cranetilt Direct Return Traps

250 pounds steam working pressure



No. 94 and No. 95 Cranetilt Direct Return Traps are equipped with dashpots to cushion the movement of the tank.

List Prices, Dimensions and Capacities

Trap No.	Price Each	Size of Pipe Connections			Overall Dimensions			Capacities
		Water Inlet and Discharge Inches	Steam Inches	Vent Inches	Length Inches	Width Inches	Height Inches	Pounds of Water per Hour
90	94.00	¾	½	½	25½	15¾	26	800
91	119.00	1	½	¾	29	19¼	29	1400
92	156.00	1¼	¾	1	34½	21¾	35	2400
93	220.00	1½	1	1¼	37½	24½	37	3600
94	313.00	2	1	1½	42½	31½	43	4800
95	463.00	2½	1¼	2	51	36½	52	7600

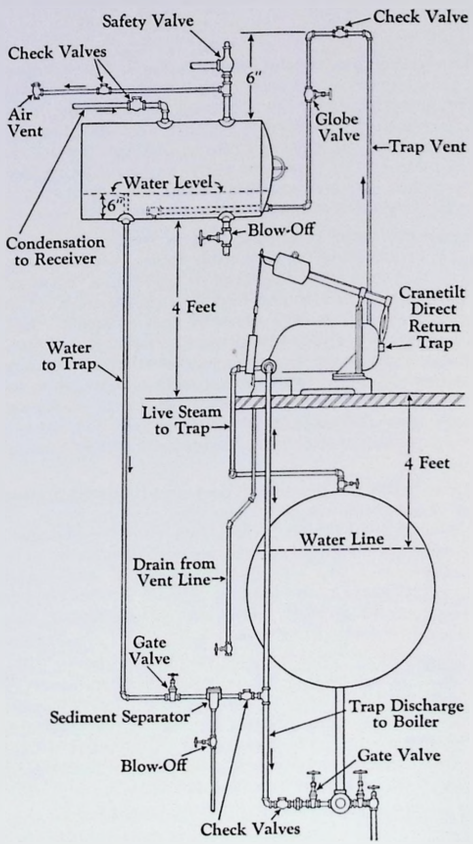
Service recommendations: The Cranetilt Direct Return Trap, in the strictest sense, is an automatic boiler feeder rather than a steam trap. It will handle not only condensate but make-up water as well. It can be installed in such a manner that it will maintain the water line in the boiler at any pre-determined level. The illustration at the right is typical of good practice in installing a direct return trap, using a receiving tank to handle the incoming condensation.

Economy and efficiency: The Cranetilt Direct Return Trap will deliver water to the boiler regardless of its temperature; it will not steam bind and prevent the flow of water to it. It is much more economical in operation than a boiler feed pump, since it consumes less steam, does not require lubricating oils, and has a much greater mechanical efficiency. It is much more efficient than an injector, and is positive in its action regardless of feed water temperature.

Durability: The two valves on the trap are both of the pilot type, in which the movement of the trap tank merely operates small pilot valves within the main valves. The main valves are actuated by pressure, and consequently have a very snappy action, both in opening and closing. Rapid wear of the valve seating surfaces due to slow moving or partially throttled valves, is completely eliminated in the Crane design.

Simplicity: The Cranetilt Direct Return Trap has fewer operating parts than any other device which may be used for the same type of service. Its valves are on the outside and readily accessible for inspection and adjustment. A glance is all that is needed to tell whether the trap is working properly, since the tank tilts at each discharge.

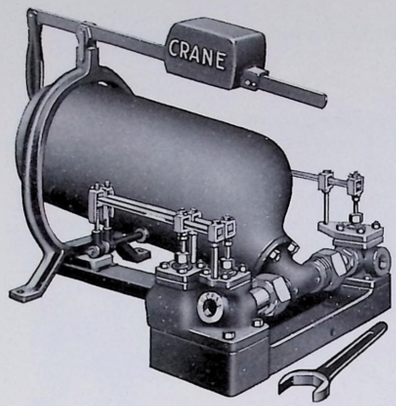
Testing: Each trap is carefully tested before shipment to insure that it is in perfect working order and fully up to its rated capacity. A comprehensive instruction book, covering installation, operation and maintenance is furnished with each trap.



Automatic boiler feeding system employing a Cranetilt Direct Return Trap and a receiving tank to handle the incoming condensate.

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Cranetilt Three-Valve Lifting Traps



No. 104 and No. 105 Cranetilt Three-Valve Lifting Traps are equipped with dashpots to cushion the movement of the tank.

250 pounds steam working pressure

List Prices, Dimensions and Capacities

Trap No.	Price Each	Size of Pipe Connections: Water Inlet and Discharge Inches	Steam Inches	Vent Inches	Overall Dimensions: Length Inches	Width Inches	Height Inches	Capacities: Pounds of Water per Hour
100	113.00	¾	½	½	25½	18	26	1200
101	138.00	1	½	¾	29	21¼	29	2250
102	181.00	1¼	¾	1	34½	24½	35	3750
103	250.00	1½	1	1¼	37½	27⅜	37	5400
104	375.00	2	1	1¼	42½	31½	43	7500
105	530.00	2½	1¼	1½	51	36½	52	11700

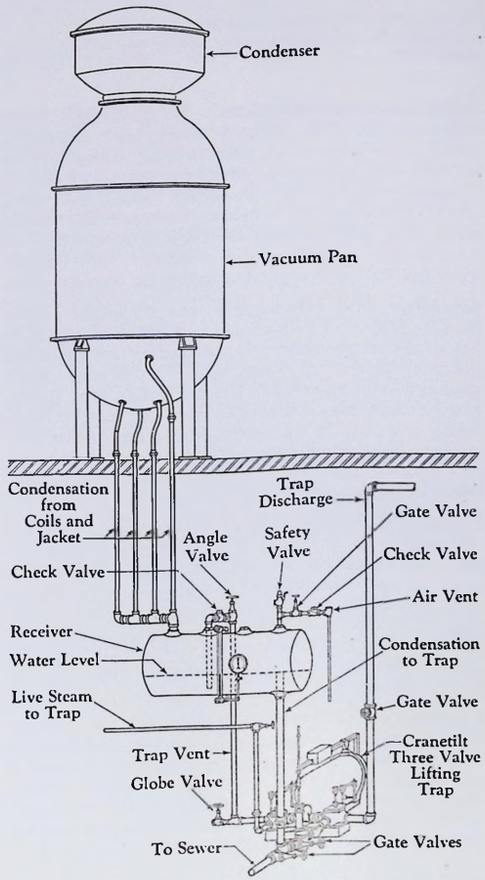
Service recommendations: Cranetilt Three-Valve Lifting Traps are particularly designed to handle condensation from low pressure services and from apparatus which operates under a vacuum or under varying pressures. They render excellent service on brewing kettles, vacuum pans, evaporators, paper machines, jacketed cooking kettles, heating systems, stills, dry kilns, oil separators, etc.

Economy and efficiency: It is frequently necessary in handling condensation from such low pressure apparatus to discharge it against a pressure higher than that in the inlet line to the trap. The three-valve trap will perform this function more economically than any other device. It will not steam-bind or air-bind; the temperature or pressure of the incoming condensation has no effect upon its operation. There is no heat loss in its operation save from radiation, even the steam used to operate it being automatically reclaimed in a properly piped system.

Durability: The steam, vent and discharge valves of these traps are all of the pilot operated type, in which the movement of the trap tank merely operates small pilot valves within the main valves. The main valves are actuated by pressure and consequently have a very snappy action in opening and closing. As a result, rapid wear of the seating surfaces is entirely eliminated.

Simplicity: The Cranetilt Three-Valve Lifting Trap has no interior valves, floats, buckets, levers or other working parts to give trouble. Its valves are all on the outside, where they are easily accessible for inspection and adjustment. The action of the trap is visible; a glance shows whether it is operating. Its operation is entirely automatic.

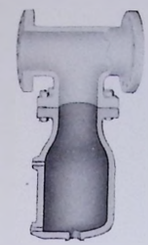
Testing: Each trap is carefully tested before shipment to insure that it is in perfect working order and fully up to its rated capacity. A comprehensive instruction book covering installation, operation and maintenance is furnished with each trap.



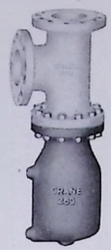
A complete piping system for a milk evaporator illustrating the use of a Cranetilt Three-Valve Lifting Trap and a receiver to handle the condensation from the steam coils and jacket.

Standard and 250-Pound

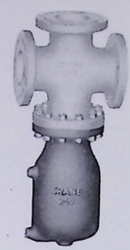
Cast Iron Drip Pockets



Cross Section Application of Drip Pocket in a horizontal line



Application of Drip Pocket at the bottom of a vertical line



Application of Drip Pocket where vertical line leaves a horizontal line

WORKING PRESSURES
Standard — 125 pounds steam
250-Pound — 250 pounds steam



Cast Steel Drip Pockets for steam working pressures up to 400 pounds at 750 degrees F. furnished on special order. Prices on application.

List Prices

Size	Inches	2½	3	3½	4	5	6	8	10	12
Standard, Faced and Drilled	Each	20.00	22.00	24.00	26.00	30.00	37.00	55.00	80.00	120.00
250-Pound, Faced and Drilled	Each	20.00	22.00	24.00	26.00	30.00	37.00	55.00	80.00	120.00
Height, face of flange to drain opening	Inches	13	14	16	16	18	20	24¼	28	32
Size of drain	Inches	¾	1	1	1	1¼	1¼	1¼	1½	1½

250-Pound drip pockets for 250 pounds steam 500 degrees F. temperature are made to order of Crane Ferrosteel at an advance in price of 25 per cent.

Prices do not include the flanged fittings or bolts shown in the above illustration.

Drip pockets are furnished tapped for water gauges, but prices do not include water gauge.

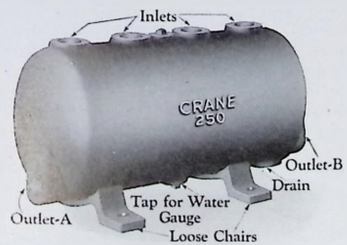
Service recommendations: Drip pockets are used primarily as condensation collectors, but also aid in keeping the pipe line clean by receiving pipe scale, dirt, and other foreign matter. They should be located where condensation is most likely to collect, such as at low points in the lines or at places where the direction of flow is changed.

Size: Full size drip pockets, corresponding to the size of the line on which they are applied, should always be used except on lines larger than 12-inch. This eliminates the possibility of water being carried beyond the drip pocket, which might happen on small lines if reduced sizes are used. The 12-inch size, however, is amply large to take care of steam lines from 12 to 24-inch. A reducing fitting is necessary when using the 12-inch drip pocket on lines 14-inch and larger.

Flange dimensions: Inlet flanges on standard drip pockets conform to the American (A.S.A.) 125-Pound Cast Iron Flange Standard, No. B16a-1928. Flanges on extra heavy drip pockets conform to the American (A.S.A.) 250-Pound Cast Iron Flange Standard, No. B16b-1928.

Drilling: Drip pockets are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the respective standards applying as listed above. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

Malleable Iron Condensation Receivers



WORKING PRESSURE — 250 pounds steam

List Prices and Dimensions

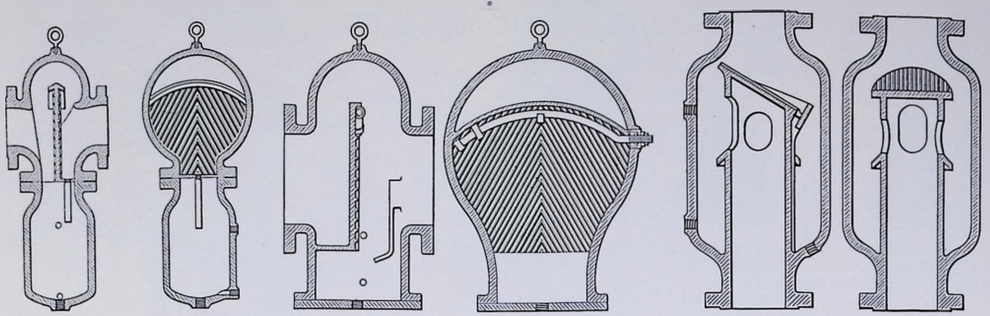
Size	Inches	¾	1	1¼	1½	2
Price	Each	22.00	28.00	36.00	50.00	70.00
Number of inlets		4	4	4	4	4
Size of inlets	Inches	¾	1	1¼	1½	2
Size of outlet "A"	Inches	1¼	1½	2	2½	3
Size of outlet "B"	Inches	1	1¼	1½	2	2½
Size of drain	Inches	¾	1	1¼	1½	2
Extreme length	Inches	21¼	26¼	30	34	39
Extreme height	Inches	11¾	13½	15⅛	16¼	18½
Outside diameter	Inches	10	11½	13	14	16¼
Capacity	Gallons	5½	9	13¼	18	28

Service recommendations: The condensation receivers are designed for use where it is desirable to handle several drain lines with one trap, or where the discharges from several traps are to be handled by one lifting trap or a direct return trap. They provide large storage capacity to take care of irregular volumes of condensation, and when used with lifting or direct return traps, provide a means for reclaiming the vented steam from these traps. For the proper method of piping receivers when using lifting or direct return traps see pages 427 and 428.

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Cast Iron and Ferrosteel

Steam and Oil Separators



Side Section, End Section — Horizontal Steam Separators
Side Section, End Section — Horizontal Oil Separators
Side Section, End Section — Vertical Steam Separators

A necessity in every steam-consuming plant: It is essential in handling steam in any plant to deliver it at its point of usage as free of moisture and other liquids as it is possible to obtain it.

In live steam lines, condensation is always a source of loss, whether the steam is to be used to drive an engine, turbine, or pump, or whether the steam is to be used as a heating medium, as in cookers, kettles, or heating systems.

In exhaust steam lines, oil from the engines or pumps renders the steam unfit for further use as a heating medium or for direct return to the boilers. Oil in pipes, radiators, or on other heating surfaces checks free radiation of heat; oil in boilers combines with impurities in the water and if present in any appreciable quantity forms a thick insulating coating over all the heating surface.

Crane Steam and Oil Separators afford an efficient, economical means of removing such condensation and oil.

Features of design: The design of these separators is based upon a scientific principle involving the tendency of a non-elastic body to move in a straight line. Water and oil entrained in flowing steam are non-elastic; therefore, if the direction of the steam flow is abruptly changed, these fluids will tend to be precipitated out of the current. If the velocity of the flowing steam is greatly decreased at the same time, the precipitation of the fluids will be increased and there will be no tendency to pick them up again as the dry steam passes the baffle plates.

Horizontal separators: The bodies of Crane Horizontal Separators provide a greatly enlarged cross section which results in a lower velocity of the entering steam. Midway of this enlarged section, a corrugated baffle plate is interposed in the flow, which frees the steam of most of its entrained moisture. As the steam rises over the top of the baffle, it is deflected by the curved walls of the head and strikes the corrugations of the reverse side of the baffle before passing on into the pipe line.

The corrugations of the baffle plate run at an angle to the current of steam, which affords ready drainage and at the same time effectively prevents the steam from picking up and carrying globules of water or oil over the top of the baffle. The normal flow of steam is away from the accumulation of condensate in the separator, which also aids in securing perfect separation.

Vertical separators: Crane Vertical Separators employ the same principles of design as the horizontal type, but due to the change in form, there are certain necessary changes in structural details, which do not affect their efficiencies.

Advantages: The construction of all Crane Separators—their large areas, the ample size and proper shape of their baffle surfaces, and the location of their openings—affords the highest degree of efficiency with the lowest possible pressure drop. They can be recommended in competition with any steam or oil separating device on the market; exhaustive tests have proven their ability to operate effectively in removing water and free oil from steam lines.

Automatic drainage: All separators must be properly drained if maximum efficiency is to be secured from them. This drainage should be automatic; only the best of steam traps should be used for this purpose. We recommend Cranetilt 3-Valve Lifting Traps to drain oil separators, and either Cranetilt Non-Return Traps or Crane Inverted Open Float Traps to drain steam separators.

Proper size is important: In order to secure maximum efficiency from steam and oil separators, they should be selected on the basis of the amount of steam to be handled and not on existing pipe sizes. Too small a separator means too high a velocity, with a resultant poor separation. Knowing the amount of steam to be handled, the size of separator can be figured from the following formula:

$$C = \frac{A \times B \times 2.4}{V}$$

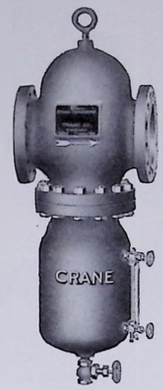
in which C = Area of inlet in square inches
A = Pounds of steam per hour
B = Volume in cubic feet of one pound of steam at the given pressure
V = Velocity in feet per minute

The velocity should be figured as being 7000 feet per minute, maximum.

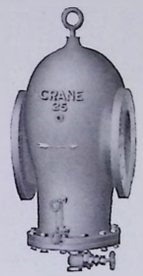
Cast Iron and Ferrosteel

Steam and Oil Separators

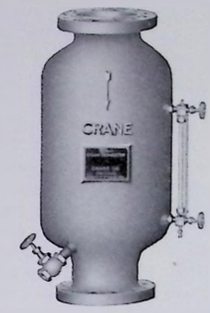
WORKING PRESSURES
No. 03 — 25 pounds
Nos. 07 and 09 — 125 pounds
Nos. 011 and 013 — 250 pounds



Horizontal Steam Separator
No. 07, 125 Pounds
No. 011, 250 Pounds



Horizontal Oil Separator
No. 03, 25 Pounds



Vertical Steam Separator
No. 09, 125 Pounds
No. 013, 250 Pounds

List Prices

Size	Inches	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20
No. 03, Faced and Drilled,	Each											200.00	250.00	325.00	450.00	555.00
No. 07, Faced and Drilled,	Each	24.00	28.00	34.00	42.00	50.00	58.00	76.00	98.00	134.00	170.00	200.00				
No. 09, Faced and Drilled,	Each	24.00	28.00	34.00	42.00	50.00	58.00	76.00	98.00	134.00	170.00	200.00				
No. 011, Faced and Drilled,	Each	26.50	31.00	37.50	46.00	55.00	64.00	84.00	108.00	147.00	187.00	220.00				
No. 013, Faced and Drilled,	Each	26.50	31.00	37.50	46.00	55.00	64.00	84.00	108.00	147.00	187.00	220.00				

List prices include drain valve with nipple, and water gauge. Companion flanges are not furnished, unless ordered, and then at an extra price.

Vertical separators are of the top inlet type. Bottom inlet type separators are made to order only, at a special price.

Service recommendations: No. 03 Oil Separators are designed to remove oil and condensation from the exhaust steam from engines, pumps, etc. Nos. 07 and 011 Horizontal Steam Separators are intended for use in live steam lines, to remove condensation from the steam before it is used in steam-heated apparatus such as cooking kettles, evaporators, heating systems, etc. No. 07 Steam Separators may be used as oil separators, whenever it is necessary to install oil separators smaller than 12-inch. Nos. 09 and 013 Vertical Steam Separators are used to remove condensation from vertical lines with downward flow, such as steam lines to turbines, pumps, etc.

Flange dimensions: The end flange dimensions of No. 03 Oil Separators conform to the American (A.S.A.) 25-Pound Cast Iron Flange Standard, No. B16b-1931. End flanges of Nos. 07 and 09 Steam Separators conform to the American (A.S.A.) 125-Pound Cast Iron Flange Standard, No. B16a-1928. End flanges of the Nos. 011 and 013 Steam Separators conform to the American (A.S.A) 250-Pound Cast Iron Flange Standard, No. B16b-1928.

Drilling: All separators are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the particular standard applying, as listed above. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

Dimensions, in Inches

Size of Separator		1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20
No. 03	Face to face											20	23	25	27	30
	Center to top											23¾	26¼	28½	32½	34¼
	Center to bottom											17½	19¾	22¼	24¼	27½
	Greatest width											27¼	31	33¾	39	42¼
	Size of drain											1½	2	2	2	2½
No. 07 and No. 011	Face to face	10	10	11	12	14	14	16	17	20	23	26				
	Center to top	4	4¾	5½	9½	11	11¼	12¾	15	18	22	26½				
	Center to bottom	17	17	18½	20¼	23	23¼	26¼	28¾	34½	39½	45				
	Greatest width	6⅝	7¾	8¾	9½	11½	12	14¼	16½	21	25	29				
	Size of drain	½	½	¾	1	1	1	1¼	1¼	1¼	1½	1½				
No. 09 and No. 013	Face to face	27	27	27	29	31	31	33	38	41	44	47				
	Greatest diameter	11	10¾	10⅞	12⅜	14	14	15⅞	17⅜	20	23½	27				
	Size of drain	½	½	¾	1	1	1	1¼	1¼	1¼	1½	1½				

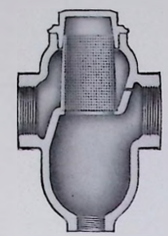
Drilling Templates . . . . pages 370 and 371

Ammonia Oil Separators . . . . page 513

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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Iron Body Sediment Separators

Standard



Cross Section
No. 986

125 pounds steam; 200 pounds cold water, oil, or gas working pressure



No. 986

List Prices and Dimensions

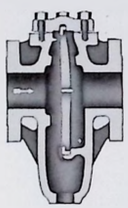
Size	Inches	½	¾	1	1¼	1½	2	2½	3
No. 986, Black	Each	3.20	4.00	5.20	6.40	8.80	13.60	19.00	25.00
No. 986, Galvanized	Each	4.00	5.00	6.50	8.00	11.00	17.00	23.00	31.00
End to end	Inches	3⅛	3¾	4¼	5	5½	6¾	8	9½
Center to top	Inches	1¾	2¼	2⅞	3¼	3¾	5	7	8
Center to bottom	Inches	2⅜	2¾	3⅜	4	4½	5½	7	8½
Size of drain	Inches	½	½	¾	¾	1	1	1¼	1¼

Service recommendation: Dirt and pipe scale in piping conveying steam, water, air, oil, and other fluids are serious trouble makers, frequently cutting the seats and discs of valves and interfering with the operation of automatic devices and machines. Crane Sediment Separators will effectively remove all foreign matter passing through the lines in which they are installed. They not only prevent the passage of such matter but furnish a pocket for its accumulation, from which the matter can be easily blown.

Construction: No. 986 Separators have cast iron bodies and brass screwed caps, in sizes 1½-inch and smaller; 2-inch and larger have bolted iron caps. The strainer element is a brass screen rolled into the form of a frustrum of a cone, one end of which seats in the cap and the other on a machined surface in the bridge wall of the body. The area through the screen is much greater than the area of the pipe size; the screen provides an unrestricted flow to the line fluid even when some of its holes are clogged with foreign matter.

Screens: Unless otherwise ordered, these separators are furnished with screens having perforations .057-inch in diameter (144 holes per square inch) and are then suitable for steam, water, and medium or heavy oils. For air, gas, gasoline, volatile oils, and fuel oils, screens having perforations .033-inch in diameter (324 holes per square inch) will be furnished. When finer perforations are desired, we can furnish .02-inch diameter perforated screens from stock (625 holes per square inch), although screens having any other diameter perforations also can be furnished on special order.

250-Pound



Cross Section
No. 989

250 pounds steam; 400 pounds cold water, oil, or gas working pressure

Features: Crane 250-Pound Sediment Separators, like the Standard, embody the four essential principles of a good separator: arrestment of foreign matter, a pocket for its accumulation, large screen area, and a vertical screen, allowing a large percentage of the heavy particles to drop naturally to the pocket. The strainer element is a flat brass screen supported between the body and cap by a malleable iron grate.



No. 988, Screwed
No. 989, Flanged

List Prices and Dimensions

Size	Inches	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
No. 988	Each	4.00	5.00	6.50	8.00	11.00	17.00	21.00	28.00					
No. 989, Flanged, F. & D.	Each							33.00	43.00	65.00	80.00	125.00	165.00	230.00
End to end, screwed	Inches	3	3½	3½	3¾	4	4½	5⅜	6					
Face to face, flanged	Inches							9¼	10	11	12¼	14¾	17¼	22
Center to top	Inches	2⅛	2⅝	3	3½	3⅞	4¾	5¾	6½	7½	8⅜	10	11¾	15¼
Center to bottom	Inches	3⅛	4	4	4⅝	5¼	6½	8	9¼	10½	11¾	14¼	17	21⅞
Size of drain	Inches	½	¾	¾	1	1	1	1¼	1¼	1¼	1¼	1½	1½	2

Screens: Unless otherwise ordered, these separators are furnished with screens having perforations .057-inch in diameter (144 holes per square inch) and are then suitable for steam, water, and medium or heavy oils. For air, gas, gasoline, volatile oils, and fuel oils, screens having perforations .033-inch in diameter (324 holes per square inch) will be furnished. When finer perforations are desired, we can furnish .02-inch diameter perforated screens from stock (625 holes per square inch), although screens having any other diameter perforations also can be furnished on special order.

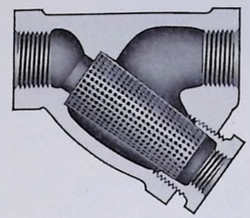
Materials: Sizes 5-inch and larger are made of Ferro-steel and can be used on 250 pounds superheated steam working pressures where the total temperature does not exceed 500° Fahrenheit. Sizes 4-inch and smaller are made of cast iron and should be used only for saturated steam service.

Flange dimensions: The end flange dimensions conform to the American (A.S.A.) 250-Pound Cast Iron Flange Standard, No. B16b-1928. Flanges have a 1/16-inch raised face.

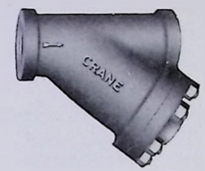
Drilling: Flanged sediment separators are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American 250-Pound Cast Iron Flange Standard. When ordered "faced only", they will be furnished at the same price as for "faced and drilled".

Y-Pattern
Iron Body Sediment Separators

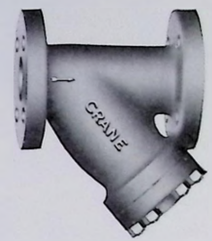
WORKING PRESSURES
Standard
125 pounds steam, 200 pounds cold water, oil, or gas
250-Pound
250 pounds steam, 500 pounds cold water, oil, or gas



Cross Section — No. 988½



No. 988½



No. 989½, Standard
No. 991½, 250-Pound

No. 988½ Sediment Separators in sizes 1½-inch and smaller have screwed caps; in sizes 2-inch and larger, flanged caps are used.

List Prices — Screwed End

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 988½	Each	2.50	2.75	3.00	3.35	3.95	4.20	5.00	16.00	19.00	20.00

List Prices — Flanged End

Size	Inches	2	2½	3	4	5	6	8	10	12
No. 989½, Faced and Drilled	Each	22.00	25.00	27.00	43.00	54.00	65.00	116.00	260.00	300.00
No. 991½, Faced and Drilled	Each	23.00	27.00	30.00	46.50	58.50	68.50	118.00	265.00	310.00

Service recommendations: These sediment separators are used to protect equipment against the ravages of dirt, grit, scale, and all foreign matter, in steam, water, air, oil, and gas lines.

Features: They are simple in construction, easily installed in any pipe line, and can be quickly cleaned of the accumulated foreign matter by merely opening the blow-off valve.

Each sediment separator is composed of a cast iron body having a perforated brass strainer cylinder held in place by a screwed or bolted cap. Sizes 1½-inch and smaller have screwed brass caps, while sizes 2-inch and larger have bolted iron caps. The area through the strainer cylinder is several times larger than the area of the inlet or outlet, thus insuring free flow of the fluid without pressure loss.

Strainer screens: For service on steam, water, medium and heavy oils, screens are made of 20 × 20 mesh having 400 holes per square inch. For service on air, gas, gasoline, light oils and No. 1 to No. 3 Fuel Oils, screens are made of 40 × 40 mesh having 1600 holes per square inch.

Coarser or finer screens, or screens made of steel, monel, or copper can be furnished when so ordered, at a special price.

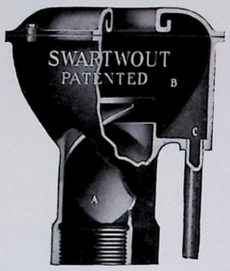
Unless service conditions are specified on the order, 20 × 20 mesh screens will always be furnished.

Flange dimensions: Inlet and outlet flange dimensions on all standard sediment separators conform to the American (A.S.A.) 125-Pound Cast Iron Flange Standard, No. B16a-1928. All inlet and outlet flanges on 250-Pound sediment separators conform to the American (A.S.A.) 250-Pound Cast Iron Flange Standard No. B16b-1928.

Drilling: All flanged sediment separators are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the particular flange standard applying as listed above. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

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Swartwout
Cast Iron Exhaust Heads



Cross Section



Outside View

List Prices and Dimensions

Size Inches	Price Screwed Each	Price Flanged Each	Diameter of Inlet Flange Inches	Greatest Diameter Inches	Over all Height Inches	Size of Drain Inches
1-1¼-1½	25.00			7¾	8⅛	½
2-2½	30.00			9	10	¾
3-3½	35.00			9¾	10¾	¾
4-4½	45.00			11½	11 11/16	1
5	50.00			13⅞	13¼	1
6		60.00	11	16	14⅞	1
8		90.00	13½	18¾	17⅞	1¼
10		115.00	16	23	21¾	2
12		155.00	19	28½	25	2½
14		190.00	21	30½	27	2½
16		230.00	23½	34¼	30½	3
18		300.00	25	38	33⅞	3
20		360.00	27½	41¼	38⅜	3½
24		730.00	32	56½	46	4
30		1400.00	38¾	62	57	4½

Service recommendations: The purpose of the Swartwout Cast Iron Exhaust Head is to remove the water and oil from exhaust steam discharging to atmosphere. If exhausted direct from the exhaust pipe, this water will rot the roof and side walls of a building in warm weather, while in cold weather it will form ice.

Features: The fundamental feature of the Swartwout Exhaust Head is that it does not interrupt or slow down the flow of steam, nor cause any appreciable back pressure. At the same time the oil and water are removed and nothing but dry steam passes out into the atmosphere.

Construction: The importance of this unusual combination is apparent to any man who has employed the common type of exhaust head which attempts to secure separation by the forcible impact of the vapor against opposing baffle plates—in other words, by stopping the vapor so suddenly as to "jolt" the liquid particles out of the flow, a method which by its very nature must develop back pressure.

Centrifugal force—one of Nature's simplest laws—is applied in the Swartwout to remove the oil and water without changing the direct flow of the steam. This is accomplished by inserting a helix of the proper pitch in the neck of the Exhaust Head, and then so proportioning the body of the head that it will collect and discharge the water and oil thus separated.

While built of cast iron, it is light in weight, ornamental and will not rust. It will usually outlast the building on which it is placed. Once in position, there is no further cost for replacement, unless, in expanding the plant, it becomes necessary to replace it with a larger head. In such case the old Swartwout will still be in such good condition that it has a high salvage value.

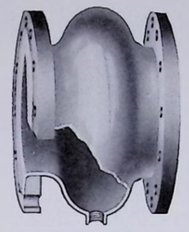
Flange dimensions: End flanges conform to the 25-Pound American Tentative Cast Iron Flange Standard (B16b2-1931).

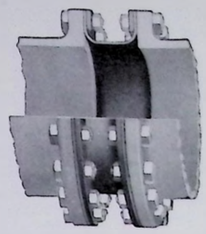
Drilling: Flanged Exhaust Heads are regularly furnished faced and drilled unless ordered faced only. List prices include facing and drilling to the 25-Pound American Tentative Cast Iron Flange Standard. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

Drilling templates....page 370

Low Pressure
Copper Expansion Joints

WORKING PRESSURE
No. 411 — 0 to 15 pounds steam
No. 412 — Vacuum service only


No. 411


No. 412

List Prices and Dimensions

Size Inches	Price No. 411 F. & D. Each	Price No. 412 F. & D. Each	Face to Face No. 411 Inches	Face to Face No. 412 Inches	Diameter of Flanges and Rings Nos. 411 and 412 Inches	Thickness of Flanges No. 411 Inches	Thickness of Rings No. 412 Inches	Size of Drain No. 411 Inches
4	110.00	110.00	8	5½	9	¾	⅜	½
5	125.00	125.00	9	5½	10	¾	⅜	½
6	140.00	140.00	9	6	11	¾	7/16	½
8	170.00	170.00	10	6	13½	¾	7/16	½
10	200.00	200.00	11	6	16	⅞	½	¾
12	225.00	225.00	11	6	19	1	½	¾
14	250.00	250.00	12	6	21	1⅛	½	¾
16	300.00	300.00	12	6	23½	1⅛	½	1
18	350.00	350.00	13	6½	25	1¼	⅝	1
20	400.00	400.00	13	6½	27½	1¼	⅝	1¼
24	500.00	500.00	14	7	32	1⅜	¾	1¼
30	725.00	725.00	16	8½	38¾	1½	⅞	1½
36	950.00	950.00	17	8½	46	1⅝	1	1½
42	1200.00	1200.00	19	9	53	1¾	1⅛	2
48	1500.00	1500.00	20	9	59½	2	1¼	2

Service recommendations: These low pressure expansion joints are designed for use in the exhaust steam lines from engines, turbines, pumps, etc. They should not be used when the expansion to be taken care of is greater than ¼ inch.

No. 411 Expansion Joints should be used when the pressure is above atmospheric but not exceeding 15 pounds. These joints should never be used on vacuum service because of the danger of collapsing the copper shell.

No. 412 Expansion Joints are designed particularly for vacuum service and should not be used for other conditions.

Installation: These expansion joints may be used in either the horizontal or vertical position. Pipe lines containing them must be carefully anchored in order to force the joints to compensate for the expansion and contraction in the piping. Piping should be properly supported to relieve the expansion joints of the necessity of carrying any great weight.

Expansion joints of this type should always be cold sprung ⅛ inch upon installation in order to relieve them of excessive strains when the line is put into service.

Flanges: End flanges of No. 411 Expansion Joints are swivel type, made of steel, to the dimensions of the 25-Pound American Tentative Cast Iron Flange Standard (B16b2-1931).

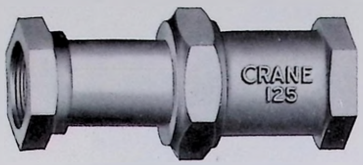
End flanges of the No. 412 Expansion Joints are light split steel rings of the same diameter as the 25-Pound American Cast Iron Flanges, but considerably thinner. Bolts for these joints are shorter than those used with regular 25-pound flanges.

No. 412 Expansion Joints are not suitable for use with raised face or Cranelap flanges, because tight joints cannot be made against such flanges. Flat faced flanges with full face gaskets should always be used.

Drilling: Flanges of these expansion joints are always furnished faced and drilled (F. & D.). List prices include facing and drilling to 25-Pound American Tentative Cast Iron Flange Standard.

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Standard Brass Expansion Joints



Semi-guided
No. 404, Standard Traverse
No. 406, Special Traverse

WORKING PRESSURES
125 pounds steam
200 pounds cold water, oil, or gas

List Prices and Dimensions

Size		Inches	½	¾	1	1¼	1½	2	2½	3
No. 404 Standard Traverse	Price	Each	1.50	2.20	3.00	4.00	5.00	8.00	14.00	21.00
	Traverse	Inches	2	2¼	2¼	2¼	2¼	2½	2½	2¾
	End to end, open	Inches	6⅜	7¼	7⅜	7⅜	7⅝	8⅜	9⅛	10⅜
No. 406 Special Traverse	4-inch traverse	Each	3.30	4.00	4.90	6.15	7.40	11.00	17.50	25.00
	6-inch traverse	Each		5.00	6.00	7.50	9.00	13.00	20.50	29.00
	8-inch traverse	Each		6.00	7.25	9.00	10.75	15.25	23.00	32.00
	12-inch traverse	Each		8.00	9.50	12.00	14.50	19.50	28.00	37.50

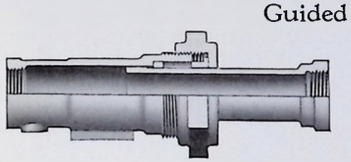
To find the over-all length of special traverse joints, take the over-all length of the standard traverse joint of the same size and add twice the difference between the special traverse and the standard traverse.

Service recommendations: Crane brass semi-guided expansion joints are chiefly used in interior piping work, on steam and hot water heating lines, domestic hot water heating lines, and for air, oil, and gas service.

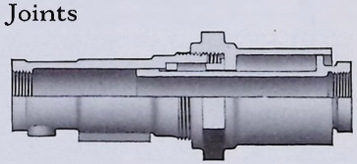
Features: They are of sturdy construction and are well proportioned throughout. A large packing nut with ample space for packing is provided.

Packing: Expansion Joints are regularly furnished without packing in the stuffing boxes, unless specifically ordered packed, in which case an extra charge is made. Orders for packed joints must specify the kind of packing wanted, or give complete information on the fluid to be handled.

Guided Type Brass Expansion Joints



Adsco Internally Guided



Adsco Internally-Externally Guided

The above Adsco guided expansion joints are of all bronze construction with screwed ends and are designed for 125 pounds saturated steam working pressure and 200 pounds cold water, oil, or gas. The internal guide feature assures straight movement of the sleeve. The external guide provides additional support for the sleeve and protects this member from the accumulation of dirt which might scratch the polished surface and score the packing. Inward and outward limit stops prevent disengagement of the body and sleeve. Additional information and prices may be had on application.

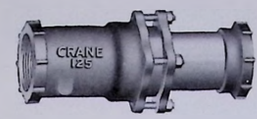
Expansion in Pipe Lines

The expansion for any length of pipe may be found by the following method:—from the table below, obtain the difference in increased length at the minimum and maximum temperatures, divide this result by 100 to obtain the increase in length per foot, and multiply by the length of the line in feet.

Inches of Linear Expansion per 100 feet

Temp. Degrees F.	Steel	Wro't Iron	Brass and Copper	Temp. Degrees F.	Steel	Wro't Iron	Brass and Copper	Temp. Degrees F.	Steel	Wro't Iron	Brass and Copper	Temp. Degrees F.	Steel	Wro't Iron
0	0	0	0	200	1.57	1.64	2.43	400	3.29	3.43	5.14	600	5.17	5.38
20	.15	.155	.25	220	1.73	1.81	2.71	420	3.465	3.62	5.45	620	5.365	5.58
40	.30	.31	.45	240	1.89	1.98	2.97	440	3.65	3.805	5.73	640	5.565	5.785
60	.455	.475	.67	260	2.065	2.16	3.22	460	3.835	4.00	5.96	660	5.765	5.99
80	.61	.63	.92	280	2.23	2.335	3.47	480	4.02	4.19	6.25	680	5.965	6.20
100	.77	.80	1.17	300	2.41	2.52	3.76	500	4.21	4.39	6.55	700	6.17	6.42
120	.915	.96	1.41	320	2.59	2.70	4.07	520	4.39	4.58		720	6.375	6.625
140	1.075	1.13	1.69	340	2.76	2.87	4.30	540	4.59	4.78		740	6.58	6.835
160	1.235	1.29	1.91	360	2.935	3.05	4.58	560	4.78	4.975		760	6.79	7.05
180	1.40	1.46	2.15	380	3.11	3.235	4.85	580	4.975	5.175		780	6.99	7.275

Standard Iron Body Expansion Joints



No. 398, Standard Traverse
No. 400, Special Traverse

WORKING PRESSURES
125 pounds steam
200 pounds cold water, oil, or gas

All screwed end joints have brass sleeves. Flanged end joints 6-inch and smaller have brass sleeves; 8-inch and larger have steel sleeves chromium plated.



No. 401, Standard Traverse
No. 403, Special Traverse

List Prices and Dimensions — Screwed

	No. 398			No. 400			
Size	Price Each	Traverse Inches	End to End Opened Inches	4-inch Traverse Price Each	6-inch Traverse Price Each	8-inch Traverse Price Each	12-inch Traverse Price Each
1½	6.25	2½	13¾	7.25	9.50	11.75	16.25
2	7.00	2½	13¾	8.50	11.00	13.50	18.50
2½	8.00	2½	14½	10.00	13.00	16.00	22.00
3	10.00	2¾	15¼	13.50	17.50	21.50	29.50
3½	14.00	3	17¼	20.00	25.00	30.00	40.00
4	18.00	3¼	18⅛	24.00	30.00	36.00	48.00
5	38.00	4	19¾		45.00	52.00	66.00
6	42.50	4	21½		51.50	60.50	78.50
8	90.00	4	22½		100.00	110.00	130.00

List Prices and Dimensions — Flanged

	No. 401, Faced and Drilled			No. 403, Faced and Drilled			
Size	Price Each	Traverse Inches	Face to Face Opened Inches	4-inch Traverse Price Each	6-inch Traverse Price Each	8-inch Traverse Price Each	12-inch Traverse Price Each
1½	13.75	2½	13⅜	14.00	16.25	18.50	23.00
2	15.00	2½	12⅛	15.50	18.00	20.50	25.50
2½	16.00	2½	12¼	17.00	20.00	23.00	29.00
3	18.50	2¾	13	21.00	25.00	29.00	37.00
3½	25.00	3	15	30.00	35.00	40.00	50.00
4	30.00	3¼	15¾	34.00	40.00	46.00	58.00
5	48.00	4	17½		55.00	62.00	76.00
6	55.00	4	19⅛		63.00	71.00	87.00
8	90.00	4	19¾		100.00	110.00	130.00
10	135.00	4	21¾			157.00	179.00
12	190.00	4	23⅝			214.00	238.00
14	263.00	4	24			291.00	319.00
16	334.00	4	26½			368.00	402.00

To find the over-all length of special traverse joints take the over-all length of the standard traverse joint of the same size and add twice the difference between the special traverse and the standard traverse.

Construction: These Semi-guided expansion joints are well proportioned throughout and are made of high quality materials. The stuffing boxes are of ample size; bolted packing glands insure a uniform application of pressure on the packing, and are carefully machined to guide the sleeves.

All-Iron Expansion Joints will be furnished with steel sleeves, chromium plated, unless otherwise specified. Prices on application.

When required these joints can be furnished with anchor bases which will be drilled with four bolt holes, also service outlets which will be screwed in sizes 14-inch and smaller and flanged in the 16-inch size. Prices on application.

Packing: Expansion Joints are regularly furnished without packing in the stuffing boxes, unless specifically ordered packed, in which case an extra charge is made. Orders for packed joints must specify the kind of packing wanted, or give complete information on the fluid to be handled.

Flange dimensions: End flanges conform to the American (A.S.A.) 125-Pound Cast Iron Flange Standard, No. B16a-1928.

Drilling: Expansion Joints are regularly furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American 125-Pound Cast Iron Flange Standard. When ordered "faced only" they will be furnished at the same price as for "faced and drilled".

Guided Expansion Joints: For illustrations and description on Guided Expansion Joints refer to pages 438 and 439.

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 237 of 402
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asbestosclaims.law/library/21275/237

Adsco Iron Body Expansion Joints

Adsco Expansion Joints, in both standard and extra heavy pattern, are available in six distinctive types—Tie Rod, Internally guided, Externally-Internally guided, Duplex Sleeve, Piston Ring, and Packless U-Ring type.

Working pressure: Standard weight expansion joints are suitable for 125 pounds saturated steam working pressure and 200 pounds cold water, oil, or gas.

Extra heavy expansion joints are suitable for 250 pounds saturated steam working pressure and 400 pounds cold water, oil, or gas.

Bodies: All bodies are made of Semi-Steel. The body design provides a recess in which sediment may accumulate without coming in contact with the sleeve or guiding surface.

Sleeves: Sleeves are made from machined and polished brass in all joints 6-inch and smaller, and from steel chromium plated in all joints 8-inch and larger.

Stuffing box: Stuffing boxes are amply deep and properly proportioned to hold sufficient packing to insure tight joints with a minimum of repacking.

Packing: All expansion joints are regularly furnished without packing in the stuffing boxes, unless specifically ordered packed. When packed joints are ordered, and no preference is expressed as to the kind of packing, suitable packing will be furnished upon receipt of complete information on the nature of the fluid to be handled, its pressure and its temperature.

Packing Glands: The packing glands are of heavy, semi-steel construction. They are accurately machined. The long lip permits compressing the packing to 50 per cent of its original depth.

Gland studs: The packing gland studs are made of non-corrosive metal to prevent freezing, are firmly embedded in the bodies, and are of sufficient size to give rigidity to the packing glands.

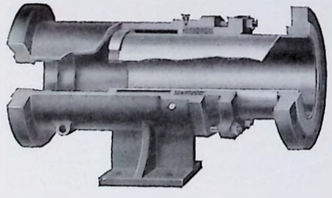
Service outlets: All expansion joints having service outlets are so designed that the sleeves cannot obstruct the opening. Outlets are provided on both sides of the joint for convenience in arranging the piping.

Anchor bases: Anchor bases are attached to the bodies by heavy webs of ample cross section to withstand the severest strains. They are drilled with four bolt holes.

Traverse: The standard traverse of the sleeves is four inches. Additional traverse is available in multiples of 4 inches from 4 to 12 inch.

Drain: All expansion joints are provided with a boss located on the under side of the body, which may be tapped for drip piping when so desired.

Internally Guided Expansion Joints



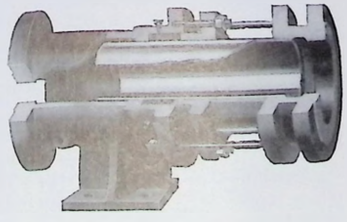
In this type of joint, the sleeve is guided by a wide metal ring screwed on the inner end of the sleeve. The guide ring also acts as a positive stop to limit the outward travel of the sleeve. The entire inner surface of the body on which the guide ring slides is carefully and accurately machined to provide perfect guiding. These expansion joints may be supplied in either single or double types, with or without anchor bases and service outlets.

Sleeves on all joints 6-inch and smaller are lapped and fitted with semi-steel swivel flanges. On joints 8-inch and larger, the flanges are screwed or welded to the sleeves.

The dimensions of the end flanges of standard joints conform to the American 125-Pound Cast Iron Flange Standard. On extra heavy joints, the flanges conform to the American 250-Pound Cast Iron Flange Standard.

Tie Rod Type Expansion Joints

This type of joint is similar to the ordinary semi-guided type as far as the guiding of the sleeve is concerned, but is provided with tie rods to limit the outward travel of the sleeve. The tie rods do not guide the sleeve and therefore this type of joint should not be used when a fully guided joint is required.



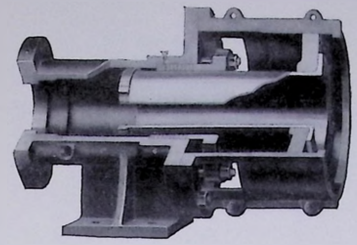
Sleeves on all joints 6-inch and larger are lapped and fitted with a special spool which serves as a base flange into which the tie rods are screwed, and also as a fitting to which the pipe line is connected. On joints 8-inch and larger, this spool is screwed on to the sleeve. Tie rod type expansion joints may be furnished in single or double types, with or without anchor bases and service outlets.

End flange dimensions of standard joints conform to the American 125-Pound Cast Iron Flange Standard. On extra heavy joints, these flanges conform to the American 250-Pound Cast Iron Flange Standard.

Prices on Application

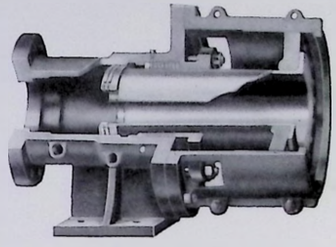
Adsco Iron Body Expansion Joints

Internally-Externally Guided Expansion Joints



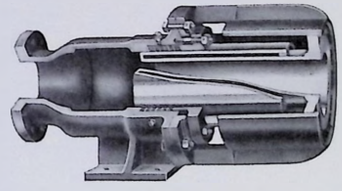
These joints are provided with a heavy cylindrical hood which guides the sleeve throughout its travel. This external guide is built in two halves to provide easy access to the packing gland and to reduce the size of manholes in underground construction. An internal guide such as described under "Internally Guided Expansion Joints" is attached to the inner end of the sleeve. These expansion joints may be furnished in single or double types, with or without anchor bases and service outlets.

Piston Ring Expansion Joints



These joints have an external guide of the split type similar to regular internally-externally guided joints, but in addition, a guide ring with grooves for piston rings is attached to the inner end of the sleeve. Between the guide ring and the packing space is a relief chamber with an external vent connection. When repacking the joint, a valve in the vent piping is opened and pressure between guide ring and stuffing box is relieved through the vent. When in operation, pressure on both sides of guide ring is the same, but with vent open, the piston rings hold back the steam and what little passes the rings is exhausted through the vent. This design permits removing the packing gland to repack the joint without shutting down the line. These joints may be furnished in single or double types, with or without anchor bases.

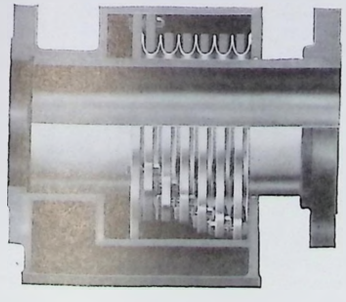
Duplex Sleeve Expansion Joints



These patented joints are specifically designed for high pressure and high temperature service. Guiding is accomplished by an external guide provided with a limit stop to prevent the sleeve from pulling out of the body. A relief in the lip at the bottom of the guide prevents the accumulation of sediment. The sleeves are radically different than employed in the conventional type joint, in that this member consists of an inner and outer sleeve welded together on the inner end forming an annular space between them. This space is open at the outer end to allow the free circulation of air, and consequently the outer sleeve, which bears against the packing, is kept at a lower temperature than the inner sleeve which is in contact with the steam. As heat is responsible for packing deterioration, this air insulated sleeve greatly prolongs the life of the packing.

These expansion joints are made only in the extra heavy pattern and of the single type. They can be supplied with one bottom anchor or with two side anchors.

Packless Expansion Joints



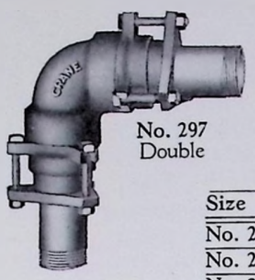
These patented joints are particularly adaptable to underground steam lines in conduits or tunnels where manholes cannot be used; to building or power plant piping in inaccessible locations, and in general to any service where space is limited. The expansion element consists of a series of stainless steel seamless U-Rings welded together. Each unit is fitted with a traverse control ring which limits the amount of movement. Limit stop-bolts combine with the control rings to distribute predetermined movement of the element. The expansion element is mounted on a chromium plated steel sleeve extending the length of the joint and is completely housed in a wrought or cast steel case. The sleeve is guided at both ends and in the body throughout the full traverse. A snap ring is mounted in the end plate of the body to prevent serious leakage of steam should the element be ruptured from any cause.

Anchor bases are provided where required for mounting to structural steel or concrete base and are drilled with four holes.

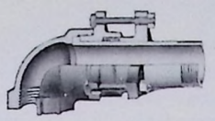
Prices on Application

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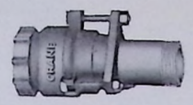
Iron Body Swing Joints
for Gasoline



No. 297
Double



No. 295, Single



No. 299, Straight

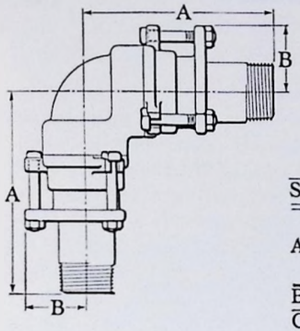
List Prices

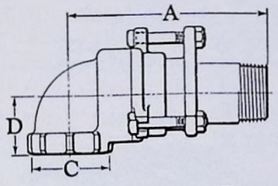
Size	Inches	2	2½	3	4
No. 295, Single	Each	13.00	17.00	24.00	40.00
No. 297, Double	Each	21.00	26.50	37.00	65.00
No. 299, Straight	Each	13.00	17.00	24.00	40.00

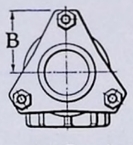
Service recommendations: These swing joints have been primarily designed for gasoline service and are used to make adjustable connections to tanks, tank cars, barges, docks, loading and unloading racks, etc. When equipped with suitable packing they may be used for cold water, oil, or gas.

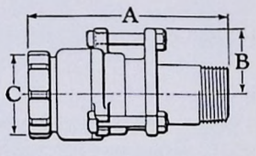
Features: These joints differ from ordinary swing joints in several important respects. In the first place, they are made with a shoulder on the inner end of the sleeve which engages with the end piece of the body and prevents the sleeve from pulling out when in service. In the second place, the load on the sleeve is carried back to the body itself and does not rest on the packing. This feature combined with the unusually deep stuffing box and the three-bolt gland results in real leak-free service.

Materials: The bodies of these swing joints are made of cast iron, while the sleeves are of brass tubing. Ends of the sleeves are equipped with iron pipe size male threads.







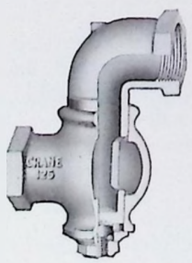


Dimensions, in Inches

Size		Inches	2	2½	3	4
A	Single	Inches	8⅜	9 9/16	10⅝	12¼
	Double	Inches	8½	9¾	10⅞	12½
	Straight	Inches	8¼	9⅜	10 5/16	11½
B		Inches	2¾	3⅛	3 9/16	4 5/16
C		Inches	3⅜	3 15/16	4⅝	5⅞
D		Inches	2 5/16	2 11/16	3⅛	3¾

Brass Swing Joints

WORKING PRESSURE — 125 pounds cold water, oil, or gas



No. 300

List Prices and Dimensions

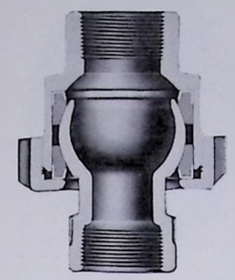
Size	Inches	¼	⅜	½	¾	1
No. 300	Each	1.90	2.20	2.50	3.50	5.00
No. 300, Finished	Each	2.40	2.70	3.00	4.00	5.75
Center to end	Inches	15/16	1 1/16	1⅜	1¾	2 1/16
Center to center of pipe	Inches	1⅛	1 5/16	1¾	2¼	2⅞

Service recommendations: These swing joints are designed for use in making up adjustable connections in piping to tanks and other apparatus where permanently fixed connections cannot be made.

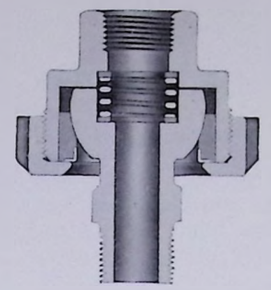
Construction: Basically, these joints consist only of a body and a hollow ell-shaped plug which is held into the body by a nut and washer. Both body and plug are tapped with iron pipe size connections. The joint operates in a manner similar to an ordinary plug cock, both body and plug being carefully ground together to insure maximum ease of operation. Ports in the plug and the passageway in the body are so designed that free flow of the fluid being handled is insured, and there is no restriction of port areas regardless of the angle at which the plug is turned. No packing is used in these joints.

Materials: All parts of these swing joints are made of brass to eliminate any possibility of corrosion binding the plugs.

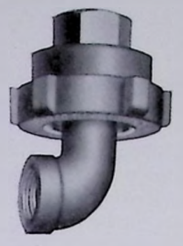
Barco Flexible Ball and Swivel Joints



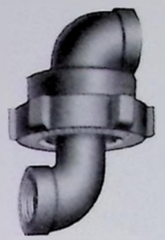
Cross Section, Style 7–8
Flexible Ball Joint



Cross Section, Style 7S–8CS
Swivel Joint



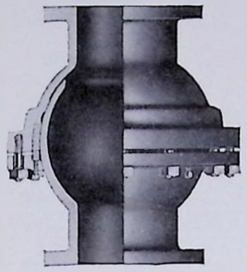
Style 7–8B
Flexible Ball Joint
Style 7S–8BS
Swivel Joint



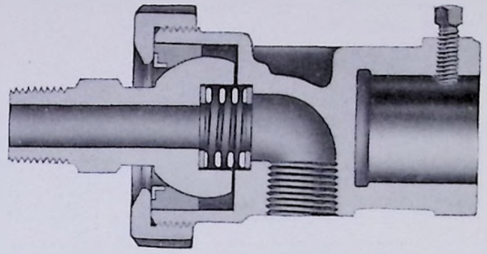
Style 7A–8B
Flexible Ball Joint
Style 7AS–8BS
Swivel Joint

With Male Straight Ball
(Not Illustrated)
Style 7A–8C
Flexible Ball Joint
Style 7AS–8CS
Swivel Joint

With Female Straight Ball
(Not Illustrated)
Style 7A–8
Flexible Ball Joint



Flexible Ball Joint
Flanged End
Style 7F
With 125-Pound
American Standard
Flanges



Swivel Joint with Socket End
For Use on Pressing Machines
Style 7KS–8CS (Illustrated)
Style 7KS–8BS
With Female 90° Angle Ball (Not Illustrated)

Flexible Ball Joints are available in many additional styles: combination screwed and flanged end; male both ends; male end on casing; 45° angle ball end; etc.

List Prices, Each — Standard Pattern

Size	Flexible Ball Joints							Swivel Joints				
Inches	Style 7–8	Style 7F F. & D.	Style 7–8B	Style 7A–8	Style 7A–8B	Style 7A–8C	*Angular Movement	Style 7S–8CS	Style 7S–8BS or 7AS–8CS	Style 7AS–8BS	Style 7KS–8BS	Style 7KS–8CS
¼	15.00		16.00	16.00	17.00		37½°	15.00	16.00	17.00		
⅜	15.00		16.00	16.00	17.00	16.00	37½°	15.00	16.00	17.00	18.00	17.00
½	15.00		16.00	16.00	17.00	16.00	37½°	15.00	16.00	17.00	18.00	17.00
¾	17.60		18.60	18.60	20.00	18.60	34°	17.60	18.60	20.00		
1	19.80		20.80	20.80	22.50	20.80	35½°	19.80	20.80	22.50		
1¼	24.60		25.60	25.60	27.60	25.60	28½°	24.60	25.60	27.60		
1½	28.00		29.00	29.00	31.00	29.00	30°					
2	35.00		39.00	39.00	40.40	39.00	28½°					
2½	42.00		46.00	46.00	48.00	46.00	27½°					
3	55.00		64.00	64.00	73.00		33°					
4	92.40	132.50	107.50	107.50	122.60		28½°					
5	137.20	154.00		146.60			30°					
6	156.80	176.00		169.00			31°					
8		275.20	Style 7F in sizes larger than 12-inch are made to order.				60°					
10		370.00					40°					
12		461.50	*Total Safe Angular Movement				40°					

When ordering Style 7KS–8BS or Style 7KS–8CS Swivel Joints, be sure to specify the diameter of the shaft on the pressing machine. The socket can be reamed to fit any size shaft from 1 to 1½ inches diameter.

Flexible Ball Joints: Flexible Ball Joints provide for a substantial angular movement and, in addition, can be swiveled through an angle of 360 degrees. They are tight seating and may be used on steam, water, oil, air, gasoline, tar, and other similar fluids. Sizes 3-inch and smaller are recommended for 300 pounds steam working pressure, and sizes 4 to 6-inch, for 125 pounds steam.

Sizes 3-inch and smaller are malleable iron; larger sizes are semi-steel. Extra heavy joints or brass joints sizes ¼ to 2-inch can be furnished when ordered, at an advance in price.

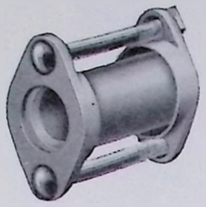
Swivel Joints: Swivel Joints are spring seated, assuring tightness on both pressure and suction lines. They are particularly well suited for service where the pressure fluctuates or where the temperature varies, as when steam and cold water are used alternately. All sizes are recommended for 300 pounds steam working pressure.

Swivel Joints have a malleable iron casing, a bronze ball end, a stainless steel spring, and a hard, non-metallic gasket. Extra heavy joints for higher pressures or brass joints can be furnished when ordered, at an advance in price.

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Dayton Couplings

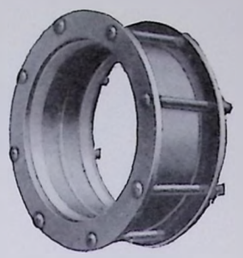
Malleable Iron and Steel



No. 1
Sizes ½ to 2-inch

For connecting plain end pipe on gas, water, air, or oil lines.

A simple and sturdy coupling which provides a tight joint and at the same time affords flexibility to take care of vibration, expansion, and contraction. These couplings are regularly furnished plain, not coated, or can be painted or completely plated. Rubber gaskets furnished regularly are suitable for water, air, or natural gas service.



No. 1
Sizes 2 to 24-inch

Special gaskets, with lead or duck tips and asbestos for service on condensates or oils, are available. Couplings other than those shown above include cast iron pipe sizes, special fittings, and extra long sleeves to provide or allow for unusual expansion.

Prices on application

Number of Bolts, Dimensions in Inches and Weight in Pounds

Size	Inches	½	¾	1	1¼	1½	2	2	2½	2¾	3	3
O.D. of pipe	Inches	.840	1.050	1.315	1.660	1.900	2.375	2.375	2.875	3.000	3.500	3.500
Thickness and length of centers	Inches	.134x5	.125x5	.148x5	.156x5	.168x5	.180x5	.180x5	.232x5	.232x5	.230x5	.230x7
Number of bolts		2	2	2	2	2	2	3	3	3	4	4
Size of bolts	Inches	⅜x6½	½x6¾	½x6¾	½x6¾	½x6¾	⅝x7	⅝x7	⅝x7	⅝x7	⅝x7	⅝x9
Weight in pounds		2	2¾	3¼	3¾	4¼	6¾	8½	10	10	13	15
Size	Inches	3½	4	4	4½	4½	4¾	4¾	5	5	5⅝	5⅝
O.D. of pipe	Inches	4.000	4.500	4.500	5.000	5.000	5.250	5.250	5.500	5.500	6.000	6.000
Thickness and length of centers	Inches	.230x5	¼x5	.237x7	¼x5	5/16x7	¼x5	5/16x7	¼x5	5/16x7	¼x5	¼x7
Number of bolts		4	4	4	4	4	4	4	4	4	4	4
Size of bolts	Inches	⅝x7	⅝x7	⅝x9	⅝x7½	⅝x10	⅝x7½	⅝x10	⅝x7½	⅝x10	⅝x8	⅝x10
Weight in pounds		13½	19	20	15	23	18	24	20	25	22	25
Size	Inches	5⅝	6	6	6	6⅝	6⅝	6⅝	7⅝	7⅝	7⅝	8
O.D. of pipe	Inches	6.000	6.625	6.625	6.625	7.000	7.000	7.000	8.000	8.000	8.000	8.625
Thickness and length of centers	Inches	5/16x7	¼x5	¼x7	5/16x7	¼x5	¼x7	5/16x7	¼x5	¼x7	5/16x7	¼x5
Number of bolts		4	6	6	6	6	6	6	6	6	6	6
Size of bolts	Inches	⅝x10	⅝x8	⅝x10	⅝x10	⅝x8	⅝x10	⅝x10	⅝x8	⅝x10	⅝x10	⅝x8
Weight in pounds		27	25	29	31½	26	31	33	28½	34	37	30½
Size	Inches	8	8	8	9⅝	9⅝	9⅝	10	10	10	10	11⅝
O.D. of pipe	Inches	8.625	8.625	8.625	10.000	10.000	10.000	10.750	10.750	10.750	10.750	12.000
Thickness and length of centers	Inches	5/16x5	¼x7	5/16x7	¼x5	¼x7	5/16x7	¼x5	5/16x5	¼x7	5/16x7	¼x5
Number of bolts		6	6	6	8	8	8	8	8	8	8	8
Size of bolts	Inches	⅝x8	⅝x10	⅝x10	⅝x8½	⅝x10½	⅝x10½	⅝x8½	⅝x8½	⅝x10½	⅝x10½	⅝x8½
Weight in pounds		33	35	37	43	47½	52½	45½	48¾	52	56½	50
Size	Inches	11⅝	11⅝	12	12	12	12	12½	14 O.D.	14 O.D.	14 O.D.	16 O.D.
O.D. of pipe	Inches	12.000	12.000	12.750	12.750	12.750	12.750	13.000	14.000	14.000	14.000	16.000
Thickness and length of centers	Inches	¼x7	5/16x7	¼x5	5/16x5	¼x7	5/16x7	¼x5	¼x5	¼x7	5/16x7	¼x7
Number of bolts		8	8	8	8	8	8	8	10	10	10	10
Size of bolts	Inches	⅝x10½	⅝x10½	⅝x8½	⅝x8½	⅝x10½	⅝x10½	⅝x8½	⅝x8½	⅝x10½	⅝x10½	⅝x10½
Weight in pounds		56	61	52½	56	60½	64½	52½	58	66	72	70
Size	Inches				16 O.D.	16 O.D.	18 O.D.	18 O.D.	20 O.D.	20 O.D.	22 O.D.	24 O.D.
O.D. of Pipe	Inches				16.000	16.000	18.000	18.000	20.000	20.000	22.000	24.000
Thickness and length of centers	Inches				5/16x7	⅜x7	5/16x7	⅜x7	5/16x7	⅜x7	⅜x7	⅜x7
Number of bolts					10	10	10	10	12	12	14	14
Size of bolts	Inches				⅝x10½	⅝x10½	⅝x10½	⅝x10½	⅝x10½	⅝x10½	⅝x10½	⅝x10½
Weight in pounds					79	85½	97½	105½	110	117	142	152

Dayton No. 1 Couplings: Couplings 4 inches and larger are furnished with pipe stops rolled in centers, which can be removed at small additional cost.

Specifications: All couplings are furnished with steel centers. Sizes ½ to 5-inch have malleable iron flanges; sizes 5⅝ to 24-inch have steel flanges.

Dayton Light Type Couplings: A limited number of sizes are available with shorter centers and of lighter construction for use on low pressure, thin walled pipe.

Dayton Boltless Couplings: Dayton Boltless Couplings are constructed entirely of malleable iron in sizes ¾ to 2-inch, with 3 and 5-inch centers, using regular types of gaskets.

Cast Iron Water Columns



No. 640
Water Column

WORKING PRESSURES

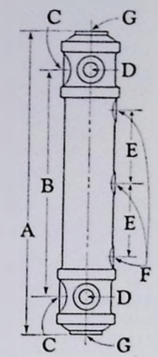
For code installations — **100** pounds steam
For non-code installations — **125** pounds steam

The No. 2, No. 3, and No. 4 sizes comply with the A.S.M.E. Boiler Construction Code (Power Boiler Section), as approved by the Council of the American Society of Mechanical Engineers, August 2, 1934, for pressures up to 100 pounds.

When used on non-code installations, all sizes are recommended for 125 pounds steam working pressure.

These Water Columns can be used either on the right hand or the left hand side of the boiler.

Water Columns are furnished without trimmings unless otherwise ordered.



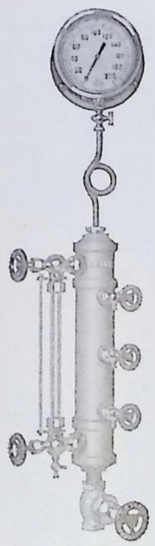
List Prices and Dimensions

Size Number			1	2	3	4
No. 640, Tapped and Painted (Without Trimmings)		Each	2.75	4.00	6.00	8.00
Dimensions in Inches	A — Length over all		13⅜	16¾	18⅞	23⅝
	B — Center to center of boiler and water gauge connections		10	12½	14	18
	C — Size of boiler connections		½	1	1	1¼
	D — Size of water gauge connections		½	½	¾	¾
	E — Center to center of try cock connections		3⅜	3¾	4½	4
	Number of try cock connections		2	3	3	3
	F — Size of try cock connections		⅜	½	½	¾
	G — Size of steam gauge and drain valve connections		½	*¾	1	1¼

*No. 2 size can be tapped with 1-inch steam gauge and drain valve connections when so ordered, at a special price

Trimmings for Water Columns

When trimmings are required for Water Columns, those shown in the following table are recommended. Prices of Water Columns complete with Trimmings are furnished on application. Orders and inquiries must specify the pressure classification, whether for code or non-code installation, and whether the Column is to be installed on the right hand or left hand side of the boiler.



No. 640
Water Column
Complete
With Trimmings

Size Number of Water Column			*1	2	3	4
Basic Trimmings All pressures Code or Non-Code	Iron Case Steam Gauge, Bourdon Spring		*5" dia.	5" dia.	6" dia.	6" dia.
	Brass Gauge Cock, No. 712	Brass or Iron, as ordered	*¼"	¼"	¼"	¼"
	Syphon for Steam Gauge		*¼"	¼"	¼"	¼"
	Bushing for Syphon		*½ x ¼"	¾ x ¼"	1 x ¼"	1¼ x ¼"
	Bushing for Drain Valve		None required		1 x ¾"	1¼ x ¾"
	Nipple for Drain Valve		*½ x 1½"	¾ x 2"	¾ x 2"	¾ x 2"
Additional Trimmings For pressures up to 100 pounds Code or Non-Code	Try Cocks, Code or Non-code		*2 – ⅜" No. 730	3 – ½" No. 730	3 – ½" No. 730	3 – ¾" No. 734
	Water Gauge	Code		½" No. 610 12½" centers	¾" No. 610 14" centers	¾" No. 610 18" centers
		Non-code	½" No. 624 10" centers	½" No. 624 12½" centers		
	Globe Valve for Drain Code or Non-code		*½" No. 14 P	¾" No. 14 P	¾" No. 14 P	¾" No. 14 P
Additional Trimmings For pressures from 101 to 125 pounds Non-Code Only	Try Cocks		2 – ⅜" No. 730	3 – ½" No. 730	3 – ½" No. 730	3 – ¾" No. 734
	Water Gauge		½" No. 610 10" centers	½" No. 610 12½" centers	¾" No. 610 14" centers	¾" No. 610 18" centers
	Globe Valve for Drain		½" No. 14 P	¾" No. 14 P	¾" No. 14 P	¾" No. 14 P

*The No. 1 size Water Column does not comply with the A.S.M.E. Code.

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Gauges

Pressure, Vacuum, and Compound Gauges

Single Bourdon Spring Pressed Steel Case



Pressure Gauge

Mounted in oven baked black enameled case with close fitting ring. Dials have dead black numerals on white background. Independent movement construction.



Vacuum Gauge

Graduated against the mercury column and guaranteed accurate. Standard dial graduation, 0 to 30 inches vacuum.



Compound Gauge

For indication of both pressure and vacuum. Standard dial graduations are as follows: 0-30". Vacuum and pressure reading to 15 lbs., 30 lbs., 60 lbs., 120 lbs. or 200 lbs.

List Prices

Pressure or Vacuum Gauges		Brass Ring	N. P. Ring	Compound Gauges		Brass Ring	N. P. Ring
2" Dial without cock	Each	1.80	2.00	2" Dial without cock	Each	2.40	2.60
2½" Dial without cock	Each	2.20	2.40	2½" Dial without cock	Each	2.80	3.00
3" Dial without cock	Each	2.60	2.80	3" Dial without cock	Each	3.20	3.40
3½" Dial with cock	Each	3.20	3.40	3½" Dial with cock	Each	3.80	4.00
4½" Dial with cock	Each	3.80	4.00	4½" Dial with cock	Each	4.40	4.60
5" Dial with cock	Each	6.00	6.20	5" Dial with cock	Each	6.60	6.80

When cock is not wanted on last three items, deduct 20c from list price. For back connection add 20c to list price. For pressures 600 lbs. to 1000 lbs. add 1.00 to list prices. For pressures below 15 lbs. add 1.00 to list price.

Prices include gauge cocks on sizes 3½ inches and larger. Unless otherwise specified gauges will be furnished with brass ring. An extra charge is made for other than standard dial graduations tabulated above and for dial reading over 600 pounds. Syphons must be used when employed on steam.

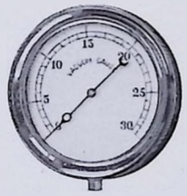
Pressure and Vacuum Gauges

Single Bourdon Spring Cast Flanged Case



Pressure Gauge

Mounted in cast iron or polished cast brass case with flange for wall or panel mounting. Furnished standard with ¼-inch male bottom connection unless back connection is specified. Prices include gauge cocks. Syphon must be used when employed on steam. All gauges should be graduated double the operating pressure.



Vacuum Gauge

List Prices

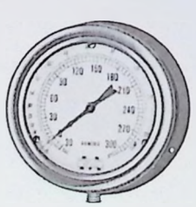
Size, Inches		Brass Ring Iron Case	N. P. Ring Iron Case	Polished Brass Case	Nickel Plated Brass Case	Chromium Plated Brass Case
3½ Dial with cock	Each	6.40	6.60	13.40	14.40	16.70
4½ Dial with cock	Each	7.40	7.60	14.30	16.05	19.00
5 Dial with cock	Each	9.40	9.60	16.05	17.70	21.55
6 Dial with cock	Each	15.60	16.15	23.65	25.30	30.60
6¾ Dial with cock	Each	18.70	19.35	25.60	27.60	34.10
8½ Dial with cock	Each	26.35	27.20	44.70	48.10	55.55
10 Dial with cock	Each	38.30	39.50	59.00	63.20	72.10
12 Dial with cock	Each	59.80	61.60	107.05	112.95	121.85

For pressures above 600 lbs. but not over 1000 lbs., add 1.00 to list price. For pressures below 15 lbs., add 1.00 to list price. For back connection add 20c to list price.

List Prices

Size, Inches		Iron Case Nickel Ring
2½ Steel Case	Each	13.00
3 Steel Case	Each	14.00
3½ Steel Case	Each	15.00
4½ Flanged Iron Case	Each	17.40
5 Flanged Iron Case	Each	20.90
6 Flanged Iron Case	Each	24.50
6¾ Flanged Iron Case	Each	28.65
8½ Flanged Iron Case	Each	40.00
10 Flanged Iron Case	Each	52.00
12 Flanged Iron Case	Each	75.00

Ammonia Gauges



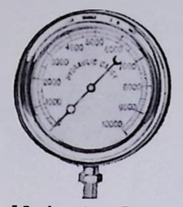
Flanged Iron Case

Construction includes chrome molybdenum steel Bourdon tubes and Monel metal movements. Sizes 2½ inch and 3½ inch are furnished in stainless steel case and ring. Larger sizes in flanged iron case. ¼-inch male bottom connection will be furnished unless back connection is specified.

All gauges should be graduated double the operating pressure.

Gauges

Hydraulic Gauges



Hydraulic Gauge

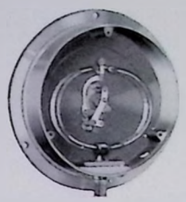
Built to withstand the severe service on Hydraulic Presses, Hydraulic Jacks, etc.

Graduated to any pressure specified from 1000 lbs. up to 30,000 lbs.

All gauges should be graduated double the operating pressure.

List Prices, Each

Size Inches	Brass Ring Iron Case	N. P. Ring Iron Case	Polished Brass Case	N. P. Brass Case
3½	18.65	18.95	28.00	29.35
4½	24.15	24.35	34.60	35.45
5	29.05	29.25	39.60	41.35
6	33.85	34.30	45.50	47.25
6¾	45.85	46.30	62.85	64.60
8½	67.68	68.35	97.85	100.85
10	81.00	84.30	107.95	111.35
12	91.05	94.50	141.75	142.30



Double Spring Gauge

Double spring gauges are of the most rugged construction throughout and should be employed wherever severe service conditions exist, including excessive vibration or pulsation.

Graduated as specified from 100 pounds to 750 pounds.

¼-inch male bottom connection is standard.

List Prices, Each

Size Inches	Iron Case Brass Ring	Iron Case N. P. Ring	Polished Brass Case	N. P. Brass Case
4½	14.00	14.30	20.25	22.45
5	15.45	15.75	21.90	26.60
6	19.80	21.75	30.35	33.60
6¾	23.80	25.75	35.70	38.95
8½	35.10	36.15	59.05	62.95
10	51.95	53.30	77.60	82.75
12	77.15	79.25	134.95	144.95

For Compound Double Spring Gauges add 1.35 to list price.

Siphon for Steam Gauges

List Prices

Size, Inches		¼
Iron, 8-inch length	Each	.50
Brass, 8-inch length	Each	1.00



Compound and Combination Gauges



Compound Gauge

Single Bourdon Spring Cast Flanged Case

Compound gauges indicate pressure and vacuum. Combination gauges are for indication of water pressure in pounds per square inch and equivalent vertical feet of water. Furnished standard with ¼-inch male bottom connection unless back connection is specified. Prices include gauge cocks. Syphon must be used on compound gauge when employed on steam.



Combination Gauge

List Prices

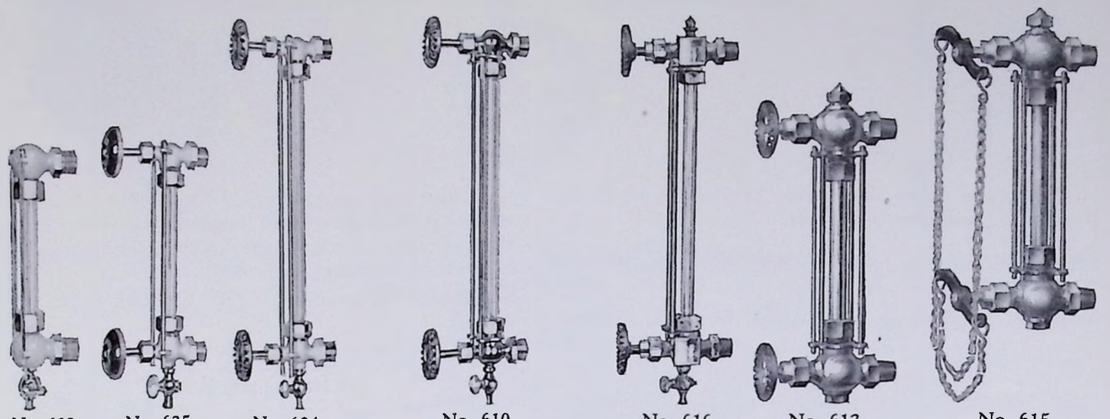
Size, Inches		Iron Case, Brass Ring		Iron Case, N. P. Ring		Polished Brass Case	Nickel Plated Brass Case	Chromium Plated Brass Case
		Compound	Altitude Combination	Compound	Altitude Combination			
3½ Dial with cock	Each	7.00	6.60	7.20	6.80	18.00	18.55	20.95
4½ Dial with cock	Each	8.00	7.60	8.20	7.80	21.00	21.95	24.90
5 Dial with cock	Each	10.00	9.60	10.20	9.80	23.60	25.30	29.15
6 Dial with cock	Each	19.15		19.75		30.00	32.05	37.40
6¾ Dial with cock	Each	22.65		23.35		34.95	36.95	42.70
8½ Dial with cock	Each	35.89		36.80		59.95	62.40	69.80
10 Dial with cock	Each	47.90		49.05		74.95	77.60	86.50
12 Dial with cock	Each	71.80		73.60		119.95	123.15	132.00

For pressures above 600 lbs. but not over 1000 lbs., add 1.00 to list price. For back connection add 20c to list price.

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Brass Water Gauges

Low Pressure 175-Pound 250-Pound



No. 623 Rough Expansion Tank Water Gauge

No. 625 Rough

No. 624 Rough

No. 610 Polished

For 175 pounds working pressure

No. 616 Polished

No. 613 Polished

No. 615 Polished

For 250 pounds working pressure

Center to Center of Valves

Unless otherwise ordered, the No. 610, No. 613, No. 615, No. 616, No. 624, and No. 625 Gauges are furnished with the centers shown below:

½-inch No. 610 . . . with 14-inch centers
¾-inch No. 610 . . . with 18-inch centers
¾-inch No. 613 . . . with 18-inch centers
¾-inch No. 615 . . . with 18-inch centers
½-inch No. 616 . . . with 14-inch centers
½-inch No. 624 . . . with 14-inch centers
½-inch No. 625 . . . with 8-inch centers

When other centers are required, orders must so specify.

The No. 623 Gauge regularly is furnished with 13½-inch centers, as listed in the table at the right. Any other center is considered special; prices on application.

Centers over 36 inches: When Water Gauges with centers greater than 36 inches are required, two Gauges of shorter lengths, staggered on the boiler, are recommended.

No. 613 Gauge: The lower valve of the No. 613 Water Gauge is drilled and tapped for a ⅜-inch drain.

By closing both valves and removing the cap at the top of the upper valve, the glass in this Gauge can be renewed while the boiler is under pressure.

List Prices and Dimensions

½-inch No. 610	Price, with 14″ or shorter centers	Each	5.50
	Extra for each inch over 14″, up to 36″		.03
	Size of glass for 14″ centers	Inches	⅝ x 12⅜
	Length of guard rod for 14″ centers	Inches	15
¾-inch No. 610	Price, with 18″ or shorter centers	Each	8.00
	Extra for each inch over 18″, up to 36″		.03
	Size of glass for 18″ centers	Inches	¾ x 15¾
	Length of guard rods for 18″ centers	Inches	17
¾-inch No. 613	Price, with 18″ or shorter centers	Each	15.00
	Extra for each inch over 18″, up to 36″		.06
	Size of glass for 18″ centers	Inches	⅝ x 14¾
	Length of guard rods for 18″ centers	Inches	17
¾-inch No. 615	Price, with 18″ or shorter centers	Each	25.00
	Extra for each inch over 18″, up to 36″		.06
	Size of glass for 18″ centers	Inches	⅝ x 14¾
	Length of guard rods for 18″ centers	Inches	17
½-inch No. 616	Price, with 14″ or shorter centers	Each	7.00
	Extra for each inch over 14″, up to 36″		.03
	Size of glass for 14″ centers	Inches	½ x 12
	Length of guard rods for 14″ centers	Inches	15
½-inch No. 623	Price, with 13½″ centers	Each	1.90
	Size of glass	Inches	⅝ x 12
½-inch No. 624	Price, with 14″ or shorter centers	Each	3.00
	Extra for each inch over 14″, up to 36″		.03
	Size of glass for 14″ centers	Inches	⅝ x 12⅜
	Length of guard rods for 14″ centers	Inches	15
½-inch No. 625	Price, with 8″ or shorter centers	Each	3.00
	Extra for each inch over 8″, up to 36″		.03
	Size of glass	Inches	⅝ x 6¾
	Length of guard rods	Inches	9

No. 615 Gauge: The No. 615 Gauge is especially suited for service on boilers having the Water Gauge above the reach of the operator. It is chain operated and regularly is furnished with chains that drop 12½ feet below the lower valve.

When the valves are open, the levers stand in a horizontal position. When the valves are closed, the levers stand at an angle of 45 degrees, with the right hand side down.

The lower valve of the No. 615 Water Gauge is drilled and tapped for a ⅜-inch drain.

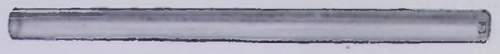
By closing both valves and removing the cap at the top of the upper valve, the glass in this Gauge can be renewed while the boiler is under pressure.

Ammonia Liquid Gauges . . . . page 513

Gauge Glass—Accessories

"Ajax" Gauge Glasses

Particularly Adapted to Both High and Low Pressures
Tested and Approved by U. S. Navy



List Prices and Dimensions

Length Inches		External Diameter ½″ and ⅝″	External Diameter ¾″	External Diameter ⅞″	Length Inches		External Diameter ½″ and ⅝″	External Diameter ¾″	External Diameter ⅞″
8	Per dozen	4.00	5.60	6.20	18	Per dozen	8.60	12.20	14.20
9	Per dozen	4.50	6.30	7.10	19	Per dozen	9.00	13.00	15.00
10	Per dozen	5.00	7.00	8.00	20	Per dozen	10.00	14.00	16.40
11	Per dozen	5.40	7.40	8.60	21	Per dozen	10.50	14.40	16.80
12	Per dozen	6.00	8.40	10.00	22	Per dozen	11.00	14.80	17.20
13	Per dozen	6.40	9.00	10.60	23	Per dozen	11.50	15.80	18.60
14	Per dozen	6.60	9.60	11.00	24	Per dozen	12.00	16.80	20.00
15	Per dozen	7.00	10.00	11.80	30	Per dozen	14.00	20.00	23.40
16	Per dozen	7.80	11.40	12.60	36	Per dozen	17.20	24.40	28.40
17	Per dozen	8.00	11.80	13.40					

Extra Brass Guards

For Water Gauges

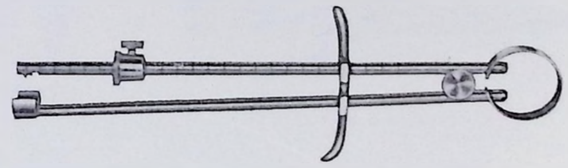


List Prices

Length Inches		
9	Each	.13
11	Each	.13
13	Each	.13
15	Each	.13
17	Each	.13
19	Each	.18
21	Each	.20
23	Each	.22
25	Each	.25
27	Each	.28
29	Each	.31
31	Each	.34
33	Each	.37
35	Each	.40

Glass Tube Cutters

For Cutting Gauge Glasses to Length



List Prices

Tube Cutter complete	Each	4.00
Extra Cutter Wheels	Each	.30

One arm has a scale in inches and fractions of an inch, a slide stop with set screw, and a rotary cutter at the end. This arm is inserted in the end of the glass tube to the required distance, against the slide stop or gauge, the outside of the glass tube resting in the circled end of the other arm. With a slight pressure of thumb and finger on the lever, and a rotation of the glass with the other hand, the rotary cutter makes an even cut around the inside of the tube and a very little pressure breaks it off.

Gauge Glass Rubber Washers

For Water Gauges



List Prices

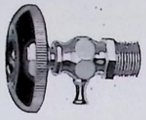
½″	Per dozen	.12
⅝″	Per dozen	.14
¾″	Per dozen	.20

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Brass Try Cocks

Low Pressure

15 pounds steam working pressure



No. 731
With Moulded Composition Wheel

Standard

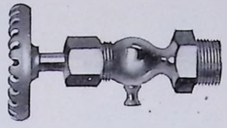
125 pounds steam working pressure



No. 730
(Short Pattern)

250-Pound

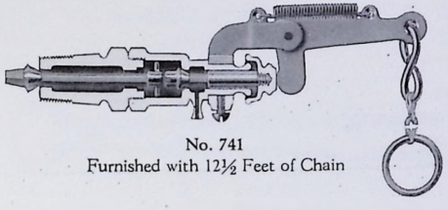
250 pounds steam working pressure



No. 734
With Stuffing Box

250-Pound Chain and Lever Try Cock

250 pounds steam working pressure



No. 741
Furnished with 12½ Feet of Chain

List Prices

Size	Inches	⅜	½	¾
No. 730	Each	.95	1.00	
No. 731	Each	.80		
No. 734	Each	1.20	1.30	1.45
No. 741, with Chain	Each			8.50

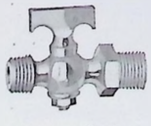
Chain and Lever Try Cocks: The No. 741 is designed for boilers having the Try Cock above the reach of the operator. It can be tried from the floor, and for that purpose, it is equipped with 12½ feet of brass chain.

The Cock is fitted with double valves. The outer or primary valve can be removed and reground while the boiler is under pressure.

Brass Cylinder, Gauge, and Pet Cocks



Cylinder Cock



Gauge Cock



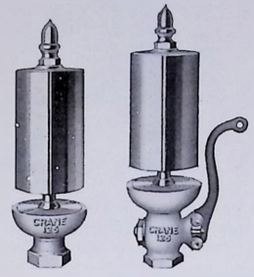
Pet Cock

For Brass Cylinder Cocks, Gauge Cocks, and Pet Cocks, see page 60.

Brass Whistles and Whistle Valves

Plain Whistles

For steam up to 125 pounds
No. 602 also recommended
for air from 25 to 125 pounds



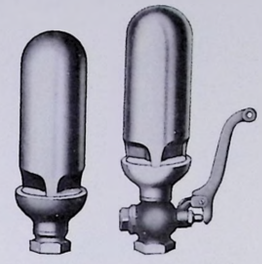
No. 602
Without Valve

No. 600
With Valve

Chime Whistles

Single Bell

For steam up to 200 pounds

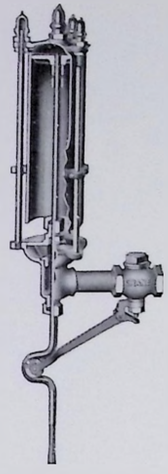


No. 607½
Without Valve

No. 607
With Valve

Mocking Bird Whistles

For steam up to 125 pounds



No. 604, With Valve

Mocking Bird Whistles: The No. 604 is an improved piston type Whistle. It produces a sound that can be easily distinguished, making the Whistle particularly well suited for river boats, fog signals, fire alarms, and similar services.

Special Whistles: Whistles with a greater bell, or whistles for higher or lower air or steam pressures can be made to order; prices on application.

Operating large whistle valves: To facilitate operating the larger whistle valves, the pull must be at right angles to the centerline of the whistle.

When ordering, specify the diameter of the bell, not the size of the pipe connection.

List Prices and Dimensions

Diameter of Bell		Inches	1	1¼	1½	2	2½	3	3½	4	5	6	8
Plain Whistles	No. 600, with Valve	Each	3.10	3.75	4.00	5.50	6.50	8.50	11.50	15.00	22.50	33.00	95.00
	No. 602, without Valve	Each	2.20	2.75	3.00	4.35	5.25	7.25	9.50	12.00	19.00	24.00	70.00
	Length of Bell	Inches	2½	3	3¼	4	4½	5	5¾	6½	8	9½	14
	Size of Pipe Connection	Inches	¼	¼	⅜	½	¾	¾	1	1¼	1½	2	2½
Mocking Bird Whistles	No. 604, with Valve	Each						40.00		53.00	70.00	95.00	
	Length of Bell	Inches						9		12	15	18	
	Size of Pipe Connection	Inches						1		1¼	1½	2	
Single Bell Chime Whistles	No. 607, with Valve	Each			6.00	7.00	9.00	11.00	15.00	18.00	28.00		
	No. 607½, without Valve	Each			4.50	5.00	7.00	8.00	11.00	14.00	22.00	38.00	85.00
	Size of Pipe Connection	Inches			⅜	½	¾	¾	1	1¼	1½	1½	2

Whistle Valves



No. 608

125 pounds steam working pressure

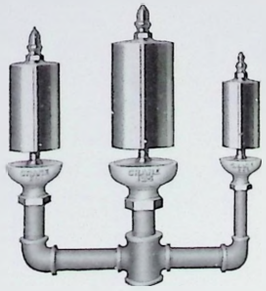
To facilitate operating the larger sizes, the pull must be at right angles to the centerline of the whistle.

When sizes larger than those listed are required, regular wheel operated valves or special power valves are recommended.

List Prices, Each

Size	Inches	⅜	½	¾	1	1¼	1½	2	2½
No. 608		2.00	2.50	3.00	3.50	5.00	6.00	9.00	18.00

Three-Bell Chime Whistles



No. 606

For steam up to 125 pounds and for air from 25 to 125 pounds

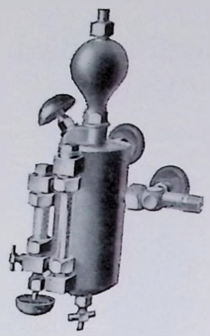
The No. 606 Whistles consist of three No. 602 Plain Whistles assembled with iron pipe and fittings.

Bell Diameters, Inches 2x2½x1½, 3x4x2, 4x5x3, 4x5x3½, 5x6x4, and 6x8x5

Prices on application

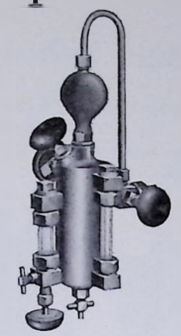
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Lubricators, Oilers, and Grease Cups



"Genuine Detroit" Improved Standard Lubricators

Detroit Lubricators are made in a variety of styles and kinds to properly lubricate the valves and cylinders of all types of steam engines, steam pumps, gas engines, air compressors and similar operating units. They are not to be used for pressures in excess of 150 pounds. For higher pressures use the No. 500 and No. 500-X types.



Double Connection

For use on all kinds of steam engines, steam pumps, etc.

Installed with both connections between the boiler and the throttle.

Single Connection

For use on all kinds of steam engines, steam pumps, etc., where conditions do not permit the installation of a double connection lubricator.

Connected to the steam pipe either above or below the throttle or into the steam chest direct.

List Prices

Size		Double Connection			Single Connection		
		Shipping weight Pounds	Polished Brass	Nickel Plated	Shipping weight Pounds	Polished Brass	Nickel Plated
⅓ pint	Each	7	22.50	25.50	8	23.50	26.00
½ pint	Each	8	23.50	27.00	8	25.00	27.00
1 pint	Each	10	27.00	32.00	10	28.50	31.50
1 quart	Each	13	34.50	37.50	13	37.00	39.00
½ gallon	Each	26	51.50	55.00			

Sight Feed, Snap Lever Oiler

With Spring Hinged Oil Hole Cover

The Sight-Feed, Snap Lever Oiler with Spring Hinged Oil Hole Cover is designed for such uses as engine, machinery and dynamo bearings, shafting, etc.

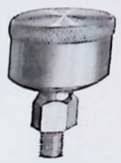


No. 200, Sentry

List Prices and Dimensions

Size Number		00	0	1	1½	2	3	4	5	6
Outside diameter of glass	Inches	1⅛	1¼	1½	1¾	2	2¼	2½	3	3½
Height of glass	Inches	1	1⅛	1⅜	1⅝	1⅞	2⅛	2⅜	3	4
Capacity	Ounces	½	⅝	1	1½	2½	4	5	10	18
Pipe thread of shank	Inches	⅛	⅛	¼	¼	⅜	⅜	⅜	½	½
Price, brass finish	Each	2.85	3.00	3.25	3.50	3.75	4.25	5.25	7.25	9.25
Price, nickel plated	Each	3.25	3.50	3.75	4.00	4.25	4.75	5.75	8.00	10.25
Extra glass	Each	.06	.08	.10	.11	.12	.15	.25	.40	.65
Extra cork washers	Dozen	.08	.12	.18	.24	.30	.36	.42	.52	.64

Plain Compression Grease Cup



No. 199

In many places, particularly for rough work, there is nothing equal to a plain brass grease cup such as we offer at the left. This cup is thoroughly well made from castings, making a strong, durable cup, which will outlast, many times over, a cheap spun brass article.

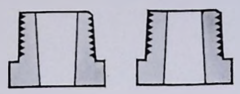
List Prices and Dimensions

Size Number		00	0	1	2	3	4
Outside diameter	Inches	1⅛	1⅜	1½	2	2¾	3¼
Pipe thread	Inches	⅛	¼	¼	⅜	½	½
Capacity	Ounces	½	⅔	1	2	3½	5
Price, not polished	Each	.55	.75	.95	1.25	1.70	2.30
Price, finished brass	Each	.70	.90	1.15	1.50	2.15	2.90
Price, nickel plated	Each	.80	1.05	.85	1.45	2.60	3.40

For oilers and grease cups of other types and sizes....Prices on application.

Fusible Plugs

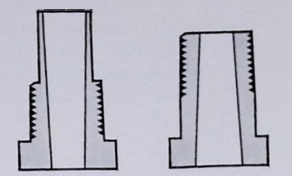
Short Pattern



Outside Type No. 750 — Inside Type No. 751

Used where Long Pattern Plugs are not required by law.

Long Pattern

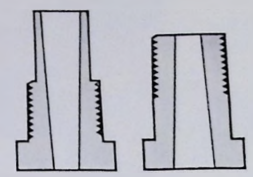


Outside Type No. 752 — Inside Type No. 753

No. 752 L With Oversize Thread — No. 753 L With Oversize Thread

A. S. M. E. Code
For working pressures not exceeding 175 pounds

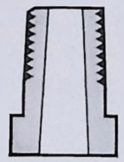
High Pressure Long Pattern



Outside Type No. 752 A — Inside Type No. 753 A

A. S. M. E. Code
For working pressures over 175 pounds and not exceeding 225 pounds

Tube Plugs

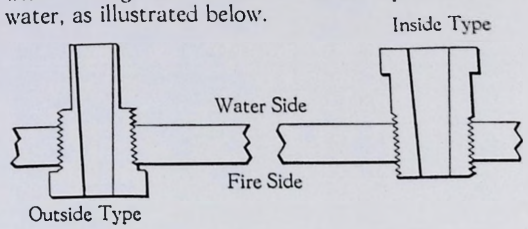


No. 749

A. S. M. E. Code

For working pressures not exceeding 225 pounds

Installation: Fusible Plugs always are installed with the large end of the core of tin exposed to the water, as illustrated below.



List Prices and Dimensions

Size		Inches	⅜	½	¾	1	1¼	1½
No. 749, Tube Plugs		Each	.90	1.20				
No. 750 or No. 751, Short Pattern Plugs		Each	.50	.60	.75	1.00	1.50	2.00
No. 752 or No. 753, Long Pattern Plugs		Each		1.20	1.50	2.00	3.00	4.00
No. 752 L or No. 753 L, Long Pattern Plugs with Oversize Thread		Each			1.60	2.15		
No. 752 A or No. 753 A, High Pressure Long Pattern Plugs		Each			1.50	2.00		
Minimum Diameter of Fusible Metal	No. 749	Inches	⅜	⅜				
	No. 750 or No. 751	Inches	¼	½	½	½	½	½
	No. 752, No. 752 L, No. 753, or No. 753 L	Inches		½	½	½	½	½
	No. 752 A or No. 753 A	Inches			⅜	⅜		

Service recommendations: The Short Pattern Plugs, No. 750 and No. 751, can be used where there is no law requiring Long Pattern Plugs.

Tube Plugs, No. 749, comply with the A. S. M. E. Code and are recommended for working pressures not exceeding 225 pounds.

Long Pattern Plugs, No. 752, No. 752 L, No. 753, and No. 753 L, comply with the A. S. M. E. Code and are recommended for working pressures not exceeding 175 pounds.

The No. 752 L and No. 753 L Plugs have an oversize thread, and are used where the continual renewal of Plugs has worn the plug tapping too large for the standard size thread. They are stamped with the letter "L" to denote the large or oversize thread.

The High Pressure Long Pattern Plugs, No. 752 A and No. 753 A, comply with the A. S. M. E. Code and are recommended for working pressures over 175 pounds and not exceeding 225 pounds.

Massachusetts Steam Boiler Rules: Crane Tube Plugs and Long Pattern Plugs, except the High Pressure Long Pattern Plugs, when marked "MASS. STD.", comply with the Massachusetts Code. When plugs that comply with this code are wanted, orders must so specify, otherwise regular plugs will be furnished.

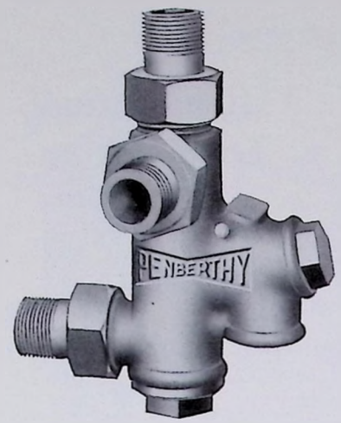
Materials: The Short Pattern Plugs are made of a high grade steam brass. The Tube Plugs and the Long Pattern Plugs, including the High Pressure, are made of Crane Special Brass.

All Crane Fusible Plugs are filled with pure Banca Tin.

Fusible Plugs for Marine Service.... page 506

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Penberthy Automatic Injector



No. 245, Stock Injector

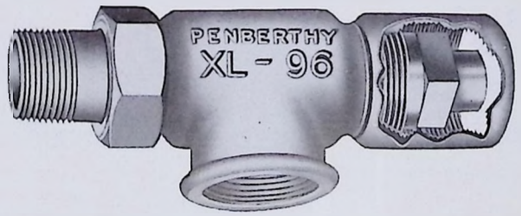
While all injectors listed below are designed for a suction lift, they will work fairly well with water under pressure. However, better service will be had at the lower steam pressures if a special steam jet is substituted when connecting directly to city pressure line.

List Prices

Size	Price Each	Horse Power Based on Ordinary Tub. Boiler	Horse Power Based on 30 lbs. Water per H. P. per hour	Pipe Connection Inches	Capacity per Hour, 1 to 3 feet lift, 60 to 110 lbs. Steam Pressure: Maximum Gallons	Capacity per Hour, 1 to 3 feet lift, 60 to 110 lbs. Steam Pressure: Minimum Gallons	Shipping Weight Boxed Lbs. Ozs.
O-22	15.00	3 to 6	4 to 8	¼	60	35	2—6
OO-21	16.00	4 to 8	6 to12	⅜	80	45	2—11
A-22	18.00	8 to 16	10 to 20	½	135	70	3—10
AA-21	20.00	12 to 22	15 to 30	½	180	100	3—10
B-22	25.00	17 to 32	22 to 45	¾	260	140	5—2
BB-21	30.00	20 to 45	25 to 60	¾	360	180	5—2
C-22	40.00	40 to 65	45 to 80	1	475	250	7—3
CC-21	45.00	45 to 80	50 to 100	1	600	325	7—3
D-22	55.00	50 to 100	60 to 135	1¼	800	425	11—6
DD-21	60.00	75 to 135	85 to 165	1¼	1,000	525	11—6
E-24	75.00	100 to 180	125 to 235	1½	1,400	740	21—4
EE-23	90.00	115 to 255	150 to 320	1½	1,900	850	21—2
F-24	110.00	160 to 320	200 to 400	2	2,400	1,275	37—6
FF-23	125.00	200 to 400	250 to 500	2	3,000	1,600	36—10
GG-21	200.00	375 to 600	400 to 750	2½	4,200	2,150	70—4

Penberthy "XL-96" Improved Ejector, Siphon, or Steam Jet Pump

A forcing Ejector of sufficient power to elevate 1 foot per each 1¼ to 1¾ pounds of steam. This Ejector has both lifting and elevating power, but on deep suction lifts with slight elevation, the water can be delivered cooler with the 20 or 40 series.



No. 250

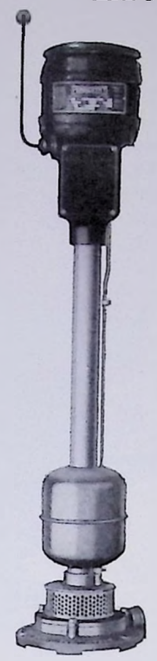
List Prices

Size No.	All Brass Each	Iron Body, Brass Jets Each	Pipe Connection, Steam	Pipe Connection, Suction and Delivery	Capacity, Gallons per Hour: 40 to 65 lbs. Steam, 3 Feet Lift	20 to 40 lbs. or 65 to 100 lbs.	40 to 65 lbs. 50 Feet Elevation	40 to 65 lbs., 25 Feet Elevation	Vertical Lift: 40 to 75 lbs., Steam Feet	25 to 40 or 75 to 100 lbs. Feet
1	8.00	(Sizes 1 to 4 made in Brass only)	⅜	½	210	235	120	180	23	20
2	10.00		½	¾	500	450	250	375	25	22
3	15.00		¾	1	840	700	420	625	25	22
4	20.00		1	1¼	1,350	1,300	650	950	25	22
5	25.00	20.00	1	1½	1,950	1,850	975	1,450	25	22
6	35.00	27.50	1¼	2	3,500	3,000	1,750	2,600	25	22
7	50.00	40.00	1½	2½	5,700	4,350	2,500	3,750	25	22
8	70.00	50.00	2	3	9,500	8,160	4,750	7,200	25	22
9	105.00	70.00	2	3½	13,600	12,400	6,800	10,200	25	22
10	145.00	95.00	2½	4	18,400	17,100	9,200	13,800	25	22

When Ejector is lifting 10 feet or over, we advise that the suction pipe be one size larger than the suction connection of Ejector, enlarging close to Ejector. A foot valve should also be used on deep lifts.

When Ejector is elevating more than 20 feet, the discharge pipe should be one size larger than coupling on Ejector, enlarging close to Ejector.

Electric and Steam Pumps



Automatic Electric Sump Pump

Model 36

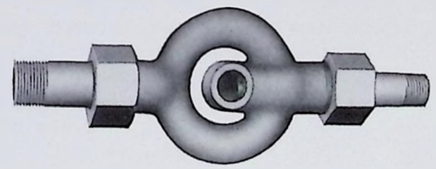
This sump pump is powered by a ¼ H.P. induction type motor, with 1725 R.P.M., for standard 110 volt, 60 cycle current. It has a mercury switch particularly adapted to float operation and controlled by an extra heavy copper float sliding freely on supporting column. The motor is protected by a fusetron unit in case of improper voltages, overloading, etc. The pump is the top suction submerged type, with double shroud impeller and bronze impeller shaft. A sump cover is recommended to exclude ashes, etc. from accumulating in sump.

List Price, Capacities, Dimensions, etc.

Size No.	Model No.	Each	Pipe Conn. Inch	Max. Sump Depth Feet	Height of Pump Feet-Inches	Approximate Capacity Gal. per Hr. Against Total Discharge Head of: 5 Ft.	10 Ft.	15 Ft.	20 Ft.	Current Consumption per Hr. Watts	Size Motor H.P.	Weight Boxed Pounds
0	36	79.00	1	2	3 4¼	1500	1500	1250	750	300	¼	57

Note: Total discharge head equals the vertical distance from water level in sump to point of discharge plus all head lost by pipe friction.

Steam Jet Pumps or Ejectors



For filling tanks, transferring liquids from one part of a building to another, substituting for water tank on railroads, unwatering shallow mines, pits, cellars, coffer-dams, quarries, wells, etc.

List Prices and Dimensions

Size of Pump Inches	Suction Pipe Inches	Discharge Pipe Inches	Steam Pipe Inches	Steam Opening	Capacity Per Minute Gallons	Each	Weight Pounds	H.P. Required to operate
¾	¾	½	⅜	3/16	8	8.00	4	2
1	1	¾	½	4/16	15	10.00	6	3
1¼	1¼	1	½	5/16	20	12.00	8	4
1½	1½	1¼	¾	6/16	30	14.00	12	6
2	2	1½	¾	7/16	40	16.00	16	8
2½	2½	2	1	8/16	50	20.00	24	10
3	3	2½	1	9/16	60	24.00	33	15
4	4	3	2		250	70.00	60	

The above capacities are based on 50-pound steam pressure.

The limit of perpendicular suction is 14 feet and will require steam pressure of 25 pounds, or above.

Special pumps furnished for higher suction power.

Liquids may be forced to an elevation equal to about one foot to each pound steam pressure. We, however, recommend two Pumps, one placed above the other, for elevations above 50 feet.

These Pumps will work in any position.

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Crane Water Systems

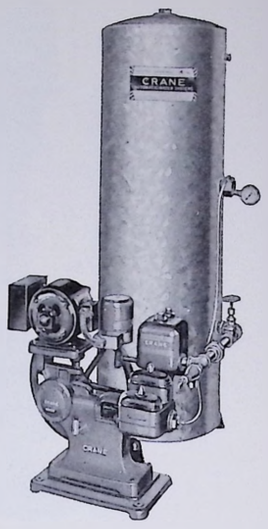
Shallow Well

Crane Shallow Well Pumps are reciprocating, double acting pumps. They are furnished with single and duplex cylinders. Capacities range from 250 to 1000 G. P. H. when operating against a 75 lbs. maximum pressure.

Shallow Well Pumps are recommended to raise water by means of suction when the maximum vertical lift at sea level does not exceed 22 feet and at higher altitudes after deducting 1 foot from the vertical suction lift for every 1200 feet of elevation.

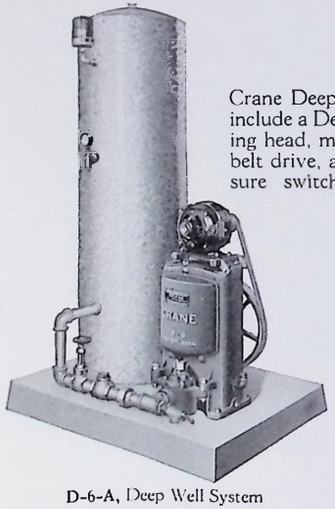
Crane Water Systems include a pump, electric motor, pneumatic storage tank, automatic pressure switch, air volume control, relief valve, and necessary fittings to connect tank to pump. Gasoline Engines are also available.

They are manufactured from the finest of materials, with the highest of technical skill—will operate economically and dependably for years. Their slow speed reduces vibration, noise and wear to a minimum. All parts are easily accessible. Splash system lubrication; flexible "V" belt drive; stainless steel piston rod; large air and vacuum chambers provide smooth, quiet operation.



S-25-A, Shallow Well System

Deep Well



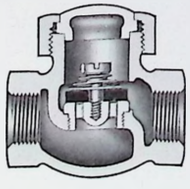
D-6-A, Deep Well System

Crane Deep Well Systems include a Deep Well pumping head, motor, dual "V" belt drive, automatic pressure switch, air release, pneumatic storage tank, check valve, relief valve and necessary fittings to connect tank to pump. The well cylinder, sucker rod and drop pipe are optional. Pressure switches automatically start and stop pumps at predetermined pressures. Gasoline Engine equipment is also available.

Crane Deep Well Systems are used to raise water from vertical depths as deep as 500 feet maximum. Capacities range from 165 to 1000 G. P. H. against a 75 lbs. discharge pressure.

The pumps are sturdy, scientifically designed, and accurately machined in every part. Connecting rod and cross-head, operating vertically, are designed to eliminate wear from side strain. Reinforced elliptical main casting contains rigid bearing supports to withstand heavy loads. Accurately machined gears are of the simplest construction, quiet, long-lived and operate in a bath of oil. All wearing parts are accessible and easily removed without the use of special tools. New integral water-cooled air compressor eliminates necessity of auxiliary air pump. Protective skirt on discharge chamber prevents surface water and insects from entering and contaminating well supply.

No. 25½, Crane Check Valve



This Pump check valve removes the pressure strain when installed between the Deep Well Pump and Storage Tank. It is an ideal valve for pulsating service where pressures do not exceed 75 lbs. A similar type is made (No. 25) for drawing cold water direct from the well. Both are high quality with positive, dependable action.

No. 1133½ Crane Relief Valve



This Relief Valve provides valuable protection against excessive overload pressures. The lever handle enables quick flushing of sediment from the valve seat to insure positive action.

No. 33½ Crane Foot Valve

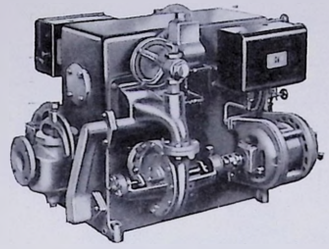


This valve with screen is strongly recommended for use at the base of the suction line with every Shallow Well system. It provides smoother pump operation, aids in priming, and relieves suction valves of excessive loads.

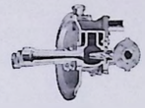
Hoffman Economy Pumps

Condensation and Vacuum

Vacuum and Condensation Pumps: A vacuum pump improves the operation of a low pressure system by creating a suction on the return lines, thus keeping the mains clear of air and condensate. Steam circulation is accelerated with consequent quicker heating and reduced fuel consumption.



Vacuum and Condensation Pump



Jet-type Vacuum Producer

Hoffman-Economy Vacuum Pumps feature a Jet-type Vacuum Producer. Because of the condenser action of the jets and the constant head pressure on the pump suction, these pumps will handle almost boiling water, banishing a frequent cause of trouble. The Vacuum Producer has no moving parts and difficulties in maintaining a vacuum, due to wear, are reduced to a minimum.

Other features are noiseless operation, upper and lower chambers in one cast-iron tank and a low inlet which, in most installations, eliminates a pump pit. Duplex units are available, furnished with two pumps, two Vacuum Producers and two motors mounted on a single tank, so that one set can be shut down for servicing while the other continues pumping operations.

Capacities and prices on application.

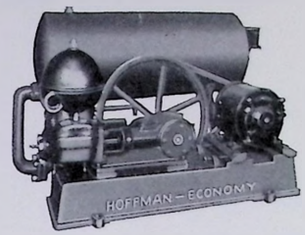
Condensation Pumps: Hoffman-Economy Condensation Pumps are made in a complete range of types, pressures and capacities. A condensation pump will improve the efficiency and effectiveness of heating system to return condensate which will not flow to the boiler by gravity.

Type E and EC



Condensation pump includes pump and motor with tank, tank trimmings and automatic control of standard make assembled, as shown in illustration. This is a high efficiency, bronze fitted centrifugal pump with bronze covered or stainless steel shaft. Capacities to 20,000 square feet radiation. Pressures to 60 pounds.

High Pressure Reciprocating Type Condensation Pump and Receiver



Reciprocating Pump and Receiver

These pumps are widely used for feeding small, high pressure boilers. They are furnished either with controls and receivers for returning condensate or with makeup water valves and boiler level controls for feeding makeup water to boilers where condensate cannot be returned.

These pumps are the self-oiling type, with bronze lined cylinders, bronze valve seats and solid bronze pistons. They have duplex, silent V-belt drive which can be easily adjusted for tension by adjustable motor base. They range in capacity from 250 to 2500 pounds of condensate per hour.

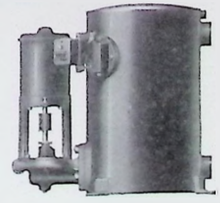
Vertical Underground Pump

This pump is used where returns are located below floor or are otherwise too low for horizontal pumps. Where it is desired to save floor space the pump is installed flush with floor. Two pumps may be installed in a single tank of larger size if desired. The price is double that of the single unit. Capacities of this pump to 30,000 square feet of radiation. Pressures to 100 pounds.



Vertical Underground Pump and Receiver

Type "S" Condensation Pump



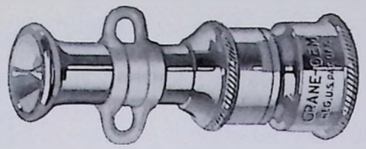
In many jobs where the service is not severe, the heavy construction and cast iron tanks furnished in our E and EC pumps are not required. For these jobs we offer Type S pumps and receivers. These systems range in capacity from 250 to 3750 pounds of condensate per hour. They will operate against discharge pressures up to and including 60 pounds per square inch.

Pump Data and Prices on Application

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Hose Nozzles and Pipes

Genuine Gem Brass Hose Nozzle

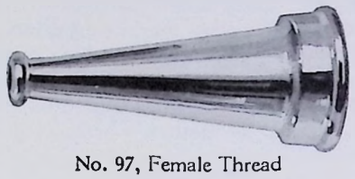


No. 904

Free from leakage. Female hose thread.

List Prices and Dimensions

Size	Inches	¾
No. 904	Per dozen	10.00



No. 97, Female Thread

Brass Hose Nozzles

Note—The following table gives standard discharges on hose pipes and hose nozzles and all stock orders are made up with this size of discharge.

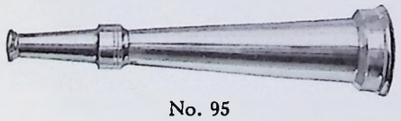
Discharges different from the standard as listed will be made to order at an extra charge.

List Prices and Dimensions

Size	Inches	¾	¾	¾	1	1	1¼	1¼	1¼	1½
Length	Inches	3	6	8	4	8	4¾	10	12	5¾
Discharge	Inches	¼	¼	¼	5/16	5/16	3/8	3/8	3/8	7/16
No. 97 H. P. & I. P. Thread	Per dozen	5.35	9.35	10.70	6.70	12.00	16.00	20.00	24.00	24.00
Size	Inches	1½	1½	2	2	2½	2½	2½	2½	2½
Length	Inches	10	12	6¾	12	7½	12	15	18	22
Discharge	Inches	½	½	9/16	9/16	5/8	1	1	1⅛	1⅛
H. P. & I. P. Thread	Per dozen	26.70	29.35	34.70	45.35	49.90	73.35	86.70	106.70	122.70

Brass Hose Pipes

With Screw Tips



No. 95

Note — Table at right gives standard discharges on Hose Pipe and Hose Nozzles and all stock orders are made up with this size of discharge. Any discharges different from the standard as listed will be made to order at an extra charge.

List Prices and Dimensions

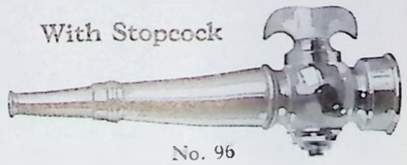
Size	Inches	¾	¾	¾	1	1	1¼		1½	1½
Length	Inches	6	7½	12	8½	12½	12		12	15
Discharge	Inches	¼	¼	¼	¼	¼	3/8		½	½
No. 95 H. P. & I. P. Thread, Per dozen		9.35	10.70	13.35	13.35	16.00	26.70		32.00	40.00
Size	Inches			2	2		2½	2½	2½	2½
Length	Inches			12	15		15	20	24	30
Discharge	Inches			5/8	5/8		5/8	1	1	1
No. 95 H. P. & I. P. Thread, Per dozen				50.70	60.00		100.00	128.00	133.35	192.00

List Prices and Dimensions

Size	Inches	¾	¾	¾	1	1	1¼	1½
Length	Inches	6	8	12	7½	12	12	12
Discharge	Inches	¼	¼	¼	¼	¼	3/8	½
No. 96 H. P. & I. P. Thread, Per dozen		14.70	17.35	24.00	20.00	26.70	53.35	73.35

Note — The above table gives standard discharges on hose pipes and nozzles, and all stock orders are made up with this size of discharge. Any discharges different from the standard as listed will be made to order at an extra charge.

With Stopcock

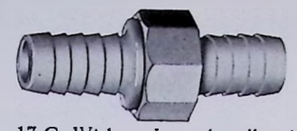


No. 96

IMPORTANT: Always supply thread information when ordering, to avoid delay.

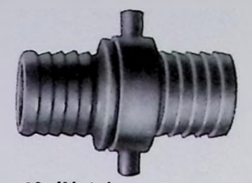
Brass Hose Fittings

Water Hose Couplings



No. 17 C, Without Lugs (smaller sizes)

½, 5/8, ¾ and 1 inch are without lugs. Always supply complete thread information when ordering.



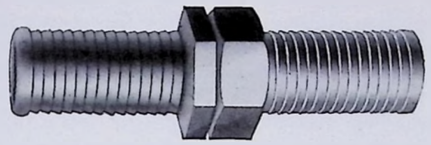
No. 89, With Lugs (larger sizes)

Sizes 1¼, 1½, 2 and 2½ inch have lugs on the female half only. Larger sizes are available.

List Prices and Dimensions

Size, Inches		½	5/8	¾	1	1¼	1½	2	2½
Full Couplings	Per Dozen Sets	3.00	3.00	3.00	7.20	15.00	21.00	36.00	72.00
Female Half Only	Per Dozen	2.00	2.00	2.00	4.80	10.11	14.00	24.00	48.00
Male Half Only	Per Dozen	1.50	1.50	1.50	3.60	7.50	10.50	18.00	36.00

Brass Steam Hose Couplings



No. 90

Also used for oil and gasoline hose, and wherever care needs to be taken to prevent hose blowing off, or leakage. Long shank, for extra clamps. (*) This size always furnished ¾ inch I.P.T. unless ½ inch I.P.T. is specifically requested.

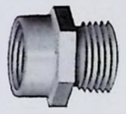
List Prices and Dimensions

Size, Inches		¼	3/8	½*	¾	1	1¼	1½	2	2½	3
Full sets, Iron Pipe Thread	Per Dozen	22.50	22.50	22.50	22.50	27.00	36.00	45.00	63.00	108.00	222.00
Half Couplings, Female end	Per Dozen	15.00	15.00	15.00	15.00	18.00	24.00	30.00	42.00	72.00	148.00
Half Couplings, Male end	Per Dozen	11.25	11.25	11.25	11.25	13.50	18.00	22.50	31.50	54.00	111.00

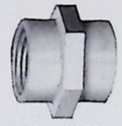
Hose Fittings



No. 91
Male



No. 92
Male and Female



No. 9200
Double Female

List Prices

Size, Inches		½	¾	1	1¼	1½	2	2½	3	3½	4
No. 91	Per Dozen	5.25	5.25	7.50	13.50	15.00	21.00	42.00	60.00	*75.00	*112.50
No. 92	Per Dozen	5.25	5.25	7.50	13.50	15.00	21.00	42.00	*60.00	*75.00	
No. 9200	Per Dozen		9.85	14.65							

Reducers



No. 93
No. 9301, Less Lugs

Bushings



No. 94 L

List Prices

Brass Hose Reducers and Brass Hose Bushings

Size, Inches	Per Dozen	Size, Inches	Per Dozen	Size, Inches	Per Dozen
No. 9301, ¾ H.P.T. x ½ I.P.T.	4.32	1½ x 1¼	18.00	2½ x 1	33.00
No. 9301, 1 I.P.T. x ¾ H.P.T.	4.32	2 x ¾	19.50	2½ x 1¼	34.50
No. 93 1¼ x ¾	12.00	2 x 1	21.00	2½ x 1½	36.00
1¼ x 1	15.00	2 x 1¼	24.00	2½ x 2	39.00
1½ x ¾	17.25	2 x 1½	27.00	3 x 2	45.00
1½ x 1	17.25	2½ x ¾	30.00	3 x 2½	54.00

Thread information must always be sent with the order.

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Hose Fittings

Brass Hose Caps



No. 120, With Lugs

Brass Hose Caps sizes ¾ and 1 inch are furnished less lugs.

Chains furnished on 1½-inch size and above, at an additional charge.

Important: When ordering, always supply thread information, to avoid delay.

List Prices

Size, Inches	Per Dozen	Size, Inches	Per Dozen
¾	6.00	1½	18.00
1	9.00	2	27.00
1¼	12.00	2½	43.20

Additional for Chain, each .90

Hose Spanner



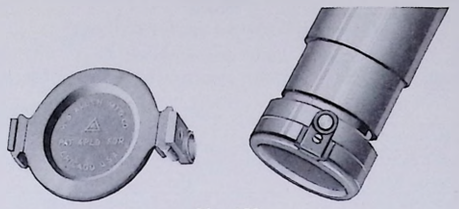
No. 9, Common

List Prices

Size, Inches	Per Dozen	Size, Inches	Per Dozen
1½ x 9	7.20	3 x 11	14.40
2 x 10	8.70	4 x 12	16.50
2½ x 10¾	9.90		

Sensible Swivel Caps

Listed and Approved by the Underwriters' Laboratories



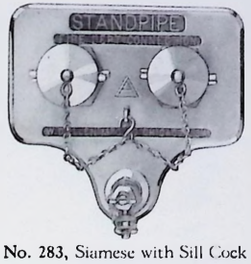
No. 132

Neat and attractive protection for standpipe and steamer hose connections. It is made of gray iron galvanized and in case of emergency is easily broken. The ears which encircle lugs of the swivel are so arranged that in screwing the cap onto the swivel the front or plate of the cap is tightly drawn up against the end of the swivel giving a tight dust-proof protection. These caps are very generally approved by fire departments and underwriters. Finished in red.

List Prices

Size, Inches	Per Dozen
2½	9.00
3	10.50

Concealed or Flush Type Siamese Connection



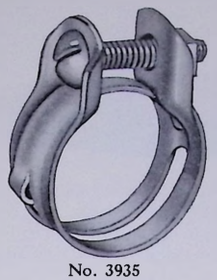
No. 283, Siamese with Sill Cock
No. 276, Siamese less Sill Cock

Designed to solve the problem presented by restricted sidewalk space in crowded metropolitan districts. There are two methods of installation where the body of siamese with its two independent interior self-closing clapper valves can be built into the wall of the building during construction; or, can be placed inside the wall. When the building is completed, the plate and the two independent swivel inlets are attached to the body of the siamese by means of the required length pipe nipples. The siamese body is furnished straight way or 90 degree outlet as indicated in the detail below. If additional water supply is needed, two of the siamese can be used and connected in series to a header. Made of bronze, extra heavy throughout and will last as long as the building. Prices on application for chromium plating. Complete with bronze plugs and chains.

List Prices and Dimensions

No. 283, Complete with Plugs and Chains — Size, Inches		Polished Brass	Polished White Metal or Chromium Plated Brass	No. 276, without Sill Cock. Complete with Plugs and Chains — Size, Inches		Polished Brass	Polished White Metal or Chromium Plated Brass
2½ x 2½ x 4	Each	142.50	160.50	2½ x 2½ x 4	Each	117.00	130.50
2½ x 2½ x 6	Each	162.75	183.75	2½ x 2½ x 6	Each	142.50	159.00

Brass and Steel Hose Clamps



No. 3935
Stamped Sheet Brass



No. 1923
Galvanized Steel

List Prices — BRASS

Garden Hose Sizes

Inches	Ply	Inside Diameter Open	No. of Clamps in Carton	Weight Pounds Gross	Per Dozen
3/16	3	7/16	144	2¼	.64
¼	3	½	144	4	.64
3/8	2	5/8	144	4¼	.64
3/8	2½	11/16	144	4½	.64
3/8	3	¾	144	4¾	.64
½	2	7/8	144	5¼	.64
½	3	15/16	144	5¾	.64
½	4	1 1/32	144	6½	.64
5/8	3	1 1/32	144	6½	.64
5/8	4	1 3/32	144	6¾	.64
¾	2	1 3/32	144	6¾	.64
¾	3	1 3/16	144	6¾	.64
¾	4	1¼	144	7¾	.64

Water Hose Sizes

Inches	Ply	Inside Diameter Open	No. of Clamps in Carton	Weight Pounds Gross	Per Dozen
1	2	1 11/32	72	17	2.67
1	3	1 7/16	72	18	2.67
1	4	1 17/32	48	20	2.67
1¼	3	1 21/32	48	21	3.34
1¼	4	1 13/16	48	23	3.34
1½	3	1 15/16	36	30	4.00
1½	4	2 1/16	36	31	4.00
2	3–4	2 9/16	24	38	5.34
2¼	3–4	2 7/8	12	48	8.67
2½	3–4	3 1/16	12	50	9.34
3	3–4	3 3/4	12	72	13.34

Steam Hose Sizes

Inches	Ply	Inside Diameter Open	No. of Clamps in Carton	Weight Pounds Gross	Per Dozen
3/4	3	1 7/16	72	18	2.67
3/4	4	1 17/32	48	20	2.67
1	3	1 5/8	48	21	3.34
1	4	1 21/32	48	21	3.34
1¼	3	1 15/16	36	30	4.00
1¼	4	1 31/32	36	30	4.00
1½	3–4	2 7/32	36	33	4.67
1½	5	2 13/32	24	35	5.34
2	3–4	2 11/16	24	38	7.34
2	5	2 7/8	12	50	8.67
2½	3–4	3¼	12	60	11.34
2½	5	3 9/16	12	66	12.67

Prices on request for larger sizes; 3¾, 3⅞, 4, 4⅛, 4¼, 4⅜, 4½, 4⅝, 4¾, 4⅞, 5, 5¼, 5⅜ and 5½-inch inside diameter.

List Prices — STEEL

Water Hose Sizes

Inches	Ply	Inside Diameter of Clamp	Per Dozen
¼	3	½	.42
3/8	2	9/16	.42
3/8	3	5/8	.42
3/8	4	11/16	.42
½	2	¾	.42
½	3	7/8	.42
½	4	15/16	.42
½	5	31/32 1	.42
5/8	2	1	.48
5/8	3	1 1/16	.48
5/8	4	1 3/16	.48
¾	2	1 1/16	.48
¾	3	1⅛	.48
¾	4	1 3/16	.48
¾	5	1¼	.48
1	3	1⅜	.96
1	4	1 7/16	.96
1	5	1 9/16	.96
1¼	3	1 11/16	2.00
1¼	4	1 13/16	2.00
1¼	5	1⅞	2.00
1½	3	2	2.40
1½	4	2⅛	2.40
1½	5	2 3/16	2.40
1¾	3	2¼	2.80
1¾	4	2⅜	2.80
2	3	2½	3.20
2	4	2 5/8	3.20
2	5	2 11/16	3.20
2	Suction	3	5.60
2¼	3	2¾	4.40
2¼	4	2 13/16	4.40
2½	3	3	5.60
2½	4	3⅛	5.60
2½	5	3 3/16	5.60
2¾	3	3¼	6.80
2¾	4	3¼	6.80
3	3	3½	8.00
3	4	3⅝	8.00

Steam Hose Sizes

Inches	Ply	Inside Diameter of Clamp	Per Dozen
½	4	1 1/16	.88
½	5	1 3/16	.88
½	6	1 5/16	.88
¾	4	1⅜	1.34
¾	5	1½	1.34
¾	6	1½	1.34
1	4	1 11/16	2.22
1	5	1 13/16	2.22
1	6	1 13/16	2.22
1¼	4	1 15/16	2.67
1¼	5	2	2.67
1¼	6	2	2.67
1½	4	2¼	3.20
1½	5	2⅜	3.20
1½	6	2⅜	3.20
2	4	2 11/16	4.88
2	5	2⅞	4.88
2	6	2⅞	4.88
2¼	4	2 15/16	6.22
2¼	5	3	6.22
2¼	6	3 1/16	6.22

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Hose

Garden Hose

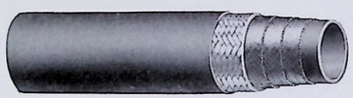


"Royal Cord": Constructed of layers of strong, tightly twisted cords laid spirally throughout the length of the hose. Furnished in double cord construction with heavy brown corrugated cover in 25, 50 and 500 ft. lengths — ⅝, ¾ and 1 inch sizes.

Rubber Hose
Water, Steam, Suction, etc.

Prices on Application

Steam Hose



"Perfected" Brand: Made of multiple plies of cotton duck with an additional ply of cotton braid. The tube is specially compounded to resist the temperature of normal steam pressures.

Working Pressures

Internal Diameter Inches	Working Pressure — Pounds Ply 4	5	6
¼			
⅜			
½	125		
¾	100	125	140
1	100	110	125
1¼		90	100
1½			90

Water Hose



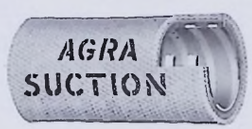
"Perfected" Brand: Wrapped Duck Construction over which is a sturdy ply of cotton braid. A high quality rubber tube and wear-resisting black rubber cover insure maximum service and durability. Maximum length 50 feet.

A fine hose for high pressure service.

Recommended maximum working pressures for hose sizes and thicknesses:

Size, Inches	Ply	Working Pressure Pounds
1	4	150
1¼	4	125
1½	4	125
2	4	100
1	5	175
1¼	5	150
1½	5	150
2	5	125

Suction Hose



Suction Hose made for the average contractor, road builder and for general purposes. Wire reinforcement prevents hose from collapsing. Made in special size lengths 10, 15 and 20 ft. long. Other lengths made to order. Sizes regularly furnished are 1½, 2, 2½, 3, 4, 5, and 6 inches. (Larger sizes on application.)

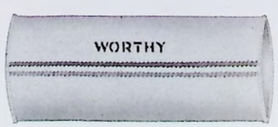
Underwriters' Fire Hose



A high grade, dependable fire hose, cotton rubber lined, carefully made and carrying necessary Underwriters' labels.

Sizes, Single Jacket, 1½ to 2½ inches
Double Jacket, 1½ to 3½ inches
Generally furnished in 50-ft. lengths.

Unlined Linen Hose

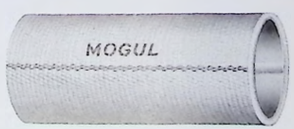


For fire protection and inside service only. Will meet specifications of Underwriters. Made in two grades.

Sizes, 1¾ to 2½ inches

Prices on Application

Mogul Mill Hose



Rubber lined, woven fabric jacket chemically treated as a protection against mildew and rot.

Sizes, 1¾ to 4 inches, 25 and 50-foot lengths

Solder-Joint Valves and Fittings

The user of copper tubing for plumbing, heating, and industrial installations will appreciate the exceptionally complete line of solder-joint material offered by Crane Co. He can now purchase all of his requirements — valves, fittings, tubing, bends, and accessories — from one source.

The list of Crane Solder-Joint Valves includes globe, angle, gate, and check valves. In addition, a wide selection of Crane screwed end and flanged end valves, through the use of adaptors, is available for copper tubing piping systems.

The list of Crane Solder-Joint Fittings includes not merely the basic elbows and tees but a diversified assortment of all regular and special type fittings, such as elbows, tees, crosses, couplings, bushings, caps, plugs, return bends, unions, flanged fittings in large sizes, and many others. The range of sizes, too, is unusually complete.

Description of the Solder-Joint.....pages 462 to 463
Procedure for Making Joints.....page 464
Using an Asbestos Sheet to Prevent Scorching.....page 465
Saving Short, Waste Ends of Copper Tubing.....page 465
Assembling Piping in Sections.....page 465
Dismantling Solder-Joint Installations.....page 465
Brass Solder-Joint Valves.....pages 466 to 469
Brass Solder-Joint Fittings.....pages 470 to 479
Bends and Offsets.....page 480
Expansion U-Bends.....page 481
Expansion of Copper Tubing.....page 481
Brass Solder-Joint Flanges.....page 482
Brass Light Weight Flanged Fittings and Flanges.....page 483
Brass Solder-Joint Drainage Fittings.....page 484
Solders and Fluxes.....page 485
Sizing Tools for Soft Copper Tubing.....page 485
Square-End Sawing Vise.....page 485
Copper Straps for Copper Tubing.....page 485
Copper Tubing, Standard Specifications.....page 486

Crane Solder-Joint Fittings are interchangeable in every respect with those manufactured by the STREAMLINE Pipe and Fittings Co., a division of the Mueller Brass Co. Crane Co. is licensed by the Mueller Brass Co., STREAMLINE Division, Port Huron, Michigan, to manufacture valves and fittings under one or more of the following United States patents:

Patent Numbers

1,770,852	1,866,857	1,895,426	1,933,915
1,776,502	1,881,943	1,916,989	1,963,421
1,801,171	1,890,998	1,931,666	1,964,474

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Crane Solder-Joint Valves and Fittings

Licensed under Mueller Brass Co., STREAMLINE Division, Patents

"Solder-Joint"

The term "Solder-Joint" as applied to Crane Valves and Fittings is descriptive of a particular type of connection through which valves and fittings are joined to copper tubing with solder. The method of making a joint can be briefly described as follows: the tubing is inserted in the end of the valve or fitting, the connection is heated, and the joint is soldered by feeding solder through a hole in the valve or fitting. The solder, liquefied by the heat, is carried thoroughly over the contacting surfaces by capillary action. It then cools and solidifies, sealing the joint.

Solder-Joints depend on capillarity.

Utilizing the natural law of capillarity is the basic principle of the joint used on Crane Solder-Joint Valves and Fittings. Capillary action is that property displayed by liquids when they extend beyond their normal limits through close fitting surfaces. Examples of its operation are common. Everyone knows that ink spreads through a blotter when one corner touches a drop, that oil rises in the wick of a lamp to the flame, and that water is absorbed by a towel when we dry our hands on it. In each of these cases, close fitting surfaces produce capillary action.

In a solder-joint, the valve or fitting end and the copper tubing are the close fitting surfaces, and the liquefied solder travels between them by capillary action.

Solder introduced at middle; assures complete bond.

Crane Solder-Joint Valves and Fittings have a solder feed hole and a solder feed channel located midway between the outer edge of the valve or fitting and the internal shoulder against which the tubing rests; see Figure No. 1. When soldering a joint, solder is introduced through the feed hole—at the middle of the joint—allowing it to flow around and inward and outward, assuring a complete, thorough bond between the valve or fitting end and the copper tubing.

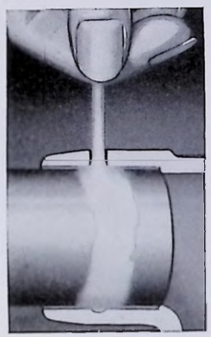


Figure No. 2

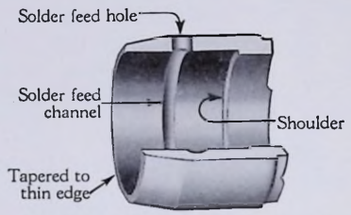


Figure No. 1
Section of a Solder-Joint End

Figures No. 2, 3, and 4 are cut open sections of a solder-joint connection illustrating the flow of solder. The solder, fed through the hole, travels around and outward and inward over the entire contacting surfaces. The action is practically instantaneous.

The shoulder at the inner end of the recess forms a dam beyond which the solder will not pass. The outer edge of the valve or fitting end is tapered to a thin edge; the thin edge hastens the cooling of the solder at the outer end of the joint, forming a solder gate. Thus the solder is stopped at both ends; it will not run out.

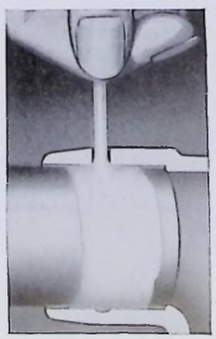


Figure No. 3

Figures No. 2, 3, and 4 are cut open sections of a solder-joint connection illustrating the flow of solder. Notice how the solder, fed from the middle of the joint, flows completely around and inward and outward until the entire contacting surfaces are thoroughly bonded.

Solder can be fed from any position.

One of the peculiarities of capillarity is that it acts in any and every direction—up, down, or sidewise—with equal facility. When making a solder-joint connection, therefore, it does not make the slightest difference where the solder feed hole is located; solder will feed readily from any position. Operators need have no fear of soldering joints when working against a partition or ceiling, or when the solder feed hole, owing to the position of the valve or fitting, is on the side or the bottom. The solder will flow readily from any position. Capillary attraction will carry it completely around and make a perfectly bonded joint.

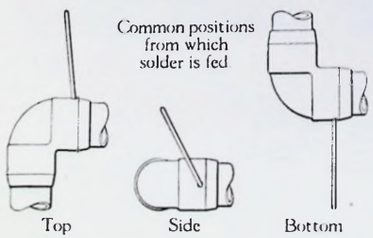




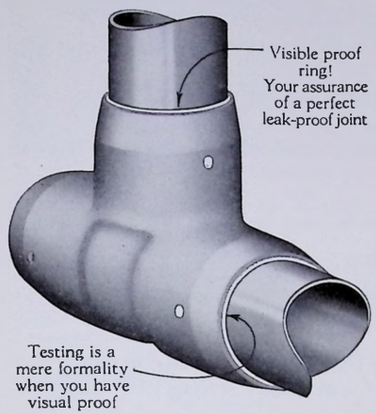
Figure No. 4

Crane Solder-Joint Valves and Fittings

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Visible Proof of a Perfect Connection—an Exclusive Feature!

When soldering a joint, the valve or fitting end and the copper tubing are cleaned, coated with flux, assembled, and heated; and solder is introduced through the feed hole in the valve or fitting. Capillarity carries the solder over the contacting surfaces.



The first indication that the solder has bonded the two surfaces is the appearance of a ring of tiny dark green bubbles around the outer edge of the connection. This is the hot flux being forced out by the outward flow of the solder. When these bubbles are wiped off, a continuous bright ring of solder appears.

The bright ring is visible and never-failing proof that a bonded, leak-tight joint has been made. Testing becomes a mere formality. The proof ring is the operator's assurance of a perfect connection.

Always feed solder through the feed hole.

When soldering a connection, always feed the solder through the hole, never from the outer edge of the joint. It must then flow inward and outward evenly; consequently, its appearance as a continuous ring at the end positively indicates thorough bonding.

Attempts to feed from the outer edge may produce leaky or only partly bonded joints. They provide no assurance that the two surfaces have been thoroughly joined by solder.

Proof ring is an exclusive feature.

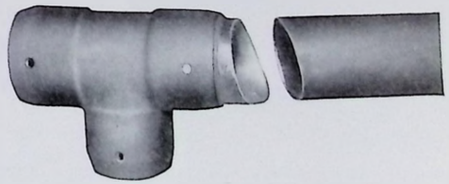
The patented joint used on Crane Solder-Joint Valves and Fittings is the only one having the valuable visual inspection feature with its positive assurance of a leak-proof connection.

Crane Soldered Joints Are Unusually Strong

Photomicrographs and innumerable tests prove conclusively that a Crane Soldered Joint is actually a complete and perfect bond of tubing, solder, and valve or fitting.

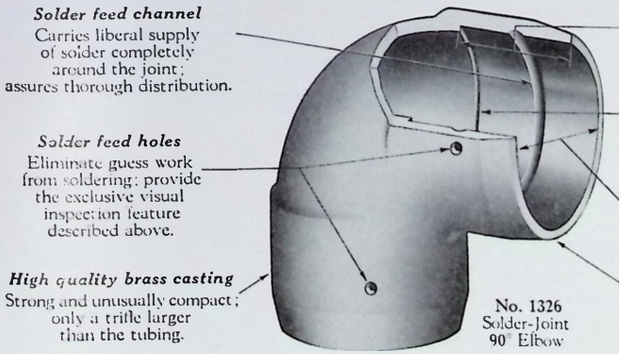
The joint is unusually rugged and has an exceptionally high safety factor. The large bonding surface assures generous strength. Both pressure and tensile tests show that loads far in excess of those found in service are required to cause failure in an assembled connection, and that when failure finally does occur, it is generally in the tubing, not the joint,—even when Type K Extra Heavy Hard Copper Tubing is used.

Expansion and contraction tests conducted under extremely severe conditions left the soldered joints without the slightest indication of damage. Rigid tests on a vibrator proved that the joints are ideal for services where vibration is present.



Photograph of a 1¼-inch Solder-Joint Tee after being subjected to a tensile test. The copper tubing broke at 13,440 pounds.

Many Valuable Features



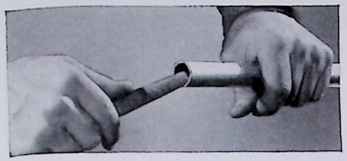
The features indicated above are found on all Crane Solder-Joint Valves and Fittings.

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Crane Solder-Joint Valves and Fittings

Licensed under Mueller Brass Co., STREAMLINE Division, Patents

Procedure for Making Joints



Cut Tubing to Length and Remove Burr

Cut the copper tubing off square, using a fine tooth hack saw (32-tooth blade preferred). Do not cut the tubing at an angle; use the Square-End Sawing Vise shown on page 485 or its equivalent.

Remove the burr from the end of the tubing with a file or scraper.

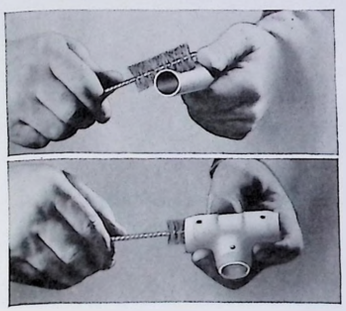


Clean Outside of Tubing and Inside of Valve or Fitting

Using sandpaper or sandcloth (Medium or No. 1 Grade), clean the outside of the tubing over the distance it will slip into the end of the valve or fitting.

Using sandpaper or sandcloth, clean the inside of the solder-joint end on the valve or fitting.

Do not solder dirty joints. Thoroughly clean the contacting surfaces with sandpaper or sandcloth, removing all dark spots. Wipe or brush away all foreign matter.

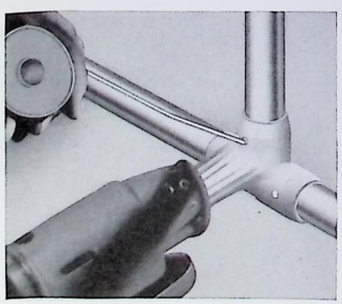


Apply Flux to Outside of Tubing and Inside of Valve or Fitting

Using a brush, apply a coat of solder flux to the outside of the tubing and to the inside of the valve or fitting. Distribute it evenly and thoroughly over the surfaces.

Before applying the flux, make certain that both parts are dry. In extremely cold weather, warm the valve or the fitting and the copper tubing slightly with a torch to approximately room temperature (from 70 to 80 degrees F.).

Slip the tubing into the valve or fitting until it will go no further, and turn it back and forth once or twice to assure an even distribution of the flux. The joint is ready to be soldered.



For soldering, use a blow torch or a similar tool, never a soldering iron.

Solder the Connection

Melt a drop of solder into the solder feed hole of the valve or fitting. Apply heat around the valve or fitting end until the drop disappears, indicating that the proper temperature has been reached. Feed solder through the hole only until it appears around the end of the connection; the joint has been made. Fill the hole completely, removing any surplus with a piece of cloth.

When the hole is on the side or bottom, the drop-indicator method cannot be used. Determine the temperature by heating the connection and touching the valve or fitting end with solder. When the solder fuses readily, feed through the hole as before.

On sizes 1½-inch and larger, move the valve or fitting on the tubing or tap it lightly when the solder starts in. This breaks the surface tension of the solder and assures full distribution.

Do not solder too hot or too cold. Solder flows freely at the proper temperature, but burns when too hot.

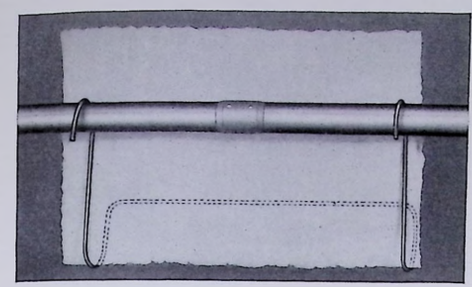
Making Joints on Sizes 3-Inch and Larger

The instructions for making joints on sizes 3-inch and larger, although fundamentally the same as those given here for the smaller sizes, are more detailed and include suggestions that facilitate the work. More care must be exercised in assembling and in applying heat, two torches being recommended on the larger sizes to assure uniform heat distribution. Complete instructions will be furnished on request.

Solders . . . . page 485 *Fluxes . . . . page 485* *Square-End Sawing Vise . . . page 485*

Crane Solder-Joint Valves and Fittings

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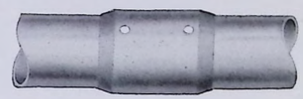
Using an Asbestos Sheet to Prevent Scorching

When soldering a joint next to a wall, ceiling, or other object, a thin sheet of asbestos, if hung behind the connection, will eliminate the danger of damaging anything in back of it. It is an inexpensive and worthwhile safeguard.

The illustration at the left shows two pieces of copper tubing, joined by a coupling, being installed next to a wall. The asbestos sheet, held in place by a simple, improvised wire bracket hooked around the tubing, will effectively prevent scorching of the wall.

Saving Short, Waste Ends of Copper Tubing

The inexpensive, yet rugged, Crane No. 1350 Solder-Joint Coupling offers a practical solution to the problem of utilizing short lengths of copper tubing. It enables the operator to solder, at low cost, the waste ends into one long usable piece, thereby saving a considerable sum of money over a period of time. The length of tubing made up of many short pieces will be as strong and as serviceable as a solid length. The couplings are only a trifle larger in diameter than the tubing.

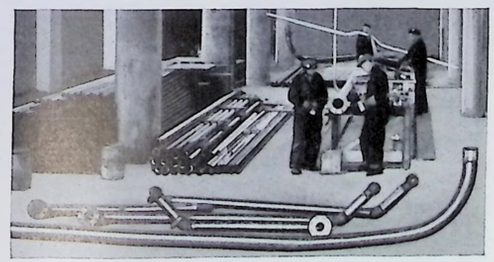


Coupling joining two lengths of copper tubing

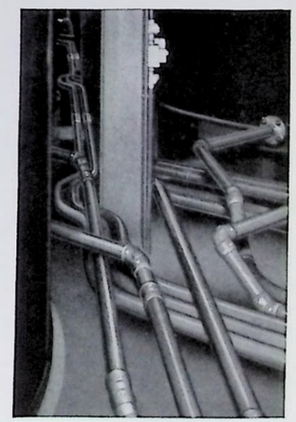
Assembling Piping in Sections

Crane Solder-Joint installations, because of the compactness of the valves and fittings and the method of making joints, can be installed in close quarters—next to walls and ceilings, in basements where head room is limited, behind fixtures and partitions, in replacement work, around machinery and equipment, and in similar places where the available working space is small.

In addition, Solder-Joint installations are unusually light in weight. Sections of the piping assembled at a work bench or at some other convenient location, can be easily carried to their final position and connected to the piping system by soldering the key joints.



The photograph at the left shows sections of a Crane Solder-Joint installation being assembled at a distillery. The photograph at the right shows the sections installed between large storage tanks.



Dismantling Solder-Joint Installations

An installation of Crane Solder-Joint Valves and Fittings and copper tubing can be easily dismantled. This is an advantage that is especially appreciated where piping is of a temporary nature or where changes or additions are frequently made. No matter how long the installation has been in service, by merely heating the joints with a blow torch, the solder will melt and the joints can be pulled apart.

An entire installation or any portion of it may be taken apart, and the valves, fittings, and tubing can be used over again.

When a soldered connection is dismantled, the contacting surfaces of both the valve or fitting and the tubing will retain a thin coating of solder. This should be removed by heating it with a torch and wiping it off clean with a rag. The material is then ready for further use.

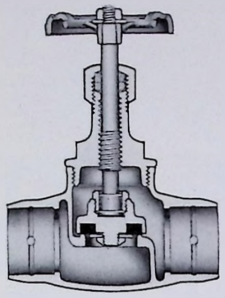
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Brass Solder-Joint Globe and Angle Valves

Composition Disc

Licensed under Mueller Brass Co., STREAMLINE Division, Patents

WORKING PRESSURE—100 pounds steam



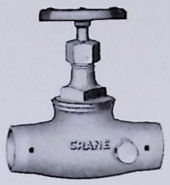
Cross Section
No. 1300, Globe

STEAM SERVICE

The solder used to make joints on steam lines must be capable of withstanding the temperature of the steam in the line; see page 485.



No. 1300, Globe



No. 1301, Globe with Drain



No. 1302, Angle

When ordering No. 1301 Valves, specify whether right hand or left hand drain is wanted.

List Prices

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 1300, Globe or No. 1302, Angle	Each	1.75	2.00	2.50	3.25	4.25	5.50	8.00
No. 1301, Globe, with Drain	Each		2.10	2.60				
Extra disc holder, disc, nut, and disc stem ring, complete	Each	.50	.60	.70	.85	1.10	1.50	2.00

For list prices of Composition Discs, see page 168.

Solder-joint ends: These valves are made for use with copper tubing. Their end connections are the same as those used on Crane Brass Solder-Joint Fittings.

Service recommendations: Solder-Joint Globe and Angle Valves are recommended for steam or water service. They are well suited for plumbing and heating systems, for low pressure steam and water lines in industrial plants, and for similar service.

When valves are installed on steam lines, the solder used to make joints must have a melting point that is high enough to withstand the temperature of the steam. For recommendations on solders, see page 485.

Construction: The valves, although light in weight, are sturdily constructed. They are well proportioned and are amply reinforced to withstand piping and operating strains. All parts are made of good quality materials.

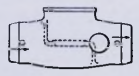
Discs: Unless otherwise ordered, these valves are furnished with a No. 8 Low Pressure Hot Water Disc, suitable for hot water or for cold water.

When ordered for steam, they will be furnished with a No. 7 Low Pressure Steam Disc.

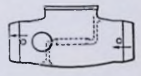
For description and dimensions of discs, see page 168.

The valves have a metal plate, secured to the valve by the wheel nut, which identifies the type of disc.

Drain on No. 1301: The No. 1301 Solder-Joint Globe Valve is furnished with either a right hand or a left hand drain; orders must specify which is wanted. The illustrations shown above indicate the position of a right hand and a left hand drain.



Right Hand



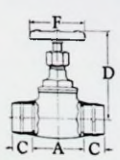
Left Hand

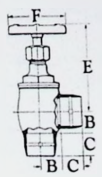
Wheel: Solder-Joint Globe and Angle Valves are equipped with malleable iron non-heating wheels. The 3/8-inch size has a Crane Style F Round Wheel; larger sizes have Crane Style C Wheels. The Style C Wheels, being oval in shape, fit the operator's hand comfortably; the broad lip affords a better grip for the palm and fingers, and the oval shape is easier to hold.

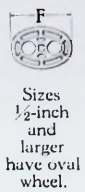
Repacking: These valves, when wide open, can be repacked while under pressure.

Larger sizes and higher pressure valves: When larger size valves or valves suitable for higher pressures are wanted, Crane screwed or flanged valves with solder-joint adaptors are recommended; see page 469.

These valves are furnished with a tag giving special instructions for soldering.







Sizes 1/2-inch and larger have oval wheel.

Dimensions, in Inches

Size	3/8	1/2	3/4	1	1 1/4	1 1/2	2
A	1 9/16	1 13/16	2	2 5/8	2 3/4	3 1/4	3 15/16
B	9/16	5/8	3/4	15/16	1 1/16	1 1/4	1 9/16
C	11/16	13/16	1	1 1/16	1 1/8	1 3/16	1 3/8
D Open	3 1/8	3 5/8	4 1/8	4 5/8	5 1/8	5 7/8	6 1/4
E Open	2 7/8	3 3/8	3 3/4	4 3/8	4 7/8	5 5/8	6 1/8
F	1 1/2	2 1/4	2 5/8	3	3 3/8	3 3/4	4 1/4

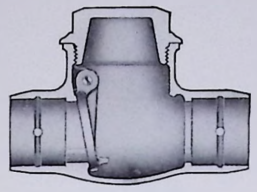
Brass Solder-Joint Check Valves

Swing or Horizontal

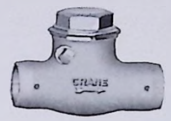
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Swing Check Valves

Brass Disc



Cross Section
No. 1303



No. 1303
Swing Check

No. 1303 Swing Check Valves may be used either in a horizontal position or in a vertical position for upward flow.

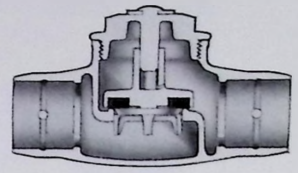
WORKING PRESSURE
100 pounds steam

STEAM SERVICE

The solder used to make joints on steam lines must be capable of withstanding the temperature of the steam in the line; see page 485.

Horizontal Check Valves

Composition Disc



Cross Section
No. 1304



No. 1304
Horizontal Check

List Prices

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 1303, Swing Check	Each		2.00	2.50	3.25	4.00	5.25	7.50
No. 1304, Horizontal Check	Each	1.50	1.75	2.25	3.00	4.00	5.00	7.00
Extra disc holder, disc, and nut, complete, for No. 1304	Each	.55	.80	1.10	1.40	1.75	2.25	3.00

For list prices of Composition Discs for No. 1304 Valves, see page 168.

Solder-joint ends: These valves are made for use with copper tubing. Their end connections are the same as those used on Crane Brass Solder-Joint Fittings.

Service recommendations: Solder-Joint Check Valves are recommended for service on steam, hot water, and cold water. They are well suited for plumbing and heating systems and for low pressure steam and water lines in industrial and process plants.

When valves are installed on steam lines, the solder used to make joints must have a melting point high enough to withstand the temperature of the steam. For recommendations on solders, see page 485.

Construction: The No. 1303 are swing check valves and have a brass disc. The No. 1304 are horizontal lift check valves and have a composition disc. Both types are strong and well proportioned; they will easily withstand normal operating strains. All parts are made of good quality materials.

Discs in No. 1304 Valves: Unless otherwise ordered, the No. 1304 Valves are furnished with a No. 8 Low Pressure Hot Water Disc, suitable for hot water or for cold water.

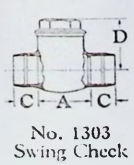
When ordered for steam service, they will be furnished with a No. 7 Low Pressure Steam Disc.

For description and dimensions of discs, see page 168.

A metal plate, secured to the cap of the valve, identifies the type of disc.

Larger sizes and higher pressure valves: When larger size valves or valves suitable for higher pressures are wanted, Crane screwed or flanged valves with solder-joint adaptors are recommended; see page 469.

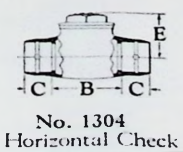
No. 1304 Valves are furnished with a tag giving special instructions for soldering.



No. 1303
Swing Check

Dimensions, in Inches

Size	3/8	1/2	3/4	1	1 1/4	1 1/2	2
A		1 3/8	1 11/16	2 1/16	2 7/16	2 7/8	3 1/2
B	1 9/16	1 13/16	2	2 3/8	2 3/4	3 1/4	3 15/16
C	11/16	13/16	1	1 1/16	1 1/8	1 3/16	1 3/8
D		1 9/16	1 13/16	2 3/16	2 9/16	2 13/16	3 1/4
E	1 1/4	1 3/8	1 5/8	1 3/4	2	2 1/4	2 1/2



No. 1304
Horizontal Check

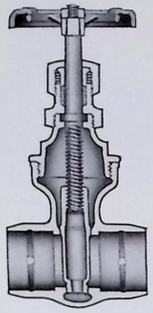
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asbestosclaims.law/library/21275/252

Brass Solder-Joint Gate Valves

Wedge Disc—Non-Rising Stem

Licensed under Mueller Brass Co., STREAMLINE Division, Patents

WORKING PRESSURE — 100 pounds steam



Cross Section

STEAM SERVICE
The solder used to make joints on steam lines must be capable of withstanding the temperature of the steam in the line; see page 485.



No. 1319

List Prices

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 1319, Gate Valve	Each	2.25	2.25	2.75	3.50	4.50	5.75	8.00

Solder-joint ends: These valves are made for use with copper tubing. Their end connections are the same as those used on Crane Brass Solder-Joint Fittings.

Service recommendations: No. 1319 Brass Solder-Joint Gate Valves will give good service under moderate working conditions. They are recommended for general shut-off valve service on low pressure steam and water lines. They are well suited for plumbing and heating systems, circulating water lines, low pressure condensation return lines, and similar low pressure service.

When valves are installed on steam lines, the solder used to make joints must have a melting point that is high enough to withstand the temperature of the steam. For solders, see page 485.

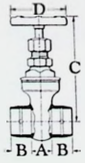
Construction: The valves have a non-rising stem and a solid wedge disc. They are sturdily constructed and are amply reinforced to withstand piping and operating strains. All parts are made of good quality materials.

Stuffing box: The stuffing box is equipped with a gland and is filled with high grade packing.

Wheel: The No. 1319 Solder-Joint Gate Valves are furnished with Crane Style C Malleable Iron Non-Heating Oval Wheels. The wheel, being oval in shape, fits the operator's hand comfortably. It has a broad lip, affording a better grip for the palm and fingers, and the oval shape is easier to hold.

Repacking: These valves, when wide open, can be repacked while under pressure.

Larger sizes and higher pressure valves: When larger size valves or valves suitable for higher pressures are wanted, Crane screwed or flanged valves with solder-joint adaptors are recommended; see page 469.





These valves have oval wheel.

Dimensions, in Inches

Size	3/8	1/2	3/4	1	1 1/4	1 1/2	2
A	7/8	13/16	7/8	1	1 1/16	1 1/8	1 3/8
B	11/16	13/16	1	1 1/16	1 1/8	1 3/16	1 3/8
C	3 3/4	3 3/4	4 1/2	5 1/4	5 3/4	6 1/2	7 5/8
D	2 1/4	2 1/4	2 5/8	3	3 3/8	3 3/4	4 1/4

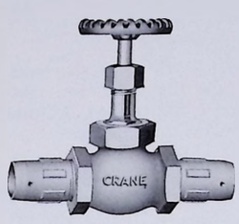
Large Size or High Pressure

Brass Solder-Joint Valves

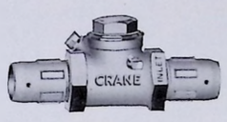
Users may sometimes require Brass Solder-Joint Valves in larger sizes or of heavier construction than those shown on the preceding three pages. This is especially true when valves are wanted for industrial installations where pipe sizes are often large and where services are frequently severe.

For such purposes, Crane Co. supplies a wide variety of screwed end and flanged end brass valves made suitable for copper tubing through the use of adaptors. A few of the popular types are illustrated below:

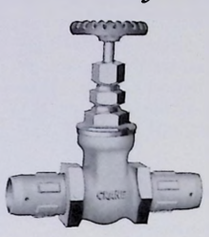
Screwed End Valves with Solder-Joint Adaptors



Globe Valve



Check Valve

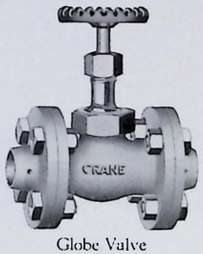


Gate Valve

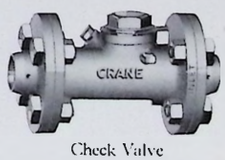
The No. 1353 Copper to Male Pipe Thread Couplings shown on page 475 are ideal adaptors for screwed end valves. They make available for copper tubing installations the complete Crane line of Screwed End Brass Valves, providing the user with an excellent selection of sizes, styles, and weights. They are easy and economical to use.

Flanged End Valves with Solder-Joint Adaptors

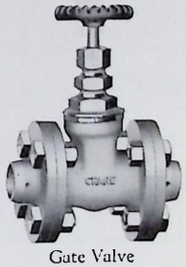
The No. 1385 Companion Flanges shown on page 482 are ideal adaptors for flanged end valves. They provide a quick, easy, and economical means of making any of the wide selection of Crane Flanged End 150-Pound Brass Valves suitable for copper tubing installations. With this combination, the entire valve can be removed at any time by simply taking out the end flange bolts.



Globe Valve



Check Valve



Gate Valve

Screwed End and Flanged End Brass Valves are shown on pages 12 to 47.

Brass Solder-Joint

Radiator Valves and Union Elbows

Licensed under Mueller Brass Co., STREAMLINE Division, Patents



Solder-Joint Radiator Angle Valve

Brass Solder-Joint Radiator Valves and Radiator Union Elbows can be made to order; prices and dimensions are furnished on application. Inquiries should state quantity, size, style of valve, and service.

Screwed End Brass Radiator Valves and Union Elbows are shown on pages 48 to 51.



Solder-Joint Radiator Union Elbow

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asbestosclaims.law/library/21275/253

Brass Solder-Joint Fittings

Pressure Ratings and Service Recommendations

Unusually wide range of application: Brass Solder-Joint Fittings combined with copper tubing have an unusually wide range of application. They are ideally suited for hot and cold water lines, for low pressure steam lines, and for underground water lines such as are used in plumbing, heating, and air conditioning systems in homes, apartments, hotels, offices, public buildings, hospitals, and factories.

In addition, they are well suited for an almost endless variety of services in industrial and processing plants, as on water and air lines, low pressure steam lines, pressure lubricating systems, stock lines in paper mills, liquor lines in breweries and distilleries, certain dye lines in textile mills, and many others.

Service recommendations: Brass Solder-Joint Fittings are recommended for hot water, cold water, saturated steam, air, vacuum, liquors used in breweries and distilleries, and many similar services that are not corrosive to brass and copper and are non-hazardous.

Hazardous fluids: Because soldered joints are generally made with an open flame torch, and also because solders fuse at a comparatively low temperature, considerable danger attends the installation and use of soldered joints on noxious or inflammable liquids and gases. When all danger of fire is eliminated, Brass Solder-Joint Fittings can be used for such service. Detail recommendations will be furnished upon receipt of complete information regarding the proposed installation.

Steam service: The success of a solder-joint installation on steam service depends upon the quality of the solder used when making joints. The solder must have a melting point that is high enough to remain unaffected by the temperature of the steam. For recommendations on solders, see page 485.

Working pressure ratings: Working pressure ratings of Solder-Joint Fittings are given in the table shown below. For convenience, the ratings of Crane Solder-Joint Valves are repeated in the table.

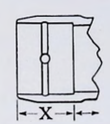
Working Pressure Ratings, Pounds per Square Inch

Article	Catalogue Numbers	Sizes	Working Pressures	
			Saturated Steam	Water, 200° F.
Solder-Joint Valves	Nos. 1300, 1301, 1302, 1303, 1304, and 1319	All sizes	100 pounds	125 pounds
Solder-Joint Fittings	Nos. 1326 to 1371 inclusive Nos. 1380, 1381, 1383, and 1384	2-inch and smaller	200 pounds	250 pounds
		2½ and 3-inch	80 pounds	250 pounds
		3½-inch and larger	80 pounds	150 pounds
Solder-Joint Flanges and Flanged Fittings	Nos. 1385 and 1387	2-inch and smaller	150 pounds	225 pounds
		2½-inch and larger	80 pounds	225 pounds
	Nos. 1374, 1375, 1376, and 1378	All sizes	25 pounds	43 pounds
Copper Tubing Bends and Offsets	Nos. 1389, 1392, 1393, 1394, and 1395	All sizes	250 pounds	250 pounds

Dimensions of Brass Solder-Joint Fittings

For the convenience of users, roughing-in dimensions of all sizes and types of Brass Solder-Joint Fittings have been included in this catalogue.

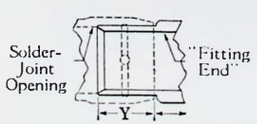
All solder-joint openings except those used on Drainage Fittings have the same depth of recess, size for size, regardless of the type of fitting. The depth on valves, too, is the same as on fittings, size for size.



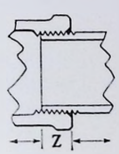
Dimension "X" is the depth of recess

Solder-Joint Drainage Fittings have a shorter recess; since they are used on gravity flow lines only, the deep recess needed for pressure joints is not required.

Fittings having what is known as a "fitting end" are used in combination with other Solder-Joint Fittings or with Solder-Joint Valves; the "fitting end" is designed to slip into a solder-joint opening. Fitting ends are slightly longer than the standard depth of recess. The roughing-in dimensions for such fittings are measured from the outer edge of the fitting to the point to which a solder-joint opening will reach, as indicated by the letter "Y" in the accompanying illustration.



Fittings having ends with inside or outside iron pipe threads are dimensioned to show not the length of thread but the distance a male pipe thread will screw into a female pipe thread when pulled up with a wrench to make a tight joint. As an example, dimension "Z", shown in the accompanying illustration, indicates the length of thread engagement in a made up joint. This dimension is referred to on the following pages as "thread engagement".

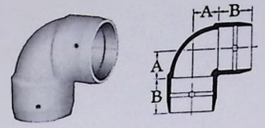


"Z" is thread engagement when joint is made up tight

Tinned Valves and Fittings for special services are made to order; prices are furnished on application.

Brass Solder-Joint Fittings

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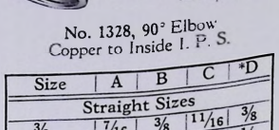


No. 1326, 90° Elbow
Copper to Copper

Size	A	B
Straight Sizes		
¼	¼	9/16
⅜	5/16	11/16
½	7/16	13/16
¾	9/16	1
1	¾	1 1/16
1¼	⅞	1⅛
1½	1	1 3/16
2	1¼	1⅜
2½	1½	1⅝
3	1¾	1⅞
3½	2	2 1/16
4	2¼	2¼
5	3⅛	2¾
6	3⅝	3⅜



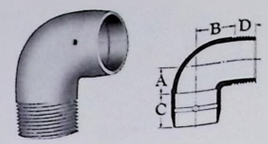
Size	C	D	E	F
Reducing Sizes				
⅜ x ¼	¼	5/16	11/16	9/16
½ x ⅜	⅝	7/16	13/16	11/16
½ x ¼	5/16	⅜	13/16	9/16
¾ x ½	7/16	9/16	1	13/16
1 x ¾	⅝	¾	1 1/16	1
1 x ½	½	¾	1 1/16	13/16
1¼ x 1	¾	⅞	1⅛	1 1/16
1¼ x ¾	⅝	⅞	1⅛	1
1½ x 1¼	⅞	1	1 3/16	1⅛
1½ x 1	¾	1	1 3/16	1 1/16
2 x 1½	1	1¼	1⅜	1 3/16
2 x 1¼	⅞	1¼	1⅜	1⅛
2 x 1	⅞	1 5/16	1⅜	1 1/16
2½ x 2	1¼	1½	1⅝	1⅜
3 x 2	1¼	1¾	1⅞	1⅜



No. 1328, 90° Elbow
Copper to Inside I. P. S.

Size	A	B	C	*D
Straight Sizes				
⅜	7/16	⅜	11/16	⅜
½	9/16	⅜	13/16	½
¾	11/16	7/16	1	9/16
1	⅞	9/16	1 1/16	11/16
1¼	⅞	13/16	1⅛	11/16
1½	1	15/16	1 3/16	11/16
2	1¼	1⅛	1⅜	¾
2½	1 9/16	1⅝	1⅝	15/16
3	1⅞	1⅞	1⅞	1
4	2⅜	2 5/16	2¼	1⅛
Reducing Sizes				
Copper x Inside				
⅜ x ½	½	⅜	11/16	½
½ x ¾	⅝	7/16	13/16	9/16
½ x ⅜	7/16	7/16	13/16	⅜
¾ x 1	¾	9/16	1	11/16
¾ x ½	½	½	1	½
1 x 1¼	⅞	11/16	1 1/16	11/16
1 x ¾	⅝	⅝	1 1/16	9/16
1¼ x 1½	1	13/16	1⅛	11/16
1¼ x 1	¾	¾	1⅛	11/16
1½ x 2	1¼	⅞	1 3/16	¾
2 x 2½	1½	1⅜	1⅜	15/16
2 x 1	¾	1 1/16	1⅜	11/16
2 x ¾	⅞	1 7/16	1⅜	9/16
2½ x 2	1¼	15/16	1⅝	¾
2½ x 1	¾	15/16	1⅝	11/16
3 x 1½	1 1/16	1⅝	1⅞	11/16

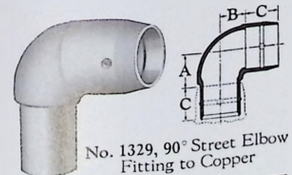
*"D" is thread engagement.



No. 1327, 90° Elbow
Copper to Outside I. P. S.

Size	A	B	C	*D
Straight Sizes				
¼	¼	½	9/16	⅜
⅜	5/16	⅝	11/16	⅜
½	7/16	¾	13/16	½
¾	9/16	1	1	9/16
1	¾	1⅛	1 1/16	11/16
1¼	⅞	1 5/16	1⅛	11/16
1½	1	1½	1 3/16	11/16
2	1¼	1⅞	1⅜	¾
2½	1½	2 3/16	1⅝	15/16
3	1¾	2⅝	1⅞	1
4	2¼	3⅜	2¼	1⅛
5	3⅛	4	2¾	1¼
6	3⅝	4 11/16	3⅜	1 5/16
Reducing Sizes				
Copper x Outside				
¼ x ⅛	3/16	9/16	9/16	¼
⅜ x ½	7/16	11/16	11/16	½
½ x ¾	9/16	⅞	13/16	9/16
½ x ⅜	⅜	¾	13/16	⅜
¾ x 1	¾	1	1	11/16
¾ x ½	7/16	⅞	1	½
1 x 1¼	⅞	13/16	1 1/16	11/16
1 x ¾	⅝	¾	1 3/16	9/16
1¼ x 1½	⅞	13/16	1⅛	11/16
1¼ x 1	¾	1⅜	1⅛	11/16
1½ x 2	1¼	1 5/16	1 3/16	¾
2 x 2½	1½	1 15/16	1⅜	15/16
2 x 1½	1	1¾	1⅜	11/16

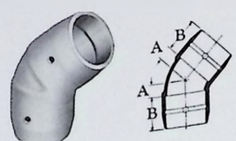
*"D" is thread engagement.



No. 1329, 90° Street Elbow
Fitting to Copper

Size	A	B	C
½	⅝	7/16	13/16
¾	¾	9/16	1
1	1	¾	1 1/16
1¼	1⅛	⅞	1⅛
1½	1¼	1	1 3/16
2	1½	1¼	1⅜

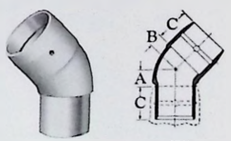
Working pressures . . . . page 470



No. 1331, 45° Elbow
Copper to Copper

Size	A	B	Size	A	B
¼	3/16	9/16	2	9/16	1⅜
⅜	3/16	11/16	2½	⅝	1⅝
½	3/16	13/16	3	¾	1⅞
¾	¼	1	3½	⅞	2 1/16
1	5/16	1 1/16	4	15/16	2¼
1¼	7/16	1⅛	5	1 7/16	2¾
1½	½	1 3/16	6	1⅝	3⅜

All dimensions are in inches.



No. 1332, 45° Street Elbow
Fitting to Copper

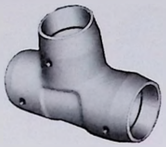
Size	A	B	C
½	7/16	3/16	13/16
¾	7/16	¼	1
1	½	5/16	1 1/16
1¼	9/16	7/16	1⅛
1½	⅝	½	1 3/16
2	13/16	9/16	1⅜

Prices on application

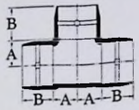
Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
Published by AsbestosClaims.Law
ACL Doc 21275 · Page 254 of 402
asbestosclaims.law/library/21275/254

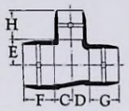
Brass Solder-Joint Fittings

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No. 1335, Tee
Copper to Copper to Copper





Size	A	B
Straight Sizes		
1/4	1/4	9/16
3/8	5/16	11/16
1/2	7/16	13/16
3/4	9/16	1
1	3/4	1 1/16
1 1/4	7/8	1 1/8
1 1/2	1	1 3/16
2	1 1/4	1 3/8
2 1/2	1 1/2	1 5/8
3	1 3/4	1 7/8
3 1/2	2	2 1/16
4	2 1/4	2 1/4
5	3 1/8	2 3/4
6	3 5/8	3 3/8

Size	C	D	E	F	G	H
Reducing Sizes						
3/8 x 3/8 x 1/4	1/4	1/4	5/16	11/16	11/16	9/16
3/8 x 1/4 x 3/8	5/16	5/16	5/16	11/16	9/16	11/16
3/8 x 1/4 x 1/4	1/4	1/4	5/16	11/16	9/16	9/16
1/2 x 1/2 x 3/8	3/8	3/8	7/16	13/16	13/16	11/16
1/2 x 1/2 x 1/4	5/16	5/16	3/8	13/16	13/16	9/16
1/2 x 3/8 x 1/2	7/16	7/16	7/16	13/16	11/16	13/16
1/2 x 3/8 x 3/8	3/8	7/16	7/16	13/16	11/16	11/16
3/8 x 3/8 x 1/2	7/16	7/16	3/8	11/16	9/16	13/16
3/8 x 1/4 x 1/2	7/16	7/16	5/16	11/16	9/16	11/16
3/4 x 3/4 x 1/2	7/16	7/16	9/16	1	1	1
3/4 x 3/4 x 3/8	3/8	3/8	5/16	1	1	11/16
3/4 x 1/2 x 3/4	9/16	9/16	9/16	1	13/16	1
3/4 x 1/2 x 1/2	7/16	7/16	9/16	1	13/16	11/16
3/4 x 1/2 x 3/8	3/8	3/8	9/16	1	13/16	1
1/2 x 1/2 x 3/4	9/16	9/16	7/16	13/16	11/16	1
1 x 1 x 3/4	5/8	5/8	3/4	1 1/16	1 1/16	13/16
1 x 1 x 1/2	1/2	1/2	3/4	1 1/16	1 1/16	11/16
1 x 1 x 3/8	7/16	7/16	3/4	1 1/16	1 1/16	1
1 x 3/4 x 1	3/4	11/16	3/4	1 1/16	1	1
1 x 3/4 x 3/4	5/8	9/16	3/4	1 1/16	1	13/16
1 x 3/4 x 1/2	1/2	7/16	3/4	1 1/16	1	11/16
1 x 3/4 x 3/8	1/2	7/16	7/8	1 1/16	1	1
1 x 1/2 x 1	3/4	3/4	3/4	1 1/16	13/16	1 1/16
1 x 1/2 x 3/4	5/8	9/16	3/4	1 1/16	13/16	13/16
1 x 1/2 x 1/2	1/2	7/16	3/4	1 1/16	13/16	11/16
3/4 x 3/4 x 1	3/4	3/4	5/8	1	13/16	1 1/16
1/2 x 1/2 x 1	3/4	3/4	1/2	1	13/16	1 1/16
1 1/4 x 1 1/4 x 1	3/4	3/4	7/8	1 1/8	1 1/8	1
1 1/4 x 1 1/4 x 3/4	5/8	5/8	7/8	1 1/8	1 1/8	13/16
1 1/4 x 1 1/4 x 1/2	1/2	1/2	7/8	1 1/8	1 1/8	11/16
1 1/4 x 1 1/4 x 3/8	1/2	1/2	1	1 1/8	1 1/8	1
1 1/4 x 1 x 1 1/4	7/8	7/8	7/8	1 1/8	1 1/16	1 1/16
1 1/4 x 1 x 1	3/4	3/4	7/8	1 1/8	1 1/16	1
1 1/4 x 1 x 3/4	5/8	5/8	7/8	1 1/8	1 1/16	13/16
1 1/4 x 1 x 1/2	1/2	1/2	7/8	1 1/8	1 1/16	11/16
1 1/4 x 3/4 x 1 1/4	7/8	7/8	7/8	1 1/8	1	1 1/16
1 1/4 x 3/4 x 1	3/4	3/4	7/8	1 1/8	1	1
1 1/4 x 3/4 x 3/4	5/8	9/16	7/8	1 1/8	1	13/16
1 1/4 x 1/2 x 1 1/4	7/8	7/8	7/8	1 1/8	1	1 1/16

Size	C	D	E	F	G	H
Reducing Sizes (Continued)						
1 1/4 x 1/2 x 1	3/4	3/4	7/8	1 1/8	1 3/16	1 1/16
1 x 1 x 1 1/4	7/8	7/8	3/4	1 1/16	1 1/16	1 1/8
3/4 x 3/4 x 1 1/4	7/8	7/8	5/8	1	1	1 1/8
1 1/2 x 1 1/2 x 1 1/4	7/8	7/8	1	1 3/16	1 3/16	1 1/16
1 1/2 x 1 1/2 x 1	3/4	3/4	1	1 3/16	1 3/16	1
1 1/2 x 1 1/2 x 3/4	5/8	5/8	1	1 3/16	1 3/16	13/16
1 1/2 x 1 1/2 x 1/2	1/2	1/2	1	1 3/16	1 3/16	11/16
1 1/2 x 1 1/2 x 3/8	1/2	1/2	1 1/8	1 3/16	1 3/16	1
1 1/2 x 1 1/4 x 1 1/2	1	1	1	1 3/16	1 1/8	1 3/16
1 1/2 x 1 1/4 x 1 1/4	7/8	7/8	1	1 3/16	1 1/8	1 1/16
1 1/2 x 1 1/4 x 1	3/4	3/4	1	1 3/16	1 1/8	1
1 1/2 x 1 1/4 x 3/4	5/8	5/8	1	1 3/16	1 1/8	13/16
1 1/2 x 1 1/4 x 1/2	1/2	1/2	1	1 3/16	1 1/8	11/16
1 1/2 x 1 x 1 1/2	1	1	1	1 3/16	1 1/16	1 3/16
1 1/2 x 1 x 1 1/4	7/8	7/8	1	1 3/16	1 1/16	1 1/16
1 1/2 x 1 x 1	3/4	3/4	1	1 3/16	1 1/16	1
1 1/2 x 1 x 3/4	5/8	5/8	1	1 3/16	1 1/16	13/16
1 1/2 x 3/4 x 1 1/2	1	1	1	1 3/16	1	1 1/8
1 1/4 x 1 1/4 x 1 1/2	1	1	7/8	1 1/8	1 1/16	1 3/16
1 x 1 x 1 1/2	1	1	3/4	1 1/16	1 1/16	1 1/16
2 x 2 x 1 1/2	1	1	1 1/4	1 3/8	1 3/8	1 3/16
2 x 2 x 1 1/4	7/8	7/8	1 1/4	1 3/8	1 3/8	1 1/16
2 x 2 x 1	3/4	3/4	1 1/4	1 3/8	1 3/8	1
2 x 2 x 3/4	5/8	5/8	1 1/4	1 3/8	1 3/8	13/16
2 x 2 x 1/2	1/2	1/2	1 1/4	1 3/8	1 3/8	1 3/8
2 x 1 1/2 x 2	1 1/4	1 1/4	1 1/4	1 3/8	1 3/16	1 3/16
2 x 1 1/2 x 1 1/2	1	1	1 1/4	1 3/8	1 3/16	1 1/8
2 x 1 1/2 x 1 1/4	7/8	7/8	1 1/4	1 3/8	1 3/16	1 1/16
2 x 1 1/2 x 1	3/4	3/4	1 1/4	1 3/8	1 3/16	1
2 x 1 1/2 x 3/4	5/8	5/8	1 1/4	1 3/8	1 3/16	13/16
2 x 1 1/2 x 1/2	1/2	1/2	1 1/4	1 3/8	1 3/16	11/16
2 x 1 1/2 x 3/8	7/16	7/16	1 1/4	1 3/8	1 3/16	1 3/8
2 x 1 1/4 x 2	1 1/4	1 1/4	1 1/4	1 3/8	1 1/8	1 3/16
2 x 1 1/4 x 1 1/2	1	1	1 1/4	1 3/8	1 1/8	1 1/8
2 x 1 1/4 x 1 1/4	7/8	7/8	1 1/4	1 3/8	1 1/8	1 1/16
2 x 1 1/4 x 1	3/4	3/4	1 1/4	1 3/8	1 1/8	1
2 x 1 x 2	1 1/4	1 1/4	1 1/4	1 3/8	1 1/16	1 3/16
2 x 1 x 1 1/2	1	1	1 1/4	1 3/8	1 1/16	1 1/16
2 x 1 x 1	3/4	3/4	1 1/4	1 3/8	1 1/16	1
2 x 3/4 x 2	1 1/4	1 1/4	1 1/4	1 3/8	1	1 3/16
2 x 3/4 x 1 1/2	1	1	1 1/4	1 3/8	1	1 1/16
2 x 1/2 x 2	1 1/4	1 1/4	1 1/4	1 3/8	1 3/16	1 3/8
1 1/2 x 1 1/2 x 2	1 1/4	1 1/4	1	1 3/16	1 3/16	1 3/8
1 1/4 x 1 1/4 x 2	1 1/4	1 1/4	7/8	1 1/8	1 1/8	1 3/8
2 1/2 x 2 1/2 x 2	1 1/4	1 1/4	1 1/2	1 5/8	1 5/8	1 3/16
2 1/2 x 2 1/2 x 1 1/2	1	1	1 1/2	1 5/8	1 5/8	1 1/8
2 1/2 x 2 1/2 x 1 1/4	7/8	7/8	1 1/2	1 5/8	1 5/8	1 1/16
2 1/2 x 2 1/2 x 1	3/4	3/4	1 1/2	1 5/8	1 5/8	1
2 1/2 x 2 1/2 x 3/4	5/8	5/8	1 1/2	1 5/8	1 5/8	13/16
2 1/2 x 2 1/2 x 1/2	1/2	1/2	1 1/2	1 5/8	1 5/8	1 5/8
2 1/2 x 2 x 2	1 1/2	1 1/2	1 1/2	1 5/8	1 3/8	1 3/8
2 1/2 x 2 x 1 1/2	1 1/4	1 1/4	1 1/2	1 5/8	1 3/8	1 3/16
2 1/2 x 2 x 1 1/4	1	1	1 1/2	1 5/8	1 3/8	1 1/8
2 1/2 x 2 x 1	7/8	7/8	1 1/2	1 5/8	1 3/8	1 1/16
2 1/2 x 2 x 3/4	3/4	3/4	1 1/2	1 5/8	1 3/8	1
2 1/2 x 2 x 1/2	5/8	5/8	1 1/2	1 5/8	1 3/8	1 3/16
2 1/2 x 1 1/2 x 2	1 1/4	1 1/4	1 1/2	1 5/8	1 3/16	1 3/16
2 1/2 x 1 1/2 x 1 1/2	1	1	1 1/2	1 5/8	1 3/16	1 1/8
2 1/2 x 3/4 x 2 1/2	1 1/2	1 1/2	1 1/2	1 5/8	1	1 5/8
2 x 2 x 2 1/2	1 1/2	1 1/2	1 1/4	1 3/8	1	1 5/8
1 1/2 x 1 1/2 x 2 1/2	1 1/2	1 1/2	1	1 3/8	1 3/16	1 5/8
3 x 3 x 2 1/2	1 1/2	1 1/2	1 1/2	1 7/8	1 7/8	1 3/8
3 x 3 x 2	1 1/4	1 1/4	1 1/4	1 3/4	1 7/8	1 3/16
3 x 3 x 1 1/2	1 1/16	1 1/16	1 1/4	1 3/4	1 7/8	1 1/16
3 x 3 x 1 1/4	15/16	15/16	1 1/4	1 3/4	1 7/8	1
3 x 3 x 1	13/16	13/16	1 1/4	1 3/4	1 7/8	1
3 x 3 x 3/4	11/16	11/16	1 1/4	1 3/4	1 7/8	1

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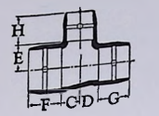
Working pressures . . . page 470

All dimensions are in inches.

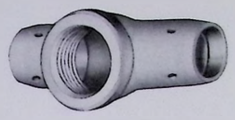
Prices on application

Brass Solder-Joint Fittings

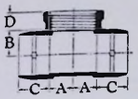
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No. 1335, Tee
Copper to Copper to Copper
Reducing Sizes
(Continued)

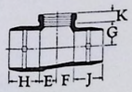


No. 1337, Tee
Copper to Copper to Inside I. P. S.



Size	A	B	C	*D
Straight Sizes				
3/8	7/16	3/8	11/16	3/8
1/2	9/16	3/8	13/16	1/2
3/4	11/16	7/16	1	9/16
1	7/8	9/16	1 1/16	11/16
1 1/4	7/8	13/16	1 1/8	11/16
1 1/2	1	15/16	1 3/16	11/16
2	1 1/4	1 1/8	1 3/8	3/4
3	1 3/4	2 5/8	1 7/8	1
4	3 1/8	3 1/2	2 1/4	1 1/8
6	3 5/8	4 7/16	3 3/8	1 5/16

*"D" is thread engagement.



Size	C	D	E	F	G	H
Reducing Sizes (Continued from preceding page)						
3 x 3 x 1/2	9/16	9/16	1 3/4	1 7/8	1 5/8	1 5/8
3 x 2 1/2 x 2 1/2	1 1/2	1 1/2	1 3/4	1 7/8	1 5/8	1 3/8
3 x 2 1/2 x 2	1 1/4	1 1/4	1 15/16	1 7/8	1 5/8	1 3/16
3 x 2 1/2 x 1 1/2	1 1/4	7/8	1 3/4	1 7/8	1 5/8	1 1/16
3 x 2 1/2 x 1 1/4	15/16	3/4	1 3/4	1 7/8	1 5/8	1
3 x 2 1/2 x 1	13/16	5/8	1 3/4	1 7/8	1 5/8	1
3 x 2 1/2 x 3/4	11/16					
3 x 2 x 3	1 3/4	1 3/4	1 3/4	1 7/8	1 3/8	1 7/8
3 x 2 x 2	1 1/4	1 1/4	1 3/4	1 7/8	1 3/8	1 3/8
3 x 1 1/2 x 3	1 3/4	1 3/4	1 3/4	1 7/8	1 3/16	1 7/8
3 x 1 1/2 x 2 1/2	1 1/2	1 1/2	1 3/4	1 7/8	1 3/16	1 5/8
3 x 1 1/2 x 1	1 3/16	3/4	1 3/4	1 7/8	1 5/16	1 1/16
2 1/2 x 2 1/2 x 3	1 3/4	1 3/4	1 1/2	1 5/8	1 5/8	1 7/8
2 x 2 x 3	1 3/4	1 3/4	1 1/4	1 3/8	1 3/8	1 7/8
3 1/2 x 3 1/2 x 2 1/2	1 1/2	1 1/2	2	2 1/16	2 1/16	1 5/8
3 1/2 x 3 1/2 x 2	1 1/2	1 1/2	2 1/4	2 1/16	2 1/16	1 3/8
3 1/2 x 3 1/2 x 1 1/4	15/16	15/16	2	2 1/16	2 1/16	1 1/8
3 1/2 x 3 1/2 x 1	13/16	13/16	2	2 1/16	2 1/16	1 1/16
3 1/2 x 3 1/2 x 3/4	11/16	11/16	2	2 1/16	2 1/16	1
3 1/2 x 3 x 3	1 3/4	1 3/4	2 1/2	2 1/16	1 7/8	1 7/8
3 1/2 x 3 x 2	1 3/4	1 3/4	2	2 1/16	1 7/8	1 3/8
3 1/2 x 3 x 3/4	11/16	11/16	2	2 1/16	1 7/8	1
3 1/2 x 2 1/2 x 3	1 3/4	1 3/4	2	2 1/16	1 5/8	1 7/8
3 1/2 x 2 1/2 x 2	1 3/4	1 3/4	2	2 1/16	1 5/8	1 3/8
3 1/2 x 2 x 3	1 3/4	1 3/4	2	2 1/16	1 3/8	1 7/8
3 1/2 x 1 1/2 x 3	1 3/4	2	1 1/2	1 5/8	2 1/4	1 7/8
2 1/2 x 2 1/2 x 3 1/2	2					
4 x 4 x 3	1 3/4	1 3/4	2 1/4	2 1/4	2 1/4	1 7/8
4 x 4 x 2 1/2	1 9/16	1 9/16	2 1/4	2 1/4	2 1/4	1 5/8
4 x 4 x 2	1 5/16	1 5/16	2 1/4	2 1/4	2 1/4	1 3/8
4 x 4 x 1 1/2	1 1/16	1 1/16	2 1/4	2 1/4	2 1/4	1 1/8
4 x 4 x 1 1/4	15/16	15/16	2 1/4	2 1/4	2 1/4	1 1/16
4 x 4 x 1	13/16	13/16	2 1/4	2 1/4	2 1/4	1
4 x 4 x 3/4	11/16	11/16	2 3/16	2 1/4	2 1/4	1
4 x 4 x 1/2	9/16	9/16	2 3/16	2 1/4	2 1/4	1
4 x 3 1/2 x 2 1/2	1 9/16	1 1/2	2 1/4	2 1/4	2 1/16	1 5/8
4 x 3 1/2 x 2	1 9/16	1 1/2	2 1/2	2 1/4	2 1/16	1 3/8
4 x 3 1/2 x 1 1/2	1 1/16	1 1/16	2 1/4	2 1/4	2 1/16	1 3/16
4 x 3 x 4	2 1/4	2 1/4	2 1/4	2 1/4	1 7/8	2 1/4
4 x 3 x 3	1 3/4	1 3/4	2 1/4	2 1/4	1 7/8	1 7/8
4 x 3 x 2	1 5/16	1 1/4	2 1/4	2 1/4	1 7/8	1 3/8
4 x 2 1/2 x 2 1/2	1 9/16	1 1/2	2 1/4	2 1/4	1 5/8	2 1/4
4 x 2 x 4	2 1/4	2 1/4	2 1/4	2 1/4	1 3/8	2 1/4
4 x 2 x 2	2 1/4	2 1/4	1 5/16	2 1/4	2 3/4	1 7/8
5 x 5 x 3	1 15/16	1 15/16	3 1/8	2 3/4	2 3/4	1 5/8
5 x 5 x 2 1/2	1 15/16	1 15/16	3 1/8	2 3/4	2 3/4	1 3/8
5 x 5 x 2	1 11/16	1 11/16	3 1/8	2 3/4	2 1/4	1 7/8
5 x 4 x 3	2 3/16	2	3 1/8	2 3/4	2 1/4	2 1/16
5 x 3 x 3 1/2	2 7/16	2	3 1/8	2 3/4	2 1/4	2 1/4
5 x 2 x 3 1/2	2 7/16	2	3 1/8	2 3/4	2 1/4	2 1/4
5 x 4 x 5	3 1/8	3 1/8	2 5/8	3 3/8	3 3/8	2 3/4
6 x 6 x 5	3 1/8	3 1/8	3 5/8	3 3/8	3 3/8	2 1/4
6 x 6 x 4	2 5/8	2 5/8	3 5/8	3 3/8	3 3/8	2 1/4
6 x 6 x 3	2 5/8	2 5/8	3 5/8	3 3/8	3 3/8	1 7/8
6 x 6 x 2 1/2	1 15/16	1 15/16	3 5/8	3 3/8	3 3/8	1 5/8
6 x 6 x 2	1 11/16	1 11/16	3 5/8	3 3/8	3 3/8	1 3/8
6 x 5 x 3	2 3/16	2 3/16	3 5/8	3 3/8	2 3/4	1 7/8
6 x 4 x 6	3 5/8	3 5/8	3 5/8	3 3/8	2 1/4	3 3/8
6 x 2 x 6	3 5/8	3 7/16	3 5/8	3 3/8	1 3/8	3 3/8
4 x 4 x 6	3 5/8	3 5/8	2 11/16	2 1/4	2 1/4	3 3/8

Size Copper x Copper x Inside	E	F	G	H	J	*K
Reducing Sizes						
1/2 x 1/2 x 3/8	7/16	7/16	7/16	13/16	13/16	3/8
1/2 x 1/2 x 1/4	7/16	7/16	7/16	13/16	13/16	3/8
3/4 x 3/4 x 1/2	1/2	1/2	1/2	1	1	1/2
3/4 x 3/4 x 3/8	7/16	7/16	1/2	1	1	3/8
3/4 x 1/2 x 1/2	1/2	9/16	1/2	1	13/16	1/2
3/4 x 1/2 x 3/8	1/2	9/16	1/2	1	13/16	9/16
1/2 x 1/2 x 3/4	5/8	7/16	7/16	13/16	11/16	9/16
3/8 x 3/8 x 3/4	7/16					
1 x 1 x 3/4	5/8	5/8	5/8	1 1/16	1 1/16	9/16
1 x 1 x 1/2	1/2	1/2	5/8	1 1/16	1 1/16	1/2
1 x 3/4 x 3/4	5/8	1/2	5/8	1 1/16	1	9/16
1 x 3/4 x 1/2	1/2	11/16	7/8	1 1/16	1	1/2
1 1/4 x 1 x 1	3/4	1/2	5/8	1 1/16	1 1/16	11/16
1 1/4 x 1 1/4 x 3/4	5/8	3/4	3/4	1 1/8	1 1/8	9/16
1 1/4 x 1 1/4 x 1/2	1/2	1/2	3/4	1 1/8	1 1/8	11/16
1 1/4 x 1 x 1	3/4	3/4	3/4	1 1/8	1 1/16	9/16
1 1/4 x 1 x 3/4	5/8	5/8	11/16	1 1/8	1 1/16	11/16
1 1/2 x 1 1/2 x 1 1/4	7/8	7/8	7/8	1 3/16	1 3/16	11/16
1 1/2 x 1 1/2 x 1	7/8	7/8	7/8	1 3/16	1 3/16	9/16
1 1/2 x 1 1/2 x 3/4	7/8	7/8	7/8	1 3/16	1 3/16	1/2
1 1/2 x 1 1/2 x 1/2	1/2	1/2	7/8	1 3/16	1 3/16	11/16
1 1/2 x 1 1/4 x 1	3/4	3/4	1	1 3/16	1 1/8	9/16
1 1/2 x 1 1/4 x 3/4	3/4	3/4	1	1 3/16	1 1/8	11/16
2 x 2 x 1	3/4	3/4	1 1/16	1 3/8	1 3/8	9/16
2 x 2 x 3/4	5/8	5/8	1 1/16	1 3/8	1 3/8	1/2
2 x 2 x 1/2	1/2	1/2	1 1/8	1 3/8	1 3/16	11/16
2 x 1 1/2 x 1 1/4	7/8	15/16	1 1/8	1 3/8	1 3/16	11/16
2 x 1 1/2 x 1	3/4	3/4	1 1/16	1 3/8	1 3/16	11/16
3 x 3 x 1 1/2	1 1/16	1 1/16	1 5/8	1 7/8	1 7/8	1
4 x 4 x 3	1 7/8	1 7/8	2 5/16	2 1/4	2 1/4	9/16
4 x 4 x 3/4	1 7/8	1 7/8	2 5/16	2 1/4	2 1/4	1 1/16
5 x 5 x 4	3 1/8	3 1/8	3 3/4	2 3/4	2 3/4	1 1/8
6 x 6 x 4	3 5/8	3 5/8	4 1/2	3 3/8	3 3/8	1 1/8
6 x 6 x 3	2 5/8	2 5/8	3 7/8	3 3/8	3 3/8	1
6 x 5 x 4	3 1/8	3 3/4	4 3/16	3 3/8	2 3/4	1 1/8

*"K" is thread engagement

Working pressures . . . page 470

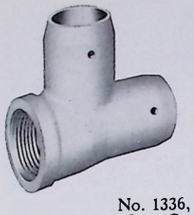
All dimensions are in inches.

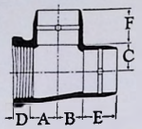
Prices on application

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Brass Solder-Joint Fittings

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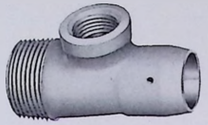


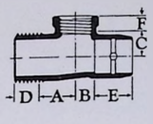


No. 1336, Tee
Inside I. P. S. to Copper to Copper

Size	A	B	C	*D	E	F
Straight Sizes						
½	⅜	7/16	9/16	½	13/16	13/16
¾	7/16	9/16	11/16	9/16	1	1
1	9/16	¾	⅞	11/16	1 1/16	1 1/16
1¼	13/16	⅞	⅞	11/16	1⅛	1⅛
1½	15/16	1	1¼	11/16	1 3/16	1 3/16
2	1⅝	1¼	1½	¾	1⅜	1⅜
2½	1 13/16	1½	1¾	15/16	1⅝	1⅝
Reducing Sizes						
Inside x Copper x Copper						
½ x 1½ x 1½	13/16	1	1	½	13/16	13/16
2½ x 2½ x 2	1 9/16	1¼	1¾	15/16	1⅝	1⅜
1 x 3½ x 3½	3⅜	2	2	11/16	2 1/16	2 1/16

*"D" is thread engagement.

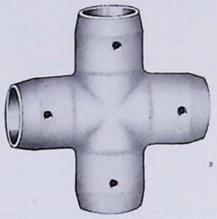




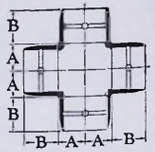
No. 1339, Tee
Outside I. P. S. to Copper to Inside I. P. S.

Size Outside x Copper x Inside	A	B	C	*D	E	*F
1 x ¾ x ½	15/16	½	9/16	11/16	1	½

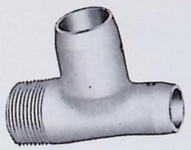
*"D" and "F" are thread engagement.

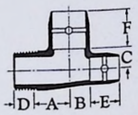


No. 1345, Cross
Copper to Copper



Size	A	B
Straight Sizes		
½	7/16	13/16
¾	9/16	1
1	¾	1 1/16
1¼	⅞	1⅛
1½	1	1 3/16
2	1¼	1⅜
2½	1½	1⅝
3	1¾	1⅞
4	2¼	2¼
6	3⅝	3⅜

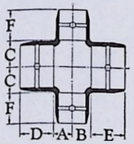




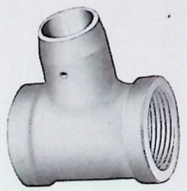
No. 1338, Tee
Outside I. P. S. to Copper to Copper

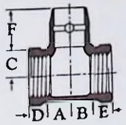
Size Outside x Copper x Copper	A	B	C	*D	E	F
¾ x ½ x ¾	1	9/16	9/16	9/16	13/16	1

*"D" is thread engagement.



Size	A	B	C	D	E	F
Reducing Sizes						
¾ x ¾ x ½ x ½	7/16	7/16	9/16	1	1	13/16
¾ x ¾ x ⅜ x ⅜	⅜	⅜	9/16	1	1	11/16
1 x 1 x ¾ x ¾	⅝	⅝	¾	11/16	1 1/16	1
1 x 1 x ½ x ½	⅝	⅝	¾	11/16	1 1/16	11/16
1 x 1 x ⅜ x ⅜	7/16	7/16	¾	11/16	1 1/16	13/16
1 x ¾ x ½ x ½	⅝	⅝	¾	11/16	1	13/16
1 x ¾ x ⅜ x ⅜	7/16	½	¾	11/16	1	11/16
1¼ x 1¼ x 1 x 1	¾	¾	⅞	1⅛	1⅛	1 1/16
1¼ x 1¼ x ¾ x ¾	⅝	⅝	⅞	1⅛	1⅛	1
1¼ x 1¼ x ½ x ½	⅝	⅝	⅞	1⅛	1⅛	13/16
1¼ x 1 x ½ x ½	⅝	⅝	⅞	1⅛	1⅛	13/16
1½ x 1½ x 1 x 1	¾	¾	1	13/16	13/16	1 1/16
1½ x 1½ x ¾ x ¾	¾	¾	1 1/16	13/16	13/16	1
1½ x 1½ x ½ x ½	¾	¾	1	13/16	13/16	13/16
1½ x 1¼ x ¾ x ¾	⅝	½	⅞	13/16	1⅛	1
1½ x 1¼ x ½ x ½	¾	¾	1	13/16	1⅛	13/16
2 x 2 x 1 x 1	¾	¾	1¼	1⅜	1⅜	1 1/16
2 x 2 x ¾ x ¾	⅝	⅝	1¼	1⅜	1⅜	1
2 x 2 x ½ x ½	½	½	1¼	1⅜	1⅜	13/16
2½ x 2½ x 1 x 1	¾	¾	1½	1⅝	1⅝	1 1/16
3 x 3 x 2 x 2	1¼	1¼	1¾	1⅞	1⅞	1⅜
4 x 3 x 3 x 3	1¾	1¾	2¼	2¼	1⅞	1⅞
6 x 6 x 4 x 4	2⅝	2⅝	3⅝	3⅜	3 3/8	2¼





No. 1340, Tee
Inside I. P. S. to Inside I. P. S. to Copper

Size Inside x Inside x Copper	A	B	C	*D	*E	F
½ x ½ x ½	⅜	⅜	9/16	½	½	13/16
¾ x ½ x ¾	7/16	¾	11/16	9/16	½	1

*"D" and "E" are thread engagement.

Working pressures . . . page 470

All dimensions are in inches.

Prices on application

Brass Solder-Joint Fittings

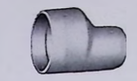
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No. 1351, Cast Coupling
Copper to Copper

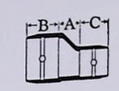


Size	A	B
Straight Sizes		
¾	⅛	1
1	⅛	1 1/16
1¼	⅛	1⅛
1½	⅛	1 3/16
2	3/16	1⅜
2½	3/16	1⅝
3	3/16	1⅞
3½	3/16	2 1/16
4	¼	2¼
5	¼	2¾
6	¼	3⅜
8	¼	3½
Reducing Sizes		
¾ x ⅜	5/16	1
1 x ½	⅜	1 1/16
1¼ x ¾	⅜	1⅛
1½ x 1	⅜	1 3/16
1½ x ¾	⅝	1 1/16
2 x 1½	9/16	1⅜
2 x 1¼	½	1⅜
2 x 1	¾	1 1/16
2 x ¾	⅝	1
2½ x 2	9/16	1⅝
3 x 2½	9/16	1⅞
3 x 1	⅝	1 1/16
3½ x 3	9/16	1⅞
4 x 2½	1⅛	2¼
4 x 2	1⅜	2¼
5 x 4	1⅞	2¾
5 x 2	1 15/16	2¾



No. 1352
Eccentric Coupling
Copper to Copper

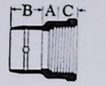




Size	A	B	C
¾ x ½	⅝	1	13/16
1 x ¾	1 1/16	1 1/16	1
1 x ½	½	1 1/16	13/16
1¼ x 1	¾	1⅛	1 1/16
1¼ x ¾	¾	1⅛	1
1½ x 1¼	1 1/16	1 3/16	1⅛
2 x 1½	1⅛	1⅜	1 3/16
2 x 1¼	15/16	1⅜	1⅛
2½ x 2	1 3/16	1⅝	1⅜
2½ x 1½	15/16	1⅝	1 1/16
2½ x 1	1 3/16	1⅝	1⅛
3 x 2½	1¼	1⅞	1⅝
3 x 2	15/16	1⅞	1⅜
3 x 1½	1¼	1⅞	1 3/16
3½ x 3	1⅛	2 1/16	1⅞
3½ x 2½	15/16	2 1/16	1⅝
4 x 3½	1 3/16	2¼	2 1/16
4 x 3	2	2¼	1⅞
4 x 2	1⅜	2¼	1⅜
5 x 4	2⅛	2¾	2¼
5 x 3	1⅞	2¾	1⅞
6 x 5	2	3⅜	2¾
6 x 4	1⅜	3⅜	2¼
6 x 3½	1 7/16	3⅜	2 1/16



No. 1354, Coupling
Copper to Inside I. P. S.

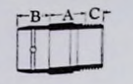


Size	A	B	*C
Straight Sizes			
¼	5/16	9/16	⅜
⅜	7/16	11/16	⅜
½	7/16	13/16	½
¾	7/16	1	9/16
1	7/16	1 1/16	11/16
1¼	9/16	1⅛	11/16
1½	9/16	1 3/16	1 1/16
2	9/16	1⅜	¾
2½	¾	1⅝	15/16
3	13/16	1⅞	1
3½	13/16	2 1/16	1 1/16
4	⅞	2¼	1⅛
5	⅞	2¾	1¼
6	15/16	3⅜	1 15/16
Reducing Sizes			
Copper x Inside			
⅜ x ¼	7/16	11/16	⅜
½ x ⅜	⅜	13/16	⅜
½ x ¼	⅜	13/16	⅜
¾ x ½	7/16	1	½
1¼ x 1	9/16	1⅛	1 1/16
1½ x 1¼	9/16	1 3/16	1 1/16
2 x ¾	⅝	1⅜	3/16
3½ x 2	1⅜	2 1/16	¾

*"C" is thread engagement.

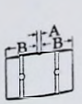


No. 1353, Coupling
Copper to Outside I. P. S.



Size	A	B	*C
Straight Sizes			
¼	9/16	9/16	⅜
⅜	11/16	11/16	⅜
½	1	1 3/16	½
¾	1 1/16	1	9/16
1	1⅛	1 1/16	11/16
1¼	1 3/16	1⅛	1 1/16
1½	1¼	1 3/16	1 1/16
2	1⅝	1⅜	¾
2½	1 11/16	1⅝	15/16
3	1⅞	1⅞	1
3½	1⅞	2 1/16	1 1/16
4	1⅞	2¼	1⅛
5	4¼	2¾	1¼
6	4 5/16	3⅜	1 5/16
8	4 9/16	3½	1 7/16
Reducing Sizes			
Copper x Outside			
¼ x ½	⅝	9/16	½
¼ x ⅜	1 1/16	9/16	⅜
⅜ x ½	1	11/16	½
⅜ x ¼	1 1/16	11/16	⅜
½ x 1	15/16	1 3/16	1 1/16
½ x ¾	1	1 3/16	9/16
½ x ⅜	1	1 3/16	⅜
¾ x 1	1⅛	1	1 1/16
¾ x ½	1⅛	1	½
1 x 1¼	1 3/16	1 1/16	1 1/16
1 x ¾	1¼	1 1/16	9/16
1¼ x 1½	1¼	1⅛	1 1/16
1¼ x 1	1 5/16	1⅛	1 1/16
1½ x 2	1 11/16	1 3/16	¾
1½ x 1¼	1¼	1 3/16	1 1/16
2 x 2½	1 15/16	1⅜	1 5/16
2 x 1½	1⅞	1⅜	1 1/16
2½ x 3	2⅛	1⅝	1
2½ x 2	1⅝	1⅝	¾
3 x 3½	2 1/16	1⅞	1 1/16

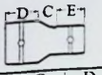
*"C" is thread engagement.



Size	A	B
Straight Sizes		
¼	⅛	9/16
⅜	⅛	11/16
½	⅛	13/16
¾	⅛	1
1	⅛	1 1/16
1¼	⅛	1⅛
1½	⅛	1 3/16
2	3/16	1⅜
2½	3/16	1⅝
3	3/16	1⅞
3½	3/16	2 1/16
4	¼	2¼
5	¼	2¾
6	¼	3⅜
8	¼	3½



No. 1350
Wrought Tube Coupling
Copper to Copper



Size	C	D	E
Reducing Sizes			
⅜ x ¼	5/16	11/16	9/16
½ x ⅜	5/16	13/16	11/16
¾ x ½	7/16	1	13/16
1 x ¾	7/16	1 1/16	1
1¼ x 1	7/16	1⅛	1 1/16
1½ x 1¼	7/16	1 3/16	1⅛
2 x 1½	11/16	1⅜	1 3/16
2½ x 2	¾	1⅝	1⅜
3 x 2½	¾	1⅞	1⅝

No. 1351 Couplings are made from brass castings. They have an internal shoulder, positively limiting the distance to which the tubing can slip into the ends of the Coupling.

No. 1350 Couplings are made from copper tubing. They have a boss or stop located midway between the ends on the straight sizes and at the inner end of the smaller opening on reducing sizes.

Working pressures . . . page 470

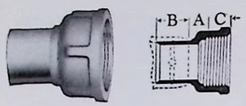
All dimensions are in inches.

Prices on application

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Brass Solder-Joint Fittings

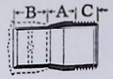
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No. 1356, Fitting Coupling
Fitting to Inside I. P. S.

Size	A	B	*C
Straight Sizes			
3/8	9/16	11/16	3/8
1/2	9/16	13/16	1/2
3/4	9/16	1	9/16
1	1/2	1 1/16	11/16
1 1/4	3/4	1 1/8	11/16
1 1/2	3/4	1 3/16	11/16
2	13/16	1 3/8	3/4
2 1/2	1	1 5/8	15/16
3	1 1/8	1 7/8	1
4	1 3/16	2 1/4	1 1/8
5	1 7/16	2 3/4	1 1/4
Reducing Sizes			
Fitting x Inside			
1/2 x 3/8	1/2	13/16	3/8
1/2 x 1/4	1/2	13/16	3/8
3/4 x 1	1/2	1	11/16
3/4 x 1/2	1/2	1	1/2
1 x 3/4	1/2	1 1/16	9/16
1 1/2 x 1 1/4	5/8	1 3/16	11/16

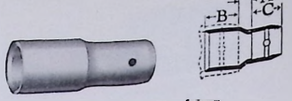
*"C" is thread engagement.

No. 1355, Fitting Nipple
Fitting to Outside I. P. S.

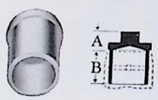
Size	A	B	*C
Straight Sizes			
3/8	15/16	11/16	3/8
1/2	15/16	13/16	1/2
3/4	1 1/16	1	9/16
1	1	1 1/16	11/16
1 1/4	1	1 1/8	11/16
1 1/2	1 1/8	1 3/16	11/16
2	1 5/16	1 3/8	3/4
2 1/2	1 9/16	1 5/8	15/16
3	1 3/4	1 7/8	1
4	1 3/4	2 1/4	1 1/8
5	4 1/4	2 3/4	1 1/4
6	4 5/16	3 3/8	1 5/16
Reducing Sizes			
Fitting x Outside			
1/2 x 3/8	13/16	13/16	3/8
3/4 x 1/2	7/8	1	1/2
1 x 3/4	1 1/8	1 1/16	9/16
2 x 1 1/2	1 3/8	1 3/8	11/16
3 x 2	1 7/8	1 7/8	3/4

*"C" is thread engagement.



No. 1357, Bushing
Fitting to Copper

Size Fitting x Copper	A	B	C
3/8 x 1/4	3/16	11/16	9/16
1/2 x 3/8	3/16	13/16	11/16
1/2 x 1/4	1/4	13/16	9/16
3/4 x 1/2	3/8	1	13/16
3/4 x 3/8	5/16	1	11/16
1 x 3/4	3/8	1 1/16	1
1 x 1/2	3/8	1 1/16	13/16
1 1/4 x 1	3/8	1 1/8	1 1/16
1 1/4 x 3/4	7/16	1 1/8	1
1 1/4 x 1/2	5/8	1 1/8	13/16
1 1/2 x 1 1/4	3/8	1 3/16	1 1/8
1 1/2 x 1	7/16	1 3/16	1 1/16
1 1/2 x 3/4	3/8	1 3/16	1
2 x 1 1/2	5/8	1 3/8	1 3/16
2 x 1 1/4	3/8	1 3/8	1 1/8
2 x 1	1/4	1 3/8	1 1/16
2 x 3/4	7/16	1 3/8	1
2 1/2 x 2	11/16	1 5/8	1 3/8
2 1/2 x 1 1/2	1/2	1 5/8	1 3/16
2 1/2 x 1 1/4	5/8	1 5/8	1 1/8
3 x 2 1/2	11/16	1 7/8	1 5/8
3 x 2	1/2	1 7/8	1 3/8
3 x 1 1/2	1 1/16	1 7/8	1 3/16
3 1/2 x 2	1 1/16	2 1/16	1 3/8
4 x 3	1 1/16	2 1/4	1 7/8
4 x 2 1/2	3/4	2 1/4	1 5/8
4 x 2	1	2 1/4	1 3/8
5 x 4	1 3/16	2 3/4	2 1/4
5 x 3	1	2 3/4	1 7/8
6 x 5	3/4	3 3/8	2 3/4
6 x 4	1	3 3/8	2 1/4
6 x 3	1 3/8	3 3/8	1 7/8



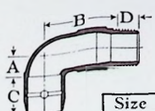
No. 1358, Plug

Size	A	B
1/4	5/16	9/16
3/8	3/8	11/16
1/2	1/4	13/16
3/4	1/4	1
1	1/4	1 1/16
1 1/4	11/16	1 1/8
1 1/2	3/4	1 3/16
2	13/16	1 3/8
2 1/2	1 5/16	1 5/8
3	1 7/16	1 7/8
3 1/2	1 9/16	2 1/16
4	1 5/8	2 1/4
5	1 15/16	2 3/4
6	2 3/16	3 3/8




No. 1359, Cap

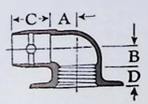
Size	A	B
1/4	1/8	9/16
3/8	3/16	11/16
1/2	3/16	13/16
3/4	3/16	1
1	1/4	1 1/16
1 1/4	3/8	1 1/8
1 1/2	7/16	1 3/16
2	5/8	1 3/8
2 1/2	5/8	1 5/8
3	11/16	1 7/8
3 1/2	3/4	2 1/16
4	13/16	2 1/4
5	1 1/16	2 3/4
6	1 3/8	3 3/8

No. 1367, Water Meter Elbow
Copper to Outside I. P. S.

Size	A	B	C	*D
3/4	9/16	2	1	9/16

*"D" is thread engagement.

No. 1366, Flanged Sink Elbow
Copper to Inside I. P. S.

Size Copper x Inside	A	B	C	*D
1/2	9/16	3/8	13/16	1/2
1/2 x 3/8	9/16	1/2	13/16	3/8

*"D" is thread engagement.

Flanged Sink Elbows are used with sinks, laundry trays, and similar fixtures installed close to a wall. The flange forms a positive bearing on the back of the fixture and permits a rigid faucet connection. The elbow has a short radius.

Working pressures . . . page 470

All dimensions are in inches.

Prices on application

Brass Solder-Joint Fittings

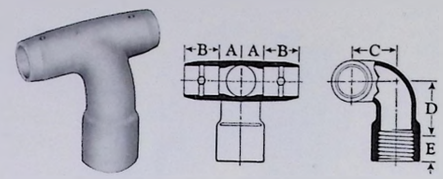
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No. 1364, Crossover
Copper to Copper

Size	A	B
1/2	2 3/8	13/16
3/4	3 1/8	1

The No. 1364 Crossovers are especially suitable for use back of laundry trays, sinks, or similar fixtures where limited space prohibits the use of elbows. The 1/2-inch size will cross over tubing or pipe having an outside diameter of not more than 7/8-inch; the 3/4-inch size, over tubing or pipe not more than 1 1/8 inches in diameter.

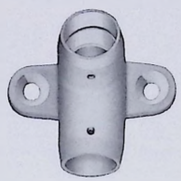
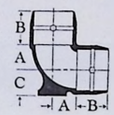


No. 1365, Short Type Wash Tray Sink Tee
Copper to Copper to Inside I. P. S.

Size	A	B	C	D	*E
1/2	1/2	13/16	1	1 1/4	1/2

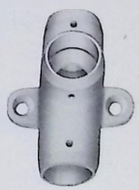
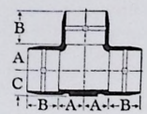
*"E" is thread engagement.

The No. 1365 Tee is a short radius fitting that can be installed in a very small space. The run of the fitting has solder-joint openings; the outlet has a female iron pipe thread.

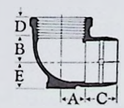
No. 1360, Drop Ear Elbow
Copper to Copper

Size	A	B	C
3/8	5/16	11/16	7/16
1/2	7/16	13/16	1/2
3/4	9/16	1	5/8

No. 1362, Drop Ear Tee
Copper to Copper to Copper

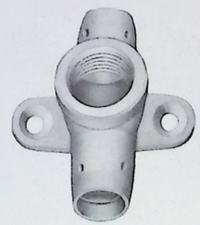
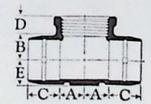
Size	A	B	C
1/2	7/16	13/16	1/2
3/4	9/16	1	5/8

No. 1361, Drop Ear Elbow
Copper to Inside I. P. S.

Size Copper x Inside	A	B	C	*D	E
3/8	7/16	3/8	11/16	3/8	7/16
3/8 x 1/2	11/16	3/8	11/16	1/2	1/2
1/2	9/16	3/8	13/16	1/2	1/2
1/2 x 3/8	7/16	7/16	13/16	3/8	1/2
1 1/4 x 1	3/4	3/4	1 1/8	11/16	7/8

*"D" is thread engagement.

No. 1363, Drop Ear Tee
Copper to Copper to Inside I. P. S.

Size Copper x Copper x Inside	A	B	C	*D	E
1/2	9/16	3/8	13/16	1/2	1/2
1/2 x 1/2 x 3/8	7/16	7/16	13/16	3/8	1/2
1 1/4 x 1 1/4 x 1	3/4	3/4	1 1/8	11/16	7/8

*"D" is thread engagement.

Working pressures . . . page 470

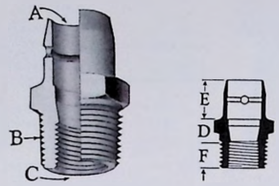
All dimensions are in inches.

Prices on application

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Brass Solder-Joint Fittings

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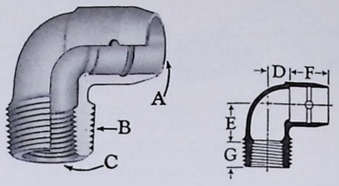


No. 1368, Range Boiler Coupling
Copper to Outside I. P. S. to Inside I. P. S.

Size Copper x Outside x Inside A B C	D	E	*F
½ x 1 x ½	9/16	13/16	11/16
¾ x 1 x ½	9/16	1	11/16
¾ x 1 x ¾	9/16	1	11/16

*"F" is thread engagement.

When ordering, be sure the correct size is specified.

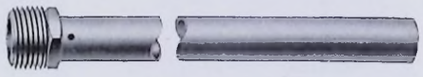


No. 1369, Range Boiler 90° Elbow
Copper to Outside I. P. S. to Inside I. P. S.

Size Copper x Outside x Inside A B C	D	E	F	*G
½ x 1 x ½	9/16	13/16	13/16	11/16
¾ x 1 x ½	9/16	15/16	1	11/16
¾ x 1 x ¾	9/16	15/16	1	11/16

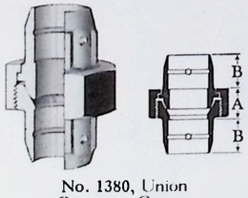
*"G" is thread engagement.

The No. 1368 and No. 1369 Fittings are used where it is necessary to connect to a tank or receiver that requires a length of pipe extending into it. The cold water connection to a range boiler or hot water tank is a common example. The internal pipe is screwed into the female thread at the male end of the fitting, and the male end is then screwed into the tank. The cold water supply tubing is soldered into the other end of the fitting.



No. 1372, Range Boiler Dip Tube
Outside I. P. S.
Sizes ½ and ¾-inch

Range Boiler Dip Tubes consist of a Brass Fitting Nipple and a length of copper tubing soldered onto the fitting end. They measure 54 inches from end to end and are provided with a ⅛-inch vent hole. The tubing is Type M Standard Hard Copper Tubing. These Dip Tubes are ideal internal pipes for range boilers or hot water tanks; they are used with the Range Boiler Couplings and Elbows shown above.

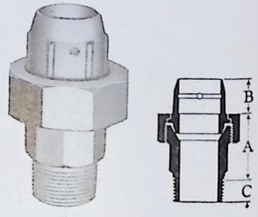


No. 1380, Union
Copper to Copper

Size	A	B
⅜	⅞	11/16
½	⅞	13/16
¾	1	1
1	1 1/16	1 1/16
1 1/4	1 1/16	1 1/8
1 1/2	1 3/8	1 3/16
2	1 1/4	1 3/8
2 1/2	1 1/2	1 5/8

Crane Solder-Joint Unions are recommended for steam, water, and similar fluids. They have a non-corrosive ground joint seat. No gasket is necessary, and the unions can be taken apart and reassembled repeatedly without affecting their strength or tightness.

Working pressures . . . page 470
All dimensions are in inches.
Prices on application



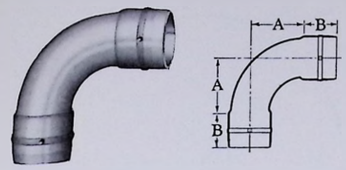
No. 1381, Union
Copper to Outside I. P. S.

Size	A	B	*C
½	1 5/8	13/16	½
¾	1 7/8	1	9/16
1	2	1 1/16	11/16
1 1/4	2 1/4	1 1/8	11/16
1 1/2	2 1/2	1 3/16	11/16
2	2 5/8	1 3/8	¾

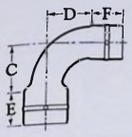
*"C" is thread engagement.

Brass Solder-Joint Fittings

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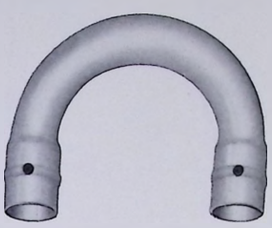
No. 1383, Wrought Tube 90° Elbow
Copper to Copper
Made from Copper Tubing



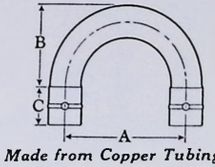
Size	A	B
Straight Sizes		
⅜	¾	11/16
½	⅞	13/16
¾	1 3/16	1
1	1 ½	1 1/16
1 1/4	1 ⅞	1 1/8
1 1/2	2 1/4	1 3/16
2	3	1 3/8

Size	C	D	E	F
Reducing Sizes				
½ x ⅜	1 3/16	¾	1 3/16	11/16
¾ x ½	1	⅞	1	1 3/16
1 x ¾	1 5/16	1 3/16	1 1/16	1
1 1/4 x 1	1 5/8	1 ½	1 1/8	1 1/16
1 ½ x 1 1/4	2	1 ⅞	1 3/16	1 1/8
2 x 1 ½	2 ½	2 1/4	1 3/8	1 3/16

For cast brass 90° Elbows, see page 471.

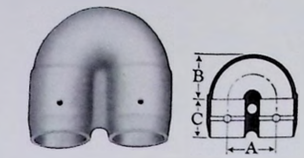


No. 1370, Wrought Tube Return Bend
Copper to Copper



Made from Copper Tubing

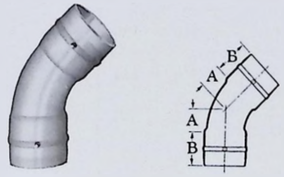
Size	Center to Center A	B	C
¼	1 ½	1	9/16
⅜	1 ½	1 1/16	11/16
⅜	1 29/32	1 1/4	11/16
⅜	2	1 5/16	11/16
⅜	3	1 13/16	11/16
⅜	4	2 5/16	11/16
½	1 9/16	1 3/16	13/16
½	1 ⅞	1 5/16	13/16
½	2 1/4	1 ½	13/16
½	2 ½	1 5/8	13/16
½	3	1 ⅞	13/16
½	3 3/8	2 1/16	13/16
½	4 15/16	1 ½	13/16
¾	3 3/8	2 3/16	1



No. 1371, Cast Return Bend
Copper to Copper
Made from Brass Castings

Size	Center to Center A	B	C
¾	1 5/16	1 3/16	1
1	1 15/64	1 5/16	1 1/16
1	1 7/8	1 5/8	1 1/16
1 1/4	3	2 5/16	1 1/8
1 1/4	5	3 5/16	1 1/8
1 1/4	6	3 13/16	1 1/8
1 ½	2 ½	2 3/16	1 3/16
1 ½	3 ½	2 11/16	1 3/16
1 ½	6	3 15/16	1 3/16
2	3	2 11/16	1 3/8
3	4 1/2	3 15/16	1 7/8

The No. 1371 Cast Return Bends are made with shorter center to center dimension than can be had with bends made from copper tubing.



No. 1384, Wrought Tube 45° Elbow
Copper to Copper
Made from Copper Tubing

Size	A	B
⅜	5/16	11/16
½	⅜	13/16
¾	½	1
1	⅝	1 1/16
1 1/4	13/16	1 1/8
1 1/2	15/16	1 3/16
2	1 1/4	1 3/8

For cast brass 45° Elbows, see page 471.



No. 1350
Wrought Tube Coupling
Copper to Copper
See page 475.



Short Radius Return Bend with
Brass Clean-Out Plugs
Copper to Copper
Made from Brass Castings

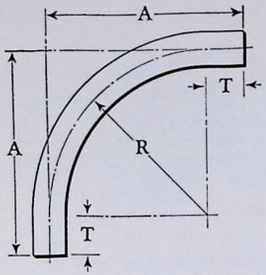
Prices and dimensions are furnished on application.

These are short radius cast brass Return Bends equipped with a brass clean-out plug opposite each solder-joint opening. They are made for installations carrying mineral salts or other insoluble foreign matter. The plugs provide quick, convenient access to the interior of the lines for cleaning.

Working pressures . . . page 470
All dimensions are in inches.
Prices on application

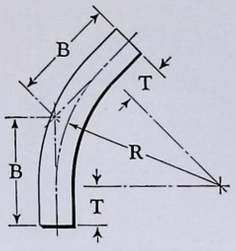
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Bends and Offsets



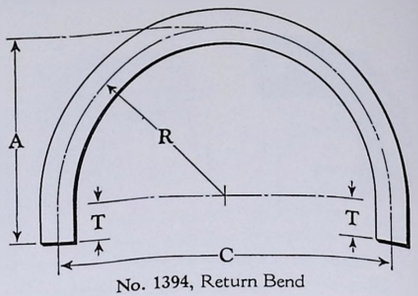
No. 1392, Quarter Bend

Size	A	R	T
½	5	3½	1½
¾	6	4½	1½
1	7	5½	1½
1¼	8	6½	1½
1½	9½	7½	2
2	9½	7½	2
2½	10	7½	2½
3	12	9	3
4	16	12	4
5	20	15	5
6	24	18	6
8	32	24	8



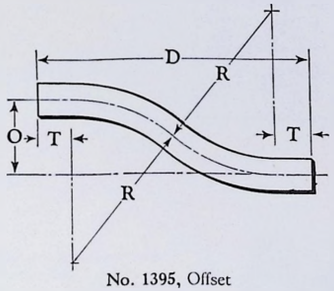
No. 1393, Eighth Bend

Size	B	R	T
½	2⅞	3½	1½
¾	3¼	4½	1½
1	3⅝	5½	1½
1¼	4	6½	1½
1½	4⅞	7½	2
2	4⅞	7½	2
2½	5⅜	7½	2½
3	6½	9	3
4	8⅝	12	4
5	10¾	15	5
6	12⅞	18	6
8	17¼	24	8



No. 1394, Return Bend

Size	A	C	R	T
½	5	7	3½	1½
¾	6	9	4½	1½
1	7	11	5½	1½
1¼	8	13	6½	1½
1½	9½	15	7½	2
2	9½	15	7½	2
2½	10	15	7½	2½
3	12	18	9	3
4	16	24	12	4
5	20	30	15	5
6	24	36	18	6
8	32	48	24	8



No. 1395, Offset

Size	D	O	R	T
½	7⅜ / 8¾	1½ / 3	3½	1½
¾	8 / 9¾	1½ / 3	4½	1½
1	8½ / 10½	1½ / 3	5½	1½
1¼	9 / 11¼	1½ / 3	6½	1½
1½	11½ / 14¼	2 / 4	7½	2
2	11½ / 14¼	2 / 4	7½	2
2½	12½ / 15¼	2 / 4	7½	2½

Bends and Offsets: The dimensions of Crane Bends and Offsets have been standardized to meet the requirements of a majority of installations. Users will find them more convenient and more economical than field fabricated bends and offsets. They eliminate the necessity for the special tools and equipment needed for field fabrication, and they reduce the installer's task to its simplest form—that of making solder-joint connections.

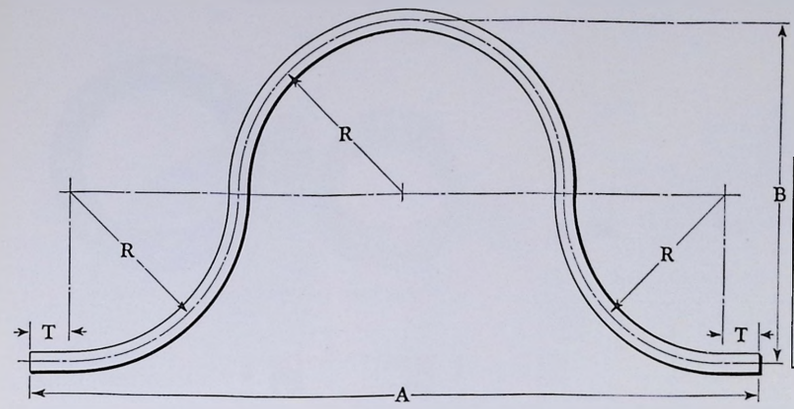
Users are assured of accurate dimensions; ample tangents; true, easy radii; and round, smooth ends and interiors.

Copper tubing: These Bends and Offsets are made from Type K Extra Heavy Hard Copper Tubing. They are recommended for the same pressures as Type K Extra Heavy Soft Copper Tubing; see page 470.

Special Bends and Offsets: Bends and Offsets made to special dimensions or made from other than Type K Extra Heavy Hard Copper Tubing can be fabricated to order; prices are furnished on application.

Working pressures . . . page 470 *All dimensions are in inches.* *Prices on application*

Expansion U-Bends



No. 1389
Expansion U-Bends

Having 1-inch Safe Deflection

Size	A	B	R	T
1	68	32	16	2
1¼	73	34	17	2½
1½	78	36	18	3
2	88	40	20	4
2½	98	44	22	5
3	108	48	24	6
4	128	56	28	8
5	144	62	31	10
6	160	68	34	12

Prices on application

Safe deflection: No. 1389 Expansion U-Bends are designed to compensate for 1-inch expansion. They provide sufficient deflection to meet the need of a majority of installations.

Cold springing: When installed cold, these Bends can be sprung open a distance equal to their deflection value, and they will then compensate for twice the normal amount of expansion.

Copper tubing: No. 1389 U-Bends are made from Type K Extra Heavy Hard Copper Tubing; they are suitable for the same pressures as Type K Extra Heavy **Soft** Copper Tubing.

Special Bends: Expansion Bends made to special dimensions or from other than Type K Tubing can be fabricated to order; prices on application.

Working pressures . . . . page 470 *All dimensions are in inches.*

Expansion of Copper Tubing

To find the number of inches of expansion in any length of copper tubing, proceed as follows:

First, determine the temperature change by subtracting the minimum line temperature from maximum.

Second, obtain from the table below the expansion at that temperature change.

Third, multiply the expansion per foot by the number of feet of tubing.

Linear Expansion of Copper Tubing, per Foot

Temperature Change In Degrees F.	Expansion of Copper Tubing In Inches	Temperature Change In Degrees F.	Expansion of Copper Tubing In Inches
0	0	260	.0295
20	.0025	280	.0317
40	.0045	300	.0342
60	.0065	320	.0370
80	.0087	340	.0395
100	.0110	360	.0415
120	.0135	380	.0440
140	.0157	400	.0464
160	.0177	420	.0489
180	.0200	440	.0515
200	.0225	460	.0537
220	.0252	480	.0564
240	.0274	500	.0588

Special Expansion U-Bends

Radii and tangents for Expansion U-Bends made of Type K Hard Copper Tubing and having a safe deflection ranging from ½ to 6 inches have been established for use in special instances where the No. 1389 Bend does not provide the correct deflection; see table shown below. Prices on application.

When ordering, specify size and deflection.

Safe Deflection, Radii, and Tangents Special Expansion U-Bends

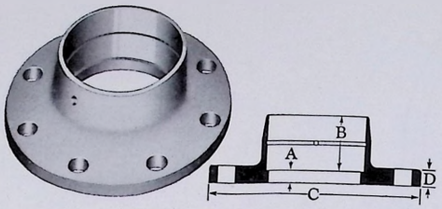
		Safe Deflection, in Inches							
		½	1½	2	2½	3	4	5	6
Size	Tangent	Radius of Bend, in Inches							
1″	2″	11	20	24	27	29	33	38	42
1¼″	2½″	11	21	26	29	32	36	42	47
1½″	3″	12	23	28	31	35	39	46	51
2″	4″	14	25	31	34	38	44	51	57
2½″	5″	16	27	32	37	42	49	56	62
3″	6″	17	30	34	39	45	53	60	67
4″	8″	20	34	39	44	48	58	66	75
5″	10″	22	38	44	49	54	62	70	78
6″	12″	24	42	48	54	59	68	76	83

The stepped line divides the table into two parts. Radii appearing above the line are for bends made from one length of tubing; those appearing below the line are for bends that must be made from two or more lengths fastened together.

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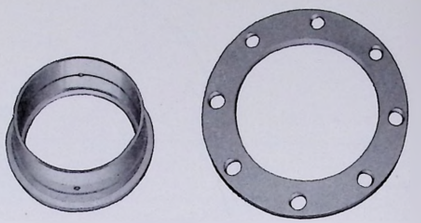
Brass Solder-Joint Flanges

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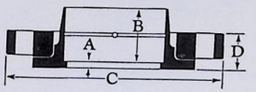


No. 1385, 150-Pound Companion Flange

Size	Recess to face A	Depth of recess B	Flange diameter C	Flange thickness D	Bolt circle	No. of bolts	Dia. of bolts
Straight Sizes							
½	3/16	13/16	3½	5/16	2⅜	4	½
¾	3/16	1	3⅞	11/32	2¾	4	½
1	¼	1 1/16	4¼	⅜	3⅛	4	½
1¼	¼	1⅛	4⅝	13/32	3½	4	½
1½	¼	1 3/16	5	7/16	3⅞	4	½
2	7/16	1⅜	6	½	4¾	4	⅝
2½	¼	1⅝	7	9/16	5½	4	⅝
3	½	1⅞	7½	⅝	6	4	⅝
3½	¼	2 1/16	8½	11/16	7	8	⅝
4	½	2¼	9	11/16	7½	8	⅝
5	9/16	2¾	10	¾	8½	8	¾
6	⅝	3⅜	11	13/16	9½	8	¾
Reducing Sizes							
1½ x 6	¼	13/16	6	½	4¾	4	⅝
2 x 7	¼	1⅜	7	9/16	5½	4	⅝
2 x 7½	¼	1⅜	7½	⅝	6	4	⅝
1½ x 7½	¼	1 3/16	7½	⅝	6	4	⅝
2½ x 9	¼	1⅝	9	11/16	7½	8	⅝
2 x 9	¼	1⅜	9	11/16	7½	8	⅝
5 x 11	⅜	2¾	11	13/16	9½	8	¾
4 x 11	⅜	2¼	11	13/16	9½	8	¾
2 x 11	⅜	1⅜	11	13/16	9½	8	¾



No. 1386, Two-Piece Companion Flange



Brass Insert Cast Iron Ring

Size	Recess to face A	Depth of recess B	Flange diameter C	Ringback to face D	Bolt circle	No. of bolts	Dia. of bolts
Straight Sizes							
3	¼	1⅞	7½	1¼	6	4	⅝
4	¼	2¼	9	1½	7½	8	⅝
5	¼	2¾	10	1½	8½	8	¾
6	5/16	3⅜	11	1⅝	9½	8	¾
8	¼	3½	13½	1 1/16	11¾	8	¾
10	¼	4	16	1¼	14¼	12	⅞
Reducing Sizes							
6 x 13½	⅝	3⅜	13½	1 1/16	11¾	8	¾
2½ x 13½	¾	1⅝	13½	1 1/16	11¾	8	¾

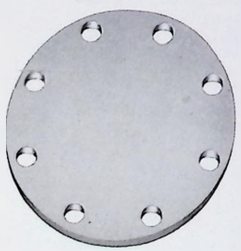
150-Pound Flanges: No. 1385 and No. 1387 Flanges are recommended for pressure service on steam, water, and similar fluids. The flange diameter, thickness, and drilling conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2a-1930). Flanges are plain faced, with two V-shaped concentric grooves between the port and the bolt holes; full face gaskets should be used. Sizes 1-inch and larger interchange with 125-Pound American Cast Iron Flanges, differing in thickness and in facing.

Two-Piece Flanges: No. 1386 Flanges are recommended for lines operated under very low pressure, such as gravity flow pulp lines in paper mills. The flange diameter and drilling are the same as those of both MSS 150-Pound Bronze Flanges and 125-Pound American Cast Iron Flanges.

Drilling: Flanges are furnished faced and drilled unless ordered faced only.

How to order reducing sizes: When ordering reducing sizes, the solder-joint opening should be designated first, and then the outside diameter of the flange. For example, a No. 1385 Flange to connect 4-inch tubing to a 6-inch flanged end (O.D. of flange, 11 inches) should be ordered—

4″ x 11″ Reducing Flange.



No. 1387
150-Pound Blind Flange

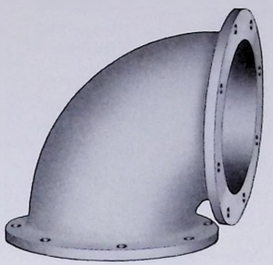
Size	Flange diameter	Flange thickness	Bolt circle	No. of bolts	Dia. of bolts
1¼	4⅝	13/32	3½	4	½
1½	5	7/16	3⅞	4	½
2	6	½	4¾	4	⅝
2½	7	9/16	5½	4	⅝
3	7½	⅝	6	4	⅝
4	9	11/16	7½	8	⅝
6	11	13/16	9½	8	¾

Working pressures . . . . page 470
Templates for drilling . . . . page 369

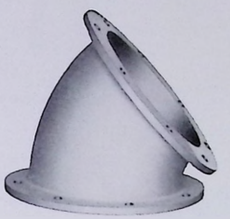
All dimensions are in inches. *Prices on application*

Brass Light Weight Flanged Fittings and Flanges

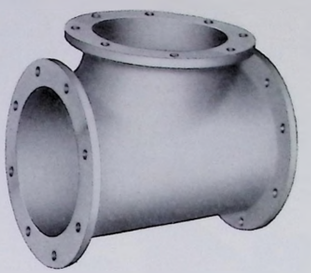
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No. 1374
Light Weight Flanged 90° Elbow

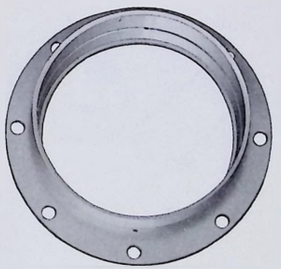


No. 1375
Light Weight Flanged 45° Elbow

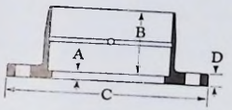


No. 1376
Light Weight Flanged Tee

Size	Center to face			Flange dimensions				
	No. 1374 90° Elbow	No. 1375 45° Elbow	No. 1376 Tee	Flange diameter	Flange thickness	Bolt circle	No. of holes	Dia. of holes
8	6⅝	3¾	6⅝	11	½	10	8	9/16
10	8⅛	4⅛	8⅛	14	½	12¼	8	9/16



No. 1378
Light Weight Companion Flange



Size	Recess to face A	Depth of recess B	Flange diameter C	Flange thickness D	Bolt circle	C. of port to C. of flange, Eccentric	No. of holes	Dia. of holes
Straight Sizes								
3	¼	1⅞	6	7/16	4¾		4	½
4	¼	2¼	7	7/16	5 15/16		8	½
5	¼	2¾	8	7/16	6 15/16		8	½
6	¼	3⅜	9	½	7⅞		8	9/16
8	¼	3½	11	½	10		8	9/16
10	¼	4	14	½	12¼		8	9/16
Reducing Sizes								
6 x 11 Eccentric	1	2¾	11	½	10	31/32	8	9/16
5 x 11 Eccentric	1⅜	2⅜	11	½	10	1 7/16	8	9/16
4 x 11 Eccentric	1¾	2	11	½	10	1 29/32	8	9/16
8 x 14 Eccentric	¾	3½	14	½	12¼	31/32	8	9/16
6 x 14 Eccentric	1½	2¾	14	½	12¼	1 15/16	8	9/16
4 x 14 Eccentric	2¼	2	14	½	12¼	2⅞	8	9/16
8 x 14 Concentric	1¼	3½	14	½	12¼		8	9/16
6 x 14 Concentric	2	2¾	14	½	12¼		8	9/16

Service recommendations: These flanged fittings and flanges are compact and light in weight, yet sturdy and well proportioned. They are recommended for service on the large low pressure lines commonly found in paper mills and industrial plants. Flange dimensions are similar to those of the Riveted Pipe Manufacturers Standard.

Drilling: Flanged fittings and flanges are furnished faced and drilled unless ordered faced only.

How to order reducing size companion flanges: When ordering reducing size companion flanges, the solder-joint opening should be designated first, and then the outside diameter of the flange. For example, an eccentric flange to connect 4-inch tubing to a 10-inch flanged fitting (O.D. of flange, 14 inches) should be ordered—

4″ x 14″ Reducing Flange, Eccentric

Working pressures . . . . page 470

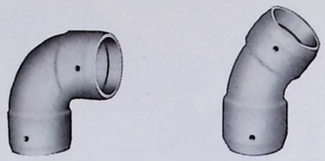
All dimensions are in inches. *Prices on application*

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Brass Solder-Joint Drainage Fittings

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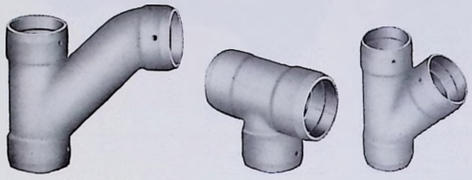
Drainage Long Turn Elbows



No. 2301
90° Long Turn Elbow

No. 2304
45° Long Turn Elbow

Drainage Y-Branches



No. 2322
90° Y-Branch

No. 2320
90° Y-Branch
Tee Pattern

No. 2328
45° Y-Branch

Copper drainage systems: Crane Solder-Joint Fittings and copper tubing are an excellent combination for drainage systems. They possess all of the advantages needed to make a distinctly ideal installation. The regular Solder-Joint Fittings shown on the preceding pages can be used for all vent piping on both soil and waste lines, and for some applications on waste piping. The Drainage Fittings illustrated on this page are designed especially for waste lines.

Non-corrosive: The corrosion of drainage piping has long been a problem in plumbing work. The alternate wetting and drying of drainage lines, which takes place while an installation is in use, hastens the normal corrosive action of drainage water and shortens the life of the system. Solder-Joint Fittings and copper tubing, due to their high copper content, are non-corrosive, and provide lasting service.

Non-clogging: An installation of Solder-Joint Fittings and copper tubing is non-clogging. The tubing sets into a recess at the ends of the fittings, forming a smooth, uninterrupted flow area. There is no chance for foreign matter such as hair, lint, and grease to catch, accumulate, and eventually clog the system.

Low flow resistance: Solder-Joint Drainage Fittings have long sweeps. An installation offers practically no resistance to flow. The smooth, uniform area and the long turns assure quick drainage.

Compact: All parts can be installed in a minimum of space, and the completed system is light in weight and exceptionally compact. The ends of the fittings are only a trifle larger than the tubing.

Crane Solder-Joint Drainage Fittings: Lists of sizes, prices, and dimensions of Crane Solder-Joint Drainage Fittings will be furnished on application.

Drainage Slip Joint Adaptors

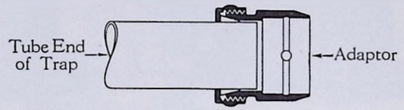


No. 2382
Adaptor Nut

No. 2380
Straight Adaptor

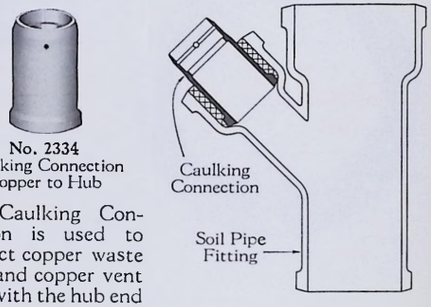
No. 2381
45° Adaptor

No. 2383
Lead Adaptor Washer



Slip Joint Adaptors provide an easy means of connecting the tube end of traps used on plumbing fixtures with copper waste piping. As illustrated above, the assembled Adaptor makes a tight joint at the end of the trap and provides a solder-joint opening for copper tubing.

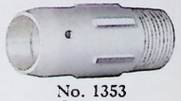
Drainage Hub Caulking Connection



No. 2334
Caulking Connection
Copper to Hub

The Caulking Connection is used to connect copper waste lines and copper vent lines with the hub end cast iron soil pipe fittings used on waste and vent stacks. As shown in the illustration, the Connection is caulked into a hub end, providing an opening for copper tubing.

Copper to Outside I. P. S. Coupling



No. 1353
Coupling

The Copper to Outside I. P. S. Couplings make it possible to connect copper tubing to traps, drains, and similar drainage accessories having female iron pipe size outlets. The male end screws into the outlet of the trap or drain, and the tubing is soldered into the opposite end. For list of sizes and dimensions, see page 475.

Solders and Fluxes

Quality: Solders and fluxes are a vital factor in every solder-joint installation. Upon them depend the life and strength of joints. They should be carefully selected and used only on services for which they are suitable.

The solders and fluxes recommended with Crane Solder-Joint Valves and Fittings are listed in the table below. They are made of the finest quality materials, properly compounded, and are especially prepared for this purpose. Their use assures strong, tight joints and lasting service.

Prices: Prices are furnished on application.

Special solders and fluxes: Solders and fluxes for higher steam pressures or for special services are available. Recommendations will be made upon request.

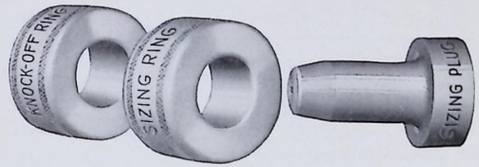
Solders				Fluxes	
Solder No.	Melting Range	Service Recommendation	Form Supplied	Flux No. and Uses	Form Supplied
No. 50 Solder	358 to 414° F.	400 pounds water 15 pounds saturated steam	3/32-inch round wire in 1-pound spools and 1/8-inch round wire in 1-pound and 5-pound spools	No. 50 Flux Use with No. 50, No. 95, or No. 104 Solders	2-ounce, 8-ounce, 1-pound and 5-pound tins
No. 95 Solder	450 to 460° F.	Air conditioning systems 35 pounds saturated steam	3/32-inch and 1/8-inch round wire in 1-pound spools		
No. 104 Solder	460° F.	400 pounds water 80 pounds saturated steam	5/32-inch round wire with flattened side in 20-inch lengths		

Approximate Quantity of Solder and Flux Required to Make 100 Joints

Size of Joints	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10
No. 50, No. 95, or No. 104 Solder	Pounds	.5	.5	.75	1	1.5	1.75	2	2.5	3.5	4.5	5	6.5	9	17	35	45
No. 50 Flux (2 oz. per lb. of Solder)	Ounces	1	1	1.5	2	3	3.5	4	5	7	9	10	13	18	34	70	90

Sizing Tools for Soft Copper Tubing

Licensed under Mueller Brass Co., STREAMLINE Division, Patents



Sizing Tool

Sizing: Soft Copper Tubing while in transit or when being handled may become flattened or distorted. Before being used with Solder-Joint Valves and Fittings, the ends of the tubing should be sized to assure a proper fit between the tubing and the valve or fitting end.

Instructions for using: Sizing Tools consist of three parts: a sizing plug, a sizing ring, and a knock-off ring. To size the end of a length of tubing: first, slip the knock-off ring over the tubing; second, by tapping it lightly, force the sizing ring over the end of the tubing until its outer edge is almost flush with the tubing; third, insert the sizing plug and drive it home with a few light hammer blows. The end of the tubing is now properly sized; remove the sizing ring and plug by tapping them off with the knock-off ring.

Instructions for ordering: Sizing Tools are made for two weights of copper tubing, Type K Extra Heavy Soft and Type L Heavy Soft, in sizes 1/4 to 2-inch inclusive. Orders should specify the size and weight of tubing for which the tool is wanted. Prices are furnished on application.

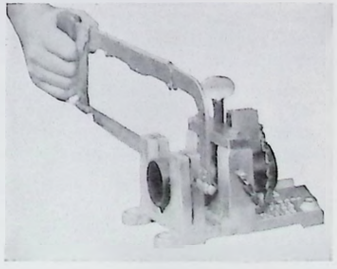
Square-End Sawing Vise

Used to Cut Square Ends on Copper Tubing Sizes 2-Inch and Smaller

The Square-End Sawing Vise, a combination vise and saw guide especially designed for thin wall tubing, is an ideal tool to use when making solder-joint installations. It holds the tubing rigidly and guides the saw accurately. Its use provides assurance that the tubing will butt squarely against the shoulder in the valve or fitting end.

The Square-End Sawing Vise will hold tubing up to and including the 2-inch size. It is made of aluminum, has steel inserts, and is easy and simple to use. It will not mar or crush the tubing. Any standard hack saw can be used in the saw guide; a 32-tooth blade is recommended for copper tubing.

Prices on application.



Copper Straps for Copper Tubing



These are neat appearing straps, made especially for use with copper tubing. They are pure copper and are available in several sizes.

Prices on application

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Copper Tubing

Standard Specifications

Copper Tubing for general plumbing and heating purposes and for industrial uses is available in four weights, commonly known as Types K, L, M, and O (Extra Heavy, Heavy, Standard, and Light, respectively). All four weights are furnished in hard temper, and in addition, Types K and L are furnished soft annealed.

Dimensions and Weights

Nominal Size of Tubing	Outside Diameter of Tubing	Hard Copper Tubing								Soft Copper Tubing			
		Type K Extra Heavy Hard		Type L Heavy Hard		Type M Standard Hard		Type O Light Hard		Type K Extra Heavy Soft		Type L Heavy Soft	
		Wall Thickness	Weight per Foot	Wall Thickness	Weight per Foot	Wall Thickness	Weight per Foot	Wall Thickness	Weight per Foot	Wall Thickness	Weight per Foot	Wall Thickness	Weight per Foot
Inches	Inches	Inches	Pounds	Inches	Pounds	Inches	Pounds	Inches	Pounds	Inches	Pounds	Inches	Pounds
¼	⅜	.032	.133			.025	.106			.032	.133		
⅜	½	.049	.269	.035	.198	.025	.144			.049	.269	.035	.198
½	⅝	.049	.344	.040	.284	.028	.203			.049	.344	.040	.284
¾	⅞	.065	.641	.045	.454	.032	.328			.065	.641	.045	.454
1	1⅛	.065	.839	.050	.653	.035	.464			.065	.839	.050	.653
1¼	1⅜	.065	1.04	.055	.882	.042	.681			.065	1.04	.055	.882
1½	1⅝	.072	1.36	.060	1.14	.049	.94			.072	1.36	.060	1.14
2	2⅛	.083	2.06	.070	1.75	.058	1.46			.083	2.06	.070	1.75
2½	2⅝	.095	2.92	.080	2.48	.065	2.03			.095	2.92	.080	2.48
3	3⅛	.109	4.00	.090	3.33	.072	2.68	.049	1.834	.109	4.00	.090	3.33
3½	3⅝	.120	5.12	.100	4.29	.083	3.58			.120	5.12	.100	4.29
4	4⅛	.134	6.51	.110	5.38	.095	4.66	.058	2.87	.134	6.51	.110	5.38
5	5⅛	.160	9.67	.125	7.61	.109	6.66	.065	4.00	.160	9.67	.125	7.61
6	6⅛	.192	13.87	.140	10.20	.122	8.91	.072	5.31	.192	13.87	.140	10.20
8	8⅛	.271	25.90			.170	16.46	.083	8.12	.271	25.90		
10	10⅛	.338	40.26			.212	25.57	.109	13.28	.338	40.26		
12	12⅛	.405	57.76			.254	36.69	.134	19.55	.405	57.76		

WORKING PRESSURES, Pounds per Square Inch

	Type K Extra Heavy Hard	Type L Heavy Hard	Type M Standard Hard	Type O Light Hard	Type K Extra Heavy Soft	Type L Heavy Soft
Saturated steam	250 pounds	150 pounds	80 pounds	15 pounds	250 pounds	150 pounds
Hot water, cold water, air, and similar fluids	400 pounds	250 pounds	250 pounds	125 pounds	250 pounds	150 pounds

Service recommendations: Copper Tubing is recommended for many services, such as for steam, water, air, oil, gas, or similar fluids. The Types K, L, and M are used for general plumbing and heating purposes, and for industrial applications. In addition, the Type K Tubing soft annealed is especially adapted to service on underground lines. The Type O Tubing is recommended only for industrial uses.

On steam installations, the successful application of Copper Tubing depends not only upon the weight of tubing but also upon the solder used when making joints. For recommendations on solders, see page 485.

Hard Copper Tubing: Hard Copper Tubing is intended primarily for use in straight lengths. It is not recommended for field bending except when proper bending equipment is used.

Soft Copper Tubing: Soft Copper Tubing can be bent without special bending equipment; it is recommended for service where bends must be made in the field, as on concealed replacement work.

Soft Copper Tubing while in transit or when being handled may become flattened or distorted. Before being used, the ends of the tubing should be sized to assure a tight soldered joint. For sizing tools, see page 485.

Standard lengths: 20-foot straight lengths for both hard and soft Copper Tubing and 60-foot coiled lengths for soft Copper Tubing are generally considered standard. Other lengths can be furnished.

Tinning: Copper Tubing can be furnished tinned on the outside, on the inside, or on both the outside and the inside.

Federal Specification: Type K hard and soft, Type L hard only, and Type M Copper Tubing in sizes ⅜ to 6-inch conforms to Federal Specification WW-T-799, dated October 18, 1932; the ¼-inch and the 8, 10, and 12-inch sizes are not included in the Federal Specification.

American Standard: Type K hard and soft, Type L hard and soft, and Type M Copper Tubing in sizes ⅜ to 6-inch conforms to the American Standard for Copper Water Tube, A. S. A. No. H23.1-1934; the ¼-inch and the 8, 10, and 12-inch sizes are not included in the Standard.

The American Standard designates tubing by "Class" letters instead of by "Type" letters, thus: Class K, Class L, and Class M.

Valves and Fittings for Marine Service

Description.....pages 488 to 489
Crane recommendations.....pages 489 to 491
Brass Globe, Angle, and Cross Valves.....pages 492 to 497
Brass Screw-Down Check Valves..pages 492, 493, 495, and 497
Brass Check Valves.....pages 498 to 501
Brass Gate Valves.....pages 502 to 505
Brass Hose Gate Valves.....page 503
Fusible Plugs.....page 506
Iron Body Gate, Globe, and Check Valves.....page 507
Iron Body Overboard Discharge Valves.....page 507
Iron Body Main Injection Valves.....page 507
Steel Gate, Globe, and Check Valves.....page 507

In addition to the valves shown on pages 492 to 507, the following valves and specialties, suitable for marine service, are shown in other sections of this catalogue because of their adaptability to general industrial service:

Brass Radiator Valves.....page 51
Brass Chronometer Valves.....page 383
Iron Body Back Pressure Valves.....page 387
Brass Pop Safety Valves.....page 391
Cast Steel Pop Safety Valves.....page 399
Brass Relief Valves.....pages 405 and 409

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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Valves and Fittings for Marine Service

The Valves and Fittings illustrated and described on pages 492 to 508 inclusive are designed and manufactured in strict accordance with the requirements of the following:

U. S. Dept. of Commerce, Bureau of Navigation and Steamboat Inspection.

American Bureau of Shipping.

Lloyds' Register of Shipping. (Ships built in U. S. A.)

There are numerous requirements which make the use of regular commercial material inadvisable, the most important of which are given here for convenient use.

The specifications as applied to Globe, Angle, Cross, Gate, and Check Valves, Cocks, and Fittings, are divided into two classes, as follows:

CLASS I

Power Piping—For pressures over 100 lbs. regardless of temperature. For temperatures over 500° F. regardless of pressure.

Hot Water Piping—For pressures over 100 lbs. regardless of temperature. For temperatures over 200° F. regardless of pressure.

Oil Piping—For pressures over 100 lbs. regardless of temperature. For temperatures over 150° F. regardless of pressure.

CLASS II

For all miscellaneous piping at lower pressures and temperatures than Class I.

GENERAL REQUIREMENTS

Metals: Regular Crane metals comply with the requirements for service as outlined herein:

Crane Steam Brass (85-5-5-5) — 150 lbs. W.P., 366° F. Temp. (Referred to in S.I.S. Specifications as Grade "A")

Crane Special Brass — 300 lbs. W.P., 450° F. Temp. (Referred to in S.I.S. Specifications as Grade "B")

Crane Malleable Iron — 125 lbs. W.P., 450° F. Temp., and 4" maximum size

Crane Cast Iron — 125 lbs., W.P., 450° F. Temp.

NOTE: Brass, Cast Iron, or Cupola Malleable Iron are not allowed for pressures or temperatures higher than those given above.

All metals regularly used in Crane Cast and Forged Steel Valves and Fittings are acceptable.

Working Pressures: Valves and Fittings are not allowed for water working pressures higher than the recommended steam working pressure.

For boiler feed or blow-off service, Valves and Fittings may only be used for pressures up to 83⅓% of the recommended steam working pressure.

The American Standard pressure ratings for Steel Valves, Fittings, and Flanges are reduced by the Marine Rules. See page 507.

Tests: Tests regularly made on Crane Valves and Fittings comply with the requirements of Class II material.

For Class I, Iron and Brass Valves and Fittings must be subjected to a hydrostatic shell test equal to three times the working pressure.

Tests regularly made on Crane Steel Valves and Fittings comply with the requirements for Class I.

Markings: Regular Crane markings comply with the requirements, and no additional marking is required.

Design: For Class I, all Valves 2½-inch and larger must have bolted bonnets.

For Classes I and II, all sizes of Cast Iron Valves must have bolted bonnets.

For Class I, screwed bonnet Globe, Angle, or Gate Valves where permitted must be of the union bonnet type.

For Class II, either inside screwed bonnets or union bonnets are permitted.

Non-Rising Stem Valves must be provided with approved indicators.

Pipe Connections: For Class I, Valves and Fittings 2½-inch and larger must be flanged end.

For Class I, Screwed Companion Flanges are allowed 2½-inch and smaller.

For Boiler Mountings, Valves and Fittings 1½-inch and larger must be flanged end.

For Class II, there is no limitation on the use of screwed joints.

Regular Cranelap Joints conform to all requirements when used for the pressure ranges allowed.

All other types of Flanges, except where Screwed Flanges are permitted, are entirely special.

Boiler Mountings (see also Pipe Connections): All Valves or Fittings must be Cast or Forged Steel, except that Crane Special Brass may be used when the pressure and temperature do not exceed the maximum allowed.

Cast Iron is not allowed for Boiler Mountings.

Boiler Nozzles to be fusion welded must be Forged or Rolled Steel.

Fuel Oil Discharge: Valves and Fittings must be designed for at least 250 lbs. steam working pressure.

Iron Valves and Fittings are not allowed.

Bushings and Street Elbows are not allowed.

Blow-off Valves (See also Working Pressures): Blow-Off Valves must be of the Y-Pattern or Angle Type, or a Straight-Way pattern (not Globe).

Check Valves used in blow-off lines must be of the swing type.

Cocks: For Class I, Cocks must be designed so that the cap holds the plug in place; the conventional type with nut holding the plug is not allowed. For Class II, there are no restrictions.

By-Pass: Although the specifications require by-passes on all Globe, Angle, and Gate Valves 6" and larger, Crane Co. will not furnish a by-pass unless specifically ordered, because it is permissible to place the by-pass entirely around the valve, from pipe to pipe, and this is done frequently.

Specialties: Relief Valves, Safety Valves, Expansion Joints, etc., must be of approved design.

Crane Recommendations

Number	Page No.	Type	Class I (over 100 lbs. W. P.) Sizes, Inches	Class I Remarks	Class II (up to 100 lbs. W. P.) Sizes, Inches	Class II Remarks
Brass Globe, Angle, Cross, and Radiator Valves						
14 P	17	Globe — Screwed	⅛ — 2	Special Test	⅛ — 3	Regular
16 P	17	Angle — Screwed	⅛ — 2	Special Test	⅛ — 3	Regular
70	492	Globe — Screwed	⅛ — 2	Regular	⅛ — 3	Regular
70	492	Angle — Screwed	⅛ — 2	Regular	⅛ — 3	Regular
74	492	Cross — Screwed	½ — 2	Regular	½ — 2	Regular
71	492	Globe — Flanged	¾ — 2	Regular	¾ — 3	Regular
71	492	Angle — Flanged	¾ — 2	Regular	¾ — 3	Regular
4212 P	494	Globe — Screwed	¼ — 2	Regular	¼ — 2	Regular
4214 P	494	Angle — Screwed	¼ — 2	Regular	¼ — 2	Regular
4362 E	495	Globe — Screwed	¼ — 2	Regular	¼ — 3	Regular
4364 E	495	Angle — Screwed	¼ — 2	Regular	¼ — 3	Regular
4382 P	496	Globe — Screwed	¼ — 2	Regular	¼ — 3	Regular
4384 P	496	Angle — Screwed	¼ — 2	Regular	¼ — 3	Regular
4383 P	496	Globe — Flanged	¾ — 3	Regular	¾ — 3	Regular
4385 P	496	Angle — Flanged	¾ — 3	Regular	¾ — 3	Regular
4196	493	Globe — Screwed	1½ — 2	Regular	1½ — 3	Regular
4197	493	Globe — Flanged	1½ — 6	Regular	1½ — 6	Regular
4198	493	Angle — Screwed	1½ — 2	Regular	1½ — 3	Regular
4199	493	Angle — Flanged	1½ — 6	Regular	1½ — 6	Regular
85 P	497	Globe — Screwed	1½ — 2	Regular	1½ — 2	Regular
85½ P	497	Angle — Screwed	1½ — 2	Regular	1½ — 2	Regular
87 P	497	Globe — Flanged	1½ — 3	Regular	1½ — 3	Regular
87½ P	497	Angle — Flanged	1½ — 3	Regular	1½ — 3	Regular
4270	51	Globe — Radiator	⅜ — 1¼	Regular	⅜ — 1¼	Regular
4270	51	Globe — Radiator	¼, 1½, 2	Made to Order	¼, 1½, 2	Made to Order
4270	51	Angle — Radiator	⅜ — 1¼	Regular	⅜ — 1¼	Regular
4270	51	Angle — Radiator	¼, 1½, 2	Made to Order	¼, 1½, 2	Made to Order
Brass Check Valves						
33½	31	Foot — Screwed			½ — 3	Regular
35	498	Horiz. — Screwed	¼ — 2	Regular	¼ — 3	Regular
35½	498	Horiz. — Flanged	¾ — 2	Regular	¾ — 3	Regular
37	498	Angle — Screwed	½ — 2	Regular	½ — 2	Regular
72	498	Horiz. — Screwed	¼ — 2	Regular	¼ — 3	Regular
72	498	Angle — Screwed	¼ — 2	Regular	¼ — 3	Regular
218	35	Horiz. — Screwed	¼ — 2	Special Test	¼ — 2	Regular
219	35	Angle — Screwed	¼ — 2	Special Test	¼ — 2	Regular
74 E	500	Horiz. — Screwed	⅜ — 2	Special Test	⅜ — 2	Regular
75 E	500	Horiz. — Flanged	¾ — 2	Special Test	¾ — 2	Regular
366 E	500	Horiz. — Screwed	¼ — 2	Special Test	¼ — 3	Regular
369 E	500	Horiz. — Flanged	¾ — 2	Special Test	¾ — 3	Regular
4032	499	Horiz. — Screwed	2	Regular	2 — 3	Regular
4033	499	Horiz. — Flanged	2 — 6	Regular	2 — 6	Regular
4062	499	Horiz. — Screwed	1½ — 2	Made to Order	1½ — 3	Made to Order
4062	499	Angle — Screwed	1½ — 2	Made to Order	1½ — 3	Made to Order
4063	499	Horiz. — Flanged	1½ — 6	Made to Order	1½ — 6	Made to Order
4063	499	Angle — Flanged	1½ — 6	Made to Order	1½ — 6	Made to Order
4234 E	501	Horiz. — Screwed	2	Regular	2	Regular
4235 E	501	Horiz. — Flanged	2 — 3	Regular	2 — 3	Regular
4064 E	501	Horiz. — Screwed	1½ — 2	Regular	1½ — 3	Regular
4065 E	501	Horiz. — Flanged	1½ — 3	Regular	1½ — 3	Regular

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Crane Recommendations (Cont.)

Number	Page No.	Type	Class I (over 100 lbs. W. P.) Sizes, Inches	Class I (over 100 lbs. W. P.) Remarks	Class II (up to 100 lbs. W.P.) Sizes, Inches	Class II (up to 100 lbs. W.P.) Remarks
Brass Gate Valves						
431	504	Screwed	.....	.....	1/4 — 3	Regular
429	504	Flanged	.....	.....	3/4 — 3	Regular
442	40	Screwed	.....	.....	3/4 — 3	Regular
457	504	Screwed	1/4 — 2	Special Test	1/4 — 3	Regular
459	42	Screwed	.....	.....	1/2 — 3	Regular
Brass Chronometer Valves						
4382	383	Screwed	1/2 — 2	Regular	1/2 — 2 1/2	Regular
4383	383	Flanged	1 1/4 — 2 1/2	Regular	1 1/4 — 2 1/2	Regular
Brass Fittings						
Std. Fittings	252 to 255	Screwed	1/8 — 2	Special Test	1/8 — 3	Regular
250 lb. Fittings	256 to 258	Screwed	1/4 — 2	Special Metal and Test	1/4 — 3	Regular
150 lb. Fittings	262	Flanged	3/4 — 8	Special Test	3/4 — 8	Regular
300 lb. Fittings	262	Flanged	3/4 — 8	Special Test	3/4 — 8	Regular
150 lb. Comp. Flanges	262	Screwed	3/4 — 2 1/2	Regular	3/4 — 8	Regular
300 lb. Comp. Flanges	262	Screwed	3/4 — 2 1/2	Regular	3/4 — 8	Regular
No. 521 1/2 Union	260	Screwed	1/4 — 2	Special Test	1/4 — 3	Regular
No. 96 E Union	261	Screwed	1/4 — 2	Special Test	1/4 — 3	Regular
Iron Body Brass Trimmed Globe, Angle, and Cross Valves						
351	144	Globe — Flanged	2 — 10	Regular	2 — 10	Regular
353	144	Angle — Flanged	2 — 10	Regular	2 — 10	Regular
363	144	Cross — Flanged	2 — 10	Regular	2 — 10	Regular
Iron Body Brass Trimmed Swing Check Valves						
373	153	Flanged	2 — 10	Regular	2 — 10	Regular
Iron Body Brass Trimmed Screw Down Check Valves						
4551	.....	Globe — Flanged	2 — 10	Made to Order	2 — 10	Made to Order
Iron Body Brass Trimmed Wedge Gate Valves						
461	75	Flanged	2 — 10	Special Indicator	2 — 10	Special Indicator
465 1/2	75	Flanged	2 — 10	Regular	2 — 10	Regular
Iron Body Brass Trimmed Overboard Discharge Valves						
4377	507	Globe — Flanged	.....	.....	2 — 14	Made to Order
4379	.....	Angle — Flanged	.....	.....	2 — 14	Made to Order
Iron Body Brass Trimmed Main Injection Valves						
4347	507	Flanged	.....	.....	10 — 16	Made to Order
Cast Iron and Malleable Iron Fittings						
Std. C. I. Fittings	191 to 196	Screwed	1/4 — 2	Special Test	1/4 — 3	Regular
125 lb. C. I. Fittings	272 to 278	Flanged	1 — 16	Special Test	1 — 16	Regular
No. 553 C. I. Comp. Flanges	290 to 291	Screwed	1 — 2 1/2	Regular	1 — 2 1/2	Regular
Std. Mall. Fittings	172 to 178	Screwed	1/8 — 2	Special Test	1/8 — 3	Regular
No. 519 Mall. Union	236	Screwed	1/8 — 2	Special Test	1/8 — 3	Regular
Fusible Plugs						
4749 Tube plug	506	.....	3/8	Regular	3/8	Regular
4752 Fireside plug	506	.....	3/4 — 1	Regular	3/4 — 1	Regular
4752 L Fireside plug	506	.....	3/4 — 1	Regular	3/4 — 1	Regular
4753 Waterside plug	506	.....	3/4 — 1	Regular	3/4 — 1	Regular
4753 L Waterside plug	506	.....	3/4 — 1	Regular	3/4 — 1	Regular

Crane Recommendations (Cont.)

Number	Page No.	Type	Class I Sizes, Inches	Class I Remarks
Steel Globe and Angle Valves				
216 P	321	Globe — Screwed	1/4 — 2	Regular
217 P	321	Angle — Screwed	1/4 — 2	Regular
176 P	323	Globe — Screwed	1/2 — 2	Regular
177 P	323	Angle — Screwed	1/2 — 2	Regular
196 P	323	Globe — Flanged	1/2 — 2	Regular
197 P	323	Angle — Flanged	1/2 — 2	Regular
142 P	302	Globe — Screwed	2	Regular
143 P	302	Globe — Flanged	2 — 8	Regular
144 P	302	Angle — Screwed	2	Regular
145 P	302	Angle — Flanged	2 — 8	Regular
150 P	304	Globe — Screwed	2	Regular
151 P	304	Globe — Flanged	2 — 8	Regular
152 P	304	Angle — Screwed	2	Regular
153 P	304	Angle — Flanged	2 — 8	Regular
155 P		Globe — Flanged	6 — 8	Regular
157 P		Angle — Flanged	6 — 8	Regular
161 P	306	Globe — Flanged	4 — 8	Regular
165 P	306	Globe — Flanged	6 — 8	Regular
163 P	306	Angle — Flanged	4 — 8	Regular
167 P	306	Angle — Flanged	6 — 8	Regular
171 P	308	Globe — Flanged	2 1/2 — 6	Regular
173 P	308	Angle — Flanged	2 1/2 — 6	Regular
183 P	310	Globe — Flanged	3 — 6	Regular
185 P	310	Angle — Flanged	3 — 4	Regular
Steel Lift Check Valves				
208 X	327	Horiz. — Screwed	1/4 — 2	Regular
178 X	326	Horiz. — Screwed	1/2 — 2	Regular
178 1/2 X	326	Angle — Screwed	1/2 — 2	Regular
198 X	326	Horiz. — Flanged	1/2 — 2	Regular
198 1/2 X	326	Angle — Flanged	1/2 — 2	Regular
Steel Swing Check Valves				
148 X	302	Screwed	2	Regular
147 X	302	Flanged	2 — 8	Regular
159 X	304	Flanged	1 1/4 — 8	Regular
169 X	306	Flanged	4 — 8	Regular
175 X	308	Flanged	2 1/2 — 8	Regular
187 X	310	Flanged	3 — 4	Regular
Steel Gate Valves				
46 XR	302	O. S. & Y. — Screwed	2	Regular
47 XR	302	O. S. & Y. — Flanged	2 — 12	Regular
32 XR	304	O. S. & Y. — Screwed	1 1/4 — 2	Regular
33 XR	304	O. S. & Y. — Flanged	1 1/4 — 12	Regular
34 XR	304	O. S. & Y. — Flanged	6 — 12	Regular
61 XR	306	O. S. & Y. — Flanged	4 — 12	Regular
63 XR	306	O. S. & Y. — Flanged	6 — 12	Regular
80 XR	325	O. S. & Y. — Screwed	1/2 — 2	Regular
79 XR	325	O. S. & Y. — Flanged	3/4 — 2	Regular
76 XR	308	O. S. & Y. — Flanged	2 1/2 — 12	Regular
78 XR	308	O. S. & Y. — Flanged	6 — 12	Regular
83 XR	310	O. S. & Y. — Flanged	3 — 12	Regular
85 XR	310	O. S. & Y. — Flanged	4 — 12	Regular
Steel Fittings				
3000 lb. Forged Steel Fittings	328	Screwed	1/4 — 2	Special Test
150 lb. Cast Steel Fittings	303	Flanged	2 — 12	Regular
300 lb. Cast Steel Fittings	305	Flanged	1 1/4 — 12	Regular
400 lb. Cast Steel Fittings	307	Flanged	4 — 12	Regular
600 lb. Cast Steel Fittings	309	Flanged	1/2 — 12	Regular
900 lb. Cast Steel Fittings	311	Flanged	3 — 12	Regular
150 lb. Forged Steel Flanges	332	Screwed	1 — 2 1/2	Regular
300 lb. Forged Steel Flanges	333	Screwed	1 — 2 1/2	Regular
600 lb. Forged Steel Flanges	335	Screwed	1/2 — 2 1/2	Regular

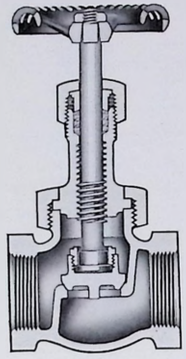
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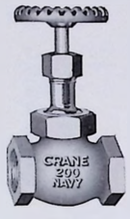
150 and 200-Pound
Brass Globe, Angle, and Cross Valves
Regrinding—For Marine Service

WORKING PRESSURES
Screwed valves — **200** pounds steam, water, or oil, **450°** F.
Flanged valves — **150** pounds steam, water, or oil, **450°** F.

For fuel oil, these valves may be used on the suction side of system only. See page 489.
For boiler feed working pressure, see page 488.

TEST PRESSURES
Screwed valves — **600** pounds hydrostatic
Flanged valves — **450** pounds hydrostatic


Cross Section
No. 70, Globe



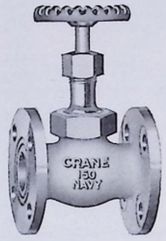
No. 70, Globe
Screwed
⅛ to 3-inch



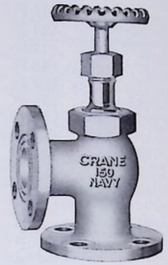
No. 70, Angle
Screwed
⅛ to 3-inch



No. 74, Cross
Screwed
½ to 2-inch



No. 71, Globe
Flanged
¾ to 3-inch



No. 71, Angle
Flanged
¾ to 3-inch

When ordering No. 70 or No. 71 Valves, specify whether globe or angle valves are wanted.

Marine Specifications

CLASS I
Screwed } 2″ and Smaller
Flanged }

These valves comply with the Rules and Regulations of the U. S. Department of Commerce, Bureau of Navigation and Steamboat Inspection. Also American Bureau of Shipping and Lloyds Register of Shipping.

CLASS II
Screwed } All Sizes
Flanged }

Material: The body is made of Crane Special Brass, a high grade steam metal.

Regrinding: These valves can be reground without removing the body from the line. Instructions for regrinding are furnished with each valve.

Union bonnet: The union bonnet ring reinforces the bonnet joint and facilitates dismantling and reassembling. When a valve is being reground, the ring centers and guides the valve trimmings.

Disc connection: The disc, in sizes ⅛ to ½-inch, is integral with the stem. In larger sizes, the disc swivels on the stem, as shown in the cross section.

Stuffing box: Stuffing boxes are deep, are equipped with a gland, and are filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges and drilling conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2a-1930). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

Full face gaskets should be used; see page 357.

Special valves: Screw-Down Check Valves are made to order only. Prices on application.

Dimensions, in Inches

Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
End to end, Globe, Screwed	1 11/16	1 11/16	1 15/16	2 1/4	2 3/4	3 5/16	3 7/8	4 1/2	5 1/4	6 5/16	7 1/4
Center to end, Angle or Cross, Screwed	13/16	13/16	1	1 3/16	1 3/8	1 11/16	1 15/16	2 1/4	2 5/8	3 3/16	3 13/16
Face to face, Globe, Flanged					3 11/16	4 3/16	4 5/16	5 5/16	6	6 3/4	7 15/16
Center to face, Angle, Flanged					2 7/16	2 5/8	2 7/8	3 3/16	3 3/4	4 5/16	4 5/8
Center to top of wheel, open	3 1/2	3 1/2	3 7/8	4 3/8	5 3/8	6	6 7/8	7 7/8	8 5/8	9 1/2	11 3/8
Diameter of wheel	1 3/4	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	6	7
Diameter of flanges					3 7/8	4 1/4	4 5/8	5	6	7	7 1/2
Thickness of flanges					11/32	3/8	13/32	7/16	1/2	9/16	5/8

List prices . . . page 19

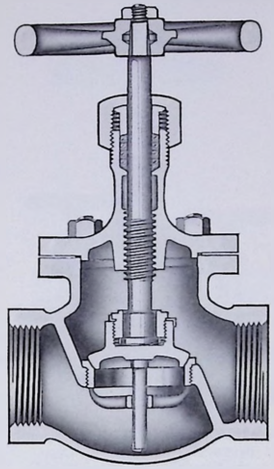
Templates for drilling . . . page 369

150 and 200-Pound
Brass Globe and Angle Valves
Bolted Bonnet—For Marine Service

WORKING PRESSURES
Screwed valves — **200** pounds steam, water, or oil, **450°** F.
Flanged valves — **150** pounds steam, water, or oil, **450°** F.

For fuel oil, these valves may be used on the suction side only. See page 489.
For boiler feed working pressure, see page 488.

TEST PRESSURES
Screwed valves — **600** pounds hydrostatic
Flanged valves — **450** pounds hydrostatic


Cross Section
No. 4196, Globe



No. 4196, Globe
Screwed
1½ to 4-inch



No. 4198, Angle
Screwed
1½ to 4-inch



No. 4197, Globe
Flanged
1½ to 6-inch



No. 4199, Angle
Flanged
1½ to 6-inch

Prices on application

Marine Specifications

CLASS I
Screwed — 2″ and Smaller
Flanged — All Sizes

These valves comply with the Rules and Regulations of the U. S. Department of Commerce, Bureau of Navigation and Steamboat Inspection. Also American Bureau of Shipping and Lloyds Register of Shipping.

CLASS II
Screwed } All Sizes
Flanged }

Construction: The valves are strong, rugged, and durable. The bolted bonnet provides liberal strength at the bonnet joint. Sizes 3½-inch and larger have outside stem threads.

Materials: Bodies are made of Crane Special Brass, a high grade steam metal. Disc and body seat ring are made of a high grade bronze that resists cutting and wiredrawing exceptionally well. Body seat rings are renewable.

Stuffing box: The stuffing box is deep and is filled with high grade packing. Sizes 3½-inch and larger are equipped with a bolted gland.

Repacking: These valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges and drilling conform to the MSS 150-Pound SP Bronze Flange Standard No. SP-2a-1930. They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

Full face gaskets should be used; see page 357.

Special valves: Cross Valves and Screw-Down Check Valves are made to order.

Dimensions, in Inches

Size	1½	2	2½	3	3½	4	5	6
End to end, Globe, Screwed	5 5/16	6	7 1/4	8 1/4	10 3/8	11 3/8		
Center to end, Angle, Screwed	2 11/16	3	3 5/8	4 1/8	5 3/16	5 11/16		
Face to face, Globe, Flanged	5 7/8	6 7/8	8	9 1/8	10 3/8	11	12 1/4	14
Center to face, Angle, Flanged	3 1/8	3 3/4	4 1/4	4 5/8	5 1/4	5 1/2	6 1/4	7
Diameter of flanges	5	6	7	7 1/2	8 1/2	9	10	11
Thickness of flanges	7/16	1/2	9/16	5/8	11/16	11/16	3/4	13/16

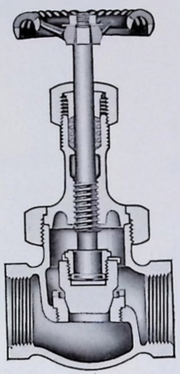
Templates for drilling . . . page 369

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asbestosclaims.law/library/21275/265

250-Pound
Brass Globe and Angle Valves
Plug Type Disc—For Marine Service

WORKING PRESSURE
250 pounds steam, water, or oil, 450° F.

For fuel oil, these valves may be used on the discharge side of the system. See page 489.
For boiler feed working pressure, see page 488.

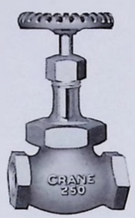


Cross Section
No. 4212 P, Globe

TEST PRESSURE
750 pounds hydrostatic

SERVICE RECOMMENDATIONS
These valves are recommended for exceptionally severe service, such as for throttling, and for soot blower, drip, and drain lines.

Prices on application



No. 4212 P, Globe
Screwed
¼ to 2-inch



No. 4214 P, Angle
Screwed
¼ to 2-inch

Marine Specifications

CLASS I
All Sizes

These valves comply with the Rules and Regulations of the U. S. Department of Commerce, Bureau of Navigation and Steamboat Inspection. Also American Bureau of Shipping and Lloyds Register of Shipping.

CLASS II
All Sizes

Body: The body is Crane Special Brass, a high grade steam metal.

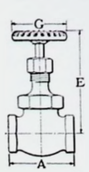
Plug type disc and seat: The plug type disc and seat are ideal for severe service. The wide seating surface is unusually resistant to foreign matter and to wiredrawing. The tapered disc permits easy regulation of flow when throttling.

Seat metals: The disc is Crane Nickel Alloy. The seat ring is Exelloy, a specially heat-treated chromium iron. These metals offer excellent resistance to wear, temperature, galling, and scoring; they are harder, tougher, and stronger than metals ordinarily used in brass valves.

Bonnet: The bonnet is made of Crane Special Brass, a high grade steam metal. Its unusually good wear-resisting properties combined with the long and accurately machined stem threads materially lengthen the life of both the stem and bonnet.

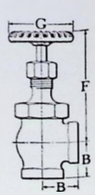
Stuffing box: The stuffing box is equipped with a gland and is unusually deep. It is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.



Dimensions, in Inches

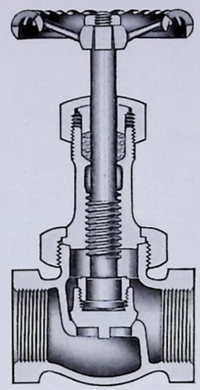
Size	¼	⅜	½	¾	1	1¼	1½	2
A	2	2 5/16	2 11/16	3 3/16	3 3/4	4 1/4	4 3/4	5 3/4
B	1 5/16	1 1/16	1 1/4	1 7/16	1 11/16	2	2 3/16	2 11/16
E — Open	4 1/8	4 3/4	5 3/8	6	6 3/4	7 5/8	8 5/8	10
F — Open	4 1/8	4 5/8	5 1/4	5 7/8	6 5/8	7 1/2	8 1/2	9 3/4
G	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	5 3/8



300-Pound
Brass Globe and Angle Valves
Regrinding—For Marine Service

WORKING PRESSURE
300 pounds steam, water, or oil, 450° F.

For fuel oil, these valves may be used on the discharge side of the system. See page 489.
For boiler feed working pressure, see page 488.



Cross Section
No. 4362 E, Globe

TEST PRESSURE
900 pounds hydrostatic

SERVICE RECOMMENDATIONS
These valves are recommended for severe operating conditions at high pressures. They combine serviceability with moderate cost.

Prices on application



No. 4362 E, Globe
Screwed
¼ to 2-inch



No. 4364 E, Angle
Screwed
¼ to 2-inch

Marine Specifications

CLASS I
All Sizes

These valves comply with the Rules and Regulations of the U. S. Department of Commerce, Bureau of Navigation and Steamboat Inspection. Also American Bureau of Shipping and Lloyds Register of Shipping.

CLASS II
All Sizes

Body and disc: These parts are made of Crane Hard Metal, a strong, hard, copper-tin bronze that resists cutting and wiredrawing exceptionally well.

Bonnet: The bonnet is made of Crane Special Brass, a high grade steam metal. Its unusually good wear-resisting properties combined with the long and accurately machined stem threads materially lengthen the life of both the stem and bonnet.

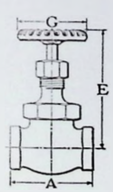
Regrinding: These valves can be reground without removing the body from the line. Instructions for regrinding are furnished with each valve.

Union bonnet construction: The union bonnet construction, in addition to making a sturdy, tight joint, facilitates dismantling and reassembling the valve. The union ring reinforces the bonnet joint; and when the valve is being reground, it centers and guides the valve trimmings.

Stuffing box: The stuffing box is unusually deep and is filled with high grade packing. It is equipped with a gland.

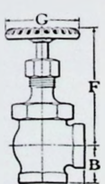
Repacking: These valves, when wide open, can be repacked while under pressure.

Special valves: Cross Valves and Screw-Down Check Valves are made to order only.



Dimensions, in Inches

Size	¼	⅜	½	¾	1	1¼	1½	2
A	2	2 5/16	2 11/16	2 15/16	3 1/2	4 1/16	4 5/8	5 3/4
B	1 5/16	1 1/16	1 1/4	1 1/2	1 3/4	2 1/16	2 5/16	2 7/8
E — Open	4 1/8	4 5/8	5 1/4	6 3/8	6 7/8	7 7/8	8 3/4	10 3/8
F — Open	4	4 1/2	5 1/8	6 1/4	7	7 7/8	9	10 1/2
G	1 3/4	2 1/16	2 9/16	3 1/16	3 5/8	4 1/16	4 3/4	6



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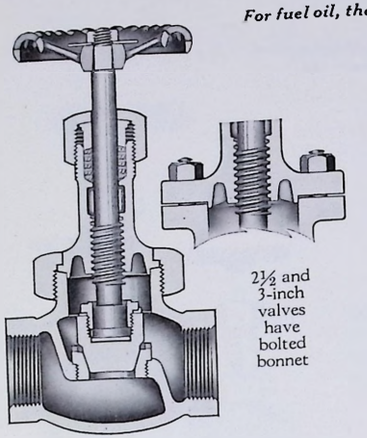
300-Pound
Brass Globe and Angle Valves
Plug Type Disc—For Marine Service

WORKING PRESSURE
300 pounds steam, water, or oil, 450° F.

TEST PRESSURE
900 pounds hydrostatic

For fuel oil, these valves may be used on the discharge side of the system. See page 489.

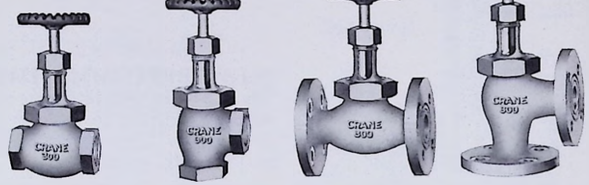
For boiler feed working pressure, see page 488.



2½ and 3-inch valves have bolted bonnet

Cross Section
No. 4382 P, Globe

SERVICE RECOMMENDATIONS
These valves are recommended for exceptionally severe service, such as for throttling and for soot blower, drip, and drain lines



No. 4382 P, Globe, Screwed, ¼ to 2-inch
No. 4384 P, Angle, Screwed, ¼ to 2-inch
No. 4383 P, Globe, Flanged, ¾ to 3-inch
No. 4385 P, Angle, Flanged, ¾ to 3-inch

Prices on application

Marine Specifications

CLASS I
All Sizes

These valves comply with the Rules and Regulations of the U. S. Department of Commerce, Bureau of Navigation and Steamboat Inspection. Also American Bureau of Shipping and Lloyds Register of Shipping.

CLASS II
All Sizes

Body: The body is strong and durable; it is made of Crane Special Brass, a high grade steam metal.

Plug type disc and seat: The wide seat resists wiredrawing and foreign matter exceptionally well. The disc taper assists in maintaining tightness and permits easy flow regulation when throttling.

Seat metals: The disc is Crane Nickel Alloy; the seat ring is Exelloy. These metals are an ideal combination, offering unusual resistance to wear, temperature and galling; they are harder, tougher, and stronger than metals ordinarily used in brass valves.

Bonnet construction: Sizes 2-inch and smaller have a union bonnet; 2½ and 3-inch sizes have a bolted bonnet, inside screw. Both types provide a strong tight joint, yet they can be easily dismantled and reassembled without injuring the valve.

Stuffing box: The stuffing box is unusually deep; it has a gland and is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges and drilling conform to the Crane 300-Pound Brass Flange Standard. They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

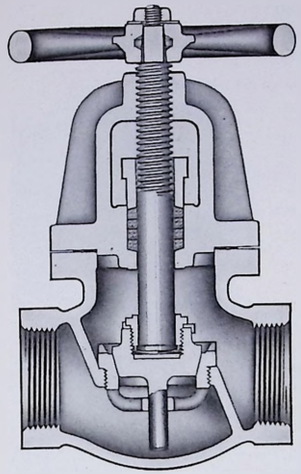
Full face gaskets should be used; page 357.

Dimensions, in Inches

Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3
End to end, No. 4382 P	2¼	2½	2 5/16	3½	4⅛	4¾	5¼	6⅜		
Center to end, No. 4384 P	1⅛	1¼	1½	1¾	2 1/16	2⅜	2⅝	3 3/16		
Face to face, No. 4383 P				4¾	5⅜	6¼	7¼	8	9	10 5/16
Center to face, No. 4385 P				3	3¼	3½	4	4 5/16	4¾	5 7/16
Center to top of wheel, open, Globe	4⅜	5⅛	5⅝	6⅝	7¼	8¼	9⅜	10⅝	12	13⅜
Center to top of wheel, open, Angle	4¼	4⅞	5⅜	6⅜	7	8	9	10¼	11	12⅜
Diameter of wheel	2 1/16	2 9/16	2¾	3 1/16	3⅝	4 1/16	4¾	6	7	8
Diameter of flanges				4⅝	4⅞	5¼	6⅛	6½	7½	8¼
Thickness of flanges				17/32	19/32	5/8	11/16	¾	13/16	29/32

Templates for drilling . . . . page 369

300-Pound
Brass Globe and Angle Valves
Outside Screw and Yoke—Bolted Bonnet
For Marine Service



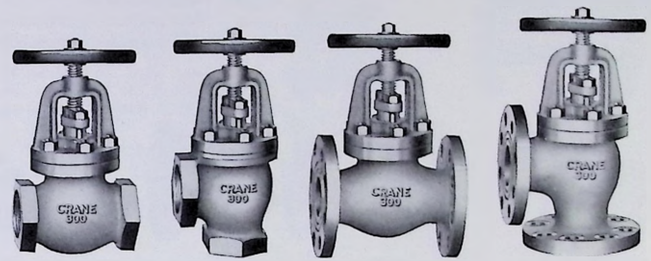
Cross Section
No. 85 P, Globe

WORKING PRESSURE
300 pounds steam, water, or oil, 450° F.

TEST PRESSURE
900 pounds hydrostatic

For fuel oil, these valves may be used on the discharge side of the system. See page 489.

For boiler feed working pressure, see page 488.



No. 85 P, Globe, Screwed, 1½ and 2-inch
No. 85½ P, Angle, Screwed, 1½ and 2-inch
No. 87 P, Globe, Flanged, 1½ to 3-inch
No. 87½ P, Angle, Flanged, 1½ to 3-inch

Prices on application

Marine Specifications

CLASS I
All Sizes

These valves comply with the Rules and Regulations of the U. S. Department of Commerce, Bureau of Navigation and Steamboat Inspection. Also American Bureau of Shipping and Lloyds Register of Shipping.

CLASS II
All Sizes

Service recommendations: These valves are recommended for throttling, for soot blower lines, and for other exceptionally severe services. The valves have a plug type disc and seat, permitting easy flow regulation when throttling and offering unusual resistance to foreign matter and to wiredrawing. The outside stem threads are particularly well suited for services where the action of the fluid might affect inside threads.

Construction: The valves are strong, rugged, and durable. The bolted bonnet provides liberal strength at the bonnet joint. Sizes 2½-inch and larger have the disc guided through a bridge cast integral with the body seat ring, as shown in the cross section; smaller sizes do not have the guide.

Materials: Bodies are made of Crane Special Brass, a high grade steam metal. The plug type disc is made of Crane Nickel Alloy; the renewable body seat ring is made of Exelloy. The disc and seat metals are an ideal combination, being stronger, harder, and tougher than metals ordinarily used in brass valves.

Stuffing box: The stuffing box is deep and is filled with packing. It is equipped with a bolted gland. The valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges and drilling conform to the Crane 300-Pound Brass Flange Standard. They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

Full face gaskets should be used; see page 357.

Larger sizes: Sizes 3½-inch and larger are made to order; they have a 45° flat seat. Prices on application.

When sizes 3½-inch and larger are wanted for high-pressure, high-temperature, or severe service, Crane Steel Valves are recommended; see page 507.

Special valves: Cross Valves and Screw-Down Check Valves are made to order.

Dimensions, in Inches

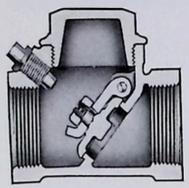
Size	1½	2	2½	3
End to end, No. 85 P	5½	6¼		
Center to end, No. 85½ P	2¾	3⅛		
Face to face, No. 87 P	7	8	9	10 5/16
Center to face, No. 87½ P	3⅞	4¼	4¾	5 7/16
Center to top of stem, open, Globe	9⅛	10¼	11⅝	13
Center to top of stem, open, Angle	8⅜	9½	10⅝	12
Diameter of wheel	6	7	8	9
Diameter of flanges	6⅛	6½	7½	8¼
Thickness of flanges	11/16	¾	13/16	29/32

Templates for drilling . . . page 369

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150 and 200-Pound
Brass Check Valves
Regrinding—For Marine Service

WORKING PRESSURES
Screwed valves — **200** pounds steam, water, or oil, **450°** F.
Flanged valves — **150** pounds steam, water, or oil, **450°** F.

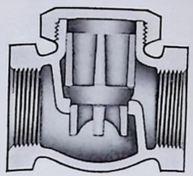


Cross Section
No. 35, Swing

For fuel oil, these valves may be used on the suction side of system only. See page 489.

For boiler feed working pressure, see page 488.

TEST PRESSURES
Screwed valves — **600** pounds hydrostatic
Flanged valves — **450** pounds hydrostatic



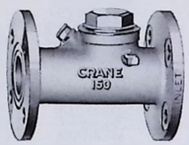
Cross Section
No. 72, Navy
Horizontal



No. 35, Swing
Screwed
¼ to 3-inch



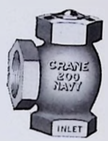
No. 37, Swing
Angle, Screwed
½ to 2-inch



No. 35½, Swing
Flanged
¾ to 3-inch



No. 72, Navy
Horizontal, Screwed
¼ to 3-inch



No. 72, Navy
Angle, Screwed
¼ to 3-inch

Horizontal Swing Check Valves may also be used in a vertical position for upward flow.

When ordering, specify whether horizontal or angle valves are wanted.

Marine Specifications

CLASS I
Screwed / Flanged } 2" and smaller

These valves comply with the Rules and Regulations of the U. S. Department of Commerce, Bureau of Navigation and Steamboat Inspection. Also American Bureau of Shipping and Lloyds Register of Shipping.

CLASS II
Screwed / Flanged } All sizes

Material: The bodies are made of Crane Special Brass, a high grade steam metal.

Regrinding: All check valves shown on this page may be reground without removing the bodies from the line. By removing the stop plug on the swing check valves, a screw driver can be engaged with the slot in the disc spud, making it easy to rotate the disc when regrinding.

Flanged valves: End flanges and drilling conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2a-1930). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

Full face gaskets should be used; see page 357.

Dimensions, in Inches

Size		¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 35, Swing	End to end	2 3/16	2 3/16	2½	2 3/4	3 1/4	3 13/16	4 1/4	5 5/16	6	7
	Center to top	1 5/16	1 5/16	1 7/16	1 11/16	2	2 3/8	2 11/16	3 3/16	3 3/4	4 5/16
No. 35½, Swing	Face to face				4 3/8	5	5 5/8	6 1/8	7 3/8	8 1/2	9 1/8
	Center to top				1 11/16	2	2 3/8	2 11/16	3 3/16	3 3/4	4 5/16
No. 37, Angle, Swing	Center to end			1 1/8	1 3/8	1 5/8	1 7/8	2 1/8	2 5/8		
	Center to top			1 9/16	1 13/16	2 3/16	2 1/2	2 7/8	3 7/16		
No. 72, Horizontal or Angle	End to end, Horizontal	1 11/16	1 15/16	2 1/4	2 3/4	3 5/16	3 7/8	4 1/2	5 1/4	6 5/16	7 1/4
	Center to end, Angle	13/16	1	1 3/16	1 3/8	1 11/16	1 15/16	2 1/4	2 5/8	3 3/16	3 13/16
	Center to top, Horizontal	1 5/16	1 1/8	1 3/16	1 7/16	1 3/4	2	2 1/4	2 5/8	3 3/4	4 5/16
	Center to top, Angle	1 5/16	1 1/8	1 3/16	1 7/16	2 1/8	2 7/16	2 3/4	3 5/16	3 3/4	4 3/8
Flange dimensions	Diameter of flanges				3 7/8	4 1/4	4 5/8	5	6	7	7 1/2
	Thickness of flanges				11/32	3/8	13/32	7/16	1/2	9/16	5/8

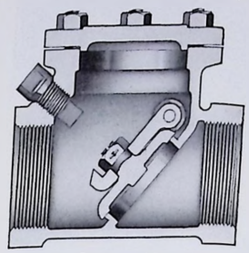
List prices . . . page 34

Templates for drilling . . . page 369

150 and 200-Pound
Brass Check Valves
Bolted Cap—For Marine Service
Swing Check Valves

WORKING PRESSURES
Screwed valves — **200** pounds steam, water, or oil, **450°** F.
Flanged valves — **150** pounds steam, water, or oil, **450°** F.

For fuel oil, these valves may be used on the suction side of system only. See page 489.
For boiler feed working pressure, see page 488.



Cross Section, No. 4032

TEST PRESSURES
Screwed valves
600 pounds hydrostatic

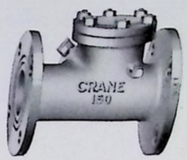
Flanged valves
450 pounds hydrostatic

These valves may also be used in a vertical position for upward flow.

Prices on application



No. 4032, Swing
Screwed
2 to 3-inch



No. 4033, Swing
Flanged
2 to 6-inch

Marine Specifications

CLASS I
Screwed — 2" and Smaller
Flanged — All Sizes

These valves comply with the Rules and Regulations of the U. S. Department of Commerce, Bureau of Navigation and Steamboat Inspection. Also American Bureau of Shipping and Lloyds Register of Shipping.

CLASS II
Screwed / Flanged } All Sizes

Construction: These valves are sturdy and rugged. They are amply reinforced at points subjected to greatest stress; their bolted cap makes an exceptionally tight, strong, and serviceable joint. Sizes 4-inch and smaller have a separate disc and hinge, as shown in the cross section; 5 and 6-inch sizes have a one-piece disc and hinge.

Materials: Bodies and discs are made of Crane Special Brass, a high grade steam metal.

Regrinding: Sizes 4-inch and smaller may be reground without removing the bodies from the line. By removing the stop plug, a screw driver can be engaged with the slot in the disc spud, making it easy to rotate the disc when regrinding.

Flanged valves: End flanges and drilling conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2a-1930). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

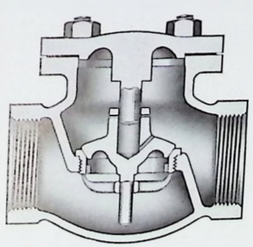
Full face gaskets should be used; see page 357.

Dimensions, in Inches

Size	2	2½	3	3½	4	5	6
End to end, No. 4032	5 3/8	6 3/8	7¼				
Face to face, No. 4033	7 3/8	8½	9 1/8	10¼	11¼	12 7/8	14 3/8
Center to top, No. 4032 or No. 4033	3¾	4 3/8	5	6	6½	7¼	8¼
Diameter of flanges	6	7	7½	8½	9	10	11
Thickness of flanges	½	9/16	5/8	11/16	11/16	¾	13/16

Templates for drilling . . . page 369

Horizontal and Angle Check Valves



Cross Section
No. 4062, Horizontal

Screwed valves — No. 4062, Horizontal or Angle
Flanged valves — No. 4063, Horizontal or Angle

These are rugged brass bolted cap check valves. They are made with Crane Special Brass body and disc, and are recommended for the same pressures and services as the Swing Check Valves shown above.

The screwed end valves are made in sizes 1½ and 2-inch; the flanged end, in sizes 1½ to 6-inch.

When ordering, specify size and catalogue number, and state whether horizontal or angle valves are wanted.

These valves are made to order; prices and dimensions on application.

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 268 of 402
Published by AsbestosClaims.Law
asbestosclaims.law/library/21275/268

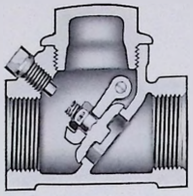
300-Pound
Brass Check Valves
Regrinding—For Marine Service

WORKING PRESSURE
300 pounds steam, water, or oil, 450° F.

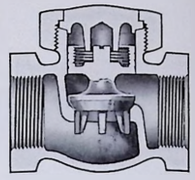
For fuel oil, these valves may be used on the discharge side of the system. See page 489.

For boiler feed working pressure, see page 488.

TEST PRESSURE
900 pounds hydrostatic



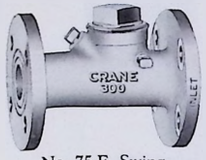
Cross Section
No. 74 E, Swing



Cross Section
No. 366 E, Horizontal



No. 74 E, Swing
Screwed
3/8 to 2-inch



No. 75 E, Swing
Flanged
3/4 to 2-inch

The No. 74 E and the No. 75 E Swing Check Valves may also be used in a vertical position for upward flow.



No. 366 E, Horizontal
Screwed
1/4 to 2-inch



No. 369 E, Horizontal
Flanged
3/4 to 2-inch

Marine Specifications

CLASS I
All Sizes

These valves comply with the Rules and Regulations of the U. S. Department of Commerce, Bureau of Navigation and Steamboat Inspection. Also American Bureau of Shipping and Lloyds Register of Shipping.

CLASS II
All Sizes

No. 74 E and No. 75 E: The No. 74 E and No. 75 E are heavy, ruggedly constructed swing check valves, recommended for severe service. Bodies and discs are Crane Special Brass, a high grade steam metal.

These valves may be reground without removing the body from the line. By removing the stop plug, a screw driver can be engaged with the disc-spud slot, making it easy to rotate the disc when regrinding.

No. 366 E and No. 369 E: These are horizontal check valves, recommended especially for service where pulsations in the line are apt to cause an ordinary check valve to hammer. The dashpot formed above the piston type disc effectively cushions the disc.

Bodies and discs are Crane Hard Metal, a copper-tin bronze that resists wear exceptionally well.

These valves can be reground without removing the body from the line.

When so ordered, the valves can be equipped with a spring above the disc; prices on application.

Flanged valves: End flanges and drilling conform to the Crane 300-Pound Brass Flange Standard. They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

Full face gaskets should be used; see page 357.

Dimensions, in Inches

Size		1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 74 E or No. 75 E	End to end, No. 74 E		2 3/4	2 3/4	3 1/16	3 5/8	4 1/8	4 13/16	5 13/16
	Face to face, No. 75 E				5 1/4	5 13/16	6 7/16	7 7/16	8 3/8
	Center to top		1 13/16	1 13/16	2 1/8	2 7/16	2 13/16	3 5/16	3 13/16
No. 366 E or No. 369 E	End to end, No. 366 E	1 13/16	2	2 1/2	2 15/16	3 1/2	4 1/16	4 5/8	5 3/4
	Face to face, No. 369 E				3 15/16	4 9/16	5	5 3/4	6 3/4
	Center to top	1	1 1/8	1 3/8	1 7/8	2	2 3/8	2 5/8	3 1/4
Flange dimensions	Diameter of flanges				4 5/8	4 7/8	5 1/4	6 1/8	6 1/2
	Thickness of flanges				17/32	19/32	5/8	11/16	3/4

List prices . . . page 36

Templates for drilling . . . page 369

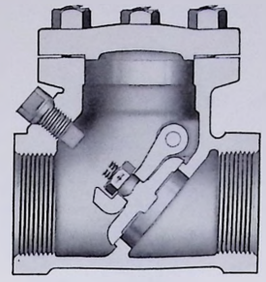
300-Pound
Brass Check Valves
Bolted Cap—For Marine Service

WORKING PRESSURE
300 pounds steam, water, or oil, 450° F.

For fuel oil, these valves may be used on the discharge side of the system. See page 489.

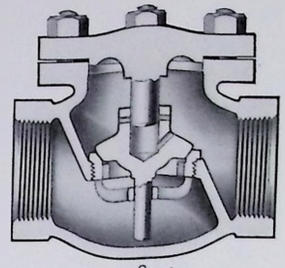
For boiler feed working pressure, see page 488.

TEST PRESSURE
900 pounds hydrostatic



Cross Section
No. 4234 E, Swing

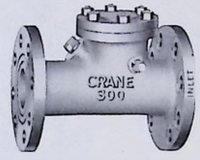
Swing Check Valves may also be used in a vertical position for upward flow.



Cross Section
No. 4064 E, Horizontal

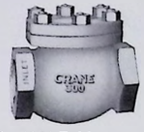


No. 4234 E, Swing
Screwed
2-inch



No. 4235 E, Swing
Flanged
2 to 3-inch

Prices on application



No. 4064 E, Horizontal
Screwed
1 1/2 and 2-inch



No. 4065 E, Horizontal
Flanged
1 1/2 to 3-inch

Marine Specifications

CLASS I
Screwed—2" and Smaller
Flanged—All Sizes

These valves comply with the Rules and Regulations of the U. S. Department of Commerce, Bureau of Navigation and Steamboat Inspection. Also American Bureau of Shipping and Lloyds Register of Shipping.

CLASS II
All Sizes

Service recommendations: These are exceptionally rugged check valves. They have heavy metal sections and are liberally reinforced to withstand severe operating conditions. Their bolted cap provides an unusually strong and tight joint. The valves are ideal for hard service.

Materials: The No. 4234 E and No. 4235 E Swing Check Valves have bodies, discs, and caps made of Crane Special Brass, a high grade steam metal.

The No. 4064 E and No. 4065 E Horizontal Check Valves have Crane Special Brass bodies and caps; the discs and body seat rings are Crane Hard Metal, a strong, hard copper-tin bronze. Body seat rings are renewable.

Regrinding: These valves can be reground without removing the bodies from the line. By removing the stop plug on the swing check valves, a screw driver can be engaged with the slot in the disc spud, making it easy to rotate the disc when regrinding.

Flanged valves: End flanges and drilling conform to the Crane 300-Pound Brass Flange Standard. They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

Full face gaskets should be used; see page 357.

Larger sizes: Larger size valves can be made to order.

Dimensions, in Inches

Size		1 1/2	2	2 1/2	3
No. 4234 E and No. 4235 E	End to end, No. 4234 E		5 13/16		
	Face to face, No. 4235 E		8 9/16	9 1/2	10 1/2
	Center to top, No. 4234 E or No. 4235 E		4 1/2	5 1/4	5 7/8
No. 4064 E and No. 4065 E	End to end, No. 4064 E	5 1/2	6 1/4		
	Face to face, No. 4065 E	7	8	9	10 5/16
	Center to top, No. 4064 E or No. 4065 E	3 1/2	3 7/8	4 7/8	5 1/2
Flange dimensions	Diameter of flanges	6 1/8	6 1/2	7 1/2	8 1/4
	Thickness of flanges	11/16	3/4	13/16	29/32

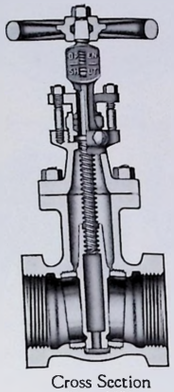
Templates for drilling . . . page 369

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Low Pressure
Brass Gate Valves
For Marine Service

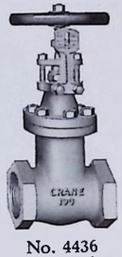
WORKING PRESSURE
100 pounds saturated steam, water, or oil

For fuel oil, these valves may be used on the suction side of system only. ***See page 489.***

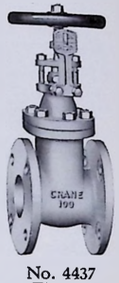


Cross Section
No. 4436

FEATURES
Bolted Bonnet — Renewable Seat
Solid Wedge Disc
Non-Rising Stem — With Indicator



No. 4436
Screwed
2 to 4-inch



No. 4437
Flanged
2 to 10-inch

Prices on application

CLASS II
All sizes

Marine Specifications
These valves comply with the Rules and Regulations of the U. S. Department of Commerce, Bureau of Navigation and Steamboat Inspection. Also American Bureau of Shipping and Lloyds Register of Shipping.

Construction: These valves are of heavy proportions throughout. All sizes have a bolted bonnet, non-rising stem, solid wedge disc, and renewable body seat rings. They are equipped with an approved type of indicator to show whether the valve is open or closed.

Materials: Bodies, seats, and discs are made of Crane Special Brass, a high grade steam metal.

Stuffing box: The stuffing box is deep and is filled with a high grade packing. All sizes are equipped with a bolted gland, and may be repacked when the valve is wide open and under pressure.

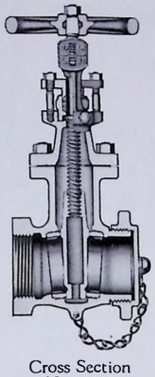
Flanged Valves: End flanges and drilling conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2a-1930). They are plain faced with two V-shaped concentric grooves between the port and the bolt holes.

Full face gaskets should be used. See page 357.

Dimensions will be furnished on request.

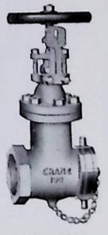
Low Pressure
Brass Hose Gate Valves
For Marine Service

WORKING PRESSURE
100 pounds cold water



Cross Section
No. 4448

FEATURES
Solid Wedge Disc
Non-Rising Stem — With Indicator



No. 4448
Screwed
1½ to 2½-inch



No. 4449
Flanged
1½ to 2½-inch

Prices on application

CLASS II
All sizes

Marine Specifications
These valves comply with the Rules and Regulations of the U. S. Department of Commerce, Bureau of Navigation and Steamboat Inspection. Also American Bureau of Shipping and Lloyds Register of Shipping.

Construction: These valves are strong, rugged, and durable. All sizes are equipped with a solid wedge disc and are non-rising stem type. Sizes 1½-inch and 2-inch have a screwed bonnet and integral seats. The 2½-inch size has a bolted bonnet and renewable seats. Valves are equipped with an approved type of indicator, to show whether the valve is open or closed.

Materials: Bodies, seats, and discs are made of Crane Special brass, a high grade steam metal.

Stuffing Box: The stuffing box is deep, and is filled with a high grade packing. Sizes 2-inch and smaller have a hexagonal packing nut and a gland follower. The 2½-inch size has a bolted gland. All sizes can be repacked when the valve is wide open and under pressure.

Flanged Valves: End flanges and drilling conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2a-1930). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

Full face gaskets should be used. See page 357.

Hose Thread: These valves will be regularly furnished with any recognized standard hose thread used in Marine work, such as "National Standard Hose Thread", "Iron Pipe Hose Thread", and "New York Corporation Hose Thread". Orders must specify the type of hose thread desired. When hose threads other than these are required, it will be necessary to send us detail information or a sample, preferably the male end of a hose coupling. Valves are furnished with cap and chain unless otherwise ordered.

Dimensions will be furnished on request.

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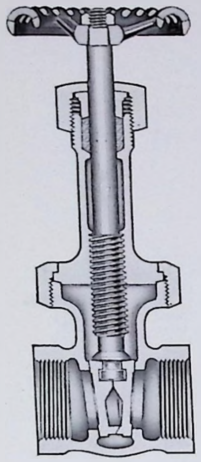
Brass Gate Valves

Wedge Disc—Rising Stem

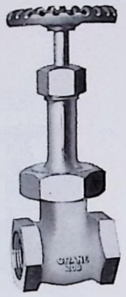
For Marine Service

WORKING PRESSURES
No. 429 and No. 431 — **100** pounds saturated steam, water, or oil
No. 457 — **200** pounds steam, water, or oil, **450°** F.

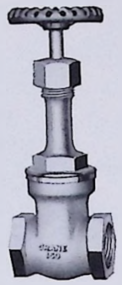
TEST PRESSURE
No. 457 — **600** pounds hydrostatic



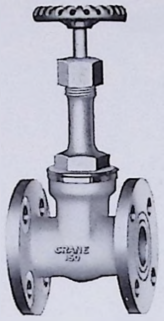
Cross Section
Rising Stem
No. 457



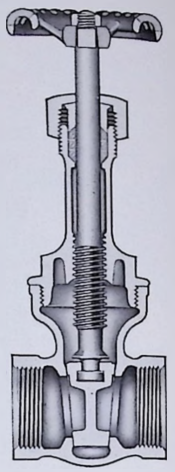
Rising Stem
No. 457
Screwed
¼ to 3-inch



Rising Stem
No. 431
Screwed
¼ to 3-inch



Rising Stem
No. 429
Flanged
¾ to 3-inch



Cross Section
Rising Stem
No. 431

Marine Specifications

CLASS I
No. 457 only—2″ and Smaller

These valves comply with the Rules and Regulations of the U. S. Department of Commerce, Bureau of Navigation and Steamboat Inspection. Also American Bureau of Shipping and Lloyds Register of Shipping.

CLASS II
All Sizes

Service recommendations: These valves are ruggedly constructed. They are recommended for severe service.

Stuffing box: The stuffing box is equipped with a gland, and is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

No. 457 Rising Stem Gate Valves: The No. 457 Gate Valves have a union bonnet, which strengthens the bonnet joint and facilitates dismantling for cleaning and repairing.

Material: The body and bonnet are made of Crane Special Brass, a high grade steam composition.

Sizes ¾-inch and smaller have a solid wedge disc; the larger sizes have a double wedge disc.

No. 431 and No. 429 Gate Valves: The No. 431 and No. 429 are rising stem valves. Their solid wedge disc slips onto the stem, and is accurately guided in the body.

Material: The body and bonnet are made of Crane Special Brass.

Flanged valves: End flanges and drilling conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2a-1930). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

Full face gaskets should be used; see page 357.

Dimensions, in Inches

Size		¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 457	End to end	1 15/16	1 15/16	2 3/16	2 7/16	2 3/4	3 1/8	3 7/16	4	4 5/8	5 7/16
	Center to top of wheel, open	5 1/4	5 1/4	6	7	8 1/2	9 3/4	11 1/4	13 3/4	16 1/2	19
	Diameter of wheel	2 1/16	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	6	7
No. 431 and No. 429	End to end, No. 431	1 7/8	1 15/16	2 1/8	2 3/8	2 7/8	3 3/16	3 7/16	3 7/8	4 1/2	4 15/16
	Face to face, No. 429				3	3 3/8	3 7/8	4 3/8	5 1/2	6 1/2	7 1/2
	Center to top of wheel, open	5 1/8	5 1/8	5 1/2	6 5/8	7 7/8	9 1/2	10 7/8	13 1/8	15 3/8	17 7/8
	Diameter of wheel	1 3/4	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8
Flange dimensions	Diameter of flanges				3 7/8	4 1/4	4 5/8	5	6	7	7 1/2
	Thickness of flanges				11/32	3/8	13/32	7/16	1/2	9/16	5/8

List prices . . . pages 41 and 42

Templates for drilling . . . page 369

300-Pound

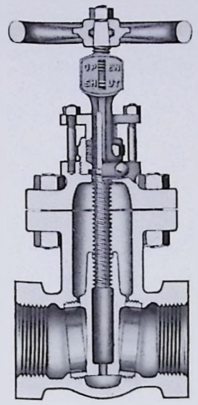
Brass Gate Valves

For Marine Service

WORKING PRESSURE
300 pounds steam, water, or oil, **450°** F.

For fuel oil, these valves may be used on the discharge side of the system. ***See page 489.***

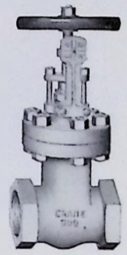
For boiler feed working pressure, see page 488.



Cross Section
No. 4068 E

TEST PRESSURE
900 pounds hydrostatic

FEATURES
Renewable Seat
Solid Wedge Disc — Bolted Bonnet
Non-Rising Stem — Indicator



No. 4068 E
Screwed
2 to 3-inch



No. 4069 E
Flanged
2 to 8-inch

Prices on application

Marine Specifications

CLASS I
Screwed — 2″ only
Flanged — All sizes

These valves comply with the Rules and Regulations of the U. S. Department of Commerce, Bureau of Navigation and Steamboat Inspection. Also American Bureau of Shipping and Lloyds Register of Shipping.

CLASS II
All sizes

Construction: These valves are strong, rugged, and durable. The bolted bonnet provides liberal strength at the bonnet joint. All sizes have a bolted bonnet, solid wedge disc, non-rising stem, and renewable body seat rings. They are equipped with an approved type indicator to show whether the valve is open or closed.

Materials: Bodies, discs, body seat rings, and bonnets are made of Crane Special Brass, a high grade steam metal. The body rings are renewable.

Stuffing Box: The stuffing box is deep, and is filled with high grade packing. All sizes are equipped with a bolted gland. When wide open, these valves can be repacked under pressure.

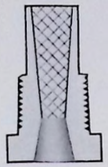
Flanged Valves: End flanges and drilling conform to the Crane 300-Pound Brass Flange Standard. The flanges are plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

Full face gaskets should be used. See page 357.

Dimensions will be furnished on request.

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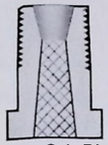
Fusible Plugs
For Marine Service



Fire Side Plug
¾ and 1-inch

No. 4752
Regular

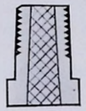
No. 4752 L
With
Oversize Thread



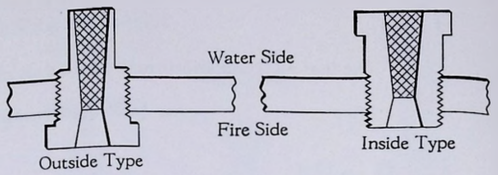
Water Side Plug
¾ and 1-inch

No. 4753
Regular

No. 4753 L
With
Oversize Thread



Tube Plug
No. 4749
⅜-inch



Installation: Fusible Plugs always are installed with the large end of the core of the tin exposed to the water, as illustrated above.

Prices on application

Marine Specifications

These Plugs comply with the Rules and Regulations of the U. S. Department of Commerce, Bureau of Navigation and Steamboat Inspection. Also American Bureau of Shipping and Lloyds Register of Shipping.

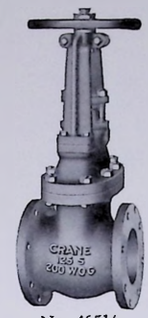
Material: The casing is made of Crane Hard Metal (referred to in the Steamboat Inspection Specification as Grade "C"). All Crane Fusible Plugs are filled with pure Banca Tin which has a melting point of 450° F.

Diameter of fusible metal: The minimum diameter of the fusible metal in these plugs is ⅜-inch.

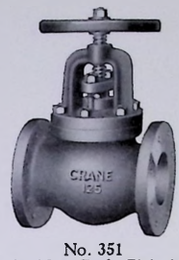
Stamping: All plugs for marine service have the heat number stamped on, and a sample plug from each heat is submitted to the "Director, Bureau of Navigation of Steam Boat Inspection, Dept. of Commerce, Washington, D. C.", for approval.

Oversize plugs: The No. 4752 L and No. 4753 L plugs have an oversize thread, and are used where the continual renewal of Plugs has worn the plug tapping too large for the standard size thread.

Valves for Marine Service



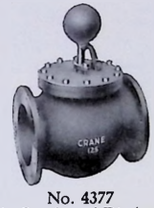
No. 465½
Iron Body Wedge Gate Valve
Brass Trimmed
Class I or II
Page 75



No. 351
Standard Iron Body Globe Valve
Brass Trimmed
Class I or II
Page 144



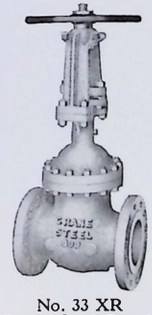
No. 373
Standard Iron Body Swing Check Valve
Brass Trimmed
Class I or II
Page 153



No. 4377
Iron Body Overboard Discharge Valve
Brass Trimmed
Class II



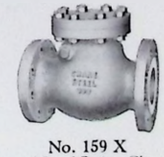
No. 4347
Iron Body Main Injection Valve
Brass Trimmed
Class II



No. 33 XR
300-Pound Steel Gate Valve
Outside Screw and Yoke
Class I



No. 151 P
300-Pound Steel Globe Valve
Outside Screw and Yoke
Class I



No. 159 X
300-Pound Steel Swing Check Valve
Class I

WORKING PRESSURE RATINGS
Steel Valves and Fittings for Marine Service



No. 216 P

Crane Primary Steam Working Pressure	Marine Steam, Water, or Oil Working Pressure
150	125
300	250
400	300
600	450
900	700

For boiler feed and blow-off working pressures, see pages 488 and 489.

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Valves and Fittings for Marine Service

In addition to the valves shown on pages 492 to 507, the following valves and specialties, suitable for marine service, are shown in other sections of this catalogue because of their adaptability to general industrial service:

Brass Radiator Valves....page 51
Brass Chronometer Valves....page 383
Iron Body Back Pressure Valves....page 387
Brass Pop Safety Valves....page 391
Cast Steel Pop Safety Valves....page 399
Brass Relief Valves....pages 405 and 409

Valves, Fittings, and Specialties
For Ammonia

Description....page 510
Globe and Angle Valves....pages 510 and 511
Expansion Valves....page 512
Check Valves....page 512
Oil Separators....page 513
Sediment Separators....page 513
Liquid Gauges....page 513
Flanged Fittings....pages 514 and 516
Boyle Flange Unions....page 514
Fillers....page 514
Flanges....page 515
Return Bends....page 516
Atmospheric Condensers....page 517
Double Pipe Condensers and Brine Coolers....page 518
Double Pipe Water Coolers....page 518
Double Pipe Fittings....pages 518 and 519
Pipe Stands....page 520
Trough Supports....page 520
Water Troughs....page 520
Gaskets....page 521
Dimensions....pages 522 and 523

For greater convenience, the following valves and fittings, suitable for ammonia, are shown in other sections of this catalogue because of their adaptability to general piping service:

Screwed Fittings....pages 182 and 183
Bushings....pages 224 and 225
Plugs....page 226
Wrought Couplings....page 227
Wrought Steel Nipples....page 228
Screwed Unions....pages 239 and 244
Union Fittings....page 245
Flange Unions....page 248
Combination Elbows....page 248
Welding Fittings....pages 338 and 339
Relief Valves....page 412
Pressure Gauges....page 444

Also, the properties of saturated ammonia are shown in the section of this catalogue devoted to Engineering Data, pages 753 to 755.

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 273 of 402
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Valves, Fittings, and Specialties
For Ammonia

Pages 511 to 524 illustrate Crane piping equipment for ammonia refrigeration. This line is unusually complete; it includes valves, flanged or screwed fittings, flanges and unions, return bends and other fittings for coils and condensers, return bends and fittings for double pipe condensers, brine coolers, and heat exchangers, specialties for ammonia,— in fact, it offers the user the opportunity to equip his installation completely with piping materials of the very highest quality.

Service recommendations: This line is especially recommended for high pressure ammonia refrigeration service.

However, it is also admirably suited for use on air, gas, oil, or chemicals, or in special process work where heavy, all-iron construction is desired.

Construction: Every detail of design, construction, and workmanship is directed toward producing piping materials that are uniquely adapted to conveying deadly or hazardous gases.

All valves and fittings are unusually massive and rugged, to provide a high margin of safety against accidents.

Flanged valves and fittings have tongue and groove faces, to assure tightness at the joints and as an added precaution against blowing out gaskets.

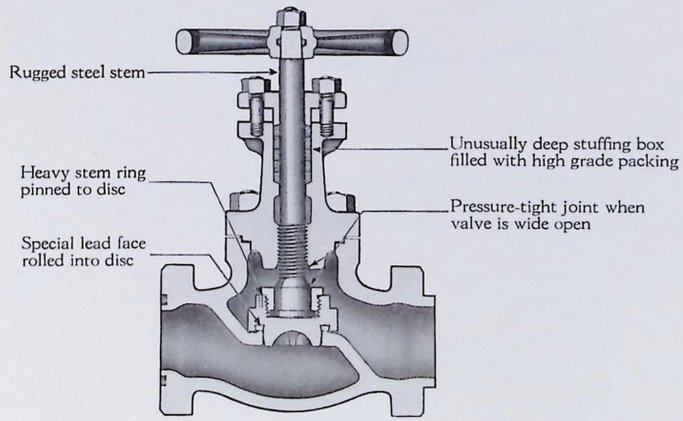
Screwed valves and fittings have long threads, and are recessed to enable soldering the joints.

All valves and fittings recommended for ammonia (except flanges) are tested to 300 pounds air under water.

Metals: Ammonia valves and fittings are made of Crane Ferrosteel, screwed fittings of malleable iron, and flanges of forged steel, malleable iron, or Ferrosteel, depending on the size and style.

Valves are all-iron, with steel stems, and have special lead disc faces or steel discs. No copper or brass is used in their construction, being unsuitable for use on ammonia.

Interchangeability: Flanged valves except the 8, 10, and 12-inch sizes have the same center to face and face to face dimensions as flanged fittings. A flanged globe valve can be substituted for a flanged tee or cross; a flanged angle valve, for a flanged elbow. This is an important feature when quick changes are necessary.



The construction of Crane Ammonia Globe and Angle Valves, illustrated above, is especially suited to conveying noxious gases.

Disc and seat: The disc has a Special Lead face, securely rolled into a machined dovetail in the disc. The face seats upon a crowned face in the body, assuring tightness in service.

Where high temperature or corrosive action prevent the use of lead, the valves can be furnished with a case-hardened steel disc and a steel seat ring, illustrated on the opposite page.

The disc is held to the stem by a threaded stem ring; the stem ring is pinned to the disc, preventing the disc from becoming detached in service.

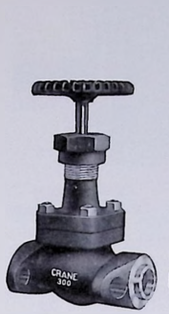
Stuffing box: The stuffing box is unusually deep, and is filled with high grade packing.

The stem is provided with a tapered, machined shoulder, which seats against a machined chamfer in the bonnet when the valve is wide open. This removes pressure from the packing, assures tightness at the stuffing box, and enables repacking the valve when wide open and under pressure.

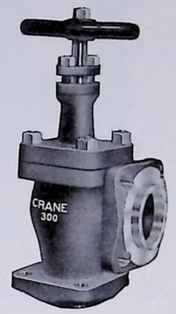
Ferrosteel Globe and Angle Valves for Ammonia

300 pounds ammonia working pressure
300-pound air-under-water test

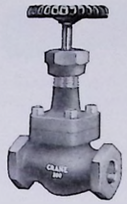
Bolted Bonnet Valves with Special Lead Disc



No. 1501, Globe
Flanged
Tongue and Groove



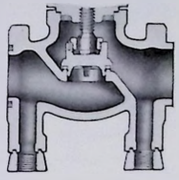
No. 1503, Angle
Flanged
Tongue and Groove



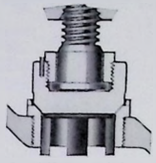
No. 1504, Globe
Screwed



No. 1505, Angle
Screwed



No. 1501½, Globe
No. 1503½, Angle
Flanged
With By-Pass Connections



Steel Disc and Seat

8-inch and larger are "outside screw and yoke" (not illustrated).

List Prices

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Flanged Valves — Style of flanges		Oval				Square					Round
*No. 1501 or No. 1503	Each	6.00	6.50	7.00	8.00	9.00	15.00	16.00	19.00	28.50	43.20
Screwed Valves — No. 1504 or No. 1505	Each	3.50	4.50	5.00	5.50	6.00	7.50	9.00	12.00	16.00	21.00
Extra for Steel Disc and Seat Ring	Per Valve	3.30	3.55	3.85	4.30	4.85	6.40	6.80	8.00	12.00	18.25

Size	Inches	3½	4	5	6	8	10	12
Flanged Valves — Style of flanges		Round						
*No. 1501 or No. 1503	Each	55.80	72.00	103.20	138.00	228.00	288.00	420.00
Extra for Steel Disc and Seat Ring	Per Valve	23.50	30.50	43.50	58.00			

List prices of Flanged Valves include facing and drilling but not companion flanges, bolts, or gaskets.

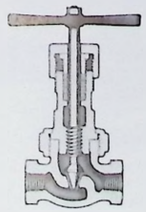
Valves with by-pass connections: No. 1501½ Globe and No. 1503½ Angle Valves can be furnished in sizes 1 to 6-inch. They enable cross-connecting the suction and discharge lines of an ammonia compressor, so that the gas in the high pressure side of the system can be pumped into the low pressure side. Prices on application.

Valves with steel disc and seat ring: In sizes ¼ to 6-inch, the valves listed above can be furnished with a case-hardened steel disc and a steel seat ring; extra list prices are shown in the table.

When so equipped, and when a suitable stuffing box packing is used, the valves are recommended for air or gas working pressures up to 250 pounds at 500° F.

Description . . . . page 510 *Dimensions . . . page 522* *Companion Flanges . . . page 515*

Union Bonnet Valves with Plug Type Disc



No. 1504½, Globe
Screwed

List Prices

Size		Inches	¼	⅜	½	¾	1
No. 1504½ or No. 1505½		Each	3.00	3.60	4.00	4.40	5.00
Dimensions	End to end, Globe	Inches	3	3¼	3½	4	4½
	Center to end, Angle	Inches	1½	1⅝	1¾	2	2¼
	Center to top, Open	Inches	6½	6½	6¾	8¼	8½
	Length of T-Handle	Inches	4½	4½	4½	6	6

These valves have a plug type disc, integral with the steel stem. They may be reground without removing them from the line.

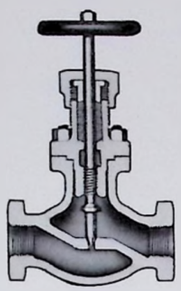


No. 1505½, Angle
Screwed

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Ferrosteel Expansion Valves for Ammonia

300 pounds ammonia working pressure
300-pound air-under-water test



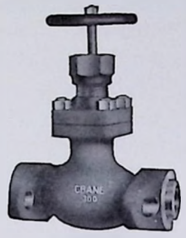
Cross Section
Rising Stem



Globe, Screwed
No. 1519½
Rising Stem
No. 1519
Non-Rising Stem



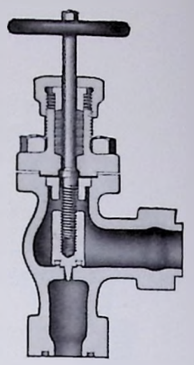
Angle, Screwed
No. 1519¾
Rising Stem
No. 1519¼
Non-Rising Stem



Globe, Flanged
Tongue and Groove
No. 1513
Rising Stem
No. 1511
Non-Rising Stem



Angle, Flanged
Tongue and Groove
No. 1517
Rising Stem
No. 1515
Non-Rising Stem



Cross Section
Non-Rising Stem

List Prices

Size		Inches	¼	⅜	½	¾	1
Flanged Valves	Style of flanges		Oval				Square
	*No. 1511, No. 1513, No. 1515, or No. 1517	Each	6.00	6.50	7.00	8.00	9.00
Screwed Valves	No. 1519, No. 1519¼, No. 1519½, or No. 1519¾	Each	4.75	5.50	6.00	6.80	7.50

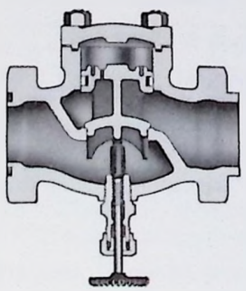
List prices of Flanged Valves include facing and drilling but not companion flanges, bolts, or gaskets.

Rising Stem Expansion Valves have a needle-point stem. The stem has fine, close fitting threads, permitting a very accurate adjustment. These valves are particularly recommended for short lines.

Non-Rising Stem Expansion Valves have a combination special lead and needle-point disc. Fine stem threads permit a close adjustment. However, the disc is not integral with the stem; therefore, these valves are recommended for long lines where minute adjustment is unnecessary.

Ferrosteel Check Valves for Ammonia

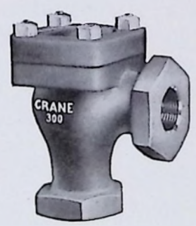
300 pounds ammonia working pressure
300-pound air-under-water test



Horizontal, with Lifting Stem
No. 1508½, Flanged
Tongue and Groove
No. 1506½, Screwed
(Not illustrated)



No. 1507½, Horizontal
Screwed



No. 1509½, Angle
Screwed



No. 1507, Horizontal
Flanged
Tongue and Groove



No. 1509, Angle
Flanged
Tongue and Groove

8-inch and larger, prices on application.

List Prices, Each

Size		Inches	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6
Flanged Valves	Style of flanges		Oval		Square					Round				
	*No. 1507 or No. 1509		8.70	10.00	11.20	18.50	19.80	23.50	34.70	53.50	68.40	89.00	127.00	170.00
	*No. 1508½ with Lifting Stem				18.70	26.00	27.30	31.00	42.20	61.00	82.40	103.00	141.00	184.00
Screwed Valves	No. 1507½ or No. 1509½		6.80	7.25	8.00	10.75	12.40	15.40						
	No. 1506½ with Lifting Stem				12.65	15.40	17.05	20.05						

List prices of Flanged Valves include facing and drilling but not companion flanges, bolts, or gaskets.

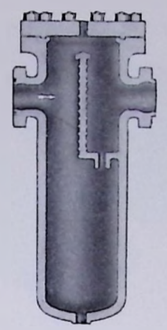
Features: Crane Ammonia Check Valves are constructed with a dash pot that cushions the disc in service, thereby increasing the life of the valve.

Valves with lifting stem: The lifting stem enables holding the valve open when pumping out the high pressure side of the system. This feature makes by-passing the check valve unnecessary, thereby eliminating fittings, piping, and joints. Angle Check Valves are not made with a lifting stem.

Dimensions . . . page 522

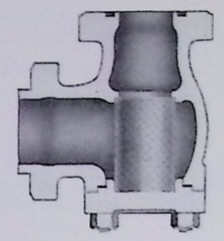
Companion Flanges . . . page 515

Ferrosteel Separators for Ammonia



No. 1594½
Oil Separator
Flanged
Tongue and Groove

300 pounds ammonia working pressure
300-pound air-under-water test



No. 1595
Sediment Separator
Flanged
Tongue and Groove

List Prices

Size	Inches	¾	1	1¼	1½	2	2½	3	3½	4	5	6
Style of flanges		Oval	Square					Round				
*No. 1594½, Oil Separators	Each	32.00	52.00	52.00	85.00	85.00	85.00	120.00	120.00	120.00	235.00	235.00
*No. 1595, Sediment Separators	Each	9.00	10.00	14.00	16.25	20.00	25.00	42.00	54.00	68.00	106.00	140.00

Smaller or larger sizes, prices on application

List prices include facing and drilling but not companion flanges, bolts, or gaskets.

Oil Separators: No. 1594½ Oil Separators have a large internal area, assuring reduced velocity. They can be easily opened for inspection and cleaning. The baffles are cast integral with the body.

Sediment Separators: The steel screen has .033-inch diameter perforations (324 holes per square inch). It can be easily removed for cleaning.

Sediment Separators have the same center to face dimensions as No. 1503 Angle Valves.

Dimensions . . . . pages 522 and 523

Companion Flanges . . . page 515

All-Iron Liquid Gauges for Ammonia
With Special Lead Seat



No. 1586½
Liquid Gauge
With Guard
and Glass Tube

300 pounds ammonia working pressure
300-pound air-under-water test

List Prices

Size		Inches	½	¾
No. 1586½ 15-inch Centers	Liquid Gauges, complete	Each	25.50	25.50
	Valves, only	Each	11.65	11.65
	Glasses, only	Each	.35	.35
	Guards, only	Each	1.65	1.65
	Gauge Glass Washers, only	Each	.25	.25
No. 1586½	Extra for each inch over 15", up to 24"		.37	.37

The Gauge Valves have a ball check valve in their inlet ends. Should a glass tube be broken, the check valves close instantly and automatically, preventing the escape of ammonia.

The glass tube is $\frac{9}{16}$-inch outside diameter.

Ammonia Pressure Gauges . . . page 444

Ammonia Relief Valves . . . page 412

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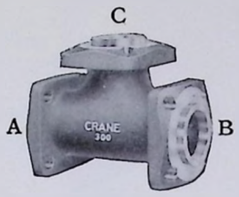
Ferrosteel Flanged Fittings for Ammonia

300 pounds ammonia working pressure
300-pound air-under-water test

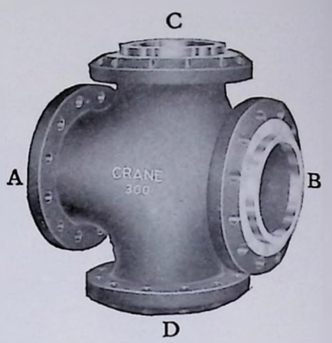
Facing
Elbows — One end tongue
— One end groove
Tees — "A", groove
— "B" and "C", tongue
Crosses — "A" and "D", groove
— "B" and "C", tongue



No. 1521
90° Elbow
Tongue and Groove



Tee
Tongue and Groove
No. 1523, Straight
No. 1525, Reducing



No. 1527
Cross
Tongue and Groove

List Prices, Straight Sizes

Style of Flanges	Size Inches	No. 1521 90° Elbows Each	No. 1523 Tees Each	No. 1527 Crosses Each
Oval	1/4	1.00	1.50	1.75
	3/8	1.25	1.75	2.40
	1/2	1.40	1.95	2.50
	3/4	1.75	2.20	3.00
Square	1	2.00	2.50	3.30
	1 1/4	2.25	3.70	4.95
	1 1/2	2.50	3.75	5.00
	2	3.00	4.00	6.00
	2 1/2	5.50	8.00	10.00
Round	3	10.00	17.00	23.00
	3 1/2	13.50	21.00	26.00
	4	15.00	23.50	30.00
	5	20.00	29.00	38.00
	6	30.00	36.00	47.00
	8	55.00	65.00	85.00
	10	70.00	85.00	110.00
	12	95.00	120.00	150.00

List prices include facing and drilling but not companion flanges, bolts, or gaskets.

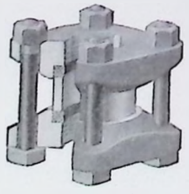
List Prices, Reducing Tees

Size Inches A	B	C	No. 1525 Each
1/2	x 1/2	x 3/8	2.00
1/2	x 1/2	x 3/4	2.00
3/4	x 3/4	x 1/2	3.50
1	x 1	x 1/2	3.50
1 1/4	x 1 1/4	x 1/2	3.75
1 1/4	x 1 1/4	x 3/4	3.75
1 1/4	x 1 1/4	x 2	3.75
1 1/2	x 1 1/2	x 1/2	3.75
1 1/2	x 1 1/2	x 3/4	3.75
1 1/2	x 1 1/2	x 1 1/4	3.75
1 1/2	x 1 1/2	x 2	3.75
1 1/2	x 1 1/2	x 2 1/2	3.75
2	x 2	x 1/2	4.00
2	x 2	x 3/4	4.00
2	x 2	x 1	4.00
2	x 2	x 1 1/4	4.00
2	x 2	x 1 1/2	4.00
2	x 2	x 2 1/2	5.50
2	x 2	x 3	8.25
2 1/2	x 2 1/2	x 1 1/4	7.00
2 1/2	x 2 1/2	x 1 1/2	7.00
2 1/2	x 2 1/2	x 2	7.25
2 1/2	x 2 1/2	x 3	12.25
3	x 3	x 1 1/4	14.50
3	x 3	x 2	14.50
3	x 3	x 2 1/2	15.30
3	x 3	x 4	21.55
3 1/2	x 3 1/2	x 2	18.00
3 1/2	x 3 1/2	x 2 1/2	19.00
4	x 4	x 2	20.60
4	x 4	x 2 1/2	21.30
4	x 4	x 3	25.30
4	x 4	x 6	38.00
5	x 5	x 2	22.25
5	x 5	x 3	27.80
5	x 5	x 4	30.75
6	x 6	x 4	41.50

List prices include facing and drilling but not companion flanges, bolts, or gaskets.

Description . . . . page 510 *Dimensions . . . . page 522* *Screwed Fittings . . . . pages 182 and 183*

Boyle Flange Unions



No. 1585
Cast Iron Boyle Flange Union
300 pounds ammonia working pressure

List Prices

Size Inches		1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
		Oval				Square					Round					
No. 1585	Style of flanges															
	Price Each	1.05	1.15	1.35	1.60	1.95	2.65	3.10	3.70	6.25	9.50	11.50	13.65	18.00	22.00	
No. 1586	Each	.25	.25	.30	.30	.30	.30	.35	.35	.45	.45	.95	.95	1.40	1.50	2.50
No. 1586 1/4	Each	1.00	1.00	1.00	1.00	1.00	1.50	1.50	1.50	2.25	2.25	2.40	3.35	3.55	3.65	5.20

Tongue and Groove Flange Unions . . . . page 248 *Screwed Unions . . . pages 239 and 244*

Ferrosteel Fillers



No. 1586

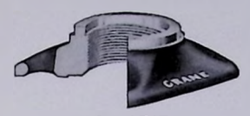


No. 1586 1/4

These Fillers are used when bolting together two tongue or two groove flanges.

Flanges for Ammonia

300 pounds ammonia working pressure



No. 1547
Screwed Flange
Tongue

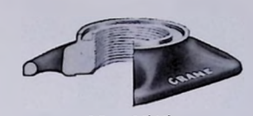


No. 1555
Blind Flange
Tongue



No. 1549
Reducing Screwed Flange
Tongue

1/4 to 3-inch are forged steel.
3 1/2 to 6-inch are malleable iron.
8 to 12-inch are Ferrosteel.



No. 1545
Screwed Flange
Groove



No. 1557
Blind Flange
Groove



No. 1551
Reducing Screwed Flange
Groove

Unless otherwise ordered, flanges will be furnished without bolts or gasket.

List Prices, Screwed and Blind Flanges

Style of Flange	Size Inches	No. 1545, No. 1547, No. 1555, or No. 1557 With Bolts and Gasket Each	Without Bolts or Gasket Each
Oval	1/4	.50	.40
	3/8	.55	.45
	1/2	.70	.50
	3/4	.90	.65
Square	1	1.20	.95
	1 1/4	1.25	1.00
	1 1/2	1.50	1.20
	2	1.70	1.40
	2 1/2	3.00	2.50
Round	3	3.75	3.00
	3 1/2	4.25	3.50
	4	5.00	4.25
	5	5.75	5.25
	6	7.50	6.25
	8	11.00	9.00
	10	15.50	12.50
	12	21.50	18.50

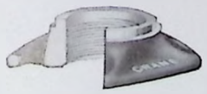
Bolting on companion flanges . . . . page 352
Dimensions . . . . page 522

List Prices, Reducing Screwed Flanges

Style of Flange	Size Inches	No. 1549 or No. 1551 With Bolts and Gasket Each	Without Bolts or Gasket Each
Oval	3/8 x 1/4	.55	.45
	1/2 x 3/8	.70	.50
	1/2 x 1/4		
	3/4 x 1/2	.90	.65
	3/4 x 3/8		
	3/4 x 1/4		
Square	1 x 3/4	1.20	.95
	1 x 1/2		
	1 x 3/8		
	1 x 1/4		
	1 1/4 x 1	1.25	1.00
	1 1/4 x 3/4		
	1 1/4 x 1/2		
	1 1/4 x 3/8		
	1 1/4 x 1/4		
	1 1/2 x 1 1/4	1.50	1.20
	1 1/2 x 1		
	1 1/2 x 3/4		
	2 x 1 1/2	1.70	1.40
	2 x 1 1/4		
	2 x 1		
Square	2 x 3/4	1.70	1.40
	2 x 1/2		
	2 x 3/8		
	2 x 1/4		
	2 1/2 x 2	3.00	2.50
	2 1/2 x 1 1/2		
	2 1/2 x 1 1/4		
Round	3 x 2 1/2	3.75	3.00
	3 x 2		
	3 x 1 1/2		
	3 1/2 x 3	4.25	3.50
	3 1/2 x 2 1/2		
	3 1/2 x 2		
	4 x 3 1/2	5.00	4.25
	4 x 3		
	4 x 2 1/2		
	4 x 2		
	5 x 4	5.75	5.25
	5 x 3 1/2		
	6 x 5	7.50	6.25
	6 x 4		

8-inch and larger, prices on application.

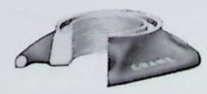
Special Forged Steel Screwed Flanges



No. 1582 1/2
Special Screwed Flange
Tongue

No. 1582 1/2 and No. 1583 1/2 Flanges have smaller over-all dimensions than regular flanges, and are used on the following:

2 x 45/8-inch No. 1559 and No. 1561 Return Bends (page 516)
No. 1591 1/2 Flange Unions (page 248)
No. 1529 Combination Elbows (page 248)



No. 1583 1/2
Special Screwed Flange
Groove

List Prices

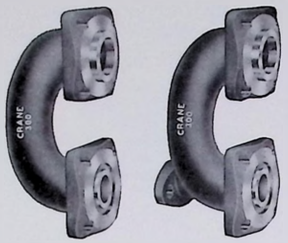
Style of Flange	Size Inches	No. 1582 1/2 or No. 1583 1/2 With Bolts and Gasket Each	Without Bolts or Gasket Each
Oval	1	.65	.50
	1 1/4	.75	.60
Square	2	1.00	.85

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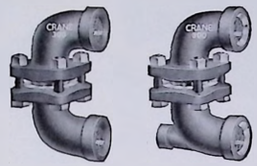
Return Bends and Special Fittings
for Atmospheric Ammonia Condensers or Pipe Coils

Return Bends

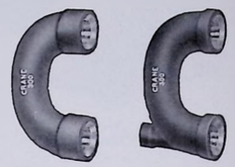
300 pounds ammonia working pressure
300-pound air-under-water test



No. 1559 Flanged
No. 1561 Flanged
Tongue and Groove
With ½-inch back outlet
Ferrosteel



No. 1570 Divided
No. 1572 Divided
With ½-inch back outlet
Malleable Iron



No. 272 E Screwed
No. 1564 Screwed
With ½-inch back outlet
Malleable Iron
See page 182

List Prices

Size		Inches	1¼	1¼	2	2	2	2	2	2	2
Center to Center		Inches	4	6	3½	4	*4⅝	6	8	10	12
Flanged	No. 1559	Each	1.90	2.40			2.60	2.85	3.40	4.25	5.10
	No. 1561	Each	2.30	2.90			3.10	3.40			
Divided	No. 1570	Each	2.50	2.70	4.40	4.75	5.00	6.00			
	No. 1572	Each		3.15	4.85	5.20	5.45				

List prices of Flanged Return Bends include facing and drilling but not companion flanges, bolts, or gaskets.

***Flanges:** Because of the short center-to-center dimension, 2-inch Flanged Return Bends with 4⅝-inch centers require No. 1582½ Tongue and No. 1583½ Groove Flanges, shown on page 515. These flanges are smaller than regular companion flanges.

All other sizes require No. 1547 Tongue and No. 1545 Groove Companion Flanges.

The back outlet on No. 1561 Return Bends is flanged, and requires a No. 1545 Groove Companion Flange.

Combination elbows: No. 1570 or No. 1572 Return Bends can be divided, and used as combination screwed and flanged elbows.

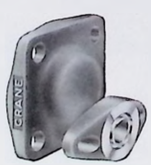
One return bend and one No. 1589 Flange Union (page 248) enable making two complete combination elbows with flange, bolts, and gasket.

Dimensions . . . . page 523

Companion flanges . . . . page 515

Ferrosteel Special Fittings

300 pounds ammonia working pressure
300-pound air-under-water test



No. 1573½
Eccentric Reducer
Flanged
Groove both ends



No. 1578, 90° Elbow
Flanged, Tongue and Groove
With ½-inch flanged back outlet opposite the tongue face
Back outlet has tongue face.

List Prices

Size	Inches	2 x ¾
*No. 1573½	Each	4.00

List Prices

Size	Inches	1¼	1½	2
*No. 1578	Each	5.00	5.25	5.50

*List prices include facing and drilling but not companion flanges, bolts, or gaskets.

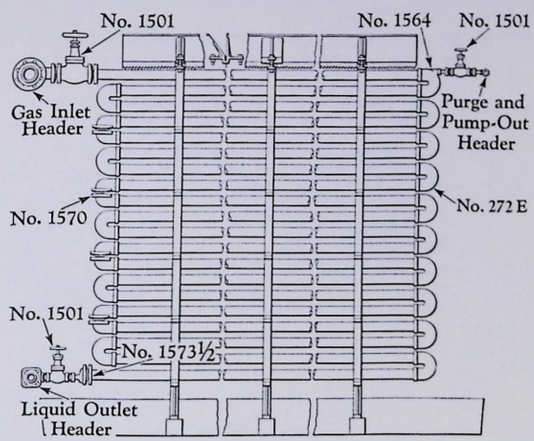
The No. 1573½ Eccentric Reducer requires No. 1547 Tongue Companion Flanges. See page 515.

The No. 1578 90° Elbows require No. 1545 Groove and No. 1547 Tongue Companion Flanges. See page 515.

Atmospheric Ammonia Condensers

The illustrations below show two commonly used types of atmospheric condensers, and indicate the application of the return bends and fittings shown on the preceding page. Either type, or any other type, can be made with flanged, screwed, or divided return bends, or combinations of all three; or if welded joints are preferred, welding return bends, fittings, and flanges (see pages 337 to 342) can be used.

Atmospheric Condensers



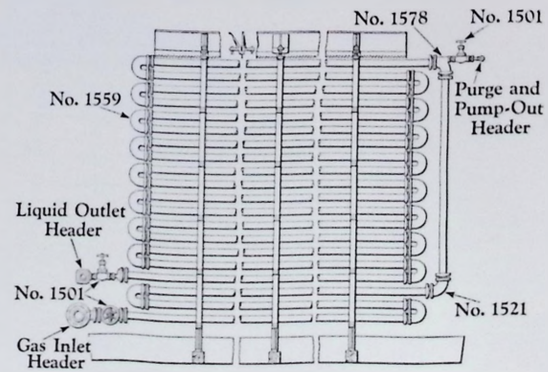
The atmospheric condenser shown on the left is the simplest type of ammonia condenser, the hot gas from the compressor entering at the top, and the condensed liquid ammonia leaving at the bottom.

These condensers are usually made of 2-inch Standard weight pipe, 20 feet long, and 18 or 20 pipes high. However, they can be built of any weight or length of pipe, and any number of pipes high.

Each stand of condensers should have a galvanized water trough made in two sections, with adjustable trough supports for leveling.

Atmospheric Condensers with Three Preliminary Pipes

The ammonia condenser shown on the right is of the atmospheric type with a three-pipe preliminary cooler at the lower part of the coil. The hot gas enters at the bottom, where it is partly cooled by the water which has already passed over the main condenser. The partially cooled gas then passes to the top of the coil and meets the coldest condensing surface where the actual process of condensation begins.



Pipe stands, water troughs, and trough supports . . . . page 520

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Ferrosteel Double Pipe Fittings

Crane Double Pipe Fittings, shown on the opposite page, are designed especially for use in heat exchangers, ammonia condensers, brine coolers, water coolers, and similar coils formed of two sets of pipes, one placed inside of the other.

With Crane fittings, the inside and outside pipes are entirely independent of each other, and are free to expand or contract independently without danger of straining the joints. The fittings can be demounted easily and quickly for cleaning or repairs.

Service recommendations: No. 1565 Double Pipe Return Bends, No. 1571 Double Pipe Tees, and No. 1569 Return Bends are recommended for heat exchangers. They are equipped with special groove flanges and Cranite gaskets, and the stuffing boxes are packed with special asbestos rings.

No. 1565 and No. 1571 are recommended for the following working pressures:

300 pounds ammonia
300 pounds water, gas, or air, 300° F.
250 pounds oil or steam, 500° F.

No. 1569 Return Bends are recommended for:

175 pounds water, oil, or gas, 100° F.
125 pounds saturated steam
25 pounds oil, 500° F.

No. 1575 Double Pipe Return Bends, No. 1581 Double Pipe Tees, and No. 1574 Return Bends are recommended for ammonia condensers and brine coolers. All joints are Boyle rubber. The No. 1574½ Union Return Bend can be used instead of the No. 1574 Boyle Return Bend.

No. 1575 and No. 1581 are recommended for the following working pressures:

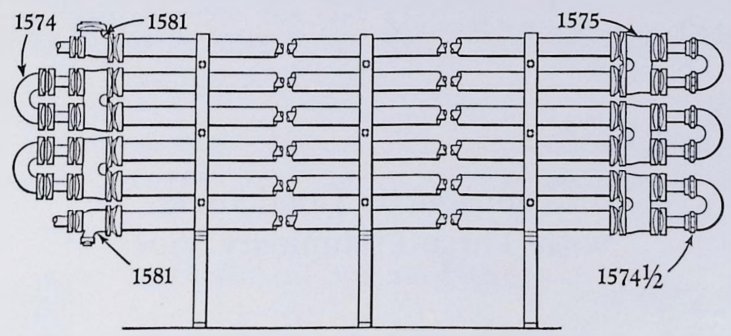
300 pounds ammonia
300 pounds water, air, or gas, 300° F.

No. 1574 Boyle Return Bends are recommended for 175 pounds cold water, while No. 1574½ Union Return Bends are recommended for 175 pounds cold water or 125 pounds saturated steam working pressures.

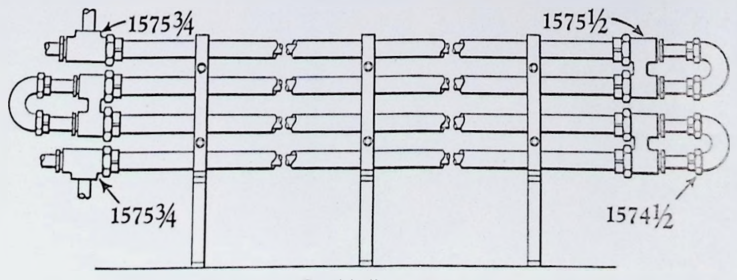
No. 1575½ Double Pipe Return Bends and No. 1575¾ Double Pipe Tees are recommended for water coolers. They are equipped with rubber gaskets. They are recommended for 125 pounds saturated steam or 175 pounds cold water working pressures.

Test pressures: No. 1565, No. 1571, No. 1575, and No. 1581 are tested to 300 pounds air under water. The other fittings shown on the opposite page are given a 250-pound hydrostatic test.

Application: The illustrations below show the application of double pipe fittings for ammonia condensers, brine coolers, and water coolers. The application of fittings for heat exchangers is shown in the section of this catalogue devoted to Fabricated Piping; see page 652.



Fittings for Double Pipe Ammonia Condensers and Brine Coolers

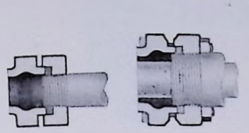


Fittings for Double Pipe Water Coolers

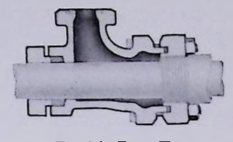
Cast Iron Pipe Stands . . . page 520

Ferrosteel Double Pipe Fittings

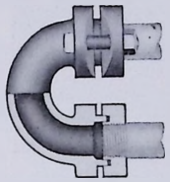
For Ammonia Condensers, Brine Coolers, and Heat Exchangers



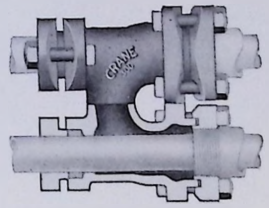
Cross Sections Showing Boyle Joints



Double Pipe Tee
No. 1571
Tongue and Groove Joint
No. 1581
Boyle Joint

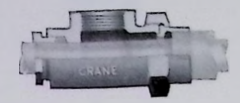


Return Bend
No. 1569
Tongue and Groove Joints
No. 1574
Boyle Joints



Double Pipe Return Bend
No. 1565
Tongue and Groove Joints
No. 1575
Boyle Joints

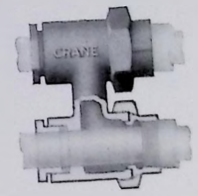
For Water Coolers



No. 1575¾
Double Pipe Tee



No. 1574½
Cast Iron Return Bend
With Union Ends



No. 1575½
Double Pipe Return Bend

List Prices

Return Bends			
Size Inches	Center to Center Inches	No. 1569 or No. 1574 Each	No. 1574½ Black Each
1¼	4⅝	3.25	1.60
2	6	4.45	3.00
3	8		*

*Price on application

Double Pipe Return Bends				
Size Inches	Center to Center Inches	No. 1565 or No. 1575 Each	No. 1575½ Black Each	No. 1575½ Galv. Each
2 x 1¼	4⅝	8.00	4.75	6.50
2½ x 1¼	4⅝	10.35		
3 x 2	6	14.00		
4 x 3	8	*		

*Price on application

Double Pipe Tees			
Size Inches	No. 1571 or No. 1581 Each	No. 1575¾ Black Each	No. 1575¾ Galv. Each
2 x 1¼ x 2	6.70	4.50	6.25
2 x 1¼ x 1½	6.70		
2 x 1¼ x 1¼	6.70		
2 x 1¼ x 1	6.70		
2 x 1¼ x ¾	6.45		
2 x 1¼ x ½	6.45		
2½ x 1¼ x 2	8.30		
3 x 2 x 2	14.00		
3 x 2 x 1½	14.00		
3 x 2 x 1¼	14.00		
3 x 2 x ¾	13.50		
3 x 2 x ½	13.50		
4 x 3 x 3	*		

*Price on application

List prices of Return Bends, Double Pipe Return Bends, and Double Pipe Tees include fittings complete with flanges, bolts, gaskets, unions, glands, and stuffing box packing as shown in the illustrations, *with the following exception:*

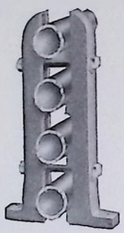
Exception: List prices of No. 1571 and No. 1581 Tees do not include the flange, bolts, and gasket for the outlet opening.

Dimensions . . . page 523

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Cast Iron Pipe Stands

For Condensers, Brine Coolers, Water Coolers, or Heat Exchangers



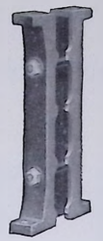
Top Section

List Prices

Size of Pipe Inches	Center to Center Inches	Top Sections 4 pipes high Each	Top Sections 6 pipes high Each	Intermediate Sections 4 pipes high Each	Intermediate Sections 6 pipes high Each	Intermediate Sections 8 pipes high Each
2	3½			2.40	3.50	5.00
	4	2.50		2.50	3.75	
	4⅝	2.50	3.75	2.50	3.75	
2½	4⅝	3.00	4.70	3.00		
3	6	3.25		3.25	5.00	

List prices include the necessary bolts for assembling.

Larger size sections, sections made of malleable iron, or galvanized sections can be made to order; prices on application.



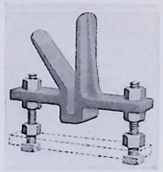
Intermediate Section



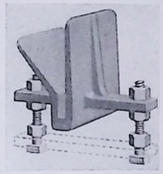
Base

List Prices

Size of Pipe Inches	Bases Height Inches	Bases Price Each	Trough Supports 2-inch face Each	Trough Supports 6-inch face Each
2 or 2½	9	2.50	1.00	1.70
	15	3.00		
3	12	3.25		



Trough Support Face 2 Inches Wide



Trough Support Face 6 Inches Wide

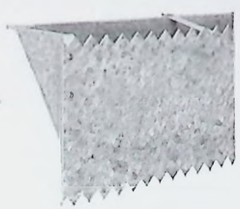
A complete stand: A complete stand consists of a base, an intermediate section or sections, and a top section. However, an intermediate section may be used at the top, and is always required when water troughs and trough supports are used.

Bases: The 9-inch and 15-inch bases are designed for 2-inch atmospheric and 2 or 2½-inch double pipe condensers; the 12-inch base, for 3-inch brine coolers or coils.

Trough supports: The trough support with a 2-inch wide face is for use on each end of a condenser coil; the support with a 6-inch wide face is for the middle of the coil where two troughs meet. See page 517.

Each trough support is equipped with two long bolts, with three hexagon nuts each, for adjusting and leveling the trough.

Galvanized Sheet Metal Water Troughs



Water Trough

These troughs are specially designed for use with the trough supports shown above, and are of superior quality and workmanship.

For rigidity and ease in handling, it is recommended that they be made of 12 gauge metal, and in sections about 10 feet long.

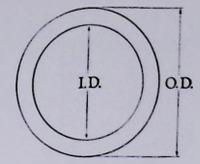
They can be made to order in any style, weight, or length.

Prices on application.

Gaskets for Ammonia



Cranite Gaskets for Tongue and Groove Joints





Rubber Gaskets for Boyle Joints

List Prices and Dimensions

Size		Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12
Tongue and Groove Gaskets	Cranite	Per Dozen	.25	.30	.30	.40	.40	.50	.50	.55	.60	.70	.85	1.00	1.20	1.50	2.40	3.00	3.75
	Lead	Per Dozen	.45	.50	.50	.70	.90	1.25	1.25	1.50	1.70	1.85	2.15	2.40	2.70	3.50	4.80	5.60	6.50
	I.D.	Inches	19/32	23/32	7/8	1 1/8	1 3/8	1 11/16	1 15/16	2 7/16	2 15/16	3 9/16	4 1/16	4 9/16	5 5/8	6 11/16	9 3/8	11 1/4	13 1/2
	O.D.	Inches	31/32	1 3/32	1 7/32	1 15/32	1 25/32	2 7/32	2 15/32	3 3/32	3 21/32	4 9/32	4 27/32	5 15/32	6 27/32	7 27/32	10 5/8	12 3/4	15
Canvas Wrapped Boyle Gaskets	Rubber	Per Dozen	1.40	1.60	1.85	2.10	2.60	5.00	5.30	8.10	13.20	16.80	21.00	26.00	49.00	60.00			
	I.D.	Inches	9/16	11/16	13/16	1 1/16	1 11/32	1 11/16	1 15/16	2 7/16	2 29/32	3 9/16	4 1/16	4 9/16	5 5/8	6 11/16			
	O.D.	Inches	1	1 1/8	1 1/4	1 1/2	1 13/16	2 1/4	2 1/2	3 1/8	3 11/16	4 5/16	4 7/8	5 1/2	6 7/8	7 7/8			
	Thickness	Inches	¼	¼	¼	¼	¼	⅜	⅜	⅜	½	½	½	½	⅝	⅝			

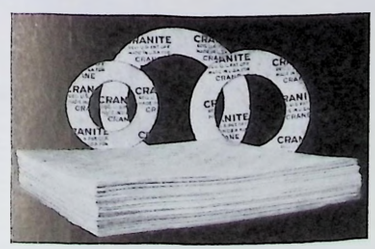
Size and thickness of gaskets: The tongue and groove dimensions of all flanged ammonia valves, fittings, and flanges are the same for each corresponding pipe size. Therefore, gaskets for tongue and groove joints will fit any corresponding size flange, regardless of the style or diameter of the flange.

"Cranite" and lead gaskets are 1/16-inch thick.

Rubber gaskets for Boyle joints: These gaskets are made of rubber, and are canvas wrapped. They are used in Boyle unions and in double pipe return bends and tees for condensers and brine coolers.

Cranite

Asbestos Composition Sheet Packing



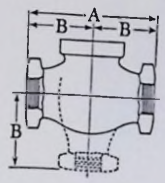
Cranite, the highest grade of sheet packing obtainable, is an exceptionally strong and durable asbestos composition that does not deteriorate with age. Only especially selected long fiber is used in its manufacture. It is recommended for service on ammonia, air, oil, gas, gasoline, and similar fluids. See page 363.

Cranite packing has been inspected and is listed by the Underwriters' Laboratories (National Board of Fire Underwriters), Chicago, for use on hazardous liquids.

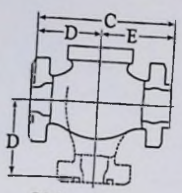
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asbestosclaims.law/library/21275/279

Valves and Fittings for Ammonia

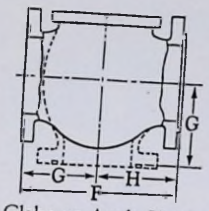
Dimensions, in Inches



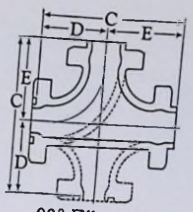
Globe, Angle, or Check Valve Screwed



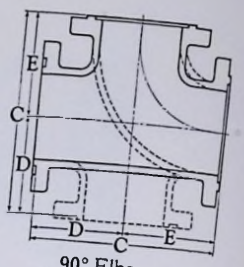
Globe, Angle, or Check Valve Flanged
¼ to 6-inch



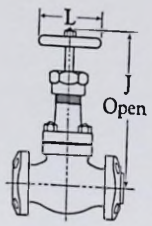
Globe or Angle Valve Flanged
8 to 12-inch



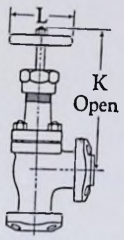
90° Elbow, Tee, or Cross Flanged
¼ to 6-inch



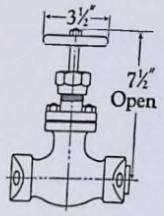
90° Elbow, Tee, or Cross Flanged
8 to 12-inch



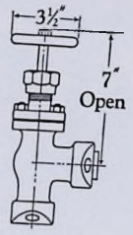
Globe Valve
No. 1501, Flanged
No. 1504, Screwed



Angle Valve
No. 1503, Flanged
No. 1505, Screwed

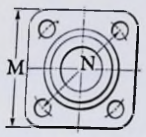


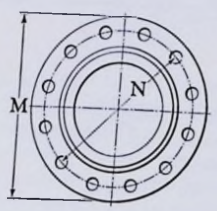
Expansion Valve
Globe

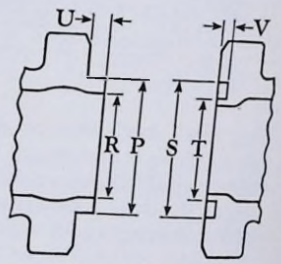


Expansion Valve
Angle







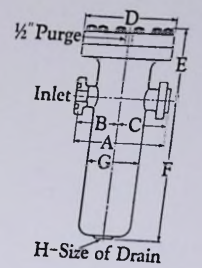


Style of flanges	Oval				Square					Round							
Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12
A	4½	4¾	5	5½	6¼	6¾	7½	8½	9½	12							
B	2¼	2⅜	2½	2¾	3⅛	3⅜	3¾	4¼	4¾	6							
C	5 5/16	5 9/16	5 13/16	6 5/16	6 11/16	7⅜	8⅛	9⅛	10 5/16	12 13/16	13 13/16	14 9/16	16 7/16	18 7/16	20¼	23¼	26¼
D	2 7/16	2 9/16	2 11/16	2 15/16	3⅛	3⅜	3¾	4¼	4¾	6	6½	6⅞	7¾	8¾	10	11½	13
E	2⅞	3	3⅛	3⅜	3 9/16	4	4⅜	4⅞	5 9/16	6 13/16	7 5/16	7 11/16	8 11/16	9 11/16	10¼	11¾	13¼
F															21¼	24¾	28¼
G															10½	12¼	14
H															10¾	12½	14¼
J	7¼	7¼	7¼	9¼	9¼	11¼	11½	12¼	12¾	14¼	15	16¼	17	20	27¼	32	37½
K	6¾	6¾	6¾	8½	8½	10¼	10¼	11	11¼	12¾	13½	14½	15¼	18¼	24¾	31¼	36½
L	3⅝	3⅝	3⅝	4 1/16	4 1/16	4¾	5⅜	8	8	9	10	10	12	14	20	24	30
Templates for Drilling																	
M	3⅝	3 13/16	4	4¾	3 9/16	3 15/16	4 11/16	5 1/16	5 13/16	8¼	9	10	11	12½	15	17½	20½
N	2⅜	2 9/16	2¾	3¼	3¼	3¾	4½	5	5⅞	6⅝	7¼	7⅞	9¼	10⅝	13	15¼	17¾
P	31/32	1 3/32	1 7/32	1 15/32	1 25/32	2 7/32	2 15/32	3 3/32	3 21/32	4 9/32	4 27/32	5 15/32	6 27/32	7 27/32	10 5/8	12¾	15
R	1 9/32	1 23/32	⅞	1⅛	1⅜	1 11/16	1 15/16	2 7/16	2 15/16	3 9/16	4 1/16	4 9/16	5 5/8	6 11/16	9 3/8	11¼	13½
S	1	1⅛	1¼	1½	1 13/16	2¼	2½	3⅛	3 11/16	4 5/16	4⅞	5½	6⅞	7⅞	10 11/16	12 13/16	15 1/16
T	9/16	11/16	27/32	1 3/32	1 11/32	1 21/32	1 29/32	2 13/32	2 29/32	3 17/32	4 1/32	4 17/32	5 19/32	6 21/32	9 5/16	11 3/16	13 7/16
U	3/16	3/16	3/16	3/16	3/16	¼	¼	¼	5/16	5/16	7/16	7/16	7/16	7/16	¼	¼	¼
V	⅛	⅛	⅛	⅛	⅛	3/16	3/16	3/16	¼	¼	¼	¼	¼	¼	3/16	3/16	3/16
No. of bolts	2	2	2	4	4	4	4	4	8	8	8	8	12	12	16	16	
Dia. of bolts	½	½	½	⅝	½	½	⅝	⅝	¾	¾	¾	¾	¾	⅞	1	1⅛	

On flanged valves, the tongue is on the end next to the upper side of the disc.

Oil Separators and Fittings for Ammonia

Dimensions, in Inches

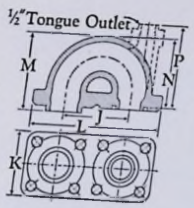


H-Size of Drain
No. 1594½
Oil Separator
Flanged

Oil Separators

Style of Flanges	Size	A	B	C	D	E	F	G	H
Oval	¾	7⅝	3⅝	4	7½	5¾	11	4¼	½
Square	1	11⅛	5 5/16	5 13/16	11	7	12	7	½
	1¼	11⅛	5 5/16	5 13/16	11	7	12	7	½
	1½	14 3/16	6¾	7 7/16	12½	8½	22½	9	¾
	2	14 3/16	6¾	7 7/16	12½	8½	22½	9	¾
	2½	14 3/16	6¾	7 7/16	12½	8½	22½	9	¾
Round	3	18 11/16	9	9 11/16	16	11⅜	25¾	12	1
	3½	18 11/16	9	9 11/16	16	11⅜	25¾	12	1
	4	18 11/16	9	9 11/16	16	11⅜	25¾	12	1
	5	24 3/16	11¾	12 7/16	20	13⅜	35¾	16	1¼
	6	24 3/16	11¾	12 7/16	20	13⅜	35¾	16	1¼

Templates for drilling . . . . page 522

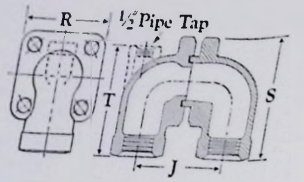


Flanged Return Bend
No. 1559
Plain
No. 1561
With Back Outlet

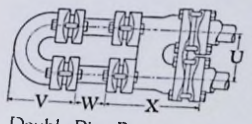
Return Bends

Size	J	K	L	M	N	P	R	S	T
1¼	4	3 15/16	7 15/16	4⅝	4⅛	5 1/16	3 15/16	5⅜	
	6	3 15/16	9 15/16	5⅝	5⅛	5 7/16	3 15/16	5⅜	4¾
2	3½						5 1/16	7 1/16	6⅝
	4						5 1/16	7 1/16	6⅝
	*4⅝	4½	9⅛	6½	6	7¼	5 1/16	7 1/16	6⅝
	6	5 1/16	11 1/16	6⅝	5 13/16	6½	5 1/16	7 1/16	
	8	5 1/16	13 1/16	7⅝	6 13/16				
	10	5 1/16	15 1/16	8⅝	7 13/16				
	12	5 1/16	17 1/16	9 7/16	8 15/16				

*2x4⅝-inch No. 1559 and No. 1561 Return Bends require No. 1583½ Groove and No. 1582½ Tongue Flanges. All other sizes require No. 1545 Groove and No. 1547 Tongue Flanges.



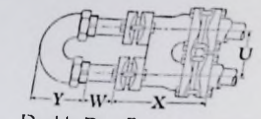
Divided Return Bend
No. 1570
Plain
No. 1572
With Back Outlet



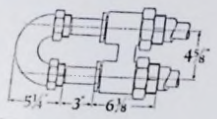
Double Pipe Return Bends
No. 1565 or No. 1575
With No. 1569 or No. 1574

Double Pipe Return Bends

Size	U	V	W	X	Y
2 x 1¼	4⅝	6	3	9⅜	5¼
2½ x 1¼	4⅝	6	3	9⅝	5¼
3 x 2	6	7½	3	10½	6¾
4 x 3	8		3	13¼	9



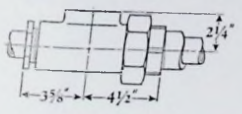
Double Pipe Return Bends
No. 1565 or No. 1575
With No. 1574½



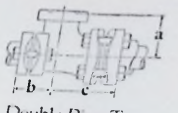
Double Pipe Return Bends
No. 1575½ with No. 1574½

Double Pipe Tees

Size	a	b	c
2 x 1¼ x 2	3 11/16	3⅝	5¾
2 x 1¼ x 1½	3 13/16	3¼	5¾
2 x 1¼ x 1¼	3 11/16	3⅝	5¾
2 x 1¼ x 1	3⅞	3⅝	5¾
2 x 1¼ x ¾	3 7/16	3⅝	5¾
2 x 1¼ x ½	3 7/16	3⅝	5¾
2½ x 1¼ x 2	3 13/16	3¼	6⅜
3 x 2 x 2	4⅜	3⅞	6¾
3 x 2 x 1½	4½	3⅞	6¾
3 x 2 x 1¼	4½	3⅞	6¾
3 x 2 x ¾	4⅜	4½	6⅜
3 x 2 x ½	4⅞	3⅞	6¾
4 x 3 x 3	Dimensions on request		



Double Pipe Tee
No. 1575¾



Double Pipe Tee
No. 1571 or No. 1581

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Other Ammonia Material

For greater convenience, the following valves and fittings, suitable for ammonia, are shown in other sections of this catalogue because of their adaptability to general piping service:

Screwed Fittings.....pages 182 and 183
Bushings.....pages 224 and 225
Plugs.....page 226
Wrought Couplings.....page 227
Wrought Steel Nipples.....page 228
Screwed Unions.....pages 239 and 244
Union Fittings.....page 245
Flange Unions.....page 248
Combination Elbows.....page 248
Welding Fittings.....pages 338 and 339
Relief Valves.....page 412
Pressure Gauges.....page 444

Also, the properties of saturated ammonia are shown in the section of this catalogue devoted to Engineering Data, pages 753 to 755.

Valves and Fittings for Gasoline Service

Pages 526 to 531 illustrate some of the lines of Crane valves and fittings recommended for use on ordinary gasoline service.

For unusual conditions in refineries or bulk stations, Crane Co. can supply special valves or fittings to order.

Consult the nearest Crane Branch.

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Brass Check and Foot Valves

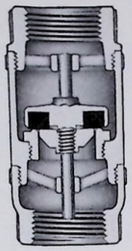
For Gasoline Service

WORKING PRESSURE — 15 pounds gasoline

Air Tested

Patented

FEATURES
Tight Seating
Crane Gasoline Disc
Special Alloy Metal Seat



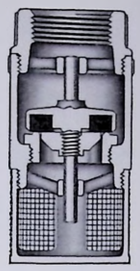
Cross Section
No. 43, Vertical Check



No. 43
Vertical Check
Screwed



No. 47
Foot Valve
With Strainer
Screwed



Cross Section
No. 47, Foot Valve
With Strainer

List Prices and Dimensions

Size			1¼	1½	2
No. 43, Vertical Check Valves		Each	7.50	9.75	14.00
No. 47, Foot Valves, with strainer		Each	7.75	10.25	15.00
End to end	No. 43	Inches	4¾	5¼	6
	No. 47	Inches	5 1/16	5 11/16	6¾
Size of pipe tap opening that valves will pass through		Inches	2½	3	4
Size of Standard Pipe that valves will pass through		Inches	3	3½	4

Service recommendations: These are superior quality valves, having a seat bearing that is ideal for gasoline service. They are recommended for lines where the pressure does not exceed 15 pounds and where the valves are accessible, as on overhead tanks. They are not recommended for service where the valves are inaccessible, as on installations that are buried underground.

Construction and materials: The valves are well proportioned and are sturdily constructed. The disc holder is guided both at the top and bottom, assuring square seating. The body seat ring is renewable; it is made of an alloy metal that is especially suitable for gasoline service. The body and disc holder are made of brass.

The strainer on the Foot Valves is made of brass wire screen.

Disc: Crane No. 6 Composition Discs are used in these valves. The No. 6 Disc is a specially prepared compound, completely resistant to the action of gasoline. It is soft enough to make a tight seat on suction lines and on gravity pressures up to 15 pounds, and it will not swell, harden, or deteriorate.

When replacement discs are ordered, a complete disc holder assembly always will be furnished. For dimensions of discs, see page 168.

Testing: The valves are tested with 80 pounds air pressure in the body and with one foot head of kerosene at the seat. After being tested, the inside of each valve is thoroughly cleaned and the ends are tightly sealed to keep out foreign matter.

For other equipment for gasoline service, see pages 528 to 531.

Iron Body Check Valves

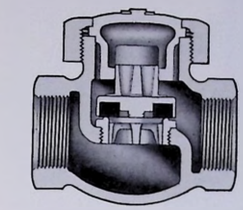
For Gasoline Service

WORKING PRESSURE — 15 pounds gasoline

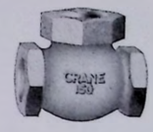
Air Tested

Patented

FEATURES
Tight Seating
Crane Gasoline Disc
Special Alloy Metal Seat



Cross Section
No. 642



No. 642, Horizontal
Screwed



No. 644, Angle
Screwed

List Prices and Dimensions

Size			½	¾	1	1¼	1½	2
No. 642 or No. 644, Galvanized		Each	3.75	5.25	7.00	9.30	12.55	19.00
End to end, Horizontal		Inches	3	3½	4⅛	4⅝	5¼	6⅜
Center to end, Angle		Inches	1 7/16	1⅝	1⅞	2 3/16	2 7/16	3
Center to top	Horizontal	Inches	1¾	2 1/16	2 5/16	2 11/16	3	3⅝
	Angle	Inches	1 11/16	2	2¼	2 9/16	2⅞	3⅜

Service recommendations: The No. 642 and No. 644 Check Valves have a special disc and seat that are ideally suited for gasoline on pressures up to and including 15 pounds. They are recommended for installations where the valves are accessible, as on overhead tanks. They are not recommended for installations where the valves are buried underground.

Construction and materials: The valves have a union cap and can be easily taken apart and reassembled. The disc holder is guided both at the top and bottom, assuring square seating.

The body is made of cast iron and is galvanized. The cap ring is made of malleable iron and also is galvanized. The disc holder and cap are made of brass. The body seat ring is an alloy metal exceptionally well suitable for gasoline service.

Disc: Crane No. 6 Gasoline Discs are used in these valves. The No. 6 Disc is a specially prepared compound, completely resistant to the action of gasoline. It is soft enough to make a tight seat on suction lines and on gravity pressures up to 15 pounds, and it will not swell, harden, or deteriorate.

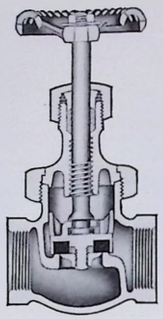
When a replacement disc is ordered, the complete disc holder assembly always will be furnished. For dimensions of discs, see page 168.

Tests: Each valve is tested in the body with 80 pounds air pressure, and at the seat with one foot head of kerosene. The inside of the valve is then thoroughly cleaned, and the ends are tightly sealed to keep out foreign matter.

For other equipment for gasoline service, see pages 528 to 531.

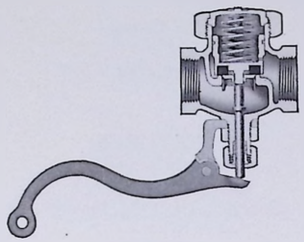
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Valves and Fittings
For Gasoline Service



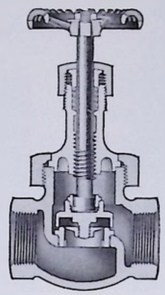
No. 7
Brass Globe Valve
With Renewable Disc

When these Valves are fitted with No. 2 hot water discs they are suitable for gasoline service. For complete description and list prices, see page 16.



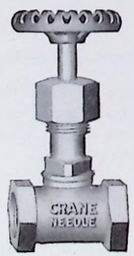
No. 7½
Brass Globe Valve
Quick-Opening, Self-Closing

Quick-opening, self-closing Globe Valves fill a long felt need on gasoline and oil loading racks. For complete description and list prices, see page 385.



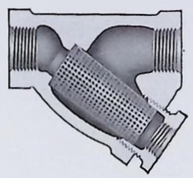
No. 350½ C
Iron Body Globe Valve

These Valves are for use in oil fields, refineries, gas plants, etc., when fitted with the proper disc. For complete description and list prices, see page 140.



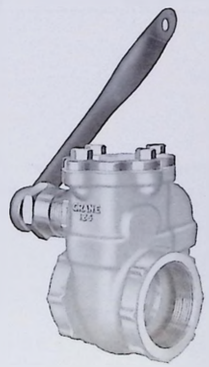
No. 88
Needle Point
Brass Globe Valve

No. 88, No. 89, and No. 85 Needle Point Brass Globe and Angle Valves are recommended for regulation of flow of oil, gas, fuel oil, or other light liquids where close adjustment is desired. For complete description and list prices, see page 15.



No. 988½
Sediment Separator
Self Cleaning
"Y" Pattern

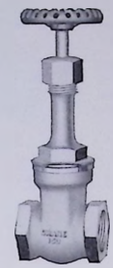
Suitable for air, gas, gasoline, light oils, fuel oils, medium and heavy oils, steam and water when fitted with the proper screen. For complete description and list prices, see page 433.



No. 432
Brass Gate Valve
Quick Opening

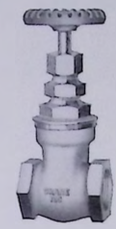
Used extensively on unloading racks at gasoline and oil bulk stations. For complete description and list prices, see page 40.

Valves and Cocks
For Gasoline Service



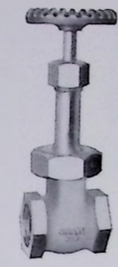
No. 431
Brass Gate Valve
Wedge Disc
Rising Stem

A Wedge Gate Valve suitable for steam, water, oil, or gas, also gasoline when given an air test at slight additional cost. Can be furnished with lock-up when so ordered. Price on application. For complete description see page 41.



No. 438
Brass Gate Valve
Wedge Disc
Non-Rising Stem

A non-rising stem Brass Gate Valve suitable for general service, and gasoline service when given an air test at slight additional cost. For complete description see page 38.



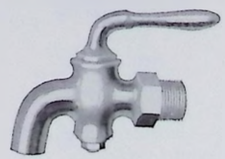
No. 457
Brass Gate Valve
Wedge Disc
Rising Stem

A heavy, rugged Valve built to withstand hard service without sacrifice of long life. Recommended for water, oil, gas, and gasoline service. For complete description and list prices, see page 42.



No. 56
Garden Hose Valve

Also made in 90° angle pattern (No. 58). These Garden Hose Valves fill a need at oil bulk and filling stations, being suitable for small hose lines. For list prices, see page 47.



No. 800
Brass Ground Key Faucet
Finished, Plain

Also made rough, and with hose thread outlet No. 801. Brass Faucets find many uses around bulk and filling stations for either faucet or hose work. For list prices, see page 58.



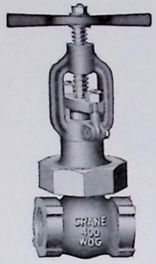
No. 320
Iron Cock
Square Head

Suitable for truck tank service and general service in bulk and filling stations. Also made with flat head, brass plug, washer, etc. For complete description and list prices, see page 62.

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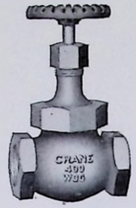
Valves

For Gasoline Service



No. 1498
Malleable Iron Gate Valve
O.S.&Y.— Union Bonnet

Malleable Iron Gate Valves are recommended for water, oil, or gas, and are specially suited for oil lines where fire hazard legislates against the use of cast iron. For complete description and list prices, see page 79.



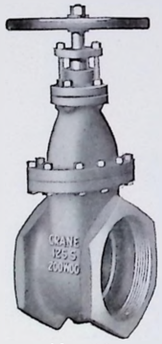
No. 346 P
Malleable Iron Globe Valve
Plug Type Disc
Union Bonnet

Malleable Iron Globe Valves are recommended for water, oil, or gas where all-iron construction is desirable, and are specially suited for oil lines where fire hazard legislates against the use of cast iron. Also made in angle pattern. For complete description and list prices, see page 141.



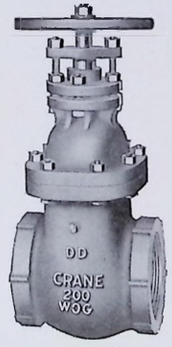
No. 346½
Swing Check Valve
Malleable Iron

Malleable Iron Swing Check Valves are recommended for water, oil, or gas where all-iron construction is desirable, and are specially suited for oil lines where fire hazard legislates against the use of cast iron. For complete description and list prices, see page 150.



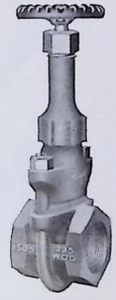
No. 460
Standard Iron Body
Wedge Gate Valve

Standard Valves are made both screwed and flanged, rising and non-rising stem type. Furnished brass trimmed, all-iron, Exelloy or "18-8" trimmed to meet specific conditions. A good standard all purpose valve suitable for air, gas, and gasoline lines when given an air test at slight additional charge. For complete description, see pages 74, 75, and 78.



No. 480
Standard Iron Body
Double Disc Gate Valve

These Valves are made both screwed and flanged, rising and non-rising stem type. They are suitable for oil, water, and gas service. For complete description and list prices, see pages 108 and 109.

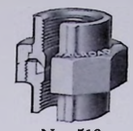


No. 488
Clamp Gate Valve

Clamp Gate Valves are particularly suited for use on gasoline and air lines, also in oil fields, gas fields, oil refineries, gas plants, benzol plants, etc. Also furnished outside screw and yoke type and flanged ends. For complete description and list prices, see pages 68 and 69.

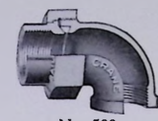
Valves and Fittings

For Gasoline Service



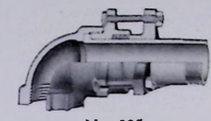
No. 519
Union, Female Ends

A heavy, rugged Union suitable for general use. Also made with male and female ends. For complete description and list prices, see page 236.



No. 590
90° Elbow
With Female Union

One of a complete line of union fittings, consisting of male union and female union 45° and 90° elbows, male union and female union tees, straight and reducing sizes. This type of fitting reduces the number of joints in a pipe line. For complete description and list prices, see page 237.



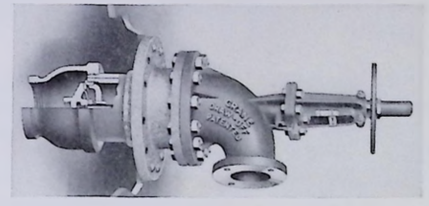
No. 295
Single Swing Joint
Iron Body

These Joints are used to make adjustable connections to tanks, tank cars, barges, on loading racks, docks, etc. They are indispensable for service on unloading racks in oil bulk stations. Also made double swing and straight. For complete description and list prices, see page 440.



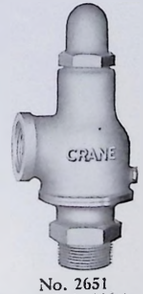
Standard Malleable Iron
90° Elbow

The extensive line of Crane malleable iron fittings includes a large variety of sizes and types and are suitable for all kinds of oil and gas lines where temperature does not exceed 500° F. See pages 172 to 187 for complete list.



No. 639
Anti-Freeze Draw-Off Valves

These Valves are used to draw off water or oil from storage tanks. They are so designed that the seat and disc are contained within the tank to prevent freezing. Prices and dimensions on application.



No. 2651
Brass Relief Valve

Suitable for air and gases up to 250 lbs. For complete description and list prices, see page 407.



No. 2668
Brass Relief Valve
For Gasoline and Noxious Gases

These Valves are recommended for service on gasoline and noxious gases. Have pressure tight outlets. For complete description and list prices, see page 407.



No. 2550
Brass Pop Safety Valve

Used extensively on air compressor receivers. For complete description and list prices, see page 303.

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Valves and Fittings for Gasoline Service

Pages 526 to 531 illustrate some of the lines of Crane valves and fittings recommended for use on ordinary gasoline service.

For unusual conditions in refineries or bulk stations, Crane Co. can supply special valves or fittings to order.

Consult the nearest Crane Branch.

Tools and Supplies

Pipe Vises....page 534
Stocks and Dies....page 535
Pipe Threading Devices....pages 536 to 539
Power Pipe Machines....page 538
Pipe Cutters....pages 540 to 541
Pipe-End Reamers....page 541
Pipe and Monkey Wrenches....pages 542 to 543
Chain Pipe Tongs....page 544
Pipe Taps....page 545
Pipe Reamers....page 545
Flue Brushes and Scrapers....page 545
Insulating Materials....pages 546 to 547

In addition to the Tools and Supplies shown on pages 534 to 547, the following are shown in other sections of this catalogue, in order to group them with allied products:

Tools

Wrenches for Body Seat Rings....page 169
Sizing Tools for Soft Copper Tubing....page 485
Square-End Sawing Vises....page 485

Supplies

Machine Bolts....page 354
Gaskets....pages 350 to 362, and 521
Sheet Packings....page 303
Rod Packings....pages 304 and 305
Thread Lubricants....page 306
Hose....page 466
Solders and Fluxes....page 485

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Pipe Vises

Crane Malleable Iron Pipe Vises



Open

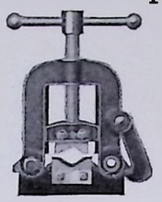
This Malleable Iron Pipe Vise is light and durable. It has renewable jaws, and is constructed for heavy work. Great care has been taken in manufacturing the various parts, and the strength put where it is most required.

List Prices

Number		1	2
Holds Pipe from		1/8 to 2 inch	1/8 to 3 inch
Weight	Pounds	16	30
Price, Complete	Each	10.00	14.00
Extra Jaws	Per Set of Three	2.00	3.00
Extra Yoke	Each	2.00	2.85
Extra Screw	Each	.85	1.35
Extra Slide	Each	.45	.68
Extra Handle	Each	.68	.90
Extra Bottom Piece	Each	2.70	3.40
Extra Hook	Each	.45	.68

Made entirely of wrought steel—Adapted for use on bench or post—Rapid in action and positive in grip —Drop-Forged jaws are tempered for file sharpening.

Malleable Iron Pipe Vises



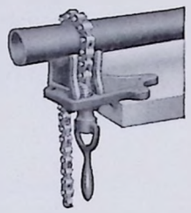
Shut

A standard weight pipe vise with jaws milled from tool steel bars and carefully hardened and tempered. Jaws are held in place by two bolts in each jaw. All castings are of certified malleable iron. Prices of sizes to take 12″ pipe on application.

List Prices

Number	00H	0H	1H	2H	3H	4H
Cap. Pipe Sizes	1/8 to 1 1/4	1/8 to 2	1/8 to 2 1/2	1/8 to 3 1/2	1/8 to 4 1/2	1/8 to 6
Price Each	2.50	4.25	5.00	7.50	11.00	23.50

Williams' "Vulcan" Drop Forged Chain Pipe Vise

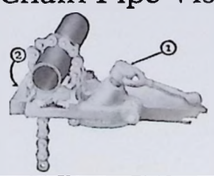


List Prices

No.	For Pipe Sizes	Size Folded for Packing	Weight Each, Lbs.	Jaws, Pair	Chain with Screw	Screw	Handle with Nut	Nut	Vise Complete
1	1/8 to 2	4 x 5 x 6	4	3.00	2.50	.80	2.20	1.40	7.00
2	1/4 to 4	6 x 8 x 8	10	7.00	4.80	1.40	4.20	2.70	15.00
3	1/4 to 6	8 x 9 x 11	18	12.00	9.00	2.50	7.00	4.00	27.00
4	1/4 to 8	8 x 10 x 12	30	18.00	12.00	2.50	7.00	4.00	36.00

Williams' "Vulcan" Superior Drop Forged Chain Pipe Vise

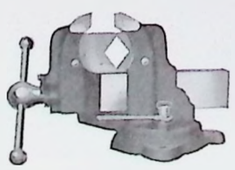
Made from tough wrought steel—Reversible jaws—double life—Overhead adjustment—easy to operate —Rapid in action—positive in grip.



List Prices

No.	For Pipe, Sizes Inches	Size Folded for Packing Inches	Weight Each, Lbs.	Jaws, Pair Std. Finish	Jaws, Pair Chrome-Plated	Chain without Chain Arm Std.	Chain without Chain Arm Plated	Screw Std. Finish	Screw Plated	Handle with Screw Std.	Handle with Screw Plated	Chain Arm Std. Finish	Chain Arm Chrome-Plated	VISE, Complete Std. Finish	VISE, Complete Chrome-Plated
11	1/8 to 2 1/2	4 1/2 x 5 1/4 x 6 1/2	7	3.30	4.00	2.00	2.20	1.00	1.15	2.35	2.80	1.20	1.40	10.00	12.00
12	1/4 to 4 1/2	5 1/2 x 7 x 9 1/4	15	7.70	9.00	3.60	4.00	1.45	1.65	3.50	4.15	1.85	2.25	19.00	22.00

Combination Pipe Vise



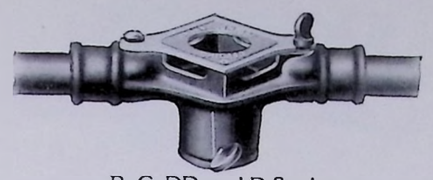
A substantial combination vise with pipe jaws of highest grade steel, milled and tempered in oil. Front jaw is reversible so it may be turned from end to end when worn. Made for bolting to bench and has split ring swivel base construction which gives unusual gripping power. Tension spring holds handle wherever it is placed.

List Prices and Dimensions

Number	Jaw Inches	Vise Opens	Max. Pipe Size	Weight	Price
87	3 1/2	3	2″	47	17.50
88	4 1/2	5	3″	74	24.00
288 1/2	5	6	4″	116	35.00
289 1/2	6	9 1/2	6″	185	49.00

Stocks and Dies

Crane Stocks with Dies



B, C, DD, and D Stocks



E and H Stocks, with Leader Screw

List Prices

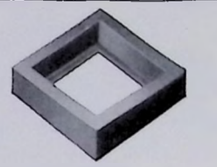
Size		B	C	DD	D	E	H
Stocks less dies	Each	2.60	3.75	4.50	4.50	7.15	26.70
Size of dies furnished with stocks		1/8″ to 1/2″	1/4″ to 1″	3/4″ to 1 1/4″	1″ to 1 1/2″	1 1/4″ to 2″	2 1/2″ and 3″
Dimension of dies		2″ x 1/2″	2 1/2″ x 3/4″	3″ x 3/4″	3″ x 3/4″	4″ x 7/8″	5″ x 1 1/4″
Stocks with dies complete		13.60	18.75	16.50	16.50	22.15	56.70



Die



Bushing



Die Frame

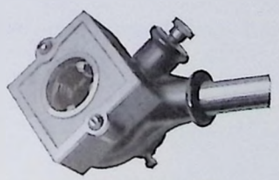
List Prices

Size		B	C	DD	D	E	H
Extra dies, R. H.	Each	2.75	3.00	4.00	4.00	5.00	15.00
Extra dies, L. H.	Each	4.15	4.50	6.00	6.00	7.50	22.50
Bushings	Each	.20	.25	.35	.35	.45	1.10

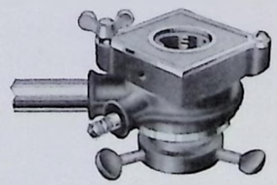
List Prices, Extra Parts

Size		B	C	DD	D	E
Caps	Each	.32	.42	.65	.65	.65
Thumb screws for cap or bushing	Each	.20	.20	.20	.20	.20
Machine screws for cap	Each	.10	.10	.10	.10	.10
Handles	Per Set	1.05	1.50	1.70	1.70	2.10
Die frames	Each			.25	.25	.42
Leader screws	Each					1.60
Thumb screws for leader	Each					.20

Solid Ratchet Die Stocks



Nos. 1 and 1 1/2



No. 2

Working parts are completely enclosed to protect them from dirt and sand and the compactness of this stock permits its use in very close quarters. A complete set of bushings is furnished with each stock, but any ordinary bushing will fit.

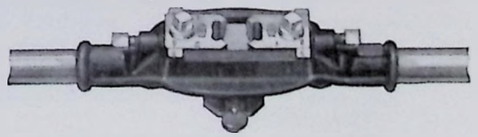
List Prices

Size		1-RS-2	1 1/2-RS-2	*2-RS-2
Die range for each stock	Inches	1/4 to 1	1/2 to 1 1/2	1 to 2
Dimensions of dies	Inches	2 1/2 x 3/4	3 x 3/4	4 x 7/8
Stocks and dies complete		21.00	27.00	29.00

*Equipped with leader screw.

For single die prices see Crane stock die list prices above. 2″ x 2″ x 3/4″ die takes same list as 2″ x 2″ x 1/2″.

Armstrong Adjustable Die Stocks



Nos. 1, 2, and 3 stocks have single end dies, requiring one set of two pieces to thread one size of pipe. No. 2 1/2 has double end dies in which two pieces also comprise one set, but each set threads two sizes of pipe.

List Prices

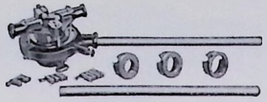
Size Number	Threads Pipe
No. 1, 4 sets of dies (8 pieces), single end	1/8″ to 1/2″
No. 2, 5 sets of dies (10 pieces), single end	1/4″ to 1″
No. 2 1/2, 2 sets of dies (4 pieces), double end	1/2″ to 1 1/4″
No. 3, 3 sets of dies (6 pieces), single end	1 1/4″ to 2″

Set No.	Cuts Pipe	Complete Stocks & Dies	Extra Dies per Pair	Extra Bushings
1	1/8″ to 1/2″	9.00	1.60	.30
2	1/4″ to 1″	12.00	2.00	.40
2 1/2	1/2″ to 1 1/4″	14.00	3.50	.60
3	1 1/4″ to 2″	18.00	3.50	.75

Left hand pipe dies take twice extra die list. Double end dies furnished in 1/2″ x 3/4″, 1″ x 1 1/4″ for No. 2 1/2 stocks.

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Toledo
Pipe Threading Devices

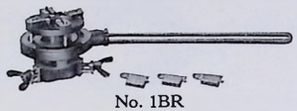


No. 1A

Like the No. 1, except equipped with a ratchet which makes it easy to thread pipe in restricted places. It may be used with two handles as an ordinary die stock when desired. Exceptionally easy operating.

List Prices and Shipping Weights

No. 1A complete, 1 to 2-inch, inclusive		22.50	24 lbs.
Dies only, 1, 1¼ or 1½-inch	Each	1.50	7 oz.
Dies only, 2-inch	Each	2.50	5 oz.



No. 1BR

The No. 1B and 1BR are similar to the No. 1 and 1A except that they do not use bushings. Clamped to the pipe by three broad-faced chuck jaws. Easily and quickly centered. Use a separate set of dies for each size pipe.

List Prices and Shipping Weights

No. 1B complete, 1 to 2-inch		24.00	22 lbs.
No. 1BR complete, 1 to 2-inch		30.00	23 lbs.
Dies only, 1, 1¼ or 1½-inch	Each	1.50	7 oz.
Dies only, 2-inch	Each	2.50	5 oz.

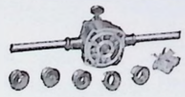


No. 30 and No. 31

The lightest, the smallest and easiest to operate of all 3-way tools. Each die head is "on center" and the handles project from either side, thus producing a perfectly balanced tool. Dies easily reground or replaced at small cost. No adjustments necessary. No loose parts.

List Prices and Shipping Weights

No. 30 complete, ⅜, ½ and ¾-inch		12.00	6 lbs.
No. 31 complete, ½, ¾ and 1-inch		13.50	8 lbs.
Dies only, ⅜, ½ or ¾-inch	Each	2.60	2 oz.
Dies only, 1-inch	Each	3.26	4 oz.

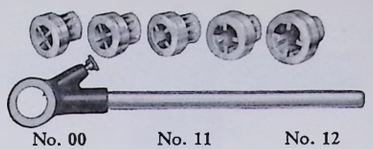


No. 0

The No. 0 is but 24″ from tip to tip of handle. Embodies the "TOLEDO" receding die feature for threading ½″ and ¾″ pipe. Produces perfectly tapered threads. Is a very easy-operating tool. Bushings make for perfect centering. Uses but three sets of dies.

List Prices and Shipping Weights

No. 0 complete, ⅛ to ¾-inch		20.80	11 lbs.
Dies only, ⅛″, ¼″ and ⅜″ or ½″ and ¾″	Each	2.76	5 oz.

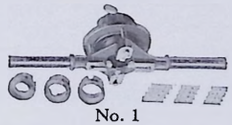


No. 00 No. 11 No. 12

Small, compact, and easy to operate ratchet threading devices. Instant die change. Operates in close quarters. Dies easily removed and reground or replaced at small cost. Ideal for close corner jobs.

List Prices and Shipping Weights

No. 00 complete, ⅛ to ¾-inch inclusive		24.70	10 lbs.
Ratchet handle complete	Each	3.90	3 lbs.
Die heads with dies, ⅛, ¼ or ⅜-inch	Each	3.90	2 lbs.
Die heads with dies, ½ or ¾-inch	Each	4.56	2 lbs.
Dies only, ⅛, ¼, ⅜, ½ or ¾-inch	Each	2.60	2 oz.
No. 11 complete, ½ to 1¼-inch inclusive		24.00	13 lbs.
No. 11 complete, ⅛ to 1¼-inch inclusive		39.00	22 lbs.
Ratchet handle complete	Each	4.00	4 lbs.
Die heads with dies, ⅛ to 1¼-inch	Each	5.00	2 lbs.
Dies only, ⅛ to ¾-inch	Each	2.60	2 oz.
Dies only, 1 or 1¼-inch	Each	3.26	4 oz.
No. 12 complete, ½ to 2-inch inclusive		42.00	27 lbs.
Ratchet handle complete	Each	6.00	6 lbs.
Die heads with dies, ½ or ¾-inch	Each	5.20	3 lbs.
Die heads with dies, 1 or 1¼-inch	Each	6.00	3 lbs.
Die heads with dies, 1½ or 2-inch	Each	6.80	4 lbs.
Dies only, ½ or ¾-inch	Each	2.60	2 oz.
Dies only, 1 or 1¼-inch	Each	3.26	4 oz.
Dies only, 1½ or 2-inch	Each	4.30	4 oz.



No. 1

The No. 1 is the first of the so-called easy-operating threaders. It utilizes the "TOLEDO" receding die principle and a boy can thread 2″ pipe. Instantly adjusted for cutting over or under size as well as standard threads. Uses a separate set of dies for each size of pipe.

List Prices and Shipping Weights

No. 1 complete, 1 to 2-inch, inclusive		18.00	19 lbs.
Dies only, 1, 1¼, 1½-inch	Each	1.50	7 oz.
Dies only, 2-inch	Each	2.50	5 oz.



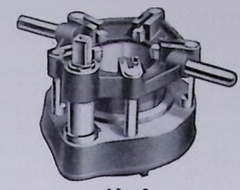
No. 10BR

No. 10B and 10BR thread 1″ to 2″ pipe using but one set of dies. Pipe holder similar in design to No. 1B and 1BR. Does not require bushings. No. 10B is plain—No. 10BR equipped with ratchet.

List Prices and Shipping Weights

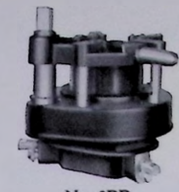
No. 10B complete, 1 to 2-inch		21.28	22 lbs.
No. 10BR complete, 1 to 2-inch		25.84	28 lbs.
Dies only, 1 to 2-inch	Per set	5.50	1 lb.

Toledo Pipe Threading Devices



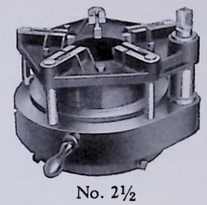
No. 2

Considerably lighter than other tools of this capacity. A separate set of dies is used for each size. Weighs but 57 pounds as it is picked up to be put on the pipe. Uses receding die principle.



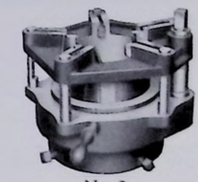
No. 2BR

Similar to No. 2 except it is equipped with new type 3-jaw pipe holder. Does not require bushings. More positive and longer lived than any cam operated mechanism. Quickly and easily centered to the pipe.



No. 2½

A companion tool for the No. 2. Threads 4½, 5, and 6-inch pipe. Similar in design and operation. Enables the owner of the No. 2 to thread up to 6 inches.

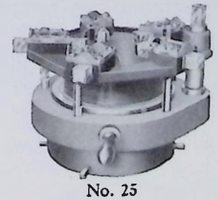


No. 3

Uses a separate set of dies for each size pipe. Its net weight as it is picked up to be put on the pipe is but 148 pounds. Compact for a tool threading these sizes.

List Prices and Capacities

Number	Capacity	Ship. Wt.	Price	Extra Dies	Extra Dies
2	2½ to 4 inches	95 pounds	100.00	8.00 Single Set	32.00 Comp. Set
2BR	2½ to 4 inches	92 pounds	110.00	8.00 Single Set	32.00 Comp. Set
2½	4½ to 6 inches	185 pounds	200.00	12.00 Single Set	36.00 Comp. Set
3	4½ to 8 inches	228 pounds	300.00	12.00 Single Set	60.00 Comp. Set



No. 25

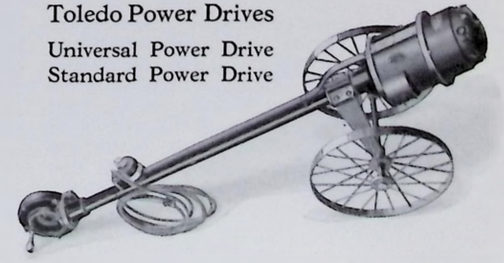
These tools thread seven sizes of pipe with one set of dies. Adjustment is positive and quickly accomplished. Uses "TOLEDO" receding die principle. Special long-barreled bushings on the No. 25 makes for easy centering. No. 25BR does not require bushings.

List Prices

Number 25	2½ to 6 inches	230.00
Number 25BR	2½ to 6 inches	230.00
Shipping Weight	No. 25 232 Lbs.	No. 25BR 175 Lbs.

Toledo Power Drives

Universal Power Drive
Standard Power Drive



"TOLEDO" Power Drives are primarily designed for operating "TOLEDO" geared threaders and cutters and when this combination is used it instantly converts large threaders and cutters into fast, efficient power machines.

"TOLEDO" Power Drives have many other uses, such as operating large gate valves, sheet metal rolls, winches, etc.

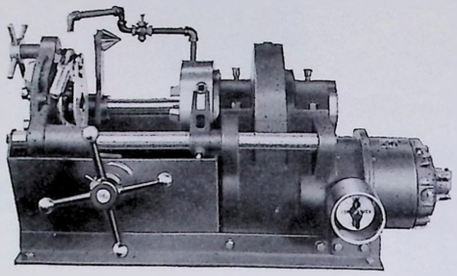
List Prices

Universal	½ H. P.	110 Volt	242 Lbs.	500.00
Standard	1½ H. P.	60 or 50 Cycle	328 Lbs.	600.00
Super	2½ H. P.	3 Phase A.C.	396 Lbs.	750.00

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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No. 999 Toledo Power Pipe Machine

Standard and Super Models



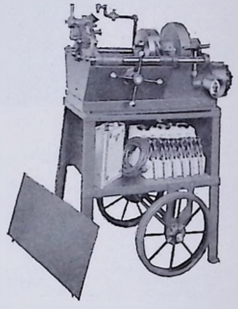
Super Model

Furnished in two models, super and standard. Super model is equipped with quick-opening die heads. Standard model is equipped with non-opening die heads. In all other respects machines are identical. Both are equipped with rack and pinion, carriage feed wheel, thread length indicator, and heavy guard protecting switch. All gears run in oil. A safety friction gear will slip in the event of overload and protect the machine from damage. The three-jaw universal chuck is equipped with chuck wrench ejector fingers. Centrifugal type oil pump assures a constant flow of oil. Two-inch pipe is cut off in 14 seconds and threaded in 20 seconds with super model, and 30 seconds with standard model machine.

Wrenches, die heads and dies, cable, and bushings, and one gallon of black sulphur base oil furnished.

List Prices, Each

No. 999 Power Pipe Machine, ½″ to 2″ Pipe Inclusive	Approximate Shipping Weight Pounds	Price F.O.B. Toledo, O
No. 999 super model, with 6 quick-opening die heads and ½″ to 2″ R. H. pipe dies	445	700.00
No. 999 super model, with 3 quick-opening die heads and ½″ to 2″ R. H. pipe dies	427	670.00
No. 999 standard model, with 6 non-opening die heads and ½″ to 2″ R. H. pipe dies	382	570.00
Cutter blades, per set of four	1	12.00
Bushings ¼″, ⅜″, ½″, 1″, 1¼″, 1½″ or 2″	1½	.70
Quick-opening die head only (less dies), for ½″ or ¾″ R. H. dies, each	6¼	26.70
Quick-opening die head only, for 1″ or 1¼″ R. H. dies (less dies)	6¼	26.70
Quick-opening die head only, for 1½″ or 2″ R. H. dies (less dies)	6¼	26.70
1 set quick-opening R. H. pipe dies, ⅛″, ¼″, ⅜″, ½″ or ¾″	1	6.50
1 set quick-opening R. H. pipe dies, 1″, 1¼″, 1½″ or 2″	1	8.00
Complete set non-opening die heads only (less dies), ½″ to 2″	17	26.60
Complete set non-opening dies, ½″ to 2″	2	28.60
Special reamer for use on standard model	5	10.00



Super Model

No. 999 with enclosed steel stand with rubber tired wheels and partitioned die head box. Quotation on request.

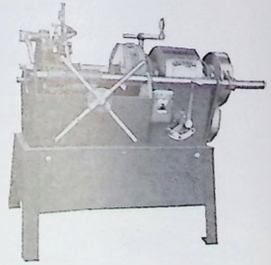
Toledo Power Pipe Machines

No. 1-2-4—Very efficient, high speed, high production. Cuts off 4″ pipe in 9 seconds; threads 4″ pipe in 42 seconds. Cuts off 2″ pipe in 3½ seconds; threads 2″ pipe in 18 seconds. Separate quick-opening die head and dies for each size pipe from 1″ to 4″ inclusive, furnished with machine. Four blade cutter head, six spindle speeds, forward and reverse, controlled by one clutch and gear shift lever. Electrical reverse. Multiple disc clutch. Safety friction gear. Motor protected by fuses. Gears all hardened steel and run in oil. Centrifugal type oil pump—no relief valves. Automatic lubrication. All steel construction.

2″ High Speed—Threads, cuts and reams ½″ to 2″ pipe. Similar in design to No. 1-2-4, except smaller. Requires less than 30 seconds to cut, thread and ream 2″ pipe, completing all three operations. Other sizes in proportion. Separate quick-opening die head and dies for each size pipe furnished with machine.

List Prices, Each

No. 1-2-4 and 2″ High Speed-Power Pipe Machines	Approximate Shipping Weight Pounds	Price F.O.B. Toledo, O.
No. 1-2-4 with 220-440 volt, 3 phase, 60, 50 or 40 cycle motor	2000	2800.00
No. 1-2-4 with 110-220 volt, 1 phase, 60, 50 or 40 cycle motor	2000	3000.00
No. 1-2-4 complete with D. C. 115 or 230 volt motor	2000	3000.00
Cutter blades, per set of four	1	24.00
1″ or 1¼″ quick-opening die head only (less dies)	25	55.00
1½″ or 2″ quick-opening die head only (less dies)	28	60.00
2½″ or 3″ quick-opening die head only (less dies)	31	65.00
3½″ or 4″ quick-opening die head only (less dies)	32	70.00
1 set 1″ or 1¼″ R. H. pipe dies	1	12.00
1 set 1½″ or 2″ R. H. pipe dies	2	16.00
1 set 2½″, 3″, 3½″ or 4″ R. H. pipe dies	3	20.00
2″ high speed with 220-440 volt, 3 phase, 60 cycle motor	1110	1500.00
2″ high speed with D. C. or 1 phase, 110-220 volt A. C. motor	1110	1550.00
Cutter blades, per set of four	1	16.00

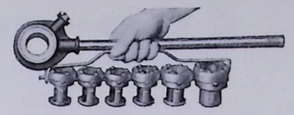


No. 1-2-4 Power Pipe Machine 1″ to 4″ Pipe Inclusive

Beaver Pipe Tools

No. 3 Beaver Ratchet

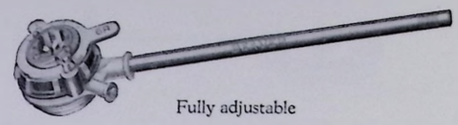
Bolt dies ¼ to 1 inch



Ratchet mechanism fully enclosed, no teeth on die heads to become mutilated. Oil holes in die heads for easy oiling and chip clearance. Dies square in shape, no weak sections to break. For iron, steel, brass or copper pipe. Right or left. Buy any range of die heads.

Specials: Bolt Die Heads ¼ to 1 inch; Straight Thread Conduit Dies ½ to 1 inch; ¾-inch OD 20-thread Brass Pipe Dies.

No. 6 R Beaverette Ratchet

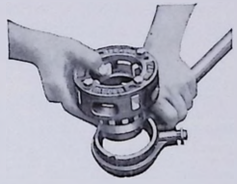


Fully adjustable

The only "one-piece" ratchet tool threading ¼ to ¾ inch

No. 6 Plain and No. 6-R Ratchet are fully self-contained and fully adjustable. The two sets of dies required for this range (¼ x ⅜-inch), and (½ x ¾-inch) are always in the stock and are set to size by a single cam, or may be set to cut standard, over or under standard without affecting the length of thread. A three-jaw Universal pipe guide eliminates loose bushings. (⅛ inch dies extra.) Improved locking device, now on top—more accessible.

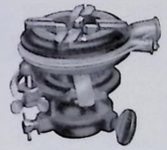
No. 17 Ratchet and Die Heads



Range ¼ to 2 inches

A rugged fool-proof unit type tool. Four large oil holes, bridged across the top to prevent spreading of die slots, facilitate oiling, provide ample chip clearance, and insure good threads. Die segments square in shape; no weak sections to break off. Dies removable for regrinding over and over again. Extra long handle and special die grinding assist easy operation. For steel, iron, cast iron, brass or copper pipe. Buy any range of die heads.

Nos. 12 and 13 Ratchet Series Beavers

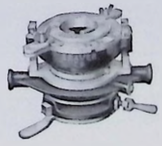


1 to 2 inches Fully adjustable

Fully self-contained. Right hand only. Dies adjustable for over, under or standard thread—of full length. No. 12 Series uses grooved bolt and washer centering device; No. 13 Series uses Universal chuck centering device. Made in Plain type; one-handle ratchet and two-handle ratchet.

No. 26

A heavy-duty tool 1 to 2 inches Fully adjustable



No. 25 Plain and 26 Ratchet Beaver Die Stocks are fully self-contained (no loose parts); and thread 1-inch, 1¼-inch, 1½-inch and 2-inch pipe without changing dies or bushings. Adjustable for standard, over-size or under-size threads without affecting the length of thread. Will cut drip threads or close nipples. A number of important improvements have been made in these tools and the new models pull much more easily due to improved die grinding.

Nos. 41-E and 61-E Beaver Geared Threaders

2½ to 12 inches Fully adjustable



No. 41 E threads 2½ to 4 inches; No. 61 E 2½ to 6 inches; No. 80—4½ to 8 inches; No. 90—9 to 12 inches. In Nos. 41 E and 61 E gears are fully enclosed (packed with graphite grease) which prevents damage to gear and pinion and eliminates costly repair bills. Lower end of pinion rides in bronze bushings.

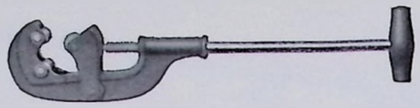
List Prices

No. 3	¼ to 1 inch. Complete with dies	31.50	No. 17	¼ to 2 inches. Complete with dies	55.60
No. 6R	¼ to ¾ inch. Complete	27.00	No. 25	1 to 2 inches. Plain complete	33.00
No. 12R	1 to 2 inches. Ratchet complete	30.00	No. 26	1 to 2 inches. Ratchet complete	38.50
No. 13R	1 to 2 inches. Ratchet complete	33.00	No. 41E	2¼ to 4 inches. Complete	100.00
			No. 61E	2¼ to 6 inches. Complete	230.00

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Pipe Cutters

Saunders Pipe Cutters

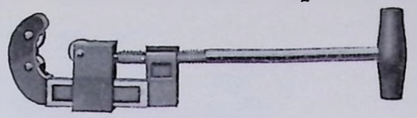


List Prices

Number	1	2	3	4	5
Cuts pipe	⅛ to 1	1 to 2	2 to 3	2½ to 4	4 to 6
Price complete	3.00	4.50	7.50	15.00	22.50
Body, only	1.00	1.50	6.00	10.00	15.00
Wheels, each	.50	.60	1.10	1.10	1.10
Rollers, each	.24	.32	.50	.50	.60
Pins, per doz.	1.20	1.20	1.80	1.80	1.80
Blocks and wheels, each	1.25	1.75	2.75	3.50	4.00
Handle and screw, each	1.00	1.25	1.75	3.50	5.00

Furnished with plain edge thin blade wheels unless knurled wheels are specified.

Barnes Three-Wheel Pipe Cutters

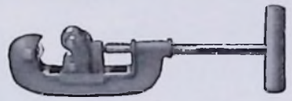


List Prices

Number	1	2	3	4	5	6
Cuts pipe	⅛ to 1	½ to 2	1½ to 3	2½ to 4	4 to 6	6 to 8
Price, complete	4.50	6.00	10.00	20.00	30.00	40.00
Body only, each	1.75	2.60	4.55	9.50	13.75	20.00
Wheels, each	.50	.60	.80	1.00	1.10	1.10
Pins, per doz.	1.00	1.00	1.00	2.00	2.00	2.00
Slide and wheel, each	.75	1.00	2.00	4.50	7.00	8.50
Handle and screw, each	1.00	1.25	2.25	4.50	7.00	9.00

Furnished with plain edge thin blade wheels unless knurled wheels are specified.

Rigid Pipe Cutter



List Prices

No.	Complete	Solid Blade Per Doz.	Blades (Old Style) Per Doz.	Sleeve and Nut	Cast Iron Wheel Each	Frame	Screw and Handle	Handle and Knob	Roll Housing	Roll	Pin and Clip	Wrench	Capacity
1	4.00	6.00	3.00	.40	.40	2.25	1.25		1.25	.30	.20	.20	⅛" to 1¼"
2	6.00	6.00	3.00	.40	.40	2.50	1.60		1.25	.30	.20	.20	⅛" to 2"
3	10.00	12.00	3.50	.60	.80	3.25	3.00	2.00	2.50	.60	.30	.20	1" to 3"
4	20.00	12.00	3.50	.60	.80	6.00	4.00	3.50	4.50	.60	.30	.20	2" to 4"

Knife Blade Cutter Wheels

Knurled or Smooth Edge



Knurled Edge

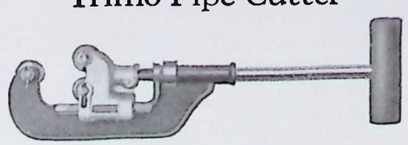
List Prices

Number		1	2	3	4	5	6
Barnes	Each	.50	.60	.80	1.00	1.10	1.10
Saunders	Each	.50	.60	1.10	1.10	1.10	
Number			1-A		2-A		3-A
Trimo	Each		.60		.60		.90
Number			1 and 2 R			3 and 4 R	
Rigid	Each		.60			.90	



Smooth Edge

Trimo Pipe Cutter

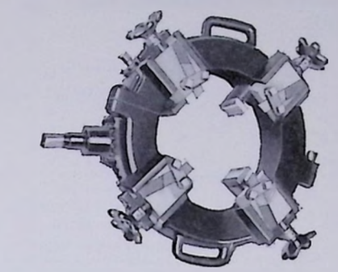


List Prices

No.	Capacity Cuts Pipe	Each Complete	Nuts	Wheels, Smooth or Teeth Edge	Rolls	Pins with Cotter Pins Per Doz.	Cotter Pins Per Doz.	Anti-Friction Washers Per Doz.	Roll Block	Frame	Handle Screw	Handle	Roll Block Pin
1 Cutter	⅛" to 1¼"	5.00	.35	.60	.30	1.30	.20	.60	1.25	2.25	1.00	.50	.03
2 Cutter	⅛" to 2"	6.00	.35	.60	.30	1.30	.20	.60	1.25	2.50	1.25	.50	.03
3 Cutter	1" to 3"	10.00	.40	.90	.40	1.30	.20	.60	2.25	3.25	2.00	.50	.03
4 Cutter	2½" to 4"	20.00	.60	1.20	.40	2.00	.20	.60	4.00	9.50	4.00	.60	.03

Pipe Cutters and Pipe-End Reamers

"Toledo" Geared Pipe Cutters

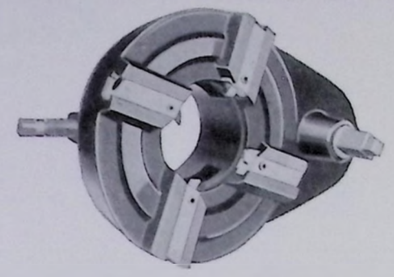


Cuts off large pipe quickly, accurately, leaving a straight square-end cut without burr. Hand-fed. No bushings are necessary. Frame may be split apart and clamped around pipe already in line and the pipe cut off.

List Prices

No. 250	2½ to 6 inches, 122 pounds	Each	160.00
No. 300	4½ to 8 inches, 164 pounds	Each	210.00
No. 350	7 to 10 inches, 173 pounds	Each	260.00
No. 400	9 to 12 inches, 207 pounds	Each	300.00

"Toledo" Automatic Pipe Cutters

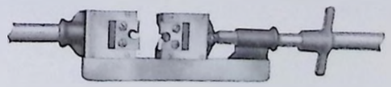


"Toledo" automatic. Cuts pipe off quickly. Leaves a square-end cut without burr. Will chamfer the outer edge, making it easy to center the threading tool if desired. Knives are fed automatically. Light in weight.

List Prices

No. 40	2 to 4 inches, 86 pounds	Each	120.00
No. 80	4½ to 8 inches, 189 pounds	Each	300.00

"Beaver" Square End Pipe Cutters



Capacity — No. 1 — ⅛ to 1 inch
No. 5 — ½ to 2 inches

List Prices

No. 1	⅛ to 1 inch	Complete	27.00
	Extra knives	Per set	1.60
No. 5	½ to 2 inches	Complete	30.00
	Extra knives	Per set	2.00
Grooving or bevelling knives		Per set	4.00

Hand Pipe-End Reamers



Capacity — ⅜ to 3 inches

List Prices

Junior pipe reamer, capacity ⅛ to 2 inches	Each	8.00
Senior ratchet pipe reamer, capacity ⅜ to 3 inches	Each	11.20

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Pipe Wrenches

"Stillson" Pipe Wrench



Sizes 6 to 48 inches

Available with wood handle in sizes 6 to 14 inches. Larger sizes, steel handle only.

List Prices

Length open	Inches	6	8	10	14	18	24	36	48
Takes pipe	Inches	⅛ to ½	⅛ to ¾	⅛ to 1	¼ to 1½	¼ to 2	¼ to 2½	¼ to 3½	1 to 5
With steel handle	Each	1.90	2.20	2.85	3.85	5.50	8.50	15.00	25.00
With wood handle	Each	2.00	2.30	3.15	4.25				

List Prices—Parts

Bar with spring	Each	1.00	1.15	1.60	2.20	3.25	5.15	10.50	17.00
Jaws	Each	.65	.70	1.10	1.50	2.15	3.50	5.70	9.00
Frame and pin	Each	.45	.55	.70	.80	.95	1.75	2.75	3.50
Frame pin only	Each	.03	.03	.04	.04	.04	.04	.05	.05
Adjusting nuts	Each	.15	.15	.20	.30	.35	.55	1.10	2.00
Wood handles and ferrule	Each	.23	.25	.30	.36				
End nuts	Each	.15	.15	.20	.20				
Springs — front	Each	.10	.10	.10	.10	.10	.11	.13	.13
Springs — back	Pair			.20	.20	.20	.22		
Spring pins or rivets	Each	.01	.01	.02	.02	.02	.02	.02	.02

"Ridgid" Pipe Wrench



Sizes 6 to 60 inches

Style "E" Ridgid Pipe Wrench



Sizes 6 to 36 inches

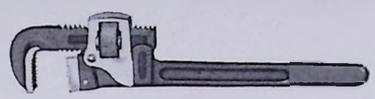
List Prices

Size	Inches	6	8	10	14	18	24	36	48	60
Straight Pattern Wrench Complete		1.90	2.20	2.85	3.85	5.50	8.50	15.00	25.00	40.00
Style "E" Pattern Wrench Complete		1.90	2.20	2.85	3.85	5.50	8.50	15.00		
Straight Handle Assembly		1.50	1.65	2.25	2.85	4.00	6.00	11.75	19.50	25.00
"E" Handle Assembly		1.50	1.65	2.25	2.85	4.00	6.00	11.75		
Straight Handle Only		1.00	1.15	1.60	2.20	3.25	5.15	10.50	17.00	20.00
"E" Handle Only		1.00	1.15	1.60	2.20	3.25	5.15	10.50		
Hook Jaw		.65	.70	1.10	1.50	2.15	3.50	5.70	9.00	15.00
Heel Jaw		.35	.40	.50	.60	.70	.80	1.10	2.00	4.00
Pin		.03	.03	.04	.04	.04	.04	.05	.05	.05
Coil Spring		.03	.03	.03	.03	.04	.04	.04	.04	.04
Flat Spring		.20	.20	.20	.30	.40	.50	.60	.80	1.20
Nut		.15	.15	.20	.30	.35	.55	1.10	2.00	3.00
Capacity	Inches	¾	1	1½	2	2½	3	4½	6	8

Rubber grips in 2 sizes only — 10"— list $3.60 per dozen; 14"—list $4.80 per dozen.

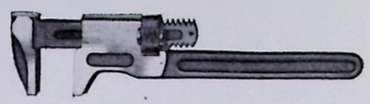
Wrenches

"Trimo" Pipe Wrench



Sizes 6 to 48 inches

"Trimo" Monkey Wrench



Sizes 6 to 21 inches

Available with wood handle in sizes 6 to 14 inches. Larger sizes, steel handle only.

List Prices

Size Inches	Steel Handle Wrench Complete	Wood Handle Wrench Complete	Movable Jaw	Nut	Insert Jaw and Pin	Frame and Pin	Spring and Pin	Frame Pins	Jaw Pins	Steel Handles	Wood Handle with Ferrule	Nut Guards Per Pair
6	1.90	2.00	.65	.15	.50	.45	.03	.03	.03	1.00	.23	.15
8	2.20	2.30	.70	.15	.55	.55	.03	.03	.03	1.15	.25	.15
10	2.85	3.15	1.10	.20	.65	.70	.03	.04	.04	1.60	.30	.20
12	3.35	3.60	1.25	.25	.75	.75	.03	.04	.04	1.80	.35	.30
14	3.85	4.25	1.50	.30	.85	.80	.03	.04	.04	2.20	.36	.30
18	5.50		2.15	.35	.95	.95	.04	.04	.04	3.25		.35
24	8.50		3.50	.55	1.10	1.75	.04	.04	.04	5.15		.45
36	15.00		5.70	1.10	1.50	2.75	.04	.05	.05	10.50		.55
48	25.00		9.00	2.00	2.00	3.50	.04	.05	.05	17.00		.65

"Warnock" Strap Wrench

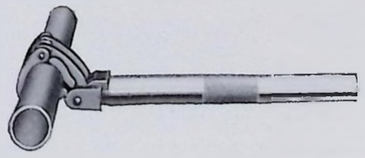


A special wrench for work with polished pipe of all types and for various purposes in the machine shop in handling finished, turned and polished work.

List Prices and Dimensions

Length	Inches	12	18
Each complete		5.00	10.00
Extra straps		.75	1.50
Takes pipe	Inches	⅛ to 2	1 to 5

"Parmalee" Pipe Wrench



Especially adapted for handling brass pipe, smooth rods or tubing.

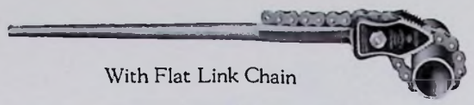
List Prices and Dimensions

Number		1	2	3	4
Pipe size	Inches	⅜ to 1	1 to 2	2 to 3	3 to 4
Length	Inches	10	20	20	37
Each complete		8.50	15.00	17.00	52.00

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Chain Pipe Tongs

"Vulcan" Drop-Forged Chain Pipe Tongs



With Flat Link Chain

"Vulcan" Chain Pipe Tongs furnished with either Flat Link or Cable Chain. Each flat chain is individually "proof-tested" to two-thirds of breaking strain listed below.

List Prices

Number	10	11	12	13	13½	14	15	15½	16
For pipe, size, in.	⅛ to ¾	⅛ to 1½	¼ to 2½	¾ to 4	1 to 6	1½ to 8	2 to 12	4 to 16	4 to 18
Length	13¾	20	27	37	44½	50½	64½	85	87
Weight, lbs.	2	5¾	10	17	24	31	52	98	137
Flat chain, length	9½	13½	17½	22½	32	40½	55½	68	74½
Breaking strain, lbs.	3,600	6,700	9,800	12,500	14,300	15,700	21,800	30,000	40,000
Cable chain, length	9¾	14½	18	27	33½	42	57	67	76
Breaking strain, lbs.	1,800	6,000	9,000	12,500	14,300	15,700	21,800	30,000	40,000
Price, complete	5.00	7.00	10.00	14.00	18.00	22.00	36.00	60.00	80.00
Extra chain	1.50	2.00	3.00	5.00	7.00	9.00	15.00	30.00	40.00
Extra jaws, pair	2.00	3.50	5.50	8.00	9.50	11.00	15.00	24.00	32.00
Extra bolt and nut, per set	.28	.36	.46	.60	.70	.90	1.30	1.75	2.50

"Vulcan Superior" Drop-Forged Pipe and Fittings Tongs



Reversible jaws give double life. Can be supplied with either Flat link or cable chain—each flat link chain proof-tested

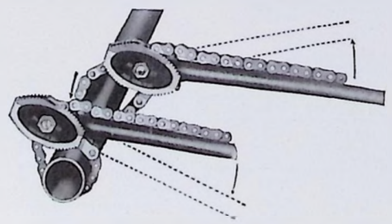
"V" recess in the jaws, combined with general design, gives them a greater number of grips or bites, on both Pipe and Fittings.

List Prices

Number	0	1	2	3	3½	4	5
For pipe and fittings, in.	⅛ to ¾	⅛ to 1½	¼ to 2½	¾ to 4	1 to 6	1½ to 8	2 to 12
Extreme length	13¾	20	27	37	44½	50½	64½
Weight, lbs.	2	5½	10	17	26	34	54
Flat link chain Breaking strain, lbs.	3,600	6,700	9,800	12,500	14,300	15,700	21,800
Cable chain Breaking strain, lbs.	1,800	6,000	9,000	12,500	14,300	15,700	21,800
Price, complete	5.00	7.00	10.00	14.00	18.00	22.00	36.00
Extra chain	1.50	2.00	3.00	5.00	7.00	9.00	15.00
*Extra jaws, per pair	2.00	3.50	5.50	8.00	9.50	11.00	15.00
Extra bolt and nut, per set	.28	.36	.46	.60	.70	.90	1.30

*Extra jaws supplied in pairs unless otherwise called for. If only a single jaw is wanted, specify right or left.

Chain Wrenches

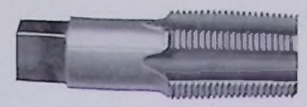


Reversible Chain Wrench

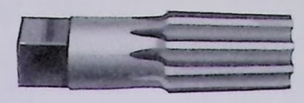
List Prices

Number		14	20	27	37	47	57	67	87
Capacity, size pipe	Inches	⅛ to ¾	⅛ to 1½	¼ to 2½	¾ to 4	1 to 6	1½ to 8	2 to 12	4 to 18
Comp. with flat link or cable chain	Each	5.00	7.00	10.00	14.00	18.00	22.00	36.00	80.00
Extra chain	Each	1.50	2.00	3.00	5.00	7.00	9.00	15.00	40.00
Extra side jaws	Per pair	2.00	3.50	5.50	8.00	9.50	11.00	15.00	32.00
Extra center jaw	Each	1.00	1.00	1.30	1.60	1.80	2.30	2.50	3.20
Extra bolt and nut for side jaws	Set	.28	.36	.46	.60	.70	.90	1.30	2.50

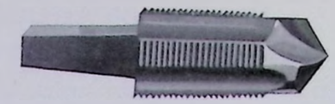
Pipe Taps, Pipe Reamers, and Flue Brushes



Pipe Tap
Sizes ⅛ to 3 inches



Pipe Reamer
Sizes ¼ to 3 inches



Combined Drill, Reamer and Tap
Sizes ¼ to 2 inches

Pipe Tap List Prices

Size	Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Price	Each	1.00	1.20	1.60	2.00	2.80	4.40	5.00	6.60	10.00	15.00	22.50
Threads per Inch		27	18	18	14	14	11½	11½	11½	11½	8	8
Number of Flutes		4	4	4	4	4	4	5	5	6	8	8
Overall Length	Inches	2⅛	2 7/16	2 9/16	3⅛	3¼	3¾	4	4¼	4½	5½	6

These taps regularly furnished with right or left hand American Standard Threads.

Pipe Reamer List Prices

Size	Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Price	Each	1.00	1.20	1.60	2.00	2.80	4.40	5.00	6.60	10.00	15.00	22.50
Diameter, Large End	Inches	.362	.472	.606	.751	.962	1.212	1.553	1.793	2.268	2.722	3.347
Diameter, Small End	Inches	.316	.406	.540	.665	.876	1.103	1.444	1.684	2.159	2.561	3.183
Length of Flutes	Inches	¾	1 1/16	1 1/16	1⅜	1⅜	1¾	1¾	1¾	1¾	2 9/16	2⅝
Diameter of Shank	Inches	.4375	.5625	.7000	.6875	.9063	1.125	1.3125	1.500	1.875	2.250	2.625
Size of Square	Inches	.328	.421	.531	.515	.679	.843	.984	1.125	1.406	1.687	1.968
Overall Length	Inches	2⅛	2 7/16	2 9/16	3⅛	3¼	3¾	4	4¼	4½	5½	6

These reamers are tapered ¾ of an inch to the foot.

Combined Drill, Reamer and Tap List Prices

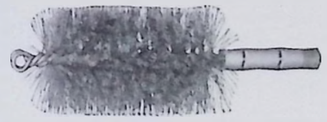
Size		Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Price		Each	2.25	2.50	3.00	3.75	5.00	6.25	7.50	9.25	12.00	21.00	30.00
Size of Square	Small End	Inches	½	½	½	½	½	½	½	½	¾	¾	¾
	Large End	Inches	¾	¾	¾	¾	¾	¾	¾	¾	1	1	1
Length	Square	Inches	1¾	1¾	1¾	1¾	1¾	1¾	1¾	1¾	2	2	2
	Thread	Inches	¾	1 1/16	1 1/16	1⅜	1⅜	1¾	1¾	1¾	1¾	2 9/16	2⅝
	Overall	Inches	3¾	3 13/16	3 13/32	4⅛	4¼	4¾	4⅞	4⅞	5¼	6 3/16	6⅜

These taps are furnished with National Standard form of threads. Left hand taps, and taps with special shanks, are special.

Steel Wire Flue Brushes



No. 1952, Style U
Round Wire, Single Spiral



No. 1953, Style W
Round Wire, Double Spiral

List Prices

Size	Inches	1	2	3	4	5	6
Price	Each	.45	.45	.65	.85	1.10	1.30

List Prices

Size	Inches	1	2	3	4	5	6
Price	Each	.55	.55	.80	1.20	1.35	1.60

No. 1952—Style "U" Round Wire Single Spiral Flue Brush for 1 to 6-inch flues. Brushes are made ¼" less than the O.D. flue size. No. 1953, style "W" brush is supplied with double spiral, round wire in the same sizes as No. 1952.

Notice: Flue Brushes are made to fit standard sizes of flues which are measured from the outside, making the actual diameter of the brushes ¼-inch less. Hence, a brush for a 3-inch flue is 2¾ inches exact diameter.

When exact diameters of brushes are intended please so specify on order.

Engineers' Favorite Flue Scraper



Engineers' Favorite

Made to fit all standard tubes from 1½ to 4 inches. Can be adjusted by merely turning rod or handle.

List Prices

Tube Size, In.	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4
Price Each	2.00	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00

Prices on sizes not listed above, up to 6-inch add 1.00 per inch to price.

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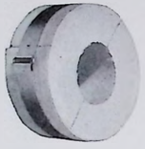
Insulating Materials

Pre-Shrunk Asbestocel



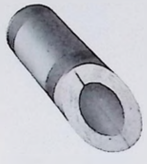
Pre-Shrunk Asbestocel, for low pressure steam and hot water heating lines (temperatures to 300° F.), is made of waterproofed asbestos felts, thus eliminating moisture absorption in storage and the objectionable shrinkage encountered with other types of cellular insulation. Furnished in 3-foot sections, thicknesses of from two to eight ¼-inch plies.* Canvas, asbestos paper and aluminum finishes.

Asbesto Sponge Felted



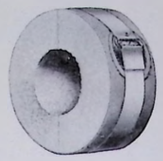
Asbesto-Sponge Felted Pipe Insulation (temperatures to 700° F.) has unusual insulating efficiency, high salvage value and the ability to withstand vibration, shock and rough usage. It retains its high insulating efficiency unimpaired over long years of service. Furnished in 3-foot sections, from 1 to 3 inches thick.* Also available in sheet or block form.

Pre-Shrunk Wool Felt



Pre-Shrunk Wool Felt Insulation is made of specially indented felt and provided with a dual-service liner for use on hot or cold water lines. It is treated to prevent moisture absorption in storage, thus eliminating shrinkage in service. Furnished in 3-foot sections, thicknesses of ½, ¾ and 1 inch, double ½ inch, double ¾ inch, for all pipe sizes from ½ inch up.* Canvas or aluminum finish.

85% Magnesia Pipe Insulation



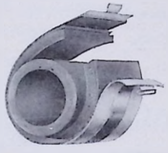
85% Magnesia Pipe Insulation is made with the maximum number of voids or minute dead-air cells which increase its insulating efficiency and reduce its weight. This material is recommended as the most generally satisfactory and economical insulation for steam lines at temperatures up to 600° F. Furnished in 3-foot sections and segments of following thicknesses: Standard, 1½, 2, 2½ inches; Double Standard; and 3-inch (broken joint construction).

Zero Pipe Insulation



Zero Pipe Insulation is the best available pipe covering for cold water pipes under exposure to weather and freezing temperatures. Furnished in 3-foot sections in one thickness only, approximately 1¼ inches. Canvas finish.

Anti-Sweat Pipe Insulation



Anti-Sweat Pipe Insulation, a combination of insulating and waterproofing felts for use on cold water pipes, prevents condensation and damage from dripping. Furnished in 3-foot sections in thicknesses of ½ and ¾-inch solid construction, 1, 1½ and 2-inch broken joint construction for standard pipe sizes.*

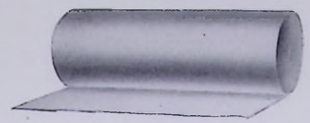
List Prices, Per Linear Foot

Pipe Size		Standard Thickness		1½-inch Thick.	2-inch Thick.	Double Standard Thickness*			2½-inch Thick.	3-inch Thick. (Double Layer)
Nominal size	Actual O.D.	Mag. Thickness	List Price			Mag. Thickness	Both Layers List Price	Outer Layer List Price		
Inches	Inches	Inches		List Price	List Price	Inches			List Price	List Price
½	0.840	⅞	.22	.46	.75	1¾	.65	.40	1.00	1.20
¾	1.050	⅞	.24	.49	.80	1¾	.70	.40	1.05	1.35
1	1.315	⅞	.27	.52	.85	1¾	.75	.45	1.10	1.40
1¼	1.660	⅞	.30	.56	.90	1¾	.80	.45	1.15	1.45
1½	1.900	⅞	.33	.60	.95	1¾	.85	.50	1.20	1.55
2	2.375	1 1/32	.36	.64	1.00	2 1/16	.90	.60	1.25	1.65
2½	2.875	1 1/32	.40	.70	1.05	2 1/16	1.00	.65	1.35	1.75
3	3.500	1 1/32	.45	.76	1.15	2 1/16	1.10	.70	1.50	1.90
3½	4.000	1 1/32	.50	.82	1.25	2 1/16	1.20	.75	1.65	2.05
4	4.500	1⅛	.60	.88	1.35	2¼	1.40	.80	1.80	2.20
4½	5.000	1⅛	.65	.94	1.45	2¼	1.50	.90	1.95	2.35
5	5.563	1⅛	.70	1.00	1.55	2¼	1.60	1.00	2.10	2.50
6	6.625	1⅛	.80	1.10	1.70	2¼	1.80	1.15	2.25	2.70
7	7.625	1¼	1.00	1.20	1.85	2½	2.25	1.30	2.40	2.90
8	8.625	1¼	1.10	1.35	2.00	2½	2.50	1.50	2.55	3.15
9	9.625	1¼	1.20	1.50	2.20	2½	2.70	1.85	2.80	3.40
10	10.750	1¼	1.30	1.65	2.40	2½	2.90	2.10	3.05	3.65
11	11.750	1¼	1.60	1.75	2.55	2½	3.50	2.10	3.20	3.85
12	12.750	1½	1.85	1.85	2.70	3	4.10	2.35	3.40	4.10
14	14.000	1½	2.10	2.10	3.00	3	4.60	2.50	3.80	4.60

All Pipe Coverings furnished in 3-foot lengths, two bands to each length.
*Only 85% Magnesia made in this thickness.

Insulating Materials

Asbestos Paper



Asbestos Paper is used where an insulating material of minimum thickness is required, principally as a protection against heat or as a fire-retardant between walls, floors or ceilings. Special grades are supplied for use in filtration of chemicals and in electrolytic and allied processes. Furnished in weights from 6 to 32 pounds per 100 square feet, in widths 18, 24 and 36 inches, in 50 or 100 pound rolls.

List Prices

Weight, Pounds	Thickness, Inches	Width, Inches	Weight of Rolls, Pounds	Per 100 Pounds
8	1/16	18, 24 or 36	50 or 100	10.70

Asbestos Sheet Millboard



Asbestos Sheet Millboard, for protection against fire, heat, acid fumes, etc., is used as a fireproof lining for floors, partitions, ceilings, elevator shafts, etc.; also, in ranges, stoves, etc.; and for various other industrial uses. Furnished in standard sheets 42 x 48 inches from 1/32 to ½ or ¾-inch thick, in a number of grades of varying densities, resiliency and fire-resistant properties.

List Prices

Size of Sheet, Inches	Per 100 Pounds
42 x 48	12.50

85% Magnesia Blocks



85% Magnesia Blocks have proved under actual service conditions to be the most durable and efficient insulation of the molded type. For many years this material has been the standard insulation in the moderate temperature field up to 600° F. Furnished in standard sizes 3 x 18 inches and 6 x 36 inches, flat or curved, ½ to 4 inches thick.

List Prices

Size, Inches	Per Square Foot
½	.54
¾	.54
⅞	.54
1	.60
1⅛	.68
1¼	.76
1⅜	.84
1½	.90
1⅝	.98
1¾	1.06
1⅞	1.14
2	1.20
2⅛	1.28
2¼	1.36
2⅜	1.44
2½	1.50
2⅝	1.58
2¾	1.66
2⅞	1.74
3	1.80
3¼	1.96
3½	2.10
4	2.40
4½	2.70

For prices on non-listed thicknesses, use next higher price.

Insulating and Finishing Cements



Insulating and Finishing Cements, made of asbestos, mineral wool, vermiculite, and magnesia, are furnished in a complete line. These are used for finishing over sheet or block insulation and for insulating surfaces where it would be impracticable to apply sectional insulation, sheets or blocks.

List Prices

Cement	Type	Temperature Limit, Degrees F.	Size of Bags, Pounds	Covering Capacity in square feet, 1 inch thick		Each
				Bag	Per 100 pounds	
No. 0352	Asbestos	1000	100	19	19	3.20
No. 352	Mine Run Asbestos	1000	100 (Carload Only)	19	19	3.20
No. 400	Asbestos	700	100	25	25	7.00

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Tools and Supplies

In addition to the Tools and Supplies shown on pages 534 to 547, the following are shown in other sections of this catalogue, in order to group them with allied products:

Tools

Wrenches for Body Seat Rings....page 169
Sizing Tools for Soft Copper Tubing....page 485
Square-End Sawing Vises....page 485

Supplies

Machine Bolts....page 354
Gaskets....pages 356 to 362, and 521
Sheet Packings....page 363
Rod Packings....pages 364 and 365
Thread Lubricants....page 366
Hose....page 460
Solders and Fluxes....page 485

Hangers and Supports

Introduction....page 550

Hangers

Standard Ring and Bolt Hangers....page 551
Government Pattern Hangers....page 551
Solid Ring and Sectional Ring Hangers....page 552
Adjustable Swivel Hangers....page 553
Sectional Ring Hangers with Adjusters....page 553
Adjustable Solid Underwriters' Rings....page 553
U-Hangers with Turned Eyes....page 554
Clevis Hangers....page 554
Sectional Hangers....page 555
Heavy Adjustable Hangers....page 555
Cast Iron Roller Hangers....page 556
Cast Iron Roller Spring Hangers....page 556
Adjustable Steel Hangers with Rollers....page 557

Hanger Extensions and Connections

Ceiling Plates and Buttons....page 557
Perforated Extension Bar....page 558
Lag Screws....page 558
Malleable Iron Sockets....page 558
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Ceiling Flanges....page 559
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Concrete Inserts....page 560
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Pipe Clamps

Pipe Clamps for Riser Pipes....page 564
Pipe Clamps with Long Arm....page 564
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Brackets

Light Pattern Welded Brackets and Clamps....page 565
Inverted Riveted Bracket....page 565
Medium Pattern Welded Bracket....page 566
Heavy Pattern Welded Bracket....page 566

Supports

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Pipe Rolls with Stands....page 569
Adjustable Rolls and Stands....page 570
Adjustable Roll Support with Roll Binder....page 570
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Adjustable Pipe Saddle Support....page 572
Adjustable Pipe Stanchion Saddle Support....page 572
Wall Pipe Support....page 573
Pipe Clamp....page 573
Pipe Standard Supports for Outside Lines....page 573

Miscellaneous

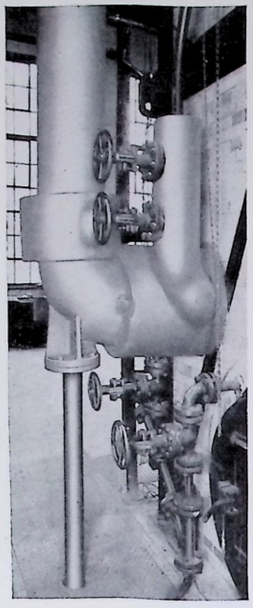
Pipe Covering Protection Saddles....page 574
Floor Sleeves....page 574
Special Spring Hangers and Supports....page 575
Coil Hangers and Spreaders....page 575
Hook Plates and Expansion Hook Plates....page 576
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Technical Data

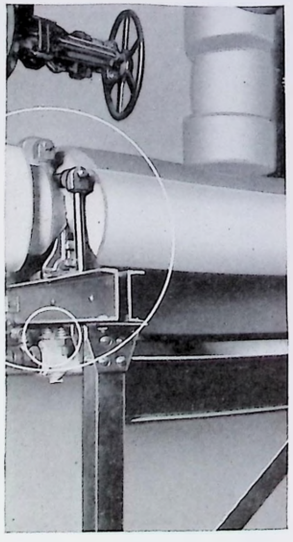
Spacing of Pipe Supports....pages 578 and 579
Excerpts from Code for Pressure Piping....page 580

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Hangers and Supports



Illustrating a support for a vertical line by means of a base elbow



Illustrating the application of Crane No. 2846 Adjustable Support with roll binder

Notice the springs on the roll binder posts as indicated by the small circle.

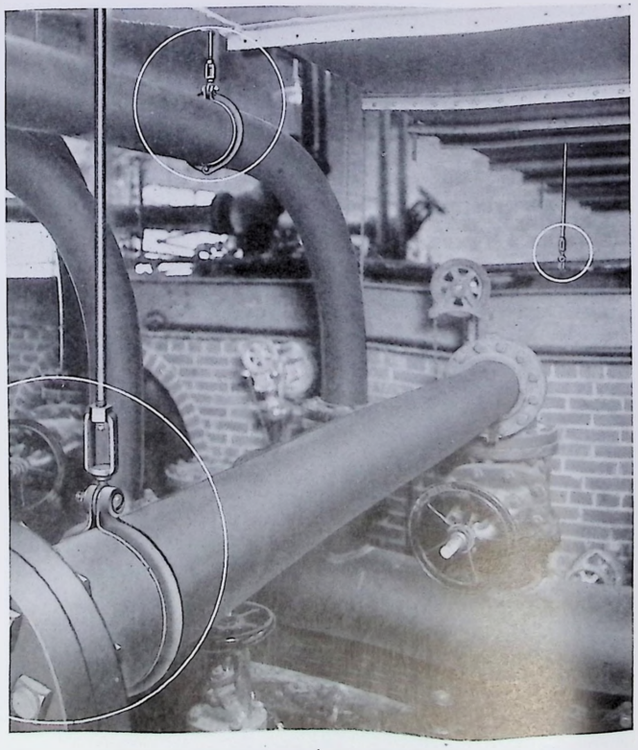
The following pages present a line of Hangers and Supports selected after careful study of the requirements of industry.

Application: The wide variety of sizes and types for various uses, as illustrated, meets most of the requirements of general piping work, for both simple and complex installations. The assortment ranges from the light strap type hanger to the heavy adjustable, sectional, and roller types. Brackets are similarly listed.

Dimensions: The principal over-all dimensions have been included for convenience in determining space requirements and types of hangers or supports best adapted to the installation.

Adjustment: Realizing the importance of proper alignment and pitch in pipe lines, also the necessity of providing for the free movement of piping, not only are hangers and supports which are readily adjustable included, but also others which are designed to permit movement.

Special Hangers or Supports: Crane Co. is prepared to furnish hangers or supports for the specialized needs of unusual construction. Inquiries or orders for such special equipment should be accompanied by a sketch or specification outlining all details.



Illustrating the application of No. 2714 Sectional Ring Hangers with Adjusters

Hangers and Supports

Standard Ring and Bolt Hangers



No. 2700

These hangers are made of good quality soft steel.

Application: These hangers are used with No. 2747 Steel Perforated Extension Bar, also No. 2753 and No. 2754 Malleable Iron Sockets with pipe or rod extensions shown on page 558.

List Prices and Dimensions

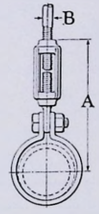
Size of Pipe Inches	List Prices Each	Size of Stock Width Inches	Size of Stock Thickness	Size of Bolt Inches	Size of No. 2747 Extension Bar to Use Number
½	.08	¾	16 ga.	¼	10
¾	.08				
1	.09				
1¼	.10	⅞	14 ga.	¼	11
1½	.12				
2	.14				
2½	.16	1	12 ga.	5/16	13
3	.18				
3½	.20	1⅛	12 ga.	5/16	14
4	.25				
5	.35	1¼	12 ga.	5/16	15 or 16
6	.40				
8	.88	1¼	3/16″	⅜	16 or 17
10	1.35				
12	1.85				

The list prices include a bolt and nut.

Hangers with Turnbuckle Adjusters, Government Pattern



List Prices do not include the upper connection rod

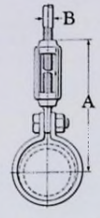


No. 2702

For Pressures not exceeding 15 pounds



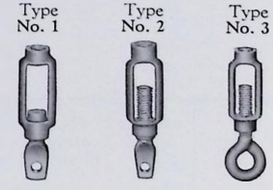
List Prices do not include the upper connection rod.



No. 2703

For Pressures over 15 pounds

Types of Turnbuckle Adjusters Used



No. 2702 and No. 2703 Hangers are furnished with Turnbuckle Adjusters of the type as listed in the table below. The three types of Turnbuckle Adjusters used are illustrated at the right.

List Prices and Dimensions

Size of Pipe Inches	No. 2702 List Prices Each	No. 2703 List Prices Each	No. 2702 Adjuster used Number	No. 2702 Size of stock Width Inches	No. 2702 Size of stock Thickness Inches	No. 2702 A Inches	No. 2702 B Size of rod Inches	No. 2703 Adjuster used Number	No. 2703 Size of stock Width Inches	No. 2703 Size of stock Thickness Inches	No. 2703 A Inches	No. 2703 B Size of rod Inches
½	.28	.28	1	¾	⅛	5½	⅜	1	1	⅛	5½	⅜
¾	.29	.29	1	¾	⅛	5½	⅜	1	1	⅛	5½	⅜
1	.31	.31	1	¾	⅛	5¾	⅜	1	1	⅛	5¾	⅜
1¼	.32	.32	1	1	⅛	6¼	⅜	1	1	⅛	6¼	⅜
1½	.32	.35	1	1	⅛	6½	⅜	1	1¼	3/16	6½	⅜
2	.32	.38	1	1	⅛	6½	⅜	1	1¼	3/16	6½	⅜
2½	.32	.47	1	1	⅛	6¾	⅜	1	1¼	¼	6¾	½
3	.35	.48	1	1¼	⅛	7¼	½	1	1¼	¼	7¼	½
3½	.36	.54	1	1¼	⅛	7⅜	½	1	1¼	¼	7⅜	½
4	.37	1.30	1	1¼	⅛	8	½	2	1¼	5/16	8⅛	⅝
5	.38	1.55	1	1¼	⅛	8⅜	½	2	1½	5/16	8½	⅝
6	.54	1.80	2	1¼	3/16	10	⅝	3	2	5/16	10⅛	¾
8	.60	2.35	2	1¼	3/16	11⅜	⅝	3	2	⅜	11½	⅞
10	1.30	2.90	3	1½	¼	14⅜	¾	3	2	½	14½	1
12	1.40	3.15	3	1½	¼	16⅜	¾	3	2	½	16½	1

Order by size and figure number.

Turnbuckle Adjusters: Type No. 1 Turnbuckles swivel on the adjusters. Type No. 2 and No. 3 have left-hand threads on the adjusters. All three types have right-hand threads in the turnbuckles for the top connection rod.

All dimensions are subject to a slight variation and change without notice.

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Hangers and Supports

Solid Ring and Sectional Ring Hangers

Cast Iron



No. 2706
Solid Ring
Hanger with
Plate and Button



No. 2707
Solid Ring
Hanger

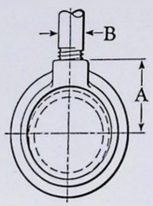
For Ceiling Plates and Buttons only, see No. 2745 on page 557.



No. 2709
Sectional
Ring Hanger



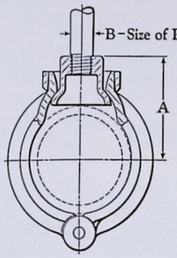
No. 2708
Sectional Ring
Hanger with
Plate and Button



No. 2707
Solid Ring
Hanger

For dimensions of No. 2745 Ceiling Plates, see page 557.

Galvanized Hangers can be furnished. Prices are on application.



No. 2709
Sectional
Ring Hanger

List Prices and Dimensions

Size of Pipe Inches	No. 2707 Hanger Rings Only Each	*No. 2706 Hanger Rings complete with Plate and Button Each	No. 2709 Hanger Rings Only Each	*No. 2708 Hanger Rings complete with Plate and Button Each	No. 2707 A Center to top Inches	No. 2707 B Size of pipe tapping Inches	No. 2709 A Center to top Inches	No. 2709 B Size of pipe tapping Inches
½	.16	.31			1	¼		
¾	.16	.31	.37	.52	1 3/16	⅜	1 3/8	⅛
1	.18	.33	.39	.54	1 5/16	⅜	1 ½	⅛
1¼	.20	.35	.42	.57	1 ½	⅜	1 7/8	⅛
1½	.30	.45	.58	.73	1 5/8	⅜	2 1/16	¼
2	.40	.55	.75	.90	1 7/8	⅜	2 5/16	¼
2½	.45	.65	.90	1.05	2¼	½	2 9/16	¼
3	.60	.80	1.10	1.30	2 5/8	½	3 3/16	⅜
3½	.80	1.00	1.40	1.60	2 15/16	½	3 7/16	⅜
4	1.00	1.20	1.70	1.90	3¼	½	3 11/16	⅜
5	1.85	2.05	3.05	3.25	4	¾	4½	¾
6	2.30	2.50	3.85	4.05	4 11/16	¾	5 1/16	¾
8	3.95	4.15	5.90	6.10	5 15/16	¾	6 1/16	¾

Order by pipe size and figure number.

***Prices:** The prices of No. 2706 and No. 2708 Hangers do not include the pipe between the ceiling plate and the ring; such pipe would be at an extra price, and furnished only when specified. If the pipe extension is required, state the distance from the center of the piping to the face of the ceiling plate.

Ceiling Plates: For prices and dimensions of Ceiling Plates with Buttons, see No. 2745 on page 557.

Sectional Hangers: The No. 2708 and No. 2709 Sectional Ring Hangers can be applied after piping is in place.

Construction: The sectional hanger ring is in three pieces. The threaded swivel is flared so that it cannot be separated from the hinged hanger. A snug fitting malleable iron ring slips over the hinged halves of the hanger ring and holds the assembly in position.

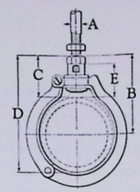
All dimensions are subject to a slight variation and change without notice.

Hangers and Supports

Adjustable Swivel Hangers

Malleable Iron





Hanger Rod and Lock Nut are not included in prices of No. 2712 Hangers.

No. 2712

List Prices and Dimensions

Size of Pipe Inches	List Prices Each	A Size of bolt thread Inches	B Inches	C Inches	D Inches	E Adjustment Inches
¾	.18	⅜ or ½	2½	1 5/16	3	1 7/8
1	.20	⅜ or ½	2 11/16	2	3 3/8	1 3/4
1¼	.21	⅜ or ½	2 13/16	2	3 5/8	1 11/16
1½	.22	⅜ or ½	2 15/16	2	3 7/8	1 11/16
2	.24	⅜ or ½	3 5/16	2 1/8	4½	1 13/16
2½	.34	½	4 1/8	2¾	5 9/16	1 7/8
3	.42	½	4 7/16	2¾	6 3/16	2
3½	.44	½	4 5/8	2¾	6 5/8	2 1/8
4	.56	½ or ⅝	4 15/16	2¾	7 3/16	2 7/8
5	.70	⅝	6½	3¾	9 5/16	2 15/16
6	1.08	⅝ or ¾	7	3¾	10 3/8	3½

Order by size and figure number, also specify the size of bolt thread wanted.

The No. 2712 Hanger assures quick and easy alignment of piping.

Adjustment: The swivel nut can be turned to raise or lower the pipe without raising or removing the pipe from the hanger.

Special feature: The arm hinge is off-center, which provides sufficient seating surface to support the pipe, and eliminates the necessity of a temporary hanger.

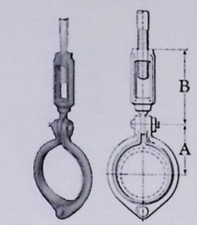
Lock nut: When excessive vibration is encountered, a lock nut can be added to the rod above the swivel which will maintain the vertical adjustment.

Sectional Ring Hangers

with Adjusters

Malleable Iron

Orders must specify whether bolt or pipe thread tapping is required.



No. 2714

No. 2714 Hangers can be furnished with other size tappings as listed for No. 2708 Adjusters. There is no extra charge, provided the tapping is listed in the schedule covering No. 2768 Adjusters.

For other sizes of Adjusters, see No. 2768 on page 560.

List Prices and Dimensions

Size of Pipe Inches	List Prices per 100 Pieces	Size of pipe tapping Inches	Size of bolt tapping Inches	A Inches	B Inches	Size of Adjuster used Number
⅜	48.80	⅛	⅜	29/32	3⅜	1
½	48.80	⅛	⅜	⅞	3⅜	1
¾	50.00	⅛	⅜	1	3⅜	1
1	52.00	⅛	⅜	1⅛	3⅜	1
1¼	55.00	¼	½	1½	3⅜	1
1½	57.60	¼	½	1 11/16	3⅜	1
2	60.00	¼	½	2 5/16	3⅜	1
2½	67.40	¼	½	2 7/16	3⅜	1
3	74.40	¼	½	3	3⅜	1
3½	110.00	⅜	⅝	3⅜	4⅛	2
4	115.80	⅜	⅝	3½	4⅛	2
5	139.00	½	¾	4	4⅛	2
6	161.00	½	¾	4 11/16	4⅛	2
8	245.00	¾	⅞	7 1/16	5⅜	3
10	365.00	¾	⅞	8⅞	5⅜	3

The No. 2714 Hanger permits alignment of piping without raising or removing the pipe.

Adjustment: The turnbuckle swivels on the swivel socket of the adjuster, and vertical adjustment is thus obtained on the long thread which should be cut on the rod. For amount of adjustment, see No. 2768 Adjusters.

Lock nut: A lock nut can be added to the rod above the adjuster to lock and maintain the vertical adjustment. The list prices do not include lock nuts.

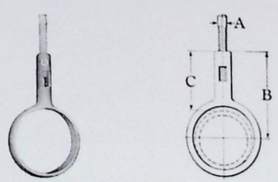
Adjustable Solid Ring Hangers, Underwriters' Approved

List Prices and Dimensions

Size of Pipe Inches	List Prices per 100 Pieces	A Size of rod Inches	B End to center Inches	C Amount of adjustment Inches
¾	10.00	⅜	2¾	2 5/16
1	11.80	⅜	2⅞	2 5/16
1¼	12.60	⅜	3 1/16	2 5/16
1½	14.00	⅜	3 3/16	2 5/16
2	20.60	⅜	3 7/16	2 5/16
2½	34.00	½	3 13/16	2½
3	42.00	½	4⅛	2½
3½	52.00	½	4⅜	2½
4	62.00	⅝	4¾	2⅝
5	74.00	⅝	5 5/16	2⅝
6	88.00	¾	6	2 13/16

Order by size and figure number.

Malleable Iron



No. 2720

Application: The No. 2720 Hanger Ring is used with No. 2757 Ceiling Base and square head rod, or with No. 2764 Ceiling Flange and threaded rod.

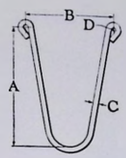
All dimensions are subject to a slight variation and change without notice.

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Hangers and Supports

U-Hangers with Turned Eyes





Underwriters' Approved

No. 2722

Sizes 2½ to 8-inch can be furnished; prices are on application.

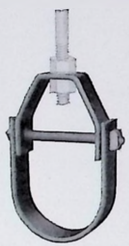
List Prices and Dimensions

Size of Pipe Inches	A Length of drop Inches	List Prices per 100 pieces	B Spread Inches	C Size of iron Inches	D Size of eyes Inches
¾	6	8.20	3 15/16	5/16	5/16
	8	9.50	4½		
	10	11.20	5 1/16		
	12	12.60	5⅝		
1	6	8.20	4 3/16	5/16	5/16
	8	9.50	4¾		
	10	11.20	5 5/16		
	12	12.60	5⅞		
1¼	6	8.20	4½	5/16	5/16
	8	9.50	5 1/16		
	10	11.20	5⅝		
	12	12.60	6 3/16		
	14	14.00	6¾		
1½	6	8.20	4 13/16	5/16	5/16
	8	9.50	5⅜		
	10	11.20	5 15/16		
	12	12.60	6½		
	14	14.00	7 1/16		
2	8	9.50	5⅞	5/16	5/16
	10	11.20	6 7/16		
	12	12.60	7		
	14	14.00	7 9/16		
	16	15.50	8⅛		

Order by size and length of drop.

Clevis Hangers

Steel

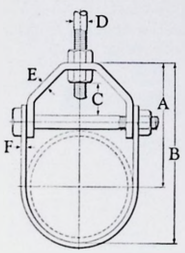


No. 2725

No. 2725, List Prices and Dimensions

Size of Pipe Inches	List Prices Each	A Inches	B Inches	C Inches	D Inches	E Size of stock Width Inches	E Size of stock Thickness Inches	F Size of stock Width Inches	F Size of stock Thickness Inches
¾	.22	3¼	3 13/16	1½	⅜	1¼	3/16	1¼	3/16
1	.24	3⅜	4 1/16	1½	⅜	1¼	3/16	1¼	3/16
1¼	.26	3⅝	4 7/16	1½	⅜	1¼	3/16	1¼	3/16
1½	.29	3 13/16	4¾	1½	⅜	1¼	3/16	1¼	3/16
2	.33	4	5 3/16	1½	⅜	1¼	3/16	1¼	3/16
2½	.40	4⅝	6 1/16	1¾	½	1¼	3/16	1¼	3/16
3	.48	4 15/16	6 11/16	1¾	½	1¼	3/16	1¼	3/16
3½	.60	5¼	7¼	1¾	½	1½	¼	1½	¼
4	.70	5¾	8	1¾	⅝	1½	¼	1½	¼
5	.90	6 9/16	9⅜	2	⅝	1½	¼	1½	¼
6	1.00	7 5/16	10⅝	2	¾	1½	⅜	1½	¼
8	1.20	8 9/16	12⅞	2	⅞	1½	⅜	1½	⅜
10	3.75	10¼	15⅝	2⅛	⅞	2	⅜	2	⅜
12	5.00	11⅝	18	2⅜	⅞	2	½	2	⅜
14 OD	6.30	13	20	2⅝	1	2	½	2	⅜
16 OD	8.80	14⅝	22⅝	3¼	1	2	½	2	⅜

Order by size and figure number.



List prices: The list prices do not include hanger rods or hanger rod nuts, which must be ordered separately if wanted.

Application: The No. 2725 Clevis Hangers are made of heavy bar steel stock and are suitable for general piping work. These hangers can be applied after the pipe is in position.

Adjustment: These hangers provide for vertical adjustment with the pipe and the hanger in position. A temporary support is not needed while the adjustment is being made.

Lock nut: The top nut locks the hanger assembly when the required adjustment has been obtained, and prevents loosening due to vibration.

Pipe spacer on large sizes: A pipe spacer is furnished on the bolt connecting the two sections of the hanger, in sizes 10-inch and larger.

All dimensions are subject to a slight variation and change without notice.

Hangers and Supports

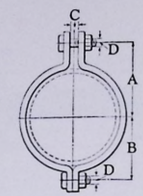
Sectional Pipe Hangers

Steel



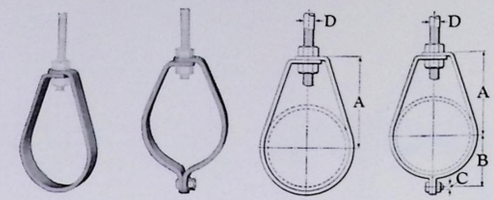
No. 2727
Standard Heavy

No. 2728
Extra Heavy



Heavy Adjustable Hangers

Steel



No. 2730 Solid Hanger — No. 2731 Sectional Hanger — No. 2730 — No. 2731

List Prices

Size of Pipe	Inches	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14 OD	16 OD	18 OD	20 OD	24 OD
No. 2727	Each					.24	.34	.42	.44	.50	.70	1.08	1.92							
No. 2728	Each					.30	.35	.40	.45	.50	.75	.75	1.25	1.60	2.00	2.50	2.80	4.40	7.00	10.00
No. 2730	Each	.16	.16	.16	.16	.16	.20	.25	.40	.50	.60	.80	1.30							
No. 2731	Each					.24	.34	.42	.44	.56	.70	1.08	1.92							

Order by size and figure number.

Sectional Pipe Hangers

Application: The No. 2727 and No. 2728 Sectional Pipe Hangers are of strong steel construction, and are suitable for general piping work. The No. 2728 is used when a very heavy hanger is required.

These hangers can be applied after the pipe is in position.

Adjustment: These hangers can be used with No. 2799 Eye Rods, No. 2754 Malleable Sockets, or No. 2768 Hanger Adjusters. Any adjustment must be taken care of in the rod or the adjuster used.

Heavy Adjustable Hangers

List Prices: The list prices of No. 2730 and No. 2731 Hangers do not include hanger rod or hanger rod nuts, which must be ordered separately if wanted.

Application: The No. 2730 and No. 2731 Heavy Adjustable Hangers are made of heavy bar steel, and are suitable for general piping work.

Adjustment: These hangers provide approximately 1½ inches of vertical adjustment with the pipe and the hanger in position. A temporary support of the pipe is not needed while the adjustment is being made.

Lock nut: The use of an additional nut at the top locks the hanger when the required adjustment has been obtained, and prevents loosening due to vibration.

Other sizes: Larger sizes can be made up special. Prices are on application.

Special feature: The No. 2731, in addition to the advantages outlined above, has the additional feature of being a sectional hanger which can be applied after the pipe is in position.

Dimensions, in Inches

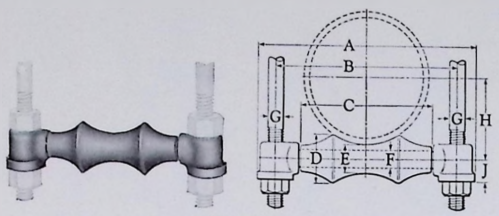
Size of Pipe	No. 2727 and No. 2728 A	B	C	No. 2727 Size of stock Width	Thickness	D	No. 2728 Size of stock Width	Thickness	D	No. 2730 and No. 2731 Size of stock Width	Thickness	A	D	No. 2731 B	C
¾										1¼	3/16	3	½		
1										1¼	3/16	3	½		
1¼										1¼	3/16	3	½		
1½										1¼	3/16	3	½		
2	2¾	2¼	½	1¼	3/16	⅜	1¼	¼	⅜	1¼	3/16	3¾	½	2	⅜
2½	2⅞	2⅝	½	1¼	3/16	⅜	1¼	¼	⅜	1¼	3/16	4	½	2 7/16	⅜
3	3¼	3	⅝	1¼	3/16	⅜	1¼	¼	½	1¼	3/16	4¼	½	2¾	⅜
3½	3½	3¼	⅝	1¼	¼	⅜	1½	⅜	½	1¼	¼	4¼	½	3	⅜
4	4	3½	⅝	1¼	¼	⅜	1½	⅜	½	1¼	¼	4⅞	⅝	3¼	⅜
5	4⅝	4⅛	⅝	1½	¼	½	1½	⅜	½	1½	¼	5⅛	⅝	3⅞	⅜
6	5 1/16	4¾	⅝	1½	¼	½	1½	⅜	½	1½	¼	7	¾	4 5/16	⅜
8	6 5/16	5¾	1	1½	⅜	⅝	2	½	¾	1½	⅜	7⅞	⅞	5 5/16	½
10	7⅜	6⅞	1				2	½	¾						
12	8⅝	8	1				2	½	¾						
14 OD	9½	8⅞	1				2	½	¾						
16 OD	10⅝	10	1				2	½	¾						
18 OD	11¾	11	1¼				2½	½	⅞						
20 OD	13	12¼	1⅜				3	⅝	1						
24 OD	15¼	14⅞	1½				3	⅝	1⅛						

All dimensions are subject to a slight variation and change without notice.

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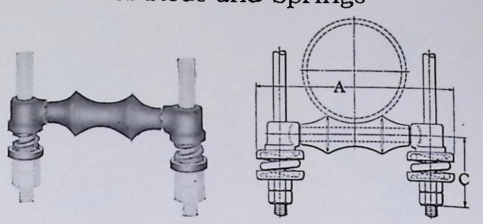
Hangers and Supports

Cast Iron Rollers with Lugs for Rods



No. 2733

Cast Iron Rollers with Lugs for Rods and Springs



No. 2734

List Prices

Size of Pipe		Inches	1	1¼	1½	2	2½	3	3½	4	5	6
No. 2733	Hangers Complete	Each	.68	.70	.72	.76	.78	.80	.82	.84	.96	1.32
	Pipe Rolls Only	Each	.09	.10	.13	.16	.17	.18	.24	.28	.35	.45
	Adjustable Lugs Only	Each	.25	.25	.25	.25	.27	.27	.27	.27	.27	.34
*No. 2734	Hangers Complete	Each	1.80	1.82	1.84	1.88	2.60	2.62	2.64	3.30	3.42	4.60

Size of Pipe		Inches	8	10	12	14 OD	16 OD	18 OD	20 OD	24 OD	30 OD
No. 2733	Hangers Complete	Each	1.80	2.60	4.00	7.00	8.25	11.60	14.00	22.00	33.00
	Pipe Rolls Only	Each	.64	1.20	1.60	4.00	5.20	7.50	9.00	15.00	21.00
	Adjustable Lugs Only	Each	.48	.48	.56	.64	.68	.90	1.15	1.60	2.15
*No. 2734	Hangers Complete	Each	6.70	7.50	8.90	15.35	16.60	20.25	24.00	33.00	

*List Prices of No. 2734 Hangers Complete include roller, rod for roller, adjustable lugs, springs, and spring cups.
Order Complete Hangers or Rolls Only by pipe size and figure number; Adjustable Lugs only by size and figure number.

List prices: The list prices do not include the hanger rods or hanger rod nuts, which must be ordered separately if wanted.

The No. 2733 and No. 2734 Hangers are alike, except that the No. 2734 are equipped with springs below the lugs.

Adjustment and locking: The adjustable lugs are cored for the hanger rods and allow vertical adjustment of the roller, while the pipe is in position, by means of the thread and the nuts on the rods.

The No. 2733 Hangers have adjustable lugs with a hexagonal recess at the bottom into which the nut at the bottom of the rod fits, thus preventing the turning or loosening of the nut from vibration.

The No. 2734 Hangers use two nuts at the bottom, the second nut being used to lock the assembly after proper vertical adjustment has been secured.

Spring Hangers: The No. 2734 Hanger is recommended for pipe lines when vibration is present, or when automatic adjustment for slight movement is necessary. The springs are held in position by cups.

Dimensions

Size of Pipe	Adjustable Lugs	No. 2733 A	B	C	D	E	F	G	H	J	*No. 2734 A	C Maximum
Inches	Number	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches
1	1	4⅛	3	1½	1	¾	⅜	⅜	1 1/16	9/16	4 3/16	2 13/16
1¼	1	4½	3⅜	1⅞	1 1/16	¾	⅜	⅜	1¼	9/16	4 9/16	2 13/16
1½	1	4¾	3⅝	2⅛	1⅛	¾	⅜	⅜	1⅜	9/16	4 13/16	2 13/16
2	1	5¼	4⅛	2⅝	1 3/16	¾	⅜	⅜	1⅝	9/16	5 5/16	2 13/16
2½	2	6¼	4⅞	3⅛	1⅜	⅞	½	½	1 15/16	11/16	6 11/16	3¼
3	2	6⅞	5½	3¾	1 7/16	⅞	½	½	2¼	11/16	7 5/16	3¼
3½	2	7½	6⅛	4¼	1⅝	1	½	½	2 9/16	¾	7 15/16	3 5/16
4	3	8¼	6¾	4¾	1¾	1	½	⅝	2 13/16	¾	9¼	3 9/16
5	3	9 11/16	8 1/16	5 13/16	2	1⅛	⅝	⅝	3 7/16	⅞	10 9/16	3 11/16
6	4	11 7/16	9 9/16	6⅞	2 5/16	1¼	¾	¾	4	1	12¼	4½
8	5	14 1/16	11 15/16	8⅞	2 13/16	1½	⅞	⅞	5⅛	1⅛	14¾	5 3/16
10	5	16 3/16	14 1/16	11	3⅜	1¾	⅞	⅞	6⅜	1⅛	16⅞	5 3/16
12	5	18 7/16	16 5/16	13	3⅞	2	1	⅞	7 7/16	1¼	19⅛	5 5/16
14 OD	6	20⅛	17¾	14¼	4⅝	2½	1⅛	1	8⅜	1⅜	21	6⅝
16 OD	6	22⅛	19¾	16¼	5	2⅝	1¼	1	9 7/16	1½	23	6¾
18 OD	7	24½	21⅞	18¼	5 7/16	2¾	1¼	1⅛	10½	1½	25¼	7⅛
20 OD	8	27¼	24¼	20¼	6	3	1⅜	1¼	11⅝	1⅝	27⅜	8⅝
24 OD	9	32⅛	28⅝	24¼	7 3/16	3⅝	1½	1½	14	1¾	32¾	8¼
30 OD	10	39⅞	35½	30¼	8 15/16	4½	1⅞	1⅞	17 7/16	2⅛		

*Dimensions not shown for No. 2734 are the same as No. 2733 Hangers.

If Pipe Covering Saddles are installed, larger size hangers must be used. See page 574.

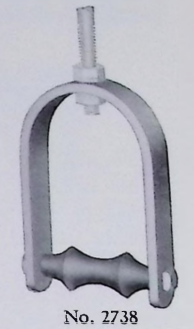
Spacing of Pipe Supports....pages 578 and 579

All dimensions are subject to a slight variation and change without notice.

Hangers and Supports

Adjustable Steel Pipe Hangers with Cast Iron Rollers

No. 2738



No. 2738

List Prices and Dimensions

Size of Pipe Inches	List Prices Each	Size of stock Width Inches	Size of stock Thickness Inches	A Inches	B Inches	C Inches	D Inches	E Inches	F Inches
2½	1.00	1½	¼	5 9/16	3 11/16	1⅞	2	5	½
3	1.25	1½	¼	6 3/16	4	2 3/16	2	5½	½
3½	1.50	1½	¼	6¾	4¼	2½	2	6	½
4	1.75	2	⅜	7⅜	4⅝	2¾	2	6¾	⅝
5	2.50	2	⅜	8½	5 5/32	3 11/32	2	8¼	⅝
6	2.75	2	⅜	9⅝	5 11/16	3 15/16	2	9⅝	¾
8	4.25	2	½	11⅞	6 13/16	5 1/16	2	12¼	⅞
10	7.65	2	½	14⅛	7⅞	6¼	2	14¼	⅞
12	11.15	2	½	16¼	8⅞	7⅜	2	16¼	⅞

Order by size and figure number.

List prices: The list prices of No. 2738 Hangers do not include hanger rods or hanger rod nuts, which must be ordered separately if wanted.

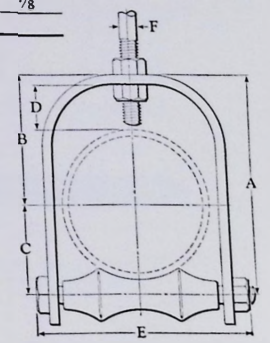
Application: The No. 2738 Hanger is used where a cast iron roller is to be hung with one rod. For cast iron rollers with two rods, see No. 2733 on page 556.

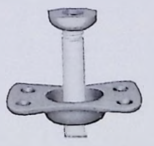
This hanger is made of heavy steel bar stock, and is used for general piping work.

Adjustment: These hangers provide vertical adjustment with the pipe and the hanger in position. A long thread should be cut on the rod for the adjustment.

Lock nut: The use of a nut at the top locks the hanger assembly after the required adjustment has been obtained, and prevents loosening due to vibration.

Other sizes: Sizes larger than 12-inch can be furnished on special orders. Prices are on application.

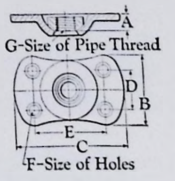




Ceiling Plates and Buttons

Cast Iron

No. 2745



List Prices and Dimensions

Size Number	List Prices Each	A Inches	B Inches	C Inches	D Inches	E Inches	F Inches	G Inches	Use with Hangers as follows: No. 2707 Solid Ring Hangers Size in Inches	Use with Hangers as follows: No. 2709 Sectional Ring Hangers Size in Inches
1	.15	½	2 1/16	3⅜	1 3/16	2 3/16	5/16	⅛		¾ to 1¼
								¼	½	1½ to 2½
								⅜	¾ to 2	
2	.20	¾	2⅝	4	1½	2 11/16	⅜	⅜		3 to 4
								½	2½ to 4	
3	.20	¾	3	4⅝	1 29/32	3⅛	⅜	¾	5, 6, and 8	5, 6, and 8

Order by figure and size number, also specify the size of tapping.

List prices: The list prices cover the button and the plate only; no pipe is included.

Application: For the application of these Ceiling Plates and Buttons, see No. 2706 and No. 2708 Hangers on page 552. These Ceiling Plates and Buttons also can be used with any other hangers having pipe threads.

Swivel Buttons: The buttons swivel in the plates.

All dimensions are subject to a slight variation and change without notice.

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Hangers and Supports

Steel Perforated Extension Bar



No. 2747

Galvanized Extension Bar can be furnished; prices are on application.

No. **2747** Steel Perforated Extension Bar is made of a good quality soft steel. It can be cut easily with a cold chisel.

Application: This Extension Bar is used with No. 2700 Standard Ring and Bolt Hangers, No. 2749 Flattened End Lag Screws, or No. 2787 Steel I-Beam Clamps.

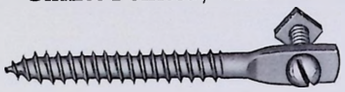
List Prices and Dimensions

Size Number		10	11	13	14	15	16	17
List Prices	Per Foot	.08	.09	.11	.12	.20	.28	.40
Size of pipe to be supported	Inches	½ to 1	1¼ to 2	2½ & 3	3½ & 4	5 & 6	8 to 12	8 to 12
Width	Inches	¾	⅞	1	1⅛	1¼	1¼	1¼
Thickness		16 ga.	16 ga.	12 ga.	12 ga.	12 ga.	3/16"	¼"
Length	Feet	5 & 10	5 & 10	5 & 10	5 & 10	5 & 10	8	8
Center to center of holes	Inches	⅝	⅝	⅝	⅝	¾	1	1
Diameter of holes	Inches	9/32	9/32	11/32	11/32	5/16	⅜	½

Order by figure and size number; also specify the length, when two lengths are listed.

Flattened Lag Screws

Gimlet Pointed, with Bolt



No. 2749

List Prices and Dimensions

Size Number	List Prices per 100 pieces	Diameter Inches	Length Inches	Size of bolt Inches	Use for pipe sizes Inches
1	6.60	5/16	3	¼	½ to 1½
2	7.00	⅜	4	¼	2 to 3
3	10.00	½	5	5/16	3½ to 6
4	15.00	⅝	5½	⅜	8
5	28.00	¾	6	½	8 to 12

Order by figure and size number.

List prices: The list prices include the lag screw and bolt.

Application: No. 2749 Lag Screws can be used with No. 2700 Ring and Bolt Hanger and with No. 2747 Perforated Extension Bar.

Threaded Lag Screws

Gimlet Pointed, Pipe Thread



No. 2750

List Prices and Dimensions

Size Number	List Prices per 100 pieces	Diameter Inches	Length Inches	Size of pipe thread Inches
1	6.60	⅜	3½	⅛
2	7.80	½	4	¼
3	9.80	⅝	5	⅜
4	10.00	⅝	5	½

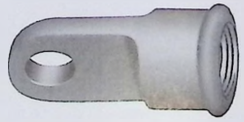
Order by figure and size number.

Application: No. 2750 Lag Screws can be used with No. 2753 Malleable Sockets, or with any hanger having pipe thread for extension.

Bolt thread: Lag Screws can be furnished with bolt thread. Prices are on application.

Malleable Iron Sockets

No. **2753**, Pipe Thread
No. **2754**, Bolt Thread



No. 2753
No. 2754

List Prices and Dimensions

Size Number	No. 2753, Pipe Thread: List Prices per 100 pieces	Size of pipe thread Inches	Size of bolt eye Inches	Center of bolt hole to end Inches	No. 2754, Bolt Thread: List Prices per 100 pieces	Size of bolt thread Inches	Size of bolt eye Inches	Center of bolt hole to end Inches
1	6.60	⅛	¼	19/32	6.60	⅜	¼	19/32
2	7.20	¼	5/16	1 13/32	7.00	7/16	5/16	15/16
3	8.60	⅜	⅜	1 19/32	7.20	½	5/16	15/16
4	13.00	½	½	1¾	8.60	⅝	⅜	1⅞
5	18.00	¾	⅝	1 15/16	13.00	¾	½	1 23/32

Order by figure and size number.

Application: These Malleable Iron Sockets can be used with any hanger having a bolt at the top, such as No. 2700 Ring and Bolt, No. 2714 Sectional Hanger, etc.

All dimensions are subject to a slight variation and change without notice.

Hangers and Supports

Ceiling Terminal or Base

Malleable Iron

Underwriters' Approved



No. 2757

List Prices

No. 2757	Per 100 pieces	21.60

Application: The No. 2757 Ceiling Terminal is made for use with ⅜-inch square head hanger rods. It is used with the No. 2720 Malleable Iron Solid Ring Underwriters' Pattern Hanger shown on page 553.

Larger sizes: Ceiling Terminals for rod sizes larger than ⅜-inch can be furnished. Prices are on application.

Toggle Bolts and Sleeves

For use on hollow tile ceilings. The sleeve is adjustable on the bolt.



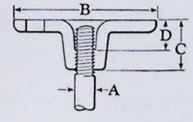
No. 2762

List Prices and Dimensions

Size of bolt and sleeve thread	Inches	⅜	½	⅝	¾
*List Prices	per 100 pieces	48.00	56.00	68.00	84.00

*The list prices include the toggle bolt and the sleeve.
Order by figure number and thread size.

Round Ceiling Flanges for Rod Extension



Cast Iron

Underwriters' Approved



No. 2764

List Prices and Dimensions

Size Number	List Prices per 100 Pieces	Pipe Size Inches	A Size of bolt thread Inches	B Inches	C Inches	D Inches
1	18.20	¾ to 2	⅜	2⅞	1⅜	⅞
2	34.20	2½ to 3½	½	4	1½	15/16
3	68.40	4 and 5	⅝	4¾	1⅝	1
4	82.00	6	¾	5¼	1⅞	1 1/16
5	136.80	8 to 12	⅞	6	2⅛	1⅛

Order by figure and size number.

All dimensions are subject to a slight variation and change without notice.

Ceiling Flanges, Swing Type

Pressed Steel

Underwriters' Approved

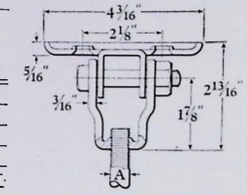
No. 2760



List Prices and Dimensions

Size Number	List Prices Each	A Size of rod Inches
1	.35	⅜
2	.35	½
3	.55	⅝
4	.55	¾

Order by size and figure number.



Application: No. 2700 Swing Type Ceiling Flanges provide a means for hanging pipe when a swing through a radius of 180 degrees or less is required.

Adjustment: An adjustment of 1⅜ inches can be obtained through the use of a long thread on the rod.

Screw holes: Four No. 14 or No. 16 diameter wood screws should be used to fasten the flange.

Rod Couplings

Malleable Iron



No. 2766

List Prices and Dimensions

Size Number	List Prices Each	Size of bolt thread Inches	Length end to end Inches
1	.10	⅜	1 15/16
2	.12	½	2 7/16
3	.14	⅝	2½
4	.20	¾	2¾
5	.24	⅞	3

Order by figure and size number.

No. 2766 Rod Couplings are regularly furnished with American Standard right hand threads.

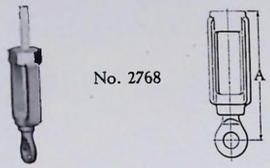
Items on this page can be furnished galvanized. Prices are on application.

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Hangers and Supports

Hanger Adjusters or Turnbuckles

Malleable Iron



No. 2768

List Prices and Dimensions

Size Number	List Prices Each	Size of bolt thread tappings Inches	Size of pipe thread tappings Inches	Amount of adjustment Inches	A Inches
1	.36	¼, ⅜, or ½	⅛ or ¼	1⅝	3⅜
2	.65	½, ⅝, or ¾	⅜ or ½	2	4⅛
3	1.00	⅝, ¾, ⅞, or 1	½ or ¾	2⅝	5⅜

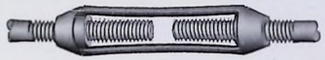
Order by figure and size number.

Orders must specify the size and kind of tapping wanted.

Construction: These Hanger Adjusters are made of Malleable Iron. The eye shanks swivel in the bodies, permitting adjustment on the long thread which should be cut on the rod or pipe.

Drop Forged Turnbuckles

With Right and Left American Standard Threads



No. 2770

List Prices

Size of bolt thread Inches	Opening Inches	List Prices per 100 pieces
⅜	6	45.00
½	6	50.00
⅝	6	60.00
¾	6	75.00
⅞	6	90.00
1	6	110.00
1⅛	6	140.00
1¼	6	170.00
1⅜	6	210.00
1½	6	250.00

Order by size and figure number.

These Turnbuckles are furnished with or without stub ends; orders should specify which is wanted.

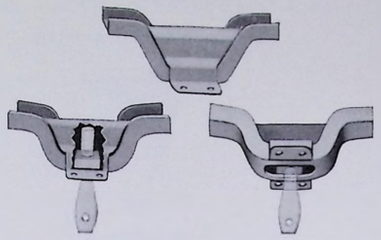
List prices: The list prices shown above apply to Black Turnbuckles with stub ends, and to Turnbuckles without stub ends; different discounts apply.

Lengths: Standard length Turnbuckles have a 6-inch opening, and this length will be shipped unless otherwise specified.

Turnbuckles with longer openings can be furnished. Prices are on application.

Concrete Inserts

Steel



No. 2772 and No. 2773

List Prices

No. 2772

Size of Tapping Inches	Kind of thread	List Prices Each
⅜	Bolt	.15
½	Bolt	.20
⅝	Bolt	.30
¾	Bolt	.40
⅞	Bolt	.60
⅜	Pipe	.40

*No. 2773

Size of Tapping Inches	Kind of thread	List Prices Each
⅜	Bolt	.30
½	Bolt	.30
⅝	Bolt	.30

*List prices include one nut of any of the three sizes of tappings listed.

Orders: Orders must specify the figure number, also the size and kind of tapping wanted.

Construction: No. 2772 and No. 2773 Inserts are made entirely of steel. The covers are welded in place and cannot become loose. Four holes are provided for attachment to form work, and to hold the insert firmly in place.

Adjustment: These Inserts can be adjusted to either side of the center line in the event of slight misalignment.

Vertical adjustment is secured through the nut into the upper cover.

Differences: The No. 2772 Insert is furnished with the nut in place. It must be ordered with the proper size nut before it is placed in position, as the nut cannot be removed.

The No. 2773 Insert is designed to use a ⅜, ½, or ⅝-inch nut, and the nut can be inserted or removed after the insert is in position. This is an advantage when it is impossible to determine the size of nut required at the time the insert is installed.

Extra nuts for the No. 2773 Insert can be furnished at an additional price.

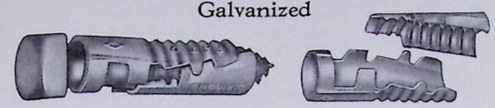
All dimensions are subject to a slight variation and change without notice.

Hangers and Supports

Expansion Shields and Anchors

Expansion Shields for Lag Screws

Galvanized



No. 2777

List Prices and Dimensions

Diameter of Lag Screw with which Shield is used Inches	*List Prices per 100 Pieces	Length of Shield Inches	Outside diameter and drill required Inches	Quantity in standard package Pieces
Long Standard Shields				
¼	15.00	1½	½	100
5/16	18.00	1¾	½	100
⅜	25.00	2¼	⅝	100
½	38.00	3	¾	100
⅝	45.00	3½	⅞	100
¾	65.00	3½	1	50
Short Standard Shields				
¼	15.00	1	½	100
5/16	18.00	1¼	½	100
⅜	25.00	1¾	⅝	100
½	38.00	2	¾	100

*The list prices do not include the lag screws.

Construction: These Lag Screw Shields are made of Galvanized Malleable Iron. They are composed of two halves, one side threaded and the other side unthreaded.

The inclined surfaces between the two halves cause a powerful wedge expansion to occur.

Orders: Orders must state whether Long Standard or Short Standard Shields are wanted.

Lead Screw Anchors



No. 2779

List Prices and Dimensions

Size of Screw Number	*List Prices per 100 Pieces	Length of Shield Inches	Size of drill Inches	Quantity in standard package Pieces
6 to 8	5.00	¾	¼	100
6 to 8	5.60	1½	¼	100
10 to 14	5.60	¾	5/16	100
10 to 14	5.60	1	5/16	100
10 to 14	8.00	1½	5/16	100
16 to 18	6.25	1	⅜	100
16 to 18	9.00	1½	⅜	100
20 to 24	10.00	1¾	7/16	100

*The list prices do not include the screws.

Construction: These Lead Screw Anchors permit the use of several diameters of wood screws in one anchor.

Orders: Orders must specify the size and length wanted.

Expansion Shields for Machine Bolts

Galvanized Underwriters' Approved



No. 2778

List Prices and Dimensions

Diameter of bolt with which Shield is used Inches	*List Prices per 100 Pieces	Length of Shield Inches	Outside diameter and drill required Inches	Safe working load Pounds	Quantity in standard package Pieces
Long Standard Shields					
¼	15.00	1¼	½	200	100
**¼	15.00	2½	½	200	100
5/16	18.00	2	⅝	300	100
⅜	25.00	2	⅝	450	100
7/16	32.00	2½	⅞	1000	50
½	38.00	2½	⅞	1000	50
⅝	45.00	3	1	1500	25
¾	65.00	3½	1⅛	2000	25
Short Standard Shields					
5/16	18.00	1½	⅝	200	100
⅜	25.00	1½	⅝	300	100
½	38.00	2	⅞	700	50
⅝	45.00	2½	1	1000	50

*The list prices do not include the machine bolts.
**Extra long ¼-inch is shipped only when specified.

Orders: Orders must state whether Long Standard or Short Standard Shields are wanted.

Lead Calking Anchors for Machine Screws



No. 2780

List Prices and Dimensions

Diameter of Bolt or Screw	*List Prices per 100 Pieces	Diameter of hole Inches	Depth of hole Inches	Suggested safe load Pounds	Quantity in standard package Pieces
No. 6-32	3.80	¼	⅜	80	100
No. 8-32	4.50	5/16	½	90	100
No. 10-24	4.95	⅜	⅝	175	100
No. 12-24	6.50	7/16	¾	320	50
¼"-20	7.20	½	⅞	400	50
5/16"	9.75	⅝	1	480	50
⅜"	12.00	¾	1¼	720	50
7/16"	15.00	⅞	1½	950	50
½"	15.00	⅞	1½	1000	50
⅝"	25.00	1⅛	2	1250	50

*The list prices do not include the machine screws.

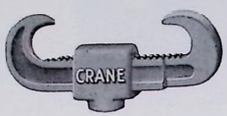
One Calking Tool is included in each box of Anchors, without extra charge.

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Hangers and Supports

Adjustable I-Beam Clamps

Malleable Iron



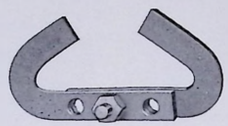
No. 2785

No. 2785, List Prices and Dimensions

Size Number	List Prices Each	Size of pipe supported Inches	Size of hub tapping, pipe thread Inches	Size of hub tapping, bolt thread Inches	Width of beam flange clamp will fit Inches	Safe load Pounds
1	.75	½ to 4	⅛, ¼, ⅜, & ½	⅜, ½, & ⅝	2¾ to 7	1000
2	1.75	5 to 8	¾	¾	3½ to 7½	2000
4	3.75	10 to 14		⅞ & 1	4¼ to 7½	4000
6	6.00	16 to 24		1¼ & 1⅜	4½ to 8½	6000

Order by figure and size number, also specify the size and kind of tapping.

Steel



No. 2787

No. 2787, List Prices and Dimensions

Size Number	List Prices Each	Size of stock Width Inches	Size of stock Thickness Inches	Size of bolt Inches	Width of beam flange clamp will fit Inches	Safe load Pounds
1	.25	½	3/16	¼	2 to 6	300
2	.30	¾	¼	⅜	2 to 6	600
3	.35	¾	⅜	⅜	2 to 6	900
4	.50	1	½	½	2 to 6	1500

Order by figure and size number.

Application: The No. 2787 I-Beam Clamp can be used with No. 2747 Steel Perforated Extension Bar, or hanger rods, using the No. 2754 Malleable Iron Sockets.

Other sizes: These I-Beam Clamps can be made to order for fitting beam flanges wider than 6-inch. Prices are on application.

I-Beam Clamps

Steel



No. 2792

Other sizes: No. 2792 I-Beam Clamps made of heavier stock can be furnished. Prices are on application.

No. 2792, List Prices and Dimensions

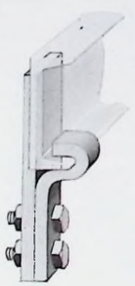
Size Number	List Prices Each	Size flange of I-Beam Inches	Size of stock Width Inches	Size of stock Thickness Inches	Space for rod Inches	Size of bolt Inches	Safe load Pounds
1	.28	2	1¼	¼	½	⅜	1000
	.35	3					
	.38	4					
	.42	5					
	.46	6					
	.50	7					
	.55	8					
2	.70	3	1½	⅜	⅝	½	2000
	.77	4					
	.84	5					
	.91	6					
	.98	7					
	1.05	8					
3	.80	3	2	½	¾	⅝	3000
	.85	4					
	.95	5					
	1.00	6					
	1.10	7					
	1.20	8					
	1.40	9					
	1.50	10					
	1.70	11					
	1.80	12					

Order by size and figure number, also state the size of the beam flange.

All dimensions are subject to a slight variation and change without notice.

Channel and Angle Clamps

Steel



No. 2794

No. 2794 Channel and Angle Clamps are made to order. Prices are on application.

Orders and inquiries should be accompanied by a sketch outlining the requirements.

Hangers and Supports

Hanger Rods



No. 2796, Right Hand Threads
No. 2797, Right and Left Threads
Bolt Thread Each End

No. 2796 and No. 2797 Hanger Rods are regularly furnished with a bolt thread 2½ inches long on each end. Threads longer than 2½ inches can be furnished when specified, at special prices.

Hanger Rods can be furnished with bolt thread on one end only; prices are on application.

No. 2796
List Prices per 100 Pieces

Rod size Inches	Length in Inches 8	10	12	14	18	24	30	36
⅜	17.00	18.00	20.70	22.50	25.60	31.40	37.00	42.40
½	19.80	22.70	26.30	28.70	33.80	40.60	47.00	56.00
⅝	25.00	28.70	32.90	36.40	43.80	56.00	65.60	76.80
¾	30.20	36.00	41.80	48.00	56.00	68.40	80.40	92.50
⅞	47.40	57.60	67.80	77.40	94.00	118.40	142.40	168.00
1	70.00	80.00	90.00	101.00	122.00	153.00	184.00	215.00
1⅛	149.00	161.00	176.00	188.00	214.00	253.00	293.00	332.00
1¼	195.00	210.00	227.00	243.00	275.00	324.00	373.00	421.00
1½	257.00	279.00	303.00	327.00	373.00	443.00	513.00	583.00

For No. 2797 Hanger Rods with right and left hand threads, add 5.00 to the above list prices for No. 2796, in any size and any length.
Order by size, length, and figure number.



No. 2798
Gimlet Pointed with Bolt Thread on Other End

No. 2798
List Prices per 100 Pieces

Rod size Inches	Length in Inches 8	10	12	14	18	24	30	36
⅜	16.00	17.50	20.10	21.90	25.00	30.90	36.50	40.80
½	19.40	22.10	25.70	28.20	33.30	40.00	42.40	54.20
⅝	24.60	29.80	32.30	35.80	43.20	55.40	65.00	74.80
¾	29.70	35.40	41.20	47.20	55.40	68.00	80.00	90.80
⅞	47.20	57.00	66.80	76.20	88.00	118.00	141.80	166.20

Order by size, length, and figure number.

The list prices for No. 2798 cover Hanger Rods with the bolt thread right hand and 2½ inches long, which will be regularly furnished unless otherwise specified. Threads longer than 2½ inches can be furnished when specified, at special prices.

Hanger Rods can be furnished gimlet pointed one end, other end not threaded; prices are on application.



No. 2799
Eye Rods with Bolt Thread

The list prices for No. 2799 cover Eye Rods with the bolt thread right hand and 2½ inches long, which will be regularly furnished unless otherwise specified. Threads longer than 2½ inches can be furnished when specified, at special prices.

No. 2799
List Prices per 100 Pieces

Rod size Inches	*Length in Inches 8	10	12	14	18	24	30	36
⅜	25.00	26.00	27.00	29.00	32.00	36.00	40.00	44.00
½	31.00	33.00	35.00	37.00	42.00	49.00	56.00	63.00
⅝	36.00	40.00	43.00	46.00	53.00	63.00	73.00	83.00
¾	47.00	51.00	56.00	61.00	70.00	84.00	98.00	112.00
⅞	65.00	71.00	77.00	84.00	96.00	115.00	134.00	153.00

*Lengths are from center of eye to end.
Order by size, length, and figure number.

No. 2800
List Prices per 100 Pieces

Rod size Inches	Length in Inches 8	10	12	14	18	24	30	36
⅜	17.20	19.50	22.10	24.40	28.20	33.30	38.30	43.60
½	21.60	24.80	28.10	31.50	36.70	43.80	51.00	58.40
⅝	26.30	30.00	34.30	38.70	45.60	55.40	60.00	75.40
¾	30.40	35.70	40.40	45.50	54.10	66.30	78.40	91.10
⅞	51.70	60.60	70.00	79.20	96.00	123.00	144.60	164.00

Order by size, length, and figure number.

Any of the four styles of Hanger Rods shown above will be furnished in intermediate lengths, other than listed in the tables, using the list price for the next longer length.



No. 2800
Square Head Rods with Bolt Thread

The list prices for No. 2800 cover Square Head Rods with the bolt thread right hand and 2½ inches long, which will be regularly furnished unless otherwise specified. Threads longer than 2½ inches can be furnished when specified, at special prices.

The ⅜-inch size of No. 2800 Hanger Rods can be used with the No. 2757 Ceiling Terminal or Base shown on page 559.

All dimensions are subject to a slight variation and change without notice.

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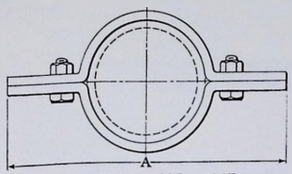
Hangers and Supports

Extension Pipe Clamps for Riser Pipes

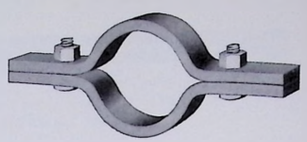
Wrought Steel



No. 2806
Standard



*No. 2806 and No. 2807



No. 2807
Heavy

No. 2806, List Prices and Dimensions

Size of Pipe		Inches	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
List Prices		Each	.50	.50	.55	.55	.60	.60	.65	.70	.75	.80	.90	1.15	1.45
Stock	Thickness	Inches	3/16	3/16	3/16	¼	¼	¼	¼	¼	¼	¼	¼	¼	⅜
	Width	Inches	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1½	1½	1½	1½
Bolts	Diameter	Inches	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	½	½	½	½
	Length	Inches	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	2	2
A—End to end		Inches	9½	9¾	9¾	10	10½	10¾	11	12	13	13½	14	15½	18

Order by size and figure number.

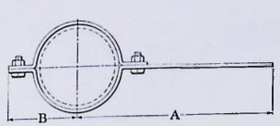
No. 2807, List Prices and Dimensions

Size of Pipe		Inches	4	5	6	8	10	12	14 OD	16 OD	18 OD	20 OD
List Prices		Each	1.60	1.80	2.30	2.90	3.80	4.40	5.00	5.60	6.20	6.80
Stock	Thickness	Inches	½	½	½	½	⅝	⅝	⅝	⅝	⅝	⅝
	Width	Inches	2	2	2	2½	2½	2½	2½	2½	2½	2½
Bolts	Diameter	Inches	⅝	⅝	⅝	⅝	⅝	¾	¾	¾	¾	¾
	Length	Inches	2	2	2	2½	2½	2½	2½	2½	2½	2½
A—End to end		Inches	13½	14½	15½	18	20	22	23¼	25¼	27¼	29¼

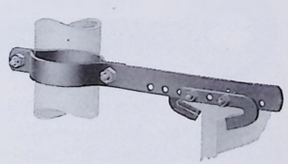
Order by size and figure number.



No. 2810
Standard
With Long Arm



*No. 2810

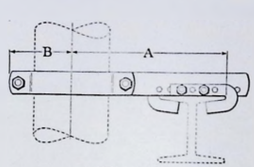


No. 2812
Combination Extension Pipe
and I-Beam Clamp

No. 2810 and No. 2812, List Prices and Dimensions

Size		Inches	2	2½	3	3½	4	5	6	8
No. 2810		Each	.60	.65	.70	.75	.80	.90	1.15	1.45
No. 2812		Each	1.15	1.20	1.30	1.40	1.50	1.70	1.80	2.30
Stock	Thickness	Inches	¼	¼	¼	¼	¼	¼	¼	⅜
	Width	Inches	1¼	1¼	1¼	1¼	1½	1½	1½	1½
Bolts	Diameter	Inches	⅜	⅜	⅜	⅜	½	½	½	½
	Length	Inches	1½	1½	1½	1½	1½	1½	2	2
A—Center to end		Inches	13¼	13⅝	14	14¼	14½	15	15½	16⅝
B—Center to end		Inches	2	3¼	3½	3¾	4½	5⅛	5½	6⅝

Order by size and figure number.



**No. 2812

***Special dimensions:** No. 2806, No. 2807, and No. 2810 Extension Pipe Clamps are regularly furnished with the dimensions shown in the tables.

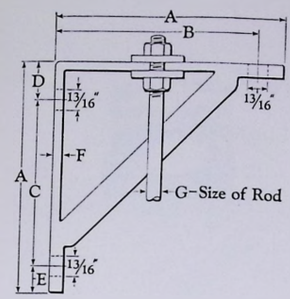
Clamps with special dimensions can be furnished at special prices, which are on application.

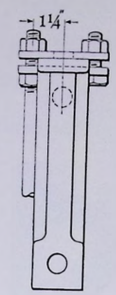
Orders or inquiries for special clamps should include a sketch outlining the necessary details.

****No. 2812 Clamps:** The No. 2812 Combination Extension Pipe and I-Beam Clamps have beam clamps which are adjustable and fit I-Beam flanges 2 to 6 inches wide. Clamps for wider flanges can be furnished at special prices, which are on application.

All dimensions are subject to a slight variation and change without notice.

Hangers and Supports





Welded Steel Brackets

Light Pattern

Maximum Load 750 pounds

No. 2816



Bracket Clamps for Hangers

No. 2818

No. 2816 Bracket
List Prices and Dimensions

Size Number	List Prices Each	A Inches	B Inches	C Inches	D Inches	E Inches	F Inches
1	7.70	9	8	6½	1½	1	5/16
2	8.00	13	12	10½	1½	1	5/16
3	8.90	19	18	16½	1½	1	⅜

Order by figure and size number.

No. 2818 Bracket Clamp
List Prices and Dimensions

Size Number	List Prices Each	For pipe sizes Inches	G Size of rod Inches
1	.70	¾ to 2	⅜
2	.78	2½ to 3½	½

Order by figure and size number.

List prices: The list prices of the No. 2816 Brackets do not include the No. 2818 Bracket Clamps, or the hanger rod and hanger rod nuts, which must be ordered separately if wanted.

The list prices of the No. 2818 Bracket Clamps cover the two steel plates with one bolt and nut; the hanger rod and hanger rod nuts are not included.

Application of Brackets: No. 2816 Light Pattern Welded Brackets are suitable for supporting piping in sizes 6-inch and smaller.

The 13/16-inch drilled hole in the end of the bracket is intended for hanger rods up to ¾-inch diameter.

These brackets can be used in the position illustrated, or they may be inverted.

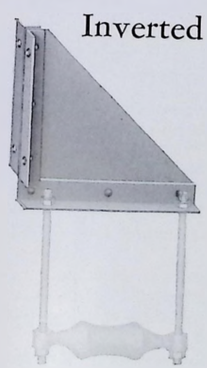
Application of Bracket Clamps: No. 2818 Bracket Clamps can be applied to No. 2816 Brackets and used to hang piping in sizes ¾ to 3½-inch.

Painting: No. 2816 Brackets are given a coat of black paint for protection against rust during shipment.

Inverted Steel Bracket

Riveted

No. 2820



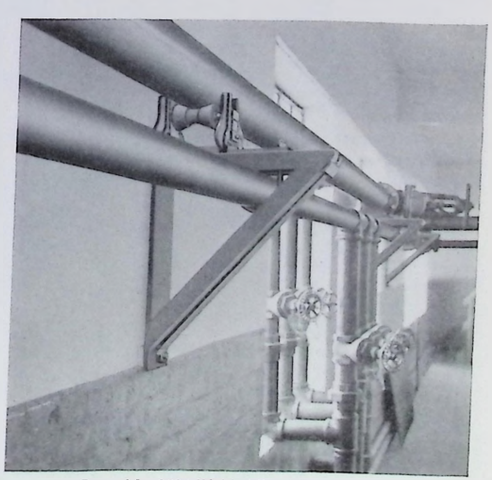
Construction: No. 2820 Brackets are made of steel plate and angle iron riveted together. Holes can be drilled for various types of hangers using rod.

Prices: No. 2820 Inverted Steel Brackets are made to order only. Prices are on application.

Sizes: These brackets can be made of any size and weight of material.

Inquiries or orders should be accompanied by a sketch outlining the required dimensions and details.

All dimensions are subject to a slight variation and change without notice.



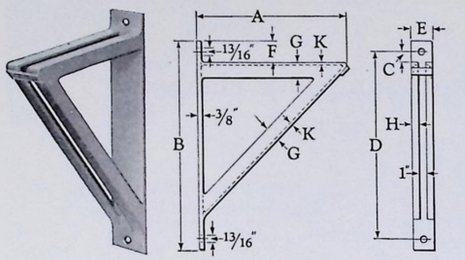
Crane No. 2824 Welded Steel Bracket and No. 2844 Adjustable Roll and Stand In a Modern Distillery

Hangers and Supports

Welded Steel Brackets

Medium Pattern

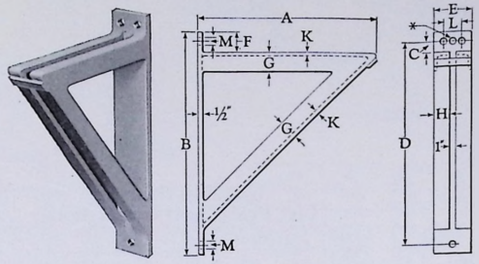
Maximum Load 1500 pounds



No. 2824

Heavy Pattern

Maximum Load 3000 pounds



No. 2825

No. 2824, List Prices and Dimensions

Size Number	List Prices Each	A Inches	B Inches	C Inches	D Inches	E Inches	F Inches	G Inches	H Inches	K Inches
1	17.00	12	18	1¼	15½	4	2½	1½	1½	3/16
2	22.00	18	24	1¼	21½	4½	2½	1¾	1¾	3/16
3	30.00	24	30	1¼	27½	5	2½	2	2	¼

Order by figure and size number.

No. 2825, List Prices and Dimensions

Size Number	List Prices Each	A Inches	B Inches	C Inches	D Inches	E Inches	F Inches	G Inches	H Inches	K Inches	L Inches	M Inches
1	20.00	12	18	1¼	15¼	4	2¾	2	1½	¼	*	13/16
2	35.00	18	24	1⅜	21⅜	5	2¾	2	2	⅜	2¾	15/16
3	41.00	24	30	1½	27½	5	2¾	2½	2	5/16	2½	1 1/16
4	45.00	30	36	1½	33¼	5	3	2½	2	5/16	2½	1 1/16
5	69.00	36	42	1½	39	6	3	3½	2½	⅜	3½	1 1/16
6	77.00	42	50	1½	46	6	3½	3½	2½	⅜	3½	1 1/16

*Size Number 1 Bracket has one bolt hole at the top; all other sizes have two bolt holes.
Order by figure and size number.

Construction: No. 2824 and No. 2825 Welded Steel Brackets are identical in construction, the only difference being in the weight of material used, and in the maximum load rating in pounds.

The tops of the No. 2824 and No. 2825 Brackets are made of two angle irons. All sizes have 1 inch of space between the angle irons which permits anchors and the various styles of roll supports to be bolted to the brackets.

Application: No. 2838, No. 2844, and No. 2846 Roll Supports, and the No. 2850 Anchor Blocks can be mounted on either the No. 2824 Medium or the No. 2825 Heavy Brackets, as illustrated on page 567.

Special dimensions: Welded Brackets of dimensions other than those regularly listed can be furnished. Prices will be quoted on application.

Inquiries or orders for special brackets should include a sketch giving the required dimensions and details.

Painting: All Welded Steel Brackets are given a coat of black paint for protection against rust during shipment.

Anchors and tie rods: When a bracket is to be equipped with a No. 2850 Anchor Chair, provision should be made for diagonal tie rods to extend from the outside edge of the bracket to the wall.

When so ordered, a flat plate, with two drilled holes for tie rods, will be welded to the top of the bracket near the outside edge, as illustrated on page 567.

This attachment for tie rods will be furnished, when ordered, at no extra charge.

For application of roll supports to brackets, see page 567.

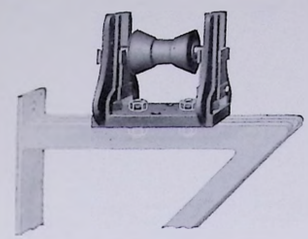
Spacing of Pipe Supports . . . pages 578 and 579

Back Plates . . . . page 567

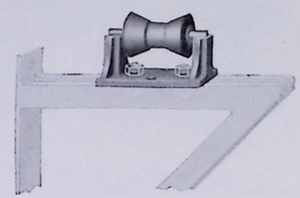
All dimensions are subject to a slight variation and change without notice.

Hangers and Supports

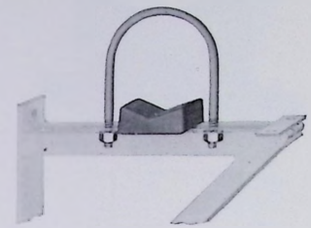
Applications of Roll Supports to Welded Steel Brackets



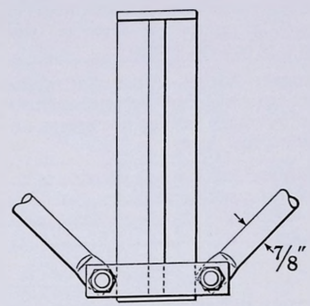
No. 2844 Adjustable Roll and Stand mounted on a Welded Steel Bracket

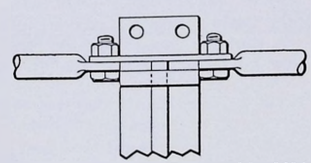


No. 2838 Pipe Roll with Stand mounted on a Welded Steel Bracket



No. 2850 Anchor Chair mounted on a Welded Steel Bracket



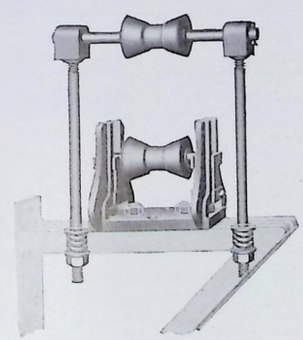


Attachment for Tie Rods on No. 2824 and No. 2825 Welded Steel Brackets
(Patent Pending)

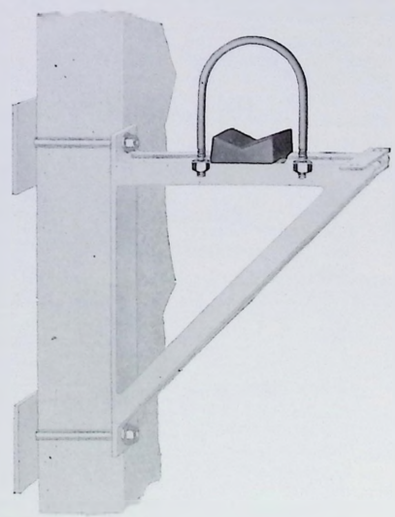
Tie rod attachment for Brackets: When No. 2850 Anchor Chairs are mounted on No. 2824 Medium or No. 2825 Heavy Welded Steel Brackets, tie rods should be extended diagonally from the outside edge of the bracket to the wall.

The illustration to the left shows the attachment for tie rods, consisting of a flat plate welded to the bracket and provided with two 1-inch drilled holes. The tie rods can be made of 7/8-inch round iron, flattened, and drilled for 7/8-inch bolts, for connecting to the plate on the bracket.

When No. 2850 Anchor Chairs are ordered with No. 2824 or No. 2825 Welded Steel Brackets, the attachment for tie rods will be furnished on the bracket when specified, and at no extra charge. No tie rods or bolts are furnished.



No. 2846 Adjustable Roll Support with Roll Binder mounted on a Welded Steel Bracket



Illustrating the use of back plates when bolting a Welded Steel Bracket to a wall

Back Plates

Back plates should be used to distribute the weight whenever a bracket is bolted to a wall. The load imposed by the weight on the bracket, as well as the construction of the wall, should determine the size of the back plates.

Reinforcement of back plates: In some installations it is advisable to reinforce the back plates with additional steel in the form of a plate or angle to distribute the load over a greater section of wall area. This is especially desirable when Anchor Chairs are mounted on a bracket.

Welded Steel Brackets . . . page 566

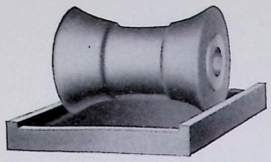
Anchor Chairs . . . page 571
Pipe Roll Supports . . . pages 569 to 571
Spacing of Pipe Supports . . . pages 578 and 579

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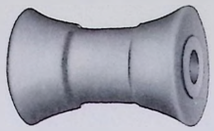
Hangers and Supports

Pipe Rolls and Plates

Cast Iron

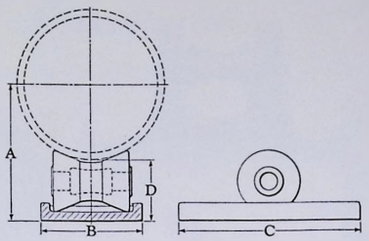


No. 2830
Pipe Roll and Plate



No. 2832
Pipe Roll Only

For lighter rolls, see No. 2733 on page 556.



No. 2830

List Prices and Dimensions

Size of Pipe Inches	No. 2830 List Prices Each	No. 2832 List Prices Each	No. 2830 A Inches	B Inches	C Inches	D Inches
4	2.25	.90	4⅞	4½	8	2⅝
5			5⅞₁₆	4½	8	
6			5¹⁵⁄₁₆	4½	8	
8	4.25	2.00	8¹⁄₁₆	6½	9	3¾
10			9⅛	6½	9	
12	6.00	3.10	10⅞	8½	10	4½
14 OD			11½	8½	10	
16 OD	7.75	5.10	13	9½	11	5
18 OD			14	9½	11	
20 OD			15	9½	11	
24 OD	8.50	6.00	17¼	10½	12	5¼

Order by size and figure number.

Application: No. 2830 Pipe Rolls and Plates can be used when provision for the expansion and contraction movement of piping must be made, but when vertical adjustment is not necessary.

Adjustment: Actual adjustment of the roll is not possible, but vertical adjustment can be made, when necessary, by shimming up the plate.

When accurate vertical adjustment is required with the piping in place, No. 2844 Adjustable Roll and Stand should be used. See page 570.

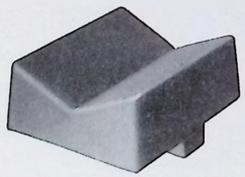
Orders: Orders must state whether No. 2830 Rolls and Plates, or No. 2832 Rolls Only are wanted.

No. 2832 Rolls: The No. 2832 Rolls have a cored hole, not bored, through the center. If a bored hole is wanted, refer to the No. 2840 Roll on page 569.

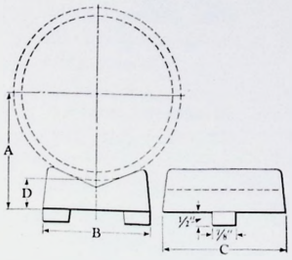
Dimensions of Rolls Only: The dimensions of No. 2832 Rolls are the same as those used for No. 2840 Rolls on page 569.

Pipe Chairs

Cast Iron



No. 2834



List Prices and Dimensions

Size of Pipe Inches	List Prices Each	A Inches	B Inches	C Inches	D Inches
4	3.35	3⅜	4¼	5	1⅛
5		3²⁹⁄₃₂			
6		4⁷⁄₁₆			
8	3.90	5¾	6	6	1⁷⁄₁₆
10		6¹³⁄₁₆			
12	4.45	8⁵⁄₁₆	8½	6	1¹⁵⁄₁₆
14 OD		8¹⁵⁄₁₆			
16 OD	6.75	10¼	11½	6	2¼
18 OD		11¼			
20 OD		12¼			
24 OD		14¼			

Order by size and figure number.

For Anchor Chairs, see No. 2850 on page 571.

Other Sizes: Sizes smaller than 4-inch and larger than 24-inch O.D. can be furnished on special orders. Prices are on application.

Application: The No. 2834 Pipe Chairs have two guide ribs on the bottom and in the center. These ribs are ⅞-inch wide to fit the 1-inch wide space in the No. 2824 and No. 2825 Welded Steel Brackets.

For application of supports to brackets, see page 567.

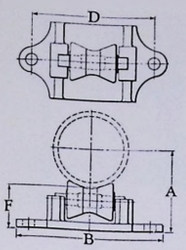
Spacing of Pipe Supports . . . pages 578 and 579.

All dimensions are subject to a slight variation and change without notice.

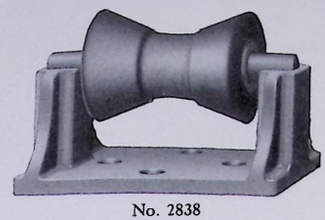
Hangers and Supports

Pipe Rolls with Stands

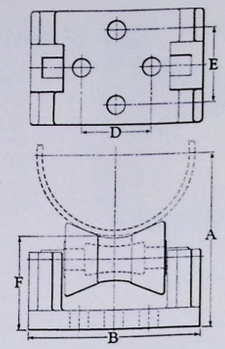
Cast Iron



Sizes 3½-inch and smaller



No. 2838



Sizes 4-inch and larger

No. 2838, List Prices and Dimensions

Size of Pipe Inches	List Prices Each	A Inches	B Inches	C Inches	D Inches	E Inches	F Inches
1	2.25	2¹⁄₁₆	4½	2⅜	3¾		1⅜
1¼		2³⁄₁₆	4½	2⅜	3¾		
1½		2⁵⁄₁₆	4½	2⅜	3¾		
2		3³⁄₁₆	7¼	4	6		2
2½		3⁷⁄₁₆	7¼	4	6		
3	2.80	4	7¾	4	6½		2¼
3½		4¼	7¾	4	6½		
4	2.80	6⅛	6½	6	2½	4	3⅞
5		6⅝	6½	6	2½	4	
6		7³⁄₁₆	6½	6	2½	4	
8	5.00	9⁵⁄₁₆	9¼	6	4½	4	5
10		10⅜	9¼	6	4½	4	
12	6.75	12⅛	11½	6¼	6	4	5¾
14 OD		12¾	11½	6¼	6	4	
16 OD	8.50	14¼	13	6½	7	4½	6¼
18 OD		15¼	13	6½	7	4½	
20 OD		16¼	13	6½	7	4½	
24 OD	10.25	18⅝	14½	6½	8	4½	6⅝

Order by size and figure number.

Application: The No. 2838 Pipe Rolls with Stands can be used when provision for the expansion and contraction movement of piping must be made, but when vertical adjustment is not necessary.

When accurate vertical adjustment is required, the No. 2844 Adjustable Roll and Stand should be used.

These Pipe Rolls with Stands can be bolted to No. 2824 and No. 2825 Welded Steel Brackets. See page 567.

Rolls: The rolls used on these supports are the No. 2840 with a bored hole and narrow bearing for the rod, as described below.

For dimensions of the rolls only, see No. 2840 listed below.

Holes in stands: Sizes 1½-inch and smaller have two ⅝-inch countersunk holes; 2 to 3½-inch have two ⅝-inch drilled holes; 4-inch and larger have four 1-inch drilled holes for bolts.

These bolt holes permit the supports to be bolted to floors, piers, structural work, etc.

Bolting to Brackets: When bolted to No. 2824 or No. 2825 Welded Steel Brackets, only two of the holes are used and the bolting is through the 1-inch space in the top of the brackets.

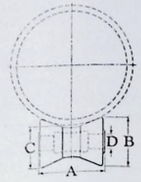
Other sizes: Sizes larger than 24-inch can be furnished. Prices are on application.

Pipe Rolls

Cast Iron



No. 2840



No. 2840, List Prices and Dimensions

Size of Pipe	Inches	1 to 1½	2 & 2½	3 & 3½	4-5-6	8 & 10	12 & 14 OD	16-18-20 OD	24 OD
List Prices	Each	.80	.80	1.15	1.15	2.25	3.40	5.40	6.80
A	Inches	1¼	2	2½	3½	5½	7½	8½	9½
B	Inches	1¹⁄₁₆	1⅝	2	2¹¹⁄₁₆	3¹⁵⁄₁₆	4¹³⁄₁₆	5¼	5⁵⁄₁₆
C	Inches	⅞	1⅜	1¹¹⁄₁₆	2⅛	3¼	3¹³⁄₁₆	4⅜	4⅝
D	Inches	⅜	⁹⁄₁₆	⅝	¹³⁄₁₆	1⅛	1³⁄₁₆	1⁵⁄₁₆	1⁷⁄₁₆

Order by size and figure number.

Holes: The No. 2840 Pipe Rolls have a bored hole for rod through the center. For Pipe Rolls with cored center holes, not bored, see No. 2832 on page 568.

Bearing on rod: No. 2840 Pipe Rolls have an enlarged core through the center, as illustrated in the dimensional drawing, which reduces the friction when the roll revolves on the rod or shaft, as the bearing is only at the ends of the pipe roll.

Other sizes: Pipe Rolls larger than 24-inch can be furnished. Prices are on application.

For application of supports to brackets, see page 567.

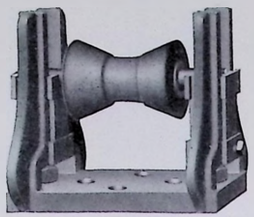
Spacing of Pipe Supports . . . . pages 578 and 579

All dimensions are subject to a slight variation and change without notice.

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Hangers and Supports

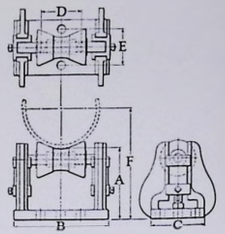
Adjustable Roll and Stand



No. 2844

Cast Iron No. 2844

Application: These supports can be bolted to No. 2824 and No. 2825 Welded Steel Brackets, structural steel, floors, etc. by means of the four 1-inch drilled holes in the base. When bolted to the Welded Steel Brackets, only two of the holes are used, and the bolting is through the 1-inch space in the top of the brackets.



No. 2844

List Prices and Dimensions

Size of Pipe Inches	List Prices Each	A Minimum Inches	A Maximum Inches	B Inches	C Inches	D Inches	E Inches	F Minimum Inches	F Maximum Inches
4	8.50	5 5/16	6 13/16	7 1/2	6	2 1/2	4	7 9/16	9 1/16
5	8.50	5 5/16	6 13/16	7 1/2	6	2 1/2	4	8 3/32	9 19/32
6	8.50	5 5/16	6 13/16	7 1/2	6	2 1/2	4	8 5/8	10 1/8
8	13.00	7 1/4	9 1/4	10 1/2	6	4 1/2	4	11 9/16	13 9/16
10	13.00	7 1/4	9 1/4	10 1/2	6	4 1/2	4	12 5/8	14 5/8
12	18.00	8 1/4	10 1/4	12 1/2	6 1/4	6	4	14 5/8	16 5/8
14 OD	18.00	8 1/4	10 1/4	12 1/2	6 1/4	6	4	15 1/4	17 1/4
16 OD	24.00	8 9/16	10 9/16	14	6 1/2	7	4 1/2	16 9/16	18 9/16
18 OD	24.00	8 9/16	10 9/16	14	6 1/2	7	4 1/2	17 9/16	19 9/16
20 OD	24.00	8 9/16	10 9/16	14	6 1/2	7	4 1/2	18 9/16	20 9/16
24 OD	30.50	8 7/8	10 7/8	15	6 1/2	8	4 1/2	20 7/8	22 7/8

Order by size and figure number.

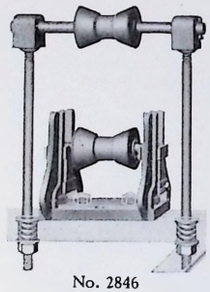
For application of supports to brackets, see page 567.

Adjustment: The No. 2844 Adjustable Roll and Stand provides for vertical adjustment while the piping is in position.

Two adjusting screws provide the means for vertical adjustment, and two set screws lock the adjusting screws after the desired adjustment has been secured.

Other sizes: Other sizes can be furnished on special orders. Prices are on application.

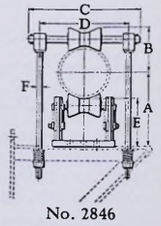
Adjustable Roll Support with Roll Binder



No. 2846

Cast Iron No. 2846

Application: The No. 2846 Support has all of the advantages of the No. 2844 Adjustable Roll and Stand, with the additional advantage of a Roll Binder at the top of the pipe. It is designed for use with No. 2824 and No. 2825 Welded Steel Brackets, but also can be applied to structural steel supports.



No. 2846

List Prices and Dimensions

Size of Pipe Inches	List Prices Each	A Minimum Inches	A Maximum Inches	B Inches	C Inches	D Inches	E Minimum Inches	E Maximum Inches	F Inches
4	12.00	7 9/16	9 1/16	4 3/8	16	12 3/8	5 5/16	6 13/16	
5	12.00	8 3/32	9 19/32	4 15/16	16	12 3/8	5 5/16	6 13/16	
6	12.00	8 5/8	10 1/8	5 7/16	16	12 3/8	5 5/16	6 13/16	
8	18.00	11 9/16	13 9/16	7 9/16	18 3/4	14 3/4	7 1/4	9 1/4	
10	18.00	12 5/8	14 5/8	8 5/8	18 3/4	14 3/4	7 1/4	9 1/4	
12	25.00	14 5/8	16 5/8	10 3/16	21 1/2	17 1/2	8 1/4	10 1/4	7/8
14 OD	25.00	15 1/4	17 1/4	10 13/16	21 1/2	17 1/2	8 1/4	10 1/4	
16 OD	34.00	16 9/16	18 9/16	12 3/8	23 1/2	19 1/2	8 9/16	10 9/16	
18 OD	34.00	17 9/16	19 9/16	13 3/8	25 1/2	21 1/2	8 9/16	10 9/16	
20 OD	34.00	18 9/16	20 9/16	14 3/8	28 3/8	24	8 9/16	10 5/16	
24 OD	44.00	20 7/8	22 7/8	16 5/8	32 3/8	28	8 7/8	10 7/8	

Order by size and figure number.

Other sizes: Other sizes can be furnished on special orders. Prices are on application.

For application of this support to welded brackets, see page 567.

Roll Binder: The Roll Binder at the top is connected to the wall bracket with rods, which are 7/8-inch diameter to pass through the 1-inch space in the top of the bracket, and which are bolted to the bracket with springs between the vertical rod nuts and the bracket.

Pipe Covering Protection Saddles . . . page 574

Dimensions: For dimensions of the Adjustable Roll and Stand, see No. 2844, shown above.

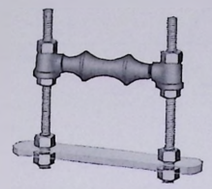
For dimensions of the Roll used at the top of the pipe in the Roll Binder, see No. 2840 on page 569.

All dimensions are subject to a slight variation and change without notice.

Spacing of Pipe Supports . . . pages 578 and 579

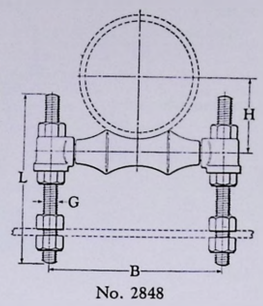
Hangers and Supports

Adjustable Roller Support



No. 2848

Cast Iron Roller



No. 2848

List Prices and Dimensions

Size of Pipe Inches	*List Prices Each	B Inches	H Inches	G Inches	L Inches
1	.70	3	1 1/16	3/8	7 1/4
1 1/4	.70	3 3/8	1 1/4	3/8	7 1/4
1 1/2	.70	3 5/8	1 3/8	3/8	7 1/4
2	.75	4 1/8	1 5/8	3/8	7 1/4
2 1/2	.90	4 7/8	1 15/16	1/2	8
3	.95	5 1/2	2 1/4	1/2	8
3 1/2	.95	6 1/8	2 9/16	1/2	8
4	1.35	6 3/4	2 13/16	1/2	8 1/2
5	1.55	8 1/16	3 7/16	5/8	9
6	1.60	9 9/16	4	3/4	9
8	2.90	11 15/16	5 1/8	7/8	10
10	3.90	14 1/16	6 3/8	7/8	10
12	5.25	16 5/16	7 7/16	7/8	10 1/4
14 OD	6.35	17 3/4	8 3/8	1	11 1/4
16 OD	8.40	19 3/4	9 7/16	1	11 1/2
18 OD	10.25	21 7/8	10 1/2	1 1/8	11 3/4
20 OD	14.85	24 1/4	11 5/8	1 1/4	12 1/4
24 OD	19.85	28 5/8	14	1 1/2	14

*The list prices include the roller with lugs, roller rod, two vertical threaded rods, and eight nuts.

Application: The No. 2848 Adjustable Roller Support has a wide range of application. It can be used on welded steel brackets, or on almost any type of steel construction.

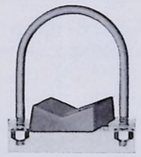
Adjustment: This support is readily adjustable; the adjustment can be made while the pipe is in place. The nuts lock the roller after it is in position.

All sizes provide a vertical adjustment of 4 inches.

Special lengths of rods can be furnished. Prices are on application.

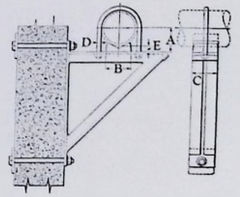
Dimensions: The dimensions not shown will be the same as the corresponding dimensions of No. 2733 Hangers on page 556.

Anchor Chairs



Cast Iron No. 2850

Diameter of yoke: Dimension "D", or the diameter of the round iron used for the yokes, is 7/8-inch for all sizes of Anchor Chairs. This permits the yokes to be bolted through the 1-inch space provided in No. 2824 and No. 2825 Brackets.



No. 2850, List Prices and Dimensions

Size of Pipe Inches	*List Prices Each	A Inches	B Inches	C Inches	E Inches
4	7.75	3 3/8	4 1/4	5	1 1/8
5	7.75	3 29/32	4 1/4	5	1 1/8
6	7.75	4 7/16	4 1/4	5	1 1/8
8	8.50	5 3/4	6	6	1 7/16
10	8.50	6 13/16	6	6	1 7/16
12	9.25	8 5/16	8 1/2	6	1 15/16
14 OD	9.25	8 15/16	8 1/2	6	1 15/16
16 OD	9.75	10 1/4	11 1/2	6	2 1/4
18 OD	9.75	11 1/4	11 1/2	6	2 1/4
20 OD	9.75	12 1/4	11 1/2	6	2 1/4
24 OD	10.25	14 1/4	11 1/2	6	2 1/4

*The list prices of No. 2850 Anchor Chairs include the Cast Iron Chair, round iron yoke, and two hexagon nuts for the threaded ends of the yoke.
Order by size and figure number.

Other sizes: Other sizes of No. 2850 Anchor Chairs can be furnished. Prices are on application.

Application: No. 2850 Anchor Chairs are designed for use with No. 2824 and No. 2825 Brackets, although they can be adapted to structural work.

Tie rods: When Anchor Chairs are used on brackets, tie rods extending diagonally from the outside of the bracket to the wall should be installed.

Provision for tie rods is made on No. 2824 and No. 2825 Brackets, when ordered, and as illustrated on page 567.

Yoke: The yoke which clamps around the pipe is regularly made of round iron. The portion of the yoke which clamps around the upper half of the pipe can be flattened at a slight additional cost, when so ordered.

In some cases it is desirable to tack weld the yoke to the pipe, and in this event the flattened yoke should be ordered.

Dimension "A": The dimension "A", or center line of pipe to face of bracket, for Anchor Chairs differs from the corresponding dimension of No. 2838 or No. 2844 Roll Supports, therefore, when piping is supported on a combination of Roll Supports and Anchor Chairs, care must be used to locate the tops of the brackets at proper elevations to compensate for this difference in dimensions.

Beam Plates . . . . page 567
Spacing of Pipe Supports . . . . pages 578 and 579
For application of Supports to brackets, see page 567.

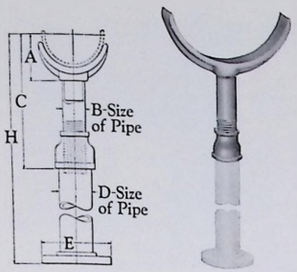
All dimensions are subject to a slight variation and change without notice.

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
ACL Doc 21275 · Page 304 of 402
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Hangers and Supports

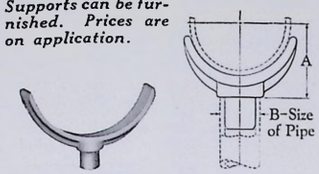
Pipe Supports

Cast Iron

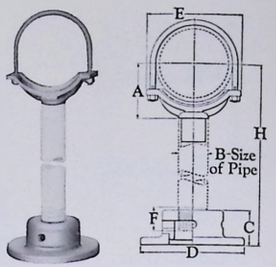


No. 2855
Adjustable Pipe Saddle Support

Other sizes of these Supports can be furnished. Prices are on application.



No. 2856
Pipe Saddle Support



No. 2858
Adjustable Pipe Stanchion Saddle Support

List Prices

Size of Pipe Inches	No. 2856 List Prices Each	No. 2855 List Prices Each	No. 2858 List Prices Each
2	.80	2.85	
2½	.90	2.95	
3	1.00	3.30	6.00
3½	1.10	3.40	6.50
4	1.20	4.05	7.00
5	1.55	4.40	7.50
6	1.80	5.20	8.00
8	2.70	6.10	9.00
10	3.35	7.30	12.00
12	3.55	7.50	13.00
14 OD	4.00	8.50	14.00
16 OD	5.35	9.85	15.00
18 OD	6.65	13.00	19.00
20 OD	8.35	15.50	24.00
24 OD	11.25	18.50	30.00

Order by size and figure number.

No. 2858 with springs: Springs can be inserted between the yoke nuts and Saddle. Prices of No. 2858 Supports with springs are furnished on application.

No. 2856 Supports

Shanks: No. 2856 Supports have shanks which fit inside of pipe. The shanks swivel in the pipe.

These supports will be made to order with any other style or size of shank at special prices, which are furnished on application.

No. 2855 Supports

List prices: The list prices of No. 2855 Supports include the Pipe Saddle Support, Special Locknut Nipple, and Reducer, assembled as shown. Lugs are welded to the lower end of the nipple, after assembly in the reducer, to prevent removal of the nipple during any adjustment. The pipe and flange between the reducer and the floor are not included in the prices.

Adjustment: A vertical adjustment of approximately 4½ inches is provided in all sizes of these supports.

Riser pipe: The pipe and flange between the reducer and the floor can be furnished when specified, in which case dimension "H" must be given. Prices are on application.

No. 2858 Supports

List prices: The list prices of No. 2858 Supports include the Pipe Saddle Support with yoke and nuts, also the Special Swivel Flange at the bottom. The pipe between the Saddle Support and the Swivel Flange is not included.

Adjustment: Vertical adjustment is provided as shown in the table.

Riser pipe: If the complete support is wanted, dimension "H" must be specified. Prices of complete supports are on application.

Dimensions, in Inches

Size of Pipe	No. 2856 A	No. 2856 B	No. 2855 A	No. 2855 B	No. 2855 C Minimum	No. 2855 C Maximum	No. 2855 D	No. 2855 E	No. 2858 A	No. 2858 B	No. 2858 C	No. 2858 D	No. 2858 E	No. 2858 F Adjustment
2	1 11/16	1	1 11/16	1	7½	12	1½	5						
2½	2 7/16	1	2 7/16	1	8	12½	1½	5						
3	2 5/8	1¼	2 5/8	1¼	8¼	12¾	2	6	2 7/8	1¼	2½	7½	5⅛	1¾
3½	2 7/8	1¼	2 7/8	1¼	8½	13	2	6	3 1/8	1¼	2½	7½	5⅛	1¾
4	3¼	1½	3¼	1½	9½	14	2½	7	3½	1½	2½	7½	6	1¾
5	3 13/16	1½	3 13/16	1½	10	14½	2½	7	4 1/16	1½	2½	7½	7⅛	1¾
6	4 9/16	2	4 9/16	2	10½	15	3	7½	4 11/16	2	3	9	8⅛	2
8	5 13/16	2	5 13/16	2	12	16½	3	7½	5¾	2	3	9	10 5/16	2
10	7¼	2½	7¼	2½	13½	18	3½	8½	7	2½	3	9	12½	2
12	8⅜	2½	8⅜	2½	15	19½	3½	8½	8⅛	2½	3	9	14⅞	2
14 OD	9⅛	3	9⅛	3	16½	21	4	9	8 13/16	3	3 5/8	10	16⅛	2½
16 OD	10⅛	3	10⅛	3	18	22½	4	9	10	3	3 5/8	10	18⅛	2½
18 OD	11¼	3½	11¼	3½	19½	24	5	10	11 3/16	3½	3 5/8	10	20½	2½
20 OD	12⅜	3½	12⅜	3½	21	25½	5	10	12 3/16	3½	3 5/8	10	22½	2½
24 OD	14½	4	14½	4	24	28½	5	10	14⅜	4	4 3/16	11	26½	3

All dimensions are subject to a slight variation and change without notice.

Hangers and Supports

Wall Pipe Supports

Riveted Steel, No. 2861

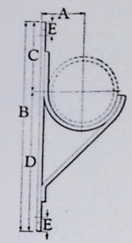
List Prices and Dimensions

Size of Pipe Inches	List Prices Each	Size of stock Width Inches	Size of stock Thickness Inches	A Inches	B Inches	C Inches	D Inches	E Inches
3	1.00	1¼	¼	2¼	12½	4½	8	⅞
3½	1.25	1¼	¼	2½	13	4½	8½	⅞
4	1.50	1¼	¼	2¾	13½	4½	9	⅞
5	2.00	1½	¼	3 5/16	14⅝	4½	10⅛	⅞
6	2.75	1½	¼	3 3/16	15⅝	4½	11⅛	⅞
8	4.50	2	½	5 5/16	18⅛	4¾	13⅜	1
10	5.50	2½	½	6⅜	20¼	4¾	15½	1
12	7.00	2½	½	7⅜	22¼	4¾	17½	1

Sizes 3 to 6-inch have holes for ½-inch bolt; sizes 8 to 12-inch for ¾-inch bolt.
Order by size and figure number.



No. 2861

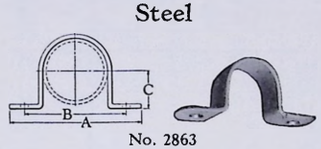


Other sizes: Special supports and offset supports can be made up special. Prices are on application. A sketch should be furnished.

Application: The No. 2861 Supports are used for supporting horizontal piping on walls when there is no appreciable movement. When provision must be made for movement due to expansion and contraction, a welded steel bracket and roll support should be used. See pages 566 to 571.

Pipe Clamps

Steel



No. 2863

Application: No. 2863 Pipe Clamps are used for clamping pipe against a wall.

Other dimensions: These Pipe Clamps can be made to special dimensions.

Prices are on application.

Orders or inquiries for special Pipe Clamps should be accompanied by a sketch giving all details.

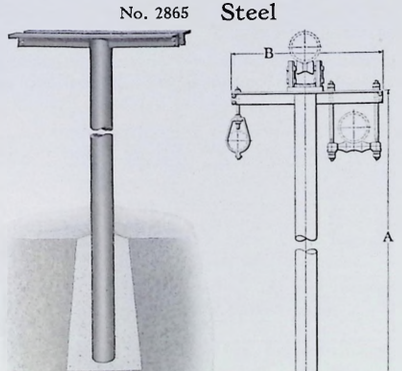
No. 2863, List Prices and Dimensions

Size of Pipe Inches	List Prices Each	A Inches	B Inches	C Inches	Size of stock Width Inches	Size of stock Thickness Inches	Size of holes Inches
½	.50	5¼	3¼	½	1¼	3/16	⅜
¾	.50	5½	3½	¾	1¼	3/16	⅜
1	.55	5¾	3¾	1	1¼	3/16	⅜
1¼	.55	6⅛	4⅛	1⅛	1¼	¼	⅜
1½	.60	6½	4½	1¼	1¼	¼	⅜
2	.60	6⅞	4⅞	1 7/16	1¼	¼	⅜
2½	.65	7⅜	5⅜	1¾	1¼	¼	⅜
3	.70	8	6	2	1¼	¼	⅜
3½	.75	8½	6½	2¼	1¼	¼	⅜
4	.80	9	7	2½	1½	¼	½
5	.90	10⅛	8⅛	3	1½	¼	½
6	1.15	11¼	9¼	3½	1½	¼	½
8	1.45	12¼	10¼	4 9/16	1½	⅜	⅝

Order by size and figure number.

Pipe Standard Supports for Outside Lines

No. 2865 Steel



All dimensions are subject to a slight variation and change without notice.

Construction: Steel pipe is used for the vertical member and steel angle irons are welded at the top for the horizontal member. A special welded end closure at the top provides a seal against the weather.

For supports with long horizontal members, a gusset plate is advisable and can be furnished when so specified.

A 1-inch space is provided between the top angle irons for hanger rods or bolting roll supports.

Hangers and Roll Supports: Various types of hangers and roll supports can be applied to No. 2865 Supports. The dimensional drawing indicates several applications.

Painting: These supports are given a coat of black paint for protection against rust during shipment.

Prices: These supports are made to order. Prices are on application.

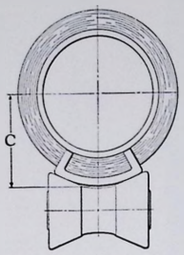
Inquiries and orders: Inquiries or orders should give dimension "A", including the bury in the ground, dimension "B", also the number and size of pipes to be hung or supported.

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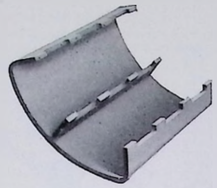
Hangers and Supports

Pipe Covering Protection Saddles

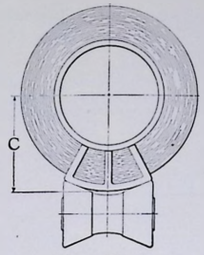
Steel



Type No. 2



No. 2868



Type No. 3

List Prices and Dimensions

Size of Pipe Inches	Saddles for Standard Thick Covering *List Prices Each	Type of Saddle Number	Size of roll required Inches	C Inches	Saddles for Double Standard Thick Covering *List Prices Each	Type of Saddle Number	Size of roll required Inches	C Inches	Saddles for Double 1½-inch Thick Covering *List Prices Each	Type of Saddle Number	Size of roll required Inches	C Inches
3	4.25	2	5	3	4.50	2	8	4	5.00	2	10	4 15/16
3½	4.25	2	6	3¼	4.50	2	8	4¼	5.00	2	10	5 3/16
4	4.75	2	6	3 9/16	5.00	2	8	4 11/16	5.50	2	10	5 7/16
5	4.75	2	8	4 3/16	5.00	2	10	5 5/16	5.50	2	12	6 1/16
6	5.25	2	8	4 11/16	5.50	2	10	5 13/16	6.00	2	12	6 9/16
8	5.25	3	10	5 13/16	5.50	3	14	7 1/16	6.00	3	14	7 9/16
10	5.75	3	12	6 15/16	6.25	3	16	8 3/16	6.25	3	18	8 11/16
12	5.75	3	16	8 3/16	6.25	3	20	9 11/16	6.25	3	20	9 11/16
14 OD	6.50	3	18	8⅞	6.75	3	20	10⅜	6.75	3	20	10⅜
16 OD	6.50	3	20	9⅞	6.75	3	24	11⅜	6.75	3	24	11⅜
18 OD	7.25	3	20	11	7.50	3	24	12½	7.50	3	24	12½
20 OD	7.50	3	24	12	7.75	3	30	13½	7.75	3	30	13½
24 OD	8.75	3	30	14	9.00	3	30	15½	9.00	3	30	15½

*List Prices do not include rolls or covering.
Order by pipe size and specify the thickness of the covering.

Application: No. 2868 Pipe Covering Protection Saddles are used for reducing heat losses by providing for a continuous and smooth covering application which is weather-tight.

Construction: All sizes of No. 2868 Saddles are 12 inches long. These saddles in both type No. 2 and No. 3 are made of steel plate, curved, and with the edges turned up to provide a bearing against the pipe.

Type No. 2 is regularly furnished for pipe sizes 6-inch and smaller; type No. 3, which has a center supporting plate, is regularly furnished for pipe sizes 8-inch and larger.

Welding: These saddles can be welded to the pipe to hold them permanently in position.

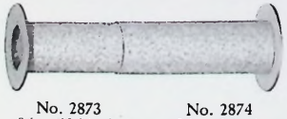
Covering material: No. 2868 Saddles are furnished unfilled. They should be filled with plastic cement or covering material before being installed in position.

Larger pipe rolls: When Pipe Covering Protection Saddles are used, the size of pipe roll required is larger than that of the pipe size. Refer to the table above for the proper size of pipe roll to use.

Other sizes: Saddles of special lengths, dimensions, or construction can be furnished. Prices are on application.

Saddles can be furnished for sizes of pipe and thicknesses of covering other than those listed above. Prices are on application.

Floor Sleeves



No. 2873
¾ to 1¼-inch
Adjustable from
12 to 17 Inches

No. 2874
¾ to 8-inch
Adjustable from
14 to 24 Inches

Telescoping

Made of Galvanized Sheet Iron, with a neat Cast Iron Flange at each end.

List Prices

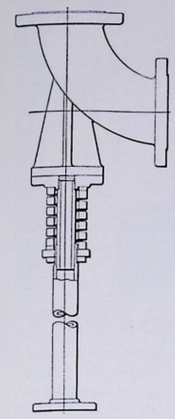
Size of Pipe	Inches	¾	1	1¼	1½	2	2½
No. 2873	Each	1.00	1.10	1.30			
No. 2874	Each	1.05	1.20	1.35	1.50	1.80	2.10
Size of Pipe	Inches	3	3½	4	5	6	8
No. 2874	Each	2.50	3.00	3.75	4.50	5.25	6.75

Order by size and figure number.

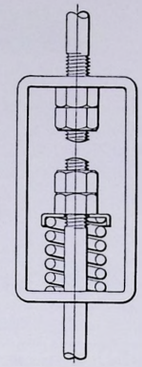
All dimensions are subject to a slight variation and change without notice.

Hangers and Supports

Special Spring Hangers and Supports



No. 2878



No. 2884

Application: Spring hangers and spring supports are recommended when it is necessary to compensate for the movement of piping and also maintain a constant support.

No. 2884 illustrates a type of Spring Hanger using a single rod extension.

For Spring Hangers with two rods, see No. 2734 on page 556.

No. 2878 illustrates an adjustable Spring Support applied to a base elbow. This type is used for the piping connection to turbine and engine inlets, also to various other pieces of equipment.

Prices: No. 2884 Spring Hangers and No. 2878 Spring Supports are only made to order. Prices are on application.

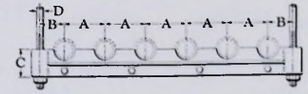
Inquiries and orders: Inquiries and orders must specify the weight to be supported in pounds, the necessary dimensions, etc.

Special Supports: Spring hangers and supports of special types can be furnished. Information and prices are on application.

Coil Hanger and Spreader

Steel





No. 2890

List Prices and Dimensions

Size of Pipe Inches	Number of branches	List Prices Each	A Centers of branches Inches	B Inches	C Inches	D Size of rod Inches
1	6	.60	2½	1¾	2	½
	8	.80				
	10	1.00				⅝
	12	1.20				
1¼	6	.72	3	1⅞	2	½
	8	.96				
	10	1.20				⅝
	12	1.44				
1½	6	.90	3½	2	2	½
	8	1.20				
	10	1.50				⅝
	12	1.80				
2	6	1.20	4½	2¼	2	½
	8	1.60				
	10	2.00				⅝
	12	2.40				

Order by pipe size and number of branches.

List prices: The list prices do not include the hanger rods or nuts, which must be ordered separately if wanted.

Construction: The No. 2890 is an all-steel Coil Hanger and Spreader, which uses rods for suspension from the ceiling or superstructure.

Adjustment: By cutting a long thread on the rods, vertical adjustment can be obtained, with the piping in place, by turning the nuts at the bottom.

Other sizes: Coil Hangers can be furnished for any number of branches and, if not listed above, prices will be quoted on application.

All dimensions are subject to a slight variation and change without notice.

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Hangers and Supports

Hook Plates and Expansion Hook Plates

Cast Iron

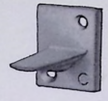


Hook Plates
No. 2892



Galvanized Hook Plates and Expansion Hook Plates can be furnished. Prices are on application.

When Hook Plates or Expansion Hook Plates are ordered specifying a greater number of hooks than 6, two Plates will be shipped. For instance, on an order calling for two 2 x 8 Hook Plates, four 2 x 4 will be shipped.





Expansion Hook Plates
No. 2893

List Prices, Each

Number of Hooks	No. 2892 Hook Plates						No. 2893 Expansion Hook Plates					
	1	2	3	4	5	6	1	2	3	4	5	6
For 1-inch pipe 2½ inches between centers	.09	.18	.23	.26	.32	.38	.15	.25	.35	.50	.60	.70
For 1¼-inch pipe 3 inches between centers	.10	.21	.27	.32	.41	.52	.17	.27	.40	.60	.70	.80
For 1½-inch pipe 3½ inches between centers	.15	.28	.43	.58	.72	.88	.25	.40	.60	.75	.90	1.00
For 2-inch pipe 4½ inches between centers	.22	.43	.65	.90	1.15	1.35		.60	.85	1.00	1.35	1.55

Order by size, number of hooks, and figure number.

Hook Plates

Steel



Hook Plate

No. 2894

No. 2894, List Prices and Dimensions

Size of Pipe	Inches	1	1¼	1½	2
List Prices	Each	3.25	3.25	3.75	4.25
Center to center of hooks	Inches	2½	3	3½	4½
Number of hooks		30	30	25	20

Order by size and figure number.

Construction: No. 2894 Hook Plates are made of steel. They are light in weight but strong. The hooks are ribbed to provide additional strength. The strips can be readily cut in the field.

These Hook Plates are regularly furnished in long strips and with the number of hooks listed above.

Other sizes: Hook Plates with any number of hooks can be furnished when so ordered. Prices are on application.

Galvanized: Galvanized Hook Plates can be furnished. Prices are on application.

No. 2895



Offset Hook Plate

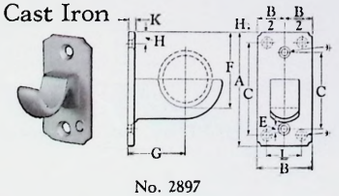
No. 2895 Offset Hook Plates are made to order; prices are on application.

Orders and inquiries should give dimensions.

Beam Hooks, Long Shank

Single Hooks, Only

Cast Iron



No. 2897

*2½-inch and smaller have two holes; 3-inch has four holes.

List Prices and Dimensions

Size of Pipe	Inches	½	¾	1	1¼	1½	2	2½	3
No. 2897	Each	.13	.15	.18	.22	.24	.35	.65	.90
A	Inches	3⅛	3 9/16	3 11/16	3¾	4 1/16	4 11/16	5 3/16	10⅛
B	Inches	1 11/16	1 13/16	1 15/16	2	2¼	2⅜	2½	3 7/16
C	Inches	2 1/16	2½	2½	2⅞	3⅛	3½	4	8⅝
E	Inches	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
F	Inches	1 9/16	1 13/16	2 1/16	2⅛	2 11/16	3⅛	3⅝	3¾
G	Inches	1 1/16	1⅛	1⅞	2	2½	2½	2 9/16	3¼
H	Inches	9/16	9/16	½	5/16	5/16	½	⅝	¾
K	Inches	¼	¼	¼	¼	¼	¼	5/16	5/16
L	Inches								1 13/16

Order by size and figure number.

All dimensions are subject to a slight variation and change without notice.

Hangers and Supports

Floor and Ceiling Plates

Black Cast Iron



No. 4
Ceiling Plate
Two Piece



No. 5
Floor Plate
One Piece



No. 7
Ceiling Plate
One Piece



No. 8
Ceiling Plate
One Piece

List Prices

Size of Pipe	Inches	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
No. 4	Each		.22	.28	.32	.40	.50	.65	.90	1.00	1.20	2.00	2.50	3.75
No. 5	Each	.06	.06	.08	.11	.14	.16	.24						
No. 7	Each	.11	.13	.16	.18	.23	.27	.36						
No. 8	Each								.50	.55	.68	.95	1.25	1.90

Order by size and figure number.

No. 4 Ceiling Plates can be applied after the pipe is in place. A simple locking device permits the halves to be joined, and a set screw holds the plate in position on the pipe.

No. 5 and No. 7 Floor and Ceiling Plates are identical, except that the No. 7 Plates have a set screw to hold the plate in position.

No. 8 Ceiling Plates have a set screw which holds the plate in position on the pipe.

Floor and Ceiling Plates

B & C
Black, Nickel-Plated, and Polished Brass



B & C No. 10
Pressed Steel
Pressed Brass
Sizes ¼ to 6-inch
Packed 12 in a box



B & C No. 20
Pressed Steel
Sizes ⅜ to 4-inch
Packed 24 in a box



B & C No. 3
Cast Iron
Cast Brass
Sizes ¼ to 12-inch
Packed 12 in a box



B & C No. 4 - 5
Cast Iron
Cast Brass
Sizes ½ to 4-inch
Packed 12 in a box

***List Prices**

Size of Pipe	No. 10 and No. 20				No. 3, No. 4, and No. 5			
	Steel		Brass		Cast Iron		**Cast Brass	
Inches	Black Each	Nickel Plated Each	Polished Each	Nickel Plated Each	Black Each	Nickel Plated Each	Polished Each	Nickel Plated Each
¼	.14	.25	.58	.58	.14	.25	1.00	1.00
⅜	.15	.26	.60	.60	.15	.26	1.00	1.00
½	.16	.27	.62	.62	.16	.27	1.00	1.00
¾	.17	.28	.65	.65	.17	.28	1.20	1.20
1	.20	.32	.72	.72	.20	.32	1.30	1.30
1¼	.22	.35	.80	.80	.22	.35	1.60	1.60
1½	.25	.38	.85	.85	.25	.38	1.80	1.80
2	.30	.45	1.00	1.00	.30	.45	2.00	2.00
2½	.50	.65	1.50	1.50	.50	.65	2.50	2.50
3	.65	.80	1.80	1.80	.65	.80	3.00	3.00
3½	.80	1.00			.80	1.00	4.00	4.00
4	1.00	1.25			1.00	1.25	5.00	5.00
5	1.50	1.75			1.50	1.75	7.00	7.00
6	1.75	2.00			1.75	2.00	9.00	9.00
8					2.25	2.50	12.00	12.00
10					2.75	3.00	16.00	16.00
12					3.25	3.50	18.00	18.00

Order by size and figure number, also state the finish wanted.
Brass Plates will be furnished only when so ordered.

The List Prices only apply to the sizes regularly made and as indicated under each illustration.

****Nickel-plated Cast Brass Plates are polished.***

No. 10 Plate: The B & C No. 10 is a Combination Floor and Ceiling Plate, smooth faced, and with both the hinge and the catch concealed. The springs hold the plate in position on the pipe. A heavy coating of copper and nickel plate assures freedom from rust, when nickel plated finish is used.

No. 20 Plate: The B & C No. 20 is a Combination Floor and Ceiling Plate, similar to the No. 10, except that the hinge is not concealed, and it is somewhat lighter in construction. The No. 20 is, however, a sturdy Plate and meets the demand for a Plate lower in price than the No. 10.

No. 3 Plate: The B & C No. 3 is a Floor or Ceiling Plate with a set screw to hold it in position on the pipe.

No. 4 - 5 Plates: The B & C No. 4 is a Floor Plate without set screw. The No. 5 is a Ceiling Plate with set screw. Both are solid plates.

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Spacing of Pipe Supports

When a horizontal pipe line is supported at intermediate points, sagging of the pipe occurs between these supports, the amount of sag being dependent upon the weight of the pipe, water, insulation, and valves or fittings which may be included in the line. If the pipe line is installed with no downward pitch, pockets will be formed in each span in which case condensation may collect if the line is transporting steam. In order to eliminate these pockets, the line must be pitched downward so that the outlet of each span is lower than the maximum sag.

Crane Co. has conducted tests to determine the deflection of horizontal standard pipe lines filled with water, in pipe sizes ¾″ to 4″ inclusive, the results of which have indicated that for pipes larger than 2″ and with supports having center to center dimensions greater than 10 feet, the resultant deflection is less than that determined by the use of the formula for a uniformly loaded pipe fixed at both ends. For pipe sizes 2″ and smaller, the test deflection was in excess of that determined by the formula for pipe having fixed ends and approached, for the shorter spans, the deflection as determined by the use of the formula for pipe lines having unrestrained ends.

Figure 1 gives the deflection of horizontal standard pipe lines filled with water, for varying spans, based upon the results obtained from tests for sizes 2″ and smaller, and upon the formula for fixed ends for the larger sizes of pipe. The deflection values given on the chart are twice those obtained from test or calculated, to compensate for any variables including weight of insulation, etc.

The pitch of pipe lines is usually expressed as so many inches in a certain number of feet. This expression is called the "Average Gradient" of the pipe line. The formula given below indicates the maximum length of unsupported piping which can be permitted without allowing the deflection of each span to exceed the drop in elevation.

$$\text{Average Gradient} = \frac{144S^2y}{36S^2-y^2}$$

where:

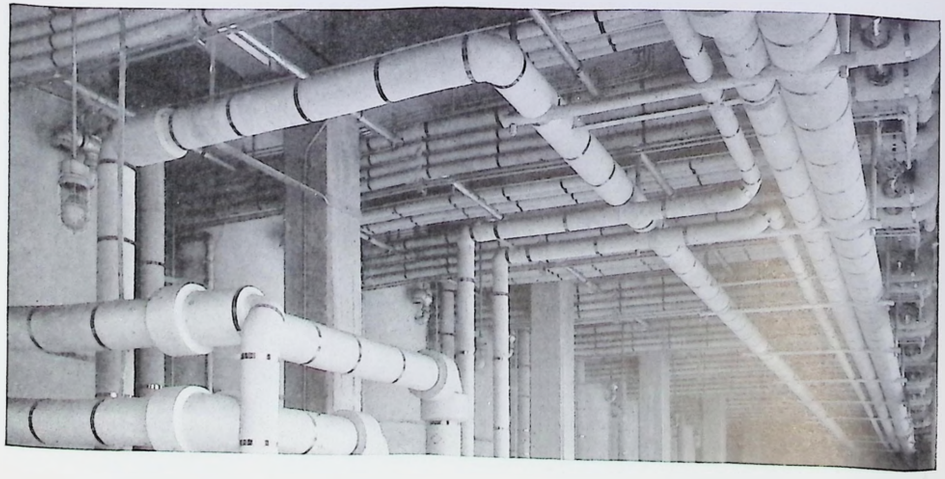
S = Length of one span, feet
y = Deflection of one span, inches

The dotted lines as shown in Figure 1 are plotted from the above formula and indicate average gradients of 1″ in 10′, 1″ in 15′, 1″ in 20′, 1″ in 30′, and 1″ in 40′.

EXAMPLE

What is the maximum distance between supports for a 4″ standard pipe line assuming a pitch or average gradient of 1″ in 30 feet?

Proceed downward from the intersection of the diagonal dotted line for an average gradient of 1″ in 30 feet and the diagonal solid line for 4″ pipe to the bottom line where it is noted that the maximum span is approximately 22 feet.



Deflection of Horizontal Pipe Lines
(Based on Standard Pipe Filled with Water)

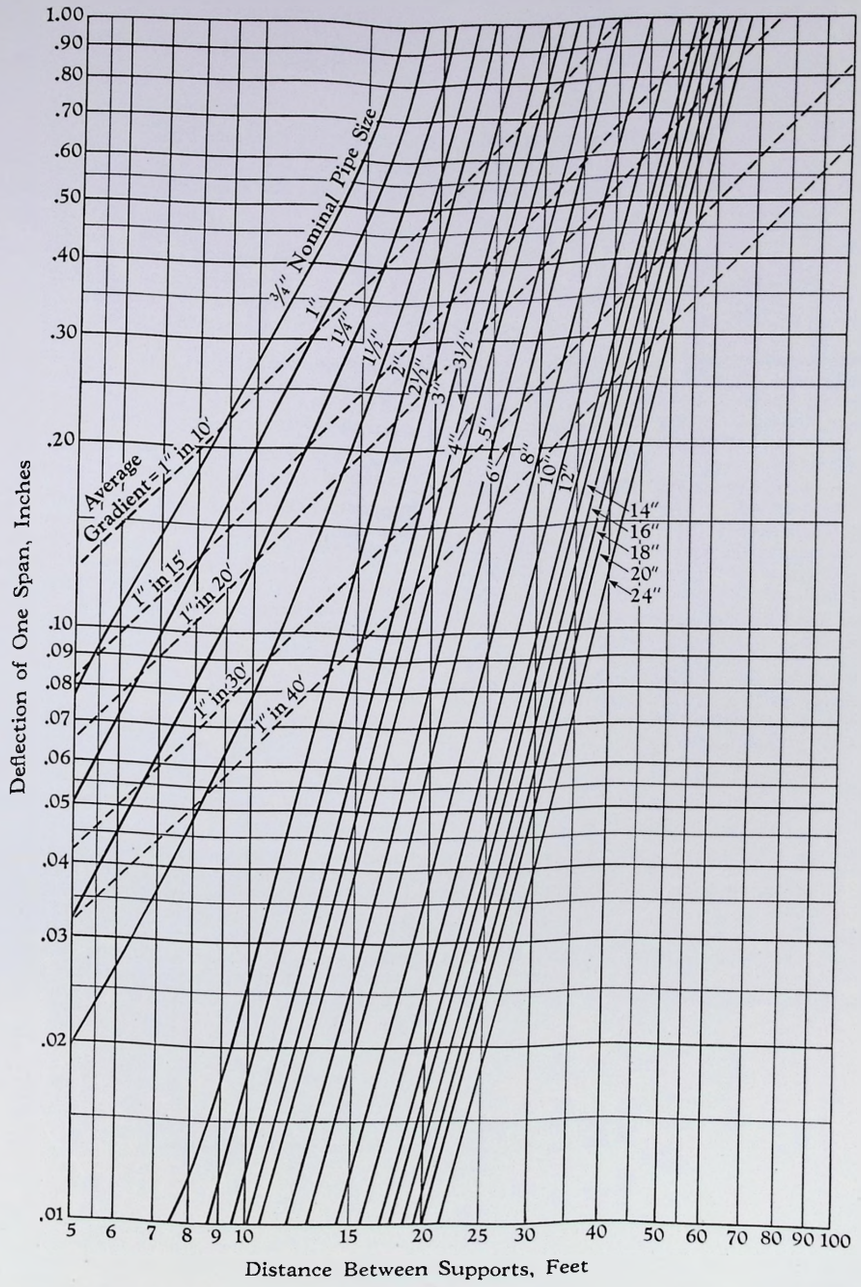


Figure No. 1

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Hangers and Supports

The following excerpts from the "Code for Pressure Piping," American Tentative Standard, ASA B31-1935, will serve as a guide in the selection of hangers and supports.

Material requirements: "All equipment for permanent hangers, supports, and anchors shall be fabricated from durable materials suitable for the service conditions involved. Where this equipment is subject to atmospheric or other conditions likely to cause deterioration or corrosion, it shall be protected from such harmful effects by painting or other suitable preservative means".

Design limitations: "Pipe, straps, or bars of strength equal to the equivalent hanger rod may be fabricated for use instead of hanger rods for the support of piping of nominal sizes 3½-inch and smaller.

Hangers used for the support of piping of 2-inch nominal pipe size and larger shall be fabricated to permit screw or equivalent adjustment after erection. Exception to this may be made in cases where hangers are to be used for the support of piping requiring exact grades, for which they may be fabricated as rigid hangers.

Screw adjustments shall be fabricated so that all threaded members will have a true and complete depth of thread. The turnbuckle or adjusting nut shall have its full length of thread in service while in use and the amount of adjustment shall be plainly visible at all times. All screw or equivalent adjustments shall be provided with suitable locking features".

Loading: "The required strength of all supporting equipment except springs shall be based on the combined weight of the piping filled with water or oil and the insulating covering if the latter is used. Where piping is conveying a fluid which in the liquid state is heavier than water or oil, the combined weight shall include that of the piping filled with this liquid and the insulating covering if the latter is used.

Weight calculations for springs should be based upon the normal operating conditions of the piping".

Supports permitting pipe movement: "When expansion or contraction of piping will be produced by reason of conveying fluids at temperatures above 150° F. or by other causes, hanger and supporting equipment shall be fabricated and assembled to permit the free movement of this piping. This should be accomplished by the use of long rod hangers, spring hangers, chains, hangers or supports fitted with rollers . . . . Rollers shall be accurately made, properly guided, and shall roll freely".

Covering Protection Saddles: "When pipe is covered by insulation, a suitable metal shield properly constructed and secured to the covered pipe should be used to protect the covering at points where the pipe is supported on movable rollers or in large diameter rings".

Anchors: "Anchors shall be fabricated and assembled in such form as to secure the desired points of piping in relatively fixed positions. They shall permit the line to take up its expansion and contraction freely in opposite directions away from the anchored point, and shall be so arranged as to be structurally suitable for the particular location, line, and loading conditions in question".

Further information about the application of hangers and supports will be furnished upon application.

Pipe and Fabricated Piping

Pipe

General Notes — Pipe Trade Practice . . . . . page 582

Standard, Extra Strong, and Double Extra Strong Pipe
- List Prices, Dimensions, and Weights . . . . . pages 583 to 585
- Bundling Schedule . . . . . page 586
- Data . . . . . page 503
- Internal Fluid Pressures . . . . . page 610

Hydraulic Pipe . . . . . page 585
Reamed and Drifted Pipe . . . . . page 586
Large O. D. Pipe . . . . . page 587
A. P. I. Line Pipe . . . . . page 588
Boiler Tubes . . . . . page 589
Merchant and Inserted Joint Casing . . . . . pages 590 to 591
Brass and Copper Pipe . . . . . page 592
American and British Standard Pipe Threads . . . . . pages 594 to 595
Threading of Material for Oil Country Tubular Goods . . . . . pages 596 to 604
Railing Pipe Threads . . . . . page 605
Wrought-Iron and Wrought-Steel Pipe, American Tentative Standard . . . . . pages 606 to 609

Fabricated Piping

Description, Dimensions, and List Prices . . . . . pages 612 to 662

See the Index on page 611.

Ordering Fabricated Piping

Foreword and General Explanation . . . . . pages 663 to 667
Flange Drilling Details . . . . . page 668
Taps and Drains for Flanged Fittings and Valves . . . . . pages 669 to 670
Location of By-Passes on Flanged Valves . . . . . page 670
Designating Center to Face and Face to Face Dimensions . . . . . page 671
Bends . . . . . pages 672 to 679
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4NH – 1A	683	4NH – 7A	684	4NW – 13A	681	4NW – 22A	682	4NB – 37A	675	4NB – 56	677
4NW – 1A	680	4NW – 7A	680	4NB – 14	673	4NB – 23	674	4NB – 38A	675	4NB – 57	677
4NB – 2	672	4NB – 8	672	4NW – 14A	681	4NW – 23	682	4NB – 39A	675	4NB – 58	677
4NH – 2A	683	4NH – 8A	684	4NB – 15	673	4NB – 24	674	4NB – 40	676	4NB – 59	678
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4NB – 3	672	4NB – 9	672	4NB – 16	673	4NB – 25	674	4NB – 42	676	4NB – 61	678
4NH – 3A	683	4NH – 9A	684	4NW – 16A	681	4NW – 25	682	4NB – 43	676	4NB – 62	678
4NW – 3A	680	4NW – 9A	680	4NB – 17	673	4NB – 26	674	4NB – 44	676	4NB – 63	678
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4NH – 4A	683	4NH – 10A	685	4NB – 18	673	4NB – 27	674	4NB – 46A	676	4NB – 65	678
4NW – 4A	680	4NW – 10A	680	4NW – 18A	681	4NB – 28	674	4NB – 47	676	4NB – 66	678
4NB – 5	672	4NB – 11	673	4NB – 19	673	4NB – 29	675	4NB – 48	676	4NB – 67	679
4NH – 5A	683	4NH – 11A	685	4NW – 19A	682	4NB – 30	675	4NB – 49	676	4NB – 68	679
4NW – 5A	680	4NW – 11	681	4NB – 20	674	4NB – 31	675	4NB – 50	677	4NB – 69	679
4NB – 6A	672	4NB – 12	673	4NW – 20A	682	4NB – 32	675	4NB – 51	677	4NB – 70	679
4NH – 6A	684	4NH – 12A	685	4NB – 21	674	4NB – 33	675	4NB – 52	677	4NB – 71	679
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						4NB – 35	675	4NB – 54	677	4NB – 73	679

Bends have the prefix "4NB".
Headers have the prefix "4NH".
Welded Assemblies have the prefix "4NW".

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Wrought Steel and Genuine Wrought Iron
Tubular Products

Butt-Welded, Lap-Welded, and Seamless Pipe, Casing, Boiler Tubes, and Tubing

General Notes

Pipe Trade Practice

All weights are figured on the basis of one cubic inch of steel weighing .2833 pound.

All material will be cut to length when so ordered, with extreme variation not exceeding one-eighth of an inch over or under, unless otherwise arranged.

All threads, unless otherwise indicated, are in accordance with American (Briggs') Standard.

The outside diameter of all classes of pipe, casing, tubing, tubes, etc., heavier than standards listed, is the same outside diameter as standards listed, the extra thickness always being on the inside and therefore reducing the inside diameter of the pipe.

Pipe and tubing are known and spoken of by their nominal inside diameters from ⅛-inch to 12-inch, inclusive. Casing is known by its nominal inside diameter.

In ordering pipe 12-inch and smaller designate weight desired, and in ordering tubes designate thickness desired.

Above 12-inch inside diameter, pipe and tubing are usually known and spoken of by their outside diameters, and when ordering, thickness desired must be specified.

All Boiler Tubes are known by their outside diameters.

All dimensions of tubular goods are subject to change without notice.

On orders calling for commercial sizes of pipe which are finished with threads and couplings, in sizes ⅛-inch to 12-inch, inclusive, and where orders specify quantity in lineal feet, it is understood that random lengths fitted with threads both ends and coupling one end will be shipped and the measurement is charged from end to end, that is over-all including coupling.

If cut lengths of any sizes are ordered, instructions must appear on the face of the order whether plain ends, threads only or threads and couplings are required. The pipe is then cut to the length specified for plain end and threads only, but if cut lengths with threads and couplings are specified the practice is the same with the exception that the couplings are charged separately, whether they are shipped loose or screwed on the pipe.

On sizes 14-inch O.D. and larger, information must appear on the order as to whether plain ends, threads only or threads and couplings are required, inasmuch as these large sizes are customarily held in stock in plain ends, subject to order as to the necessary requirements in regard to threads only or threads and couplings.

All data given on the following pages, numbers 583 to 591 inclusive, apply to Wrought Steel Tubular Products.

Standard Pipe
Black and Galvanized

All Dimensions and Weights Are Nominal

Size	List Prices	Diameters		Thick-ness	Weight per Foot		Number of Threads	Couplings			Test Pressure Pounds per Square Inch		
		External	Internal		Plain Ends	Threads and Couplings		Diameter	Length	Weight			
Inches	Per Foot	Inches	Inches	Inches	Pounds	Pounds	per Inch	Inches	Inches	Pounds	Butt-Weld	Lap-Weld	Seamless
⅛	.05½	.405	.269	.068	.24	.24	27	.562	⅞	.03	700		1000
¼	.06	.540	.364	.088	.42	.42	18	.685	1	.04	700		1000
⅜	.06	.675	.493	.091	.56	.56	18	.848	1⅛	.07	700		1000
½	.08½	.840	.622	.109	.85	.85	14	1.024	1⅜	.11	700		1000
¾	.11½	1.050	.824	.113	1.13	1.13	14	1.281	1⅝	.21	700		1000
1	.17	1.315	1.049	.133	1.67	1.68	11½	1.576	1⅞	.35	700		1000
1¼	.23	1.660	1.380	.140	2.27	2.28	11½	1.950	2⅛	.54	700		2500
1½	.27½	1.900	1.610	.145	2.71	2.73	11½	2.218	2⅜	.75	700		2300
2	.37	2.375	2.067	.154	3.65	3.67	11½	2.760	2⅝	1.23	700	1000	2000
2½	.58½	2.875	2.469	.203	5.79	5.81	8	3.276	2⅞	1.75	800	1000	2100
3	.76½	3.500	3.068	.216	7.57	7.61	8	3.948	3⅛	2.54	800	1000	1900
3½	.92	4.000	3.548	.226	9.10	9.20	8	4.591	3⅝	4.32		1000	1700
4	1.09	4.500	4.026	.237	10.79	10.88	8	5.091	3⅝	5.41		1000	1600
*4½	1.27	5.000	4.506	.247	12.53	12.64	8	5.591	3⅝	5.98		1000	1500
5	1.48	5.563	5.047	.258	14.61	14.81	8	6.296	4⅛	9.15		1000	1500
6	1.92	6.625	6.065	.280	18.97	19.18	8	7.358	4⅛	10.82		1000	1500
*7	2.38	7.625	7.023	.301	23.54	23.76	8	8.358	4⅛	12.39		1000	1200
8	2.50	8.625	8.071	.277	24.69	25.00	8	9.420	4⅝	15.84		800	1000
	2.88		7.981	.322	28.55	28.80						1000	1200
*9	3.45	9.625	8.941	.342	33.90	34.18	8	10.420	5⅛	19.75		900	1100
10	3.20	10.750	10.192	.279	31.20	32.00	8	11.721	6⅛	33.92		600	800
	3.50		10.136	.307	34.24	35.00						800	900
	4.12		10.020	.365	40.48	41.13						900	1000
*11	4.63	11.750	11.000	.375	45.55	46.24	8	12.721	6⅛	36.97		800	950
12	4.50	12.750	12.090	.330	43.77	45.00	8	13.958	6⅛	48.26		600	800
	5.07		12.000	.375	49.56	50.70						800	900

*These sizes are listed as standard but are not commonly used.

Unless otherwise ordered: Unless otherwise ordered, Standard Pipe is furnished with threads and couplings and in random lengths.

On sizes 3-inch and smaller, butt-weld pipe will be furnished unless otherwise specified.

Cut lengths: For cut lengths, an extra charge will be made above random lengths.

Galvanized or coated pipe: For galvanized or coated pipe, an extra charge will be made above Black.

Threads: The taper of threads is ¾-inch diameter per foot length for all sizes.

Weights: The permissible variation in weight is 5 per cent above and 5 per cent below.

The weight per foot of pipe with threads and couplings is based on a length of 20 feet, including the coupling.

8, 10, and 12-inch sizes: On sizes made in more than one weight, weight desired must be specified.

General notes . . . . page 582 *Standard Bundling Schedule . . . page 586*

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Extra Strong Pipe

Black and Galvanized

All Dimensions and Weights Are Nominal

Size	List Prices	Diameters		Thickness	Weight per Foot Plain Ends	Test Pressure Pounds per Square Inch		
		External	Internal			Butt-Weld	Lap-Weld	Seamless
Inches	Per Foot	Inches	Inches	Inches	Pounds			
⅛	.12	.405	.215	.095	.31	700		1000
¼	.07½	.540	.302	.119	.53	700		1000
⅜	.07½	.675	.423	.126	.73	700		1000
½	.11	.840	.546	.147	1.08	700		1000
¾	.15	1.050	.742	.154	1.47	700		1000
1	.22	1.315	.957	.179	2.17	700		1000
1¼	.30	1.660	1.278	.191	2.99	1500		2500
1½	.36½	1.900	1.500	.200	3.63	1500		2500
2	.50½	2.375	1.939	.218	5.02	1500	2500	2500
2½	.77	2.875	2.323	.276	7.66	1500	2000	2500
3	1.03	3.500	2.900	.300	10.25	1500	2000	2500
3½	1.25	4.000	3.364	.318	12.50		2000	2500
4	1.50	4.500	3.826	.337	14.98		2000	2200
* 4½	1.80	5.000	4.290	.355	17.61		1800	2100
5	2.08	5.563	4.813	.375	20.77		1800	2000
6	2.86	6.625	5.761	.432	28.57		1800	2000
* 7	3.81	7.625	6.625	.500	38.04		1500	2000
8	4.34	8.625	7.625	.500	43.38		1500	1700
* 9	4.90	9.625	8.625	.500	48.72		1500	1600
10	5.48	10.750	9.750	.500	54.73		1200	1400
*11	6.10	11.750	10.750	.500	60.07		1100	1300
12	6.55	12.750	11.750	.500	65.41		1100	1100

*These sizes are listed as standard but are not commonly used.

Unless otherwise ordered: Unless otherwise ordered, Extra Strong Pipe is furnished with plain ends and in random lengths.

On sizes 3-inch and smaller, butt-weld pipe will be furnished unless otherwise specified.

Random lengths: Random lengths of Extra Strong Pipe are considered to be 12 feet to 22 feet, we to have the privilege, however, of supplying not exceeding 5 per cent of total order in lengths 6 feet to 12 feet.

Cut lengths: For cut lengths, an extra charge will be made above random lengths.

Threads, couplings: For pipe fitted with threads only or with threads and couplings, an extra charge will be made above plain ends.

Galvanized or coated pipe: For galvanized or coated pipe, an extra charge will be made above Black.

Weights: The permissible variation in weight is 5 per cent above and 5 per cent below.

General notes . . . . page 582

Standard Bundling Schedule . . . . page 586

Double Extra Strong Pipe

Black and Galvanized

All Dimensions and Weights Are Nominal

Size	List Prices	Diameters		Thickness	Weight per Foot Plain Ends	Test Pressure Pounds per Square Inch		
		External	Internal			Butt-Weld	Lap-Weld	Seamless
Inches	Per Foot	Inches	Inches	Inches	Pounds			
½	.32	.840	.252	.294	1.71	700		1000
¾	.35	1.050	.434	.308	2.44	700		1000
1	.37	1.315	.599	.358	3.65	700		1000
1¼	.52½	1.660	.896	.382	5.21	2200		2500
1½	.65	1.900	1.100	.400	6.40	2200		3000
2	.91	2.375	1.503	.436	9.02	2200	3000	3000
2½	1.37	2.875	1.771	.552	13.69	2200	3000	3000
3	1.86	3.500	2.300	.600	18.58		3000	3000
3½	2.30	4.000	2.728	.636	22.85		2500	2500
4	2.76	4.500	3.152	.674	27.45		2500	2500
*4½	3.26	5.000	3.580	.710	32.53		2000	2500
5	3.86	5.563	4.063	.750	38.55		2000	2500
6	5.32	6.625	4.897	.864	53.16		2000	2500
*7	6.35	7.625	5.875	.875	63.07		2000	2500
8	7.25	8.625	6.875	.875	72.42		2000	2500

*These sizes are listed as standard but are not commonly used.

Unless otherwise ordered: Unless otherwise ordered, Double Extra Strong Pipe is furnished with plain ends and in random lengths.

On sizes 2½-inch and smaller, butt-weld pipe will be furnished unless otherwise specified.

Random lengths: Random lengths of Double Extra Strong Pipe are considered to be 12 feet to 22 feet, we to have the privilege, however, of supplying not exceeding 5 per cent of total order in lengths 6 feet to 12 feet.

Cut lengths: For cut lengths, an extra charge will be made above random lengths.

Threads, couplings: For pipe fitted with threads only or with threads and couplings, an extra charge will be made above plain ends.

Galvanized or coated pipe: For galvanized or coated pipe, an extra charge will be made above Black.

Weights: The permissible variation in weight is 10 per cent above and 10 per cent below.

General notes . . . . page 582

Standard Bundling Schedule . . . . page 586

Hydraulic Pipe

All Dimensions and Weights Are Nominal

Size	List Prices	Diameters		Thickness		Weight per Foot Plain Ends	Test Pressure
		External	Internal	Fraction	Decimal		
Inches	Per Foot	Inches	Inches	Inches	Inches	Pounds	Pounds per Square Inch
9	6.01	9.625	8.375	⅝	.625	60.08	1600
	7.11		8.125	¾	.750	71.09	1700
	8.18		7.875	⅞	.875	81.77	1800
	9.22		7.625	1	1.000	92.12	1800
10	6.76	10.750	9.500	⅝	.625	67.59	1400
	8.01		9.250	¾	.750	80.10	1500
	9.23		9.000	⅞	.875	92.28	1600
	10.42		8.750	1	1.000	104.13	1800
11	7.43	11.750	10.500	⅝	.625	74.26	1300
	8.82		10.250	¾	.750	88.11	1400
	10.17		10.000	⅞	.875	101.63	1500
	11.49		9.750	1	1.000	114.81	1600
12	8.10	12.750	11.500	⅝	.625	80.94	1200
	9.62		11.250	¾	.750	96.12	1300
	11.10		11.000	⅞	.875	110.97	1400
	12.55		10.750	1	1.000	125.49	1500

Unless otherwise ordered: Unless otherwise ordered, Hydraulic Pipe is furnished with plain ends and in random lengths.

Cut lengths: For cut lengths, an extra charge will be made above random lengths.

Weights: The permissible variation in weight is 10 per cent above and 10 per cent below.

General notes . . . . page 582

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Reamed and Drifted Pipe

All Dimensions and Weights Are Nominal

Size	List Prices	Diameters		Thickness	Weight per Foot		Number of Threads per Inch	Couplings			Test Pressure Pounds per Square Inch	
		External	Internal		Plain Ends	Threads and Couplings		Diameter	Length	Weight		
Inches	Per Foot	Inches	Inches	Inches	Pounds	Pounds		Inches	Inches	Pounds	Butt-Weld	Lap-Weld
1	.17	1.315	1.049	.133	1.67	1.70	11½	1.575	2⅜	.47	700	
1¼	.23	1.660	1.380	.140	2.27	2.30	11½	2.054	2⅞	1.03	1000	
1½	.27½	1.900	1.610	.145	2.71	2.75	11½	2.294	2⅞	1.17	1000	
2	.37	2.375	2.067	.154	3.65	3.75	11½	2.773	3⅝	1.87	1000	1800
	.40		2.041	.167	3.93	4.00						2200
2½	.58½	2.875	2.469	.203	5.79	5.90	8	3.265	4⅛	2.60	1000	1500
3	.76½	3.500	3.068	.216	7.57	7.70	8	4.014	4⅛	4.13	1000	1500
3½	.92	4.000	3.548	.226	9.10	9.25	8	4.628	4⅝	6.28		1000
4	1.09	4.500	4.026	.237	10.79	11.00	8	5.233	4⅝	8.15		1000
*4½	1.27	5.000	4.506	.247	12.53	12.80	8	5.733	4⅝	9.00		1000
5	1.48	5.563	5.047	.258	14.61	15.00	8	6.420	5⅛	12.87		1000
6	1.92	6.625	6.065	.280	18.97	19.45	8	7.482	5⅛	15.17		1000

*This size is listed as standard but is not commonly used.

Unless otherwise ordered: Unless otherwise ordered, Reamed and Drifted Pipe is furnished with threads and couplings and in random lengths, 20 feet and shorter.

Threads: The taper of threads is ¾-inch diameter per foot length for all sizes.

Weights: The permissible variation in weight is 5 per cent above and 5 per cent below.

The weight per foot of pipe with threads and couplings is based on a length of 20 feet, including the coupling, but shipping lengths of small sizes will usually average less than 20 feet.

2-inch size: On sizes made in more than one weight, weight desired must be specified.

General notes . . . . page 582

Standard Bundling Schedule

Number of Pieces, Average Feet, and Average Weight of Pipe, per Bundle

Size	Standard Pipe			Extra Strong Pipe			Double Extra Strong Pipe		
	Number of Pieces per Bundle	Average, per Bundle		Number of Pieces per Bundle	Average, per Bundle		Number of Pieces per Bundle	Average, per Bundle	
		Number of Feet	Weight Pounds		Number of Feet	Weight Pounds		Number of Feet	Weight Pounds
Inches									
⅛	30	500	123	30	500	157			
¼	24	420	179	24	400	214			
⅜	18	340	193	18	330	244			
½	12	240	204	12	230	250	7	130	223
¾	7	140	159	7	140	206	5	95	232
1	5	100	168	5	100	217	3	60	220
1¼	3	60	137	3	60	180	3	60	313
1½	3	60	164	3	60	218	3	60	384

Order sizes ⅛ to 1½-inch by Bundle.
Order sizes 2-inch and larger by lengths, using 20 feet as average length.

Large O.D. Pipe

Plain Ends

All Dimensions and Weights Are Nominal

Size O.D.	Thickness	List Prices	Weight per Foot	Test Pressure Pounds per Square Inch		
					Seamless	
				Welded	Low Carbon	Medium Carbon
Inches	Inches	Per Foot	Pounds			
14	¼	3.67	36.71	550		
	5/16	4.56	45.68	650	650	750
	⅜	5.45	54.56	800	800	900
	7/16	6.33	63.37	950	950	1100
	½	7.20	72.09	1100	1100	1200
	9/16	8.07	80.72	1200	1200	1400
	⅝	8.92	89.27	1300	1300	1500
	11/16	9.77	97.74	1500	1500	1700
	¾	10.61	106.13	1600	1600	1800
	⅞	12.26	122.65	1900		
15	¼	3.93	39.38	500		
	5/16	4.90	49.02	650		
	⅜	5.85	58.57	750		
	7/16	6.80	68.04	900		
	½	7.74	77.43	1000		
	9/16	8.67	86.73	1100		
	⅝	9.59	95.95	1300		
	11/16	10.50	105.09	1400		
	¾	11.41	114.14	1500		
	⅞	13.20	132.00	1800		
16	¼	4.20	42.05	450		
	5/16	5.23	52.35	600	600	650
	⅜	6.25	62.57	700	700	800
	7/16	7.27	72.71	800	800	950
	½	8.27	82.77	950	950	1100
	9/16	9.27	92.74	1100	1100	1200
	⅝	10.26	102.62	1200	1200	1300
	11/16	11.24	112.43	1300	1300	1500
	¾	12.21	122.15	1400	1400	1600
	⅞	14.13	141.34	1600		

Size O.D.	Thickness	List Prices	Weight per Foot	Test Pressure Pounds per Square Inch		
					Seamless	
				Welded	Low Carbon	Medium Carbon
Inches	Inches	Per Foot	Pounds			
18	5/16	5.90	59.03	500	500	600
	⅜	7.05	70.58	650	650	700
	7/16	8.20	82.06	750	750	850
	½	9.34	93.45	850	850	950
	9/16	10.47	104.75	950	950	1100
	⅝	11.59	115.97	1000	1000	1200
	11/16	12.71	127.11	1100	1100	1300
	¾	13.81	138.17	1300	1300	1400
	⅞	16.00	160.03	1500		
20	5/16	6.57	65.70	450	450	550
	⅜	7.85	78.59	550	550	650
	7/16	9.14	91.40	650	650	750
	½	10.41	104.13	750	750	850
	9/16	11.67	116.77	850	850	950
	⅝	12.93	129.33	950	950	1100
	11/16	14.18	141.80	1000	1000	1200
	¾	15.41	154.19	1100	1100	1300
	⅞	17.87	178.72	1300		
22	5/16	7.23	72.38	450	450	500
	⅜	8.66	86.60	500	500	600
	7/16	10.07	100.75	600	600	700
	½	11.48	114.81	700	700	750
	9/16	12.87	128.78	750	750	850
	⅝	14.26	142.68	850	850	950
	11/16	15.64	156.48	950	950	1100
	¾	17.02	170.21	1000	1000	1200
24	⅜	9.46	94.61	450	450	550
	7/16	11.00	110.09	550	550	600
	½	12.54	125.49	650	650	700
	9/16	14.08	140.80	700	700	800
	⅝	15.60	156.03	800	800	900
	11/16	17.11	171.17	850	850	950
	¾	18.62	186.23	950	950	1100

Unless otherwise ordered: Unless otherwise ordered, Large O.D. Pipe is furnished with plain ends and in random lengths.

Cut lengths: For cut lengths, an extra charge will be made above random lengths.

Threads, couplings: For pipe fitted with threads only or with threads and couplings, an extra charge will be made above plain ends.

Weights: The permissible variation in weight is 10 per cent above and 10 per cent below.

Other sizes: Prices, dimensions, weights, and test pressures on 17 and 21-inch O.D. sizes and on sizes 26-inch O.D. and larger, are furnished on application.

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A. P. I. Line Pipe

All Dimensions and Weights Are Nominal

Size	List Prices	Diameters		Thickness	Weight per Foot		Number of Threads per Inch	Couplings			Test Pressure Pounds per Square Inch			
		External	Internal		Plain Ends	Threads and Couplings		Diameter, Inches	Length, Inches	Weight, Pounds	Butt-Weld	*Lap-Weld and Grade "A" Seamless	Grade "B" Seamless	Grade "C" Seamless
Inches	Per Foot	Inches	Inches	Inches	Pounds	Pounds								
⅛	.06	.405	.269	.068	.24	.25	27	.582	1⅛	.04	700	1000	1000	1000
¼	.06½	.540	.364	.088	.42	.43	18	.724	1⅜	.07	700	1000	1000	1000
⅜	.06½	.675	.493	.091	.56	.57	18	.898	1⅝	.13	700	1000	1000	1000
½	.09	.840	.622	.109	.85	.86	14	1.085	1⅞	.21	700	1000	1000	1000
¾	.12	1.050	.824	.113	1.13	1.14	14	1.316	2⅛	.33	700	1000	1000	1000
1	.17½	1.315	1.049	.133	1.67	1.70	11½	1.575	2⅜	.47	700	1000	1000	1000
1¼	.23½	1.660	1.380	.140	2.27	2.30	11½	2.054	2⅞	1.03	1200	2500	2500	2500
1½	.28	1.900	1.610	.145	2.71	2.75	11½	2.294	2⅞	1.17	1200	2300	2500	2500
2	.37½	2.375	2.067	.154	3.65	3.75	11½	2.870	3⅝	2.17	1200	1900	2200	2500
2½	.59	2.875	2.469	.203	5.79	5.90	8	3.389	4⅛	3.43	1200	2100	2400	2500
3	.77	3.500	3.068	.216	7.57	7.70	8	4.014	4⅛	4.13	1200	1900	2100	2300
3½	.93	4.000	3.548	.226	9.10	9.25	8	4.628	4⅝	6.28		1700	1900	2100
4	1.10	4.500	4.026	.237	10.79	11.00	8	5.216	4⅝	8.15		1600	1800	2000
5	1.50	5.563	5.047	.258	14.61	15.00	8	6.420	5⅛	12.87		1400	1600	1800
6	1.94	6.625	6.065	.280	18.97	19.45	8	7.482	5⅛	15.17		1300	1400	1600
8	2.54	8.625	8.071	.277	24.69	25.55	8	9.593	6⅛	26.62		950	1100	1200
	2.92		7.981	.322	28.55	29.35						1100	1300	1400
10	3.25	10.750	10.192	.279	31.20	32.75	8	11.958	6⅝	44.15		800	900	1000
	3.55		10.136	.307	34.24	35.75						850	950	1100
	4.17		10.020	.365	40.48	41.85						1000	1200	1300
12	4.55	12.750	12.090	.330	43.77	45.45	8	13.958	6⅝	51.99		800	900	1000
	5.12		12.000	.375	49.56	51.15						900	1000	1100
14 OD	5.68	14.000	13.250	.375	54.56	57.00	8	15.446	7⅛	72.28		800	900	1000
15 OD	6.18	15.000	14.250	.375	58.57	61.15	8	16.446	7⅛	77.22		750	850	950
16 OD	6.60	16.000	15.250	.375	62.57	65.30	8	17.446	7⅛	82.16		700	800	900
17 OD	7.30	17.000	16.214	.393	69.70	73.20	8	18.683	7⅛	99.62		700	800	900
18 OD	8.10	18.000	17.182	.409	76.84	81.20	8	19.921	7⅛	119.14		700	750	850
20 OD	9.00	20.000	19.182	.409	85.57	90.00	8	21.706	7⅝	127.85		600	700	800

*Lap-Weld not furnished in sizes below 2 inches.

Unless otherwise ordered: Unless otherwise ordered, A. P. I. Line Pipe is furnished with threads and couplings and in random lengths.

Cut lengths: For cut lengths, an extra charge will be made above random lengths.

Galvanized or coated pipe: For galvanized or coated pipe, an extra charge will be made above Black.

Threads: The taper of threads is ¾-inch diameter per foot length for all sizes.

Weights: The permissible variation in weight for any length of pipe is 10 per cent above and 3½ per cent below, but the carload weight shall not be more than 1¾ per cent under the nominal weight. The weight per foot of pipe with threads and couplings is based on a length of 20 feet, including the coupling.

8, 10, and 12-inch sizes: On sizes made in more than one weight, weight desired must be specified.

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Boiler Tubes

Under latest revision of A.S.T.M. Specification, Serial Designation A-83, and A.S.M.E. Boiler Code, the gauge ordered is the lightest we may ship. As it is impossible to manufacture to an exact thickness or weight, the necessary variation will be represented by heavier wall and overweight. Prices are based on this manufacturing weight.

Prices on Application

Size O.D.	Thickness Minimum		Manufacturing Weight
Inches	B.W.G.	Decimal of Inch	Pounds per Foot
1	13	.095	1.037
	12	.109	1.168
	11	.120	1.263
	10	.134	1.384
1¼	13	.095	1.328
	12	.109	1.502
	11	.120	1.628
	10	.134	1.793
1½	13	.095	1.619
	12	.109	1.836
	11	.120	1.994
	10	.134	2.201
1¾	13	.095	1.910
	12	.109	2.169
	11	.120	2.360
	10	.134	2.610
2	13	.095	2.201
	12	.109	2.503
	11	.120	2.726
	10	.134	3.018
2¼	13	.095	2.492
	12	.109	2.837
	11	.120	3.092
	10	.134	3.427
2½	12	.109	3.171
	11	.120	3.457
	10	.134	3.835
	9	.148	4.207
2¾	12	.109	3.504
	11	.120	3.823
	10	.134	4.244
	9	.148	4.658

Size O.D.	Thickness Minimum		Manufacturing Weight
Inches	B.W.G.	Decimal of Inch	Pounds per Foot
3	12	.109	3.838
	11	.120	4.189
	10	.134	4.652
	9	.148	5.110
3¼	11	.120	4.555
	10	.134	5.061
	9	.148	5.561
	8	.165	6.179
3½	11	.120	4.921
	10	.134	5.469
	9	.148	6.012
	8	.165	6.683
4	10	.134	6.286
	9	.148	6.915
	8	.165	7.693
	7	.180	8.347
4½	10	.134	7.103
	9	.148	7.817
	8	.165	8.702
	7	.180	9.447
5	9	.148	8.720
	8	.165	9.711
	7	.180	10.550
	6	.203	11.810
5½	9	.148	9.622
	8	.165	10.720
	7	.180	11.650
	6	.203	13.050
6	7	.180	12.750
	6	.203	14.290
	5	.220	15.410
	4	.238	16.640

Dimensions and weights of Boiler Tubes more than four gauges heavier than Standard and sizes larger than 6-inch O.D., are furnished on application.

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Merchant Casing

For Water Wells and Irrigation Purposes

All Dimensions and Weights Are Nominal

Size	List Prices	Diameters		Thickness	Weight per Foot		Number of Threads per Inch	Couplings			Test Pressure
		External	Internal		Plain Ends	Threads and Couplings		Diameter	Length	Weight	Pounds per Square Inch
Inches	Per Foot	Inches	Inches	Inches	Pounds	Pounds		Inches	Inches	Pounds	Lap-Weld
2	.33	2.250	2.050	.100	2.29	2.34	14	2.714	2 5/8	1.41	500
2 1/4	.33	2.500	2.284	.108	2.75	2.82	14	2.964	2 5/8	1.55	500
*2 1/2	.33	2.750	2.524	.113	3.18	3.25	14	3.214	2 7/8	1.88	500
2 3/4	.40	3.000	2.768	.116	3.57	3.65	14	3.464	2 7/8	2.04	500
3	.41	3.250	3.010	.120	4.01	4.10	14	3.771	3 1/8	2.72	500
3 1/4	.46	3.500	3.250	.125	4.50	4.60	14	4.021	3 1/8	2.92	500
*3 1/2	.51	3.750	3.492	.129	4.98	5.10	14	4.271	3 1/8	3.12	500
3 3/4	.56 1/2	4.000	3.732	.134	5.53	5.65	14	4.521	3 1/8	3.31	500
4	.62	4.250	3.974	.138	6.06	6.20	14	4.771	3 5/8	4.12	500
4 1/4	.68 1/2	4.500	4.216	.142	6.60	6.75	14	5.021	3 5/8	4.35	500
4 1/2	.74	4.750	4.460	.145	7.13	7.25	14	5.271	3 5/8	4.58	500
4 3/4	.81	5.000	4.696	.152	7.87	8.00	14	5.521	3 5/8	4.81	500
5	.85	5.250	4.944	.153	8.32	8.50	14	5.828	4 1/8	6.29	500
5 3/16	.90	5.500	5.192	.154	8.79	9.00	14	6.078	4 1/8	6.58	500
5 5/8	1.05	6.000	5.672	.164	10.22	10.50	14	6.664	4 1/8	8.13	500
6 1/4	1.20	6.625	6.287	.169	11.65	12.00	14	7.308	4 5/8	10.45	500
6 5/8	1.35	7.000	6.652	.174	12.68	13.00	14	7.692	4 5/8	11.43	500
*7 1/4	1.48	7.625	7.263	.181	14.39	14.75	14	8.317	4 5/8	12.10	500
7 5/8	1.60	8.000	7.628	.186	15.52	16.00	11 1/2	8.788	5 1/8	16.26	500
8 1/4	1.75	8.625	8.249	.188	16.94	17.50	11 1/2	9.413	5 1/8	17.47	500
8 5/8	1.90	9.000	8.608	.196	18.42	19.00	11 1/2	9.788	5 1/8	18.20	500
9 5/8	2.28	10.000	9.582	.209	21.85	22.75	11 1/2	10.911	6 1/8	27.86	500
*10 5/8	2.68	11.000	10.552	.224	25.78	26.75	11 1/2	11.911	6 1/8	30.34	500
11 5/8	3.15	12.000	11.514	.243	30.51	31.50	11 1/2	12.911	6 1/8	33.00	500
12 1/2	3.65	13.000	12.482	.259	35.24	36.50	11 1/2	14.025	6 1/8	39.99	500
13 1/2	4.20	14.000	13.448	.276	40.45	42.00	11 1/2	15.139	6 1/8	47.31	500
14 1/2	4.75	15.000	14.418	.291	45.71	47.50	11 1/2	16.263	6 1/8	55.58	500
15 1/2	5.25	16.000	15.396	.302	50.63	52.50	11 1/2	17.263	6 1/8	59.15	500

*These sizes are listed as standard but are not commonly used; earlier delivery can generally be made of other sizes.

Unless otherwise ordered: Unless otherwise ordered, Merchant Casing is furnished with threads and couplings and in random lengths.

Cut lengths: For cut lengths, an extra charge will be made above random lengths.

Galvanized or coated casing: For galvanized or coated casing, an extra charge will be made above Black.

Threads: The taper of threads is 3/8-inch diameter per foot length for all sizes.

The thickness of walls makes it impracticable to cut threads of coarser pitch than shown on the table.

Weights: The permissible variation in weight is 5 per cent above and 5 per cent below.

The weight per foot of casing with threads and couplings is based on a length of 20 feet, including the coupling.

General notes . . . . page 582

Inserted Joint Casing

All Dimensions and Weights Are Nominal

Size	List Prices	Diameters		Thickness	Weight per Foot	Number of Threads per Inch	Joint		Test Pressure
		External	Internal		Plain Ends		Length of Joint	Diameter of Joint	Pounds per Square Inch
Inches	Per Foot	Inches	Inches	Inches	Pounds		Inches	Inches	Lap-Weld
2	.33	2.250	2.050	.100	2.29	14	.968	2.340	1300
2 1/4	.33	2.500	2.284	.108	2.75	14	.993	2.606	1300
*2 1/2	.33	2.750	2.524	.113	3.18	14	1.018	2.866	1200
2 3/4	.40	3.000	2.768	.116	3.57	14	1.043	3.122	1200
3	.41	3.250	3.010	.120	4.01	14	1.068	3.380	1100
3 1/4	.46	3.500	3.250	.125	4.50	14	1.093	3.640	1100
*3 1/2	.51	3.750	3.492	.129	4.98	14	1.118	3.898	1000
3 3/4	.56 1/2	4.000	3.732	.134	5.53	14	1.143	4.158	1000
4	.62	4.250	3.974	.138	6.06	14	1.168	4.416	950
4 1/4	.68 1/2	4.500	4.216	.142	6.60	14	1.193	4.674	950
4 1/2	.74	4.750	4.460	.145	7.13	14	1.218	4.930	900
4 3/4	.81	5.000	4.696	.152	7.87	14	1.243	5.194	900
5	.85	5.250	4.944	.153	8.32	14	1.268	5.446	850
5 3/16	.90	5.500	5.192	.154	8.79	14	1.293	5.698	850
5 5/8	1.05	6.000	5.672	.164	10.22	14	1.343	6.218	800
6 1/4	1.20	6.625	6.287	.169	11.65	14	1.405	6.853	750
6 5/8	1.35	7.000	6.652	.174	12.68	14	1.443	7.238	750
*7 1/4	1.48	7.625	7.263	.181	14.39	14	1.505	7.877	700
7 5/8	1.60	8.000	7.628	.186	15.52	11 1/2	1.574	8.238	700
8 1/4	1.75	8.625	8.249	.188	16.94	11 1/2	1.636	8.867	650
8 5/8	1.90	9.000	8.608	.196	18.42	11 1/2	1.674	9.258	650
9 5/8	2.28	10.000	9.582	.209	21.85	11 1/2	1.774	10.284	650
*10 5/8	2.68	11.000	10.552	.224	25.78	11 1/2	1.874	11.314	600
11 5/8	3.15	12.000	11.514	.243	30.51	11 1/2	1.974	12.352	600
12 1/2	3.65	13.000	12.482	.259	35.24	11 1/2	2.074	13.384	600
13 1/2	4.20	14.000	13.448	.276	40.45	11 1/2	2.174	14.418	600
14 1/2	4.75	15.000	14.418	.291	45.71	11 1/2	2.274	15.448	600
15 1/2	5.25	16.000	15.396	.302	50.63	11 1/2	2.374	16.470	550

*These sizes are listed as standard but are not commonly used; earlier delivery can generally be made of other sizes.

Unless otherwise ordered: Unless otherwise ordered, Inserted Joint Casing is furnished in random lengths.

Cut lengths: For cut lengths, an extra charge will be made above random lengths.

Galvanized or coated casing: For galvanized or coated casing, an extra charge will be made above Black.

Threads: The taper of threads is 3/8-inch diameter per foot length for all sizes.

The thickness of walls makes it impracticable to cut threads of coarser pitch than shown on the table.

Weights: The permissible variation in weight is 10 per cent above and 5 per cent below.

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Brass and Copper Pipe

Standard Pipe Sizes

Prices on application

Dimensions and Weights

Nominal Size (Iron Pipe Size)	Diameters		Wall Thickness	Weight Per Linear Foot		
	External	Internal		Yellow Brass	Red Brass	Copper
Inches	Inches	Inches	Inches	Pounds	Pounds	Pounds
Regular						
⅛	.405	.281	.0620	.246	.253	.259
¼	.540	.375	.0825	.437	.450	.460
⅜	.675	.494	.0905	.612	.630	.643
½	.840	.625	.1075	.911	.938	.957
¾	1.050	.822	.1140	1.24	1.27	1.30
1	1.315	1.062	.1265	1.74	1.79	1.83
1¼	1.660	1.368	.1460	2.56	2.63	2.69
1½	1.900	1.600	.1500	3.04	3.13	3.20
2	2.375	2.062	.1565	4.02	4.14	4.23
2½	2.875	2.500	.1875	5.83	6.00	6.14
3	3.500	3.062	.2190	8.31	8.56	8.75
3½	4.000	3.500	.2500	10.85	11.17	11.41
4	4.500	4.000	.2500	12.29	12.66	12.94
4½	5.000	4.500	.2500	13.74	14.15	14.46
5	5.563	5.063	.2500	15.40	15.85	16.21
6	6.625	6.125	.2500	18.44	18.99	19.41
7	7.625	7.062	.2815	23.92	24.63	25.17
8	8.625	8.000	.3125	30.05	30.95	31.63
10	10.750	10.019	.3655	43.91	45.20	46.22
12	12.750	12.000	.3750	53.71	55.29	56.51
Extra Strong						
⅛	.405	.205	.100	.353	.363	.371
¼	.540	.294	.123	.593	.611	.624
⅜	.675	.421	.127	.805	.829	.847
½	.840	.542	.149	1.19	1.23	1.25
¾	1.050	.736	.157	1.62	1.67	1.71
1	1.315	.951	.182	2.39	2.46	2.51
1¼	1.660	1.272	.194	3.30	3.39	3.46
1½	1.900	1.494	.203	3.99	4.10	4.19
2	2.375	1.933	.221	5.51	5.67	5.79
2½	2.875	2.315	.280	8.41	8.66	8.84
3	3.500	2.892	.304	11.24	11.57	11.82
3½	4.000	3.358	.321	13.67	14.07	14.37
4	4.500	3.818	.341	16.41	16.89	17.25
4½	5.000	4.250	.375	20.07	20.66	21.10
5	5.563	4.813	.375	22.52	23.18	23.67
6	6.625	5.751	.437	31.32	32.21	32.93
7	7.625	6.625	.500	41.23	42.43	43.34
8	8.625	7.625	.500	47.02	48.39	49.42
10	10.750	9.750	.500	59.32	61.05	62.40

Unless otherwise ordered: Unless otherwise ordered, Brass or Copper Pipe is furnished with plain ends.

When Brass Pipe is ordered, Yellow Brass will be furnished unless Red Brass is specified.

Lengths: Commercial lengths of Brass and Copper Pipe are 12 feet long. Longer lengths are made to order.

Weights: Variations from the weights given in the table shown above must be expected in practice.

Gauge tubing: Prices of seamless tubing, diameters ⅛ to 10-inch in any gauge in which the different diameters are made, will be quoted on request, for direct shipment from the mill.

Copper Tubing for Solder-Joint Valves and Fittings....page 486

Standard Pipe Data

All Dimensions and Weights are Nominal

Size	Diameters		Thickness	Circumference		Transverse Areas			Length of Pipe Per Sq. Foot of		Length of Pipe Containing One Cubic Foot	Weight per Foot		Number of Threads per Inch of Screw	Moment of Inertia	Wt. of Water Per Foot
	External	Internal		External	Internal	External	Internal	Metal	External Surface	Internal Surface		Plain Ends	Threaded and Coupled			
Ins.	Inches	Inches	Inches	Inches	Inches	Sq. Ins.	Sq. Ins.	Sq. Ins.	Feet	Feet	Feet	Pounds	Pounds			Pounds
⅛	.405	.269	.068	1.272	.845	.129	.057	.072	9.431	14.199	2533.775	.244	.245	27	.00105	.025
¼	.540	.364	.088	1.696	1.144	.229	.104	.125	7.073	10.493	1383.789	.424	.425	18	.00331	.045
⅜	.675	.493	.091	2.121	1.549	.358	.191	.167	5.658	7.747	754.360	.567	.568	18	.00729	.083
½	.840	.622	.109	2.639	1.954	.554	.304	.250	4.547	6.141	473.906	.850	.852	14	.01709	.132
¾	1.050	.824	.113	3.299	2.589	.866	.533	.333	3.637	4.635	270.034	1.130	1.134	14	.03704	.231
1	1.315	1.049	.133	4.131	3.296	1.358	.864	.494	2.904	3.641	166.618	1.678	1.684	11½	.08734	.375
1¼	1.660	1.380	.140	5.215	4.335	2.164	1.495	.669	2.301	2.767	96.275	2.272	2.281	11½	.1947	.65
1½	1.900	1.610	.145	5.969	5.058	2.835	2.036	.799	2.010	2.372	70.733	2.717	2.731	11½	.3099	.88
2	2.375	2.067	.154	7.461	6.494	4.430	3.355	1.075	1.608	1.847	42.913	3.652	3.678	11½	.6657	1.45
2½	2.875	2.469	.203	9.032	7.757	6.492	4.788	1.704	1.328	1.547	30.077	5.793	5.819	8	1.530	2.07
3	3.500	3.068	.216	10.996	9.638	9.621	7.393	2.228	1.091	1.245	19.479	7.575	7.616	8	3.017	3.20
3½	4.000	3.548	.226	12.566	11.146	12.566	9.886	2.680	.954	1.076	14.565	9.109	9.202	8	4.788	4.29
4	4.500	4.026	.237	14.137	12.648	15.904	12.730	3.174	.848	.948	11.312	10.790	10.889	8	7.233	5.50
4½	5.000	4.506	.247	15.708	14.156	19.635	15.947	3.688	.763	.847	9.030	12.538	12.642	8	10.44	6.91
5	5.563	5.047	.258	17.477	15.856	24.306	20.006	4.300	.686	.756	7.198	14.617	14.810	8	15.16	8.67
6	6.625	6.065	.280	20.813	19.054	34.472	28.891	5.581	.576	.629	4.984	18.974	19.185	8	28.14	12.51
7	7.625	7.023	.301	23.955	22.063	45.664	38.738	6.926	.500	.543	3.717	23.544	23.769	8	46.52	16.80
8	8.625	8.071	.277	27.096	25.356	58.426	51.161	7.265	.442	.473	2.815	24.696	25.000	8	63.35	22.18
8	8.625	7.981	.322	27.096	25.073	58.426	50.027	8.399	.442	.478	2.878	28.554	28.809	8	72.49	21.70
9	9.625	8.941	.342	30.238	28.089	72.760	62.786	9.974	.396	.427	2.294	33.907	34.188	8	107.6	27.20
10	10.750	10.192	.279	33.772	32.019	90.763	81.585	9.178	.355	.374	1.765	31.201	32.000	8	125.9	35.37
10	10.750	10.136	.307	33.772	31.843	90.763	80.691	10.072	.355	.376	1.785	34.240	35.000	8	137.4	34.95
10	10.750	10.020	.365	33.772	31.479	90.763	78.855	11.908	.355	.381	1.826	40.483	41.132	8	160.7	34.20
11	11.750	11.000	.375	36.914	34.558	108.434	95.033	13.401	.325	.347	1.515	45.557	46.247	8	217.0	41.20
12	12.750	12.090	.330	40.055	37.982	127.676	114.800	12.876	.299	.315	1.254	43.773	45.000	8	248.5	49.70
12	12.750	12.000	.375	40.055	37.699	127.676	113.097	14.579	.299	.318	1.273	49.562	50.706	8	279.3	49.00

Extra Strong Pipe Data

All Dimensions and Weights are Nominal

Size	Diameters		Thickness	Circumference		Transverse Areas			Length of Pipe per Sq. Ft. of		Length of Pipe Containing One Cubic Foot	Weight per Foot Plain Ends	Moment of Inertia	Wt. of Water Per Foot
	External	Internal		External	Internal	External	Internal	Metal	External Surface	Internal Surface				
Ins.	Inches	Inches	Inches	Inches	Inches	Sq. Ins.	Sq. Ins.	Sq. Ins.	Feet	Feet	Feet	Pounds		Pounds
⅛	.405	.215	.095	1.272	.675	.129	.036	.093	9.431	17.766	3966.392	.314	.00122	.016
¼	.540	.302	.119	1.696	.949	.229	.072	.157	7.073	12.648	2010.290	.535	.00377	.031
⅜	.675	.423	.126	2.121	1.329	.358	.141	.217	5.658	9.030	1024.689	.738	.00862	.061
½	.840	.546	.147	2.639	1.715	.554	.234	.320	4.547	6.995	615.017	1.087	.02008	.102
¾	1.050	.742	.154	3.299	2.331	.866	.433	.433	3.637	5.147	333.016	1.473	.04479	.188
1	1.315	.957	.179	4.131	3.007	1.358	.719	.639	2.904	3.991	200.193	2.171	.1056	.312
1¼	1.660	1.278	.191	5.215	4.015	2.164	1.283	.881	2.301	2.988	112.256	2.996	.2418	.56
1½	1.900	1.500	.200	5.969	4.712	2.835	1.767	1.068	2.010	2.546	81.487	3.631	.3912	.77
2	2.375	1.939	.218	7.461	6.092	4.430	2.953	1.477	1.608	1.969	48.766	5.022	.8679	1.28
2½	2.875	2.323	.276	9.032	7.298	6.492	4.238	2.254	1.328	1.644	33.976	7.661	1.924	1.87
3	3.500	2.900	.300	10.996	9.111	9.621	6.605	3.016	1.091	1.317	21.801	10.252	3.894	2.86
3½	4.000	3.364	.318	12.566	10.568	12.566	8.888	3.678	.954	1.135	16.202	12.505	6.280	3.84
4	4.500	3.826	.337	14.137	12.020	15.904	11.497	4.407	.848	.998	12.525	14.983	9.610	4.98
4½	5.000	4.290	.355	15.708	13.477	19.635	14.455	5.180	.763	.890	9.962	17.611	14.05	6.27
5	5.563	4.813	.375	17.477	15.120	24.306	18.194	6.112	.686	.793	7.915	20.778	20.67	7.88
6	6.625	5.761	.432	20.813	18.099	34.472	26.067	8.405	.576	.663	5.524	28.573	40.49	11.29
7	7.625	6.625	.500	23.955	20.813	45.664	34.472	11.192	.500	.576	4.177	38.048	71.37	14.95
8	8.625	7.625	.500	27.096	23.955	58.426	45.663	12.763	.442	.500	3.154	43.388	105.7	19.78
9	9.625	8.625	.500	30.238	27.096	72.760	58.426	14.334	.396	.442	2.464	48.728	149.6	25.30
10	10.750	9.750	.500	33.772	30.631	90.763	74.662	16.101	.355	.391	1.929	54.735	212.0	32.35
11	11.750	10.750	.500	36.914	33.772	108.434	90.763	17.671	.325	.355	1.587	60.075	280.1	39.40
12	12.750	11.750	.500	40.055	36.914	127.676	108.434	19.242	.299	.325	1.328	65.415	361.5	46.92

Double Extra Strong Pipe Data

All Dimensions and Weights are Nominal

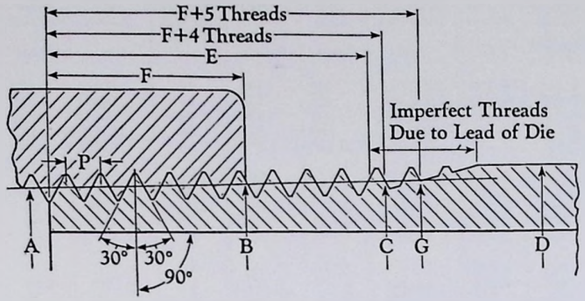
Size	Diameters		Thickness	Circumference		Transverse Areas			Length of Pipe per Sq. Ft. of		Length of Pipe Containing One Cubic Foot	Weight per Foot Plain Ends	Moment of Inertia	Wt. of Water Per Foot
	External	Internal		External	Internal	External	Internal	Metal	External Surface	Internal Surface				
Ins.	Inches	Inches	Inches	Inches	Inches	Sq. Ins.	Sq. Ins.	Sq. Ins.	Feet	Feet	Feet	Pounds		Pounds
½	.840	.252	.294	2.639	.792	.554	.050	.504	4.547	15.157	2887.164	1.714	.0242	.022
¾	1.050	.434	.308	3.299	1.363	.866	.148	.718	3.637	8.801	973.404	2.440	.0579	.064
1	1.315	.599	.358	4.131	1.882	1.358	.282	1.076	2.904	6.376	510.998	3.659	.1405	.122
1¼	1.660	.896	.382	5.215	2.815	2.164	.630	1.534	2.301	4.263	228.379	5.214	.3411	.273
1½	1.900	1.100	.400	5.969	3.456	2.835	.950	1.885	2.010	3.472	151.526	6.408	.5678	.42
2	2.375	1.503	.436	7.461	4.722	4.430	1.774	2.656	1.608	2.541	81.162	9.029	1.311	.77
2½	2.875	1.771	.552	9.032	5.564	6.492	2.464	4.028	1.328	2.156	58.457	13.695	2.871	1.07
3	3.500	2.300	.600	10.996	7.226	9.621	4.155	5.466	1.091	1.660	34.659	18.583	5.993	1.80
3½	4.000	2.728	.636	12.566	8.570	12.566	5.845	6.721	.954	1.400	24.637	22.850	9.848	2.53
4	4.500	3.152	.674	14.137	9.902	15.904	7.803	8.101	.848	1.211	18.454	27.541	15.28	3.38
4½	5.000	3.580	.710	15.708	11.247	19.635	10.066	9.569	.763	1.066	14.306	32.530	22.62	4.36
5	5.563	4.063	.750	17.477	12.764	24.306	12.966	11.340	.686	.940	11.107	38.552	33.63	5.61
6	6.625	4.897	.864	20.813	15.384	34.472	18.835	15.637	.576	.780	7.646	53.160	66.33	8.16
7	7.625	5.875	.875	23.955	18.457	45.664	27.109	18.555	.500	.650	5.312	63.079	107.5	11.75
8	8.625	6.875	.875	27.096	21.598	58.426	37.122	21.304	.442	.555	3.879	72.424	162.0	16.10

For list prices and tests see pages 583, 584, and 585

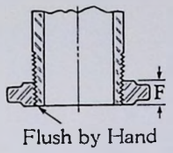
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American Standard Pipe Threads

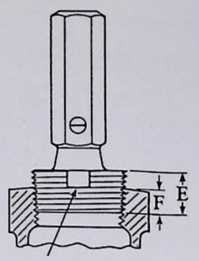
Taper, Straight, and Locknut



$A = D - (0.050D + 1.1)P$
$B = A + 0.0625\ F$
$C = B + (4P \times 0.0625)$
$E = (0.80D + 6.8)P$
$G = B + (5P \times 0.0625)$
P = Pitch
Depth of thread = $0.80P$



Tolerance on Product:
One turn large or small from notch on plug gauge or face of ring gauge



Notch flush with face of fitting. If chamfered, notch flush with bottom of chamfer

B = Pitch Diameter for American Standard Straight Pipe Threads

Total Taper ¾-inch per Foot

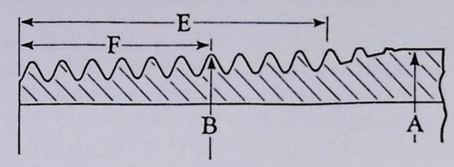
Dimensions, in Inches

Nominal Pipe Size	A Pitch Diameter at End of Male Thread	B † Pitch Diameter at End of Female Thread	C Maximum Pitch Diameter of Straight Male Locknut Thread	D Outside Diameter of Pipe	E § Length of Effective Thread	F ¶ Normal Engagement by Hand between Male and Female Thread	G Minimum Pitch Diameter of Straight Female Locknut Thread	P Pitch of Thread	Depth of Thread	Number of Threads Per Inch
1/8	0.36351	0.37476	0.38402	0.405	0.2638	0.180	0.38633	0.03704	0.02963	27
1/4	0.47739	0.48989	0.50378	0.540	0.4018	0.200	0.50725	0.05556	0.04444	18
3/8	0.61201	0.62701	0.64090	0.675	0.4078	0.240	0.64437	0.05556	0.04444	18
1/2	0.75843	0.77843	0.79628	0.840	0.5337	0.320	0.80075	0.07143	0.05714	14
3/4	0.96768	0.98887	1.00672	1.050	0.5457	0.339	1.01118	0.07143	0.05714	14
1	1.21363	1.23863	1.26037	1.315	0.6828	0.400	1.26580	0.08696	0.06957	11½
1¼	1.55713	1.58338	1.60512	1.660	0.7068	0.420	1.61055	0.08696	0.06957	11½
1½	1.79609	1.82234	1.84407	1.900	0.7235	0.420	1.84951	0.08696	0.06957	11½
2	2.26902	2.29627	2.31801	2.375	0.7565	0.436	2.32344	0.08696	0.06957	11½
2½	2.71953	2.76216	2.79341	2.875	1.1375	0.682	2.80122	0.12500	0.10000	8
3	3.34063	3.38850	3.41975	3.500	1.2000	0.766	3.42756	0.12500	0.10000	8
3½	3.83750	3.88881	3.92006	4.000	1.2500	0.821	3.92787	0.12500	0.10000	8
4	4.33438	4.38713	4.41838	4.500	1.3000	0.844	4.42619	0.12500	0.10000	8
* 4½	4.83125	4.88594	4.91719	5.000	1.3500	0.875	4.92500	0.12500	0.10000	8
5	5.39073	5.44929	5.48054	5.563	1.4063	0.937	5.48836	0.12500	0.10000	8
6	6.44609	6.50597	6.53722	6.625	1.5125	0.958	6.54503	0.12500	0.10000	8
* 7	7.43984	7.50234	7.53359	7.625	1.6125	1.000	7.54141	0.12500	0.10000	8
8	8.43359	8.50003	8.53128	8.625	1.7125	1.063	8.53909	0.12500	0.10000	8
* 9	9.42734	9.49797	9.52922	9.625	1.8125	1.130	9.53703	0.12500	0.10000	8
10	10.54531	10.62094	10.65219	10.750	1.9250	1.210	10.66000	0.12500	0.10000	8
*11	11.53906	11.61938	11.65063	11.750	2.0250	1.285	11.65844	0.12500	0.10000	8
12	12.53281	12.61781	12.64906	12.750	2.1250	1.360	12.65688	0.12500	0.10000	8
14 O.D.	13.77500	13.87263		14.000	2.2500	1.562		0.12500	0.10000	8
*15 O.D.	14.76875	14.87419		15.000	2.3500	1.687		0.12500	0.10000	8
16 O.D.	15.76250	15.87575		16.000	2.4500	1.812		0.12500	0.10000	8
*17 O.D.	16.75625	16.87500		17.000	2.5500	1.900		0.12500	0.10000	8
18 O.D.	17.75000	17.87500		18.000	2.6500	2.000		0.12500	0.10000	8
20 O.D.	19.73750	19.87031		20.000	2.8500	2.125		0.12500	0.10000	8
*22 O.D.	21.72500	21.86562		22.000	3.0500	2.250		0.12500	0.10000	8
24 O.D.	23.71250	23.86094		24.000	3.2500	2.375		0.12500	0.10000	8
*26 O.D.	25.70000	25.85625		26.000	3.4500	2.500		0.12500	0.10000	8
*28 O.D.	27.68750	27.85156		28.000	3.6500	2.625		0.12500	0.10000	8
*30 O.D.	29.67500	29.84687		30.000	3.8500	2.750		0.12500	0.10000	8

†Also pitch diameter at gauging notch.
§Also length of plug gauge.
¶Also length of ring gauge, and length from gauging notch to small end of plug gauge.
*These sizes are special. Not included in the American Standard for Pipe Threads.

The above information taken from the American Standard for Pipe Threads, A. S. A.—B2.

British Standard Pipe Threads



Whitworth 55° Form of Thread

Total Taper ¾-inch per Foot

Dimensions, in Inches

Nominal Bore of Pipe	A Approximate Outside Diameter of Pipe	B Gauge Diameter Top of Thread	Depth of Thread	Number of Threads Per Inch	E Length of Effective Thread	F Distance of Gauge Diameter from End
1/8	13/32	.383	.0230	28	3/8	5/32
1/4	17/32	.518	.0335	19	7/16	3/16
3/8	11/16	.656	.0335	19	1/2	1/4
1/2	27/32	.825	.0455	14	5/8	1/4
5/8	15/16	.902	.0455	14	5/8	1/4
3/4	1 1/16	1.041	.0455	14	3/4	3/8
7/8	1 7/32	1.189	.0455	14	3/4	3/8
1	1 11/32	1.309	.0580	11	7/8	3/8
1¼	1 11/16	1.650	.0580	11	1	1/2
1½	1 29/32	1.882	.0580	11	1	1/2
1¾	2 5/32	2.116	.0580	11	1 1/8	5/8
2	2 3/8	2.347	.0580	11	1 1/8	5/8
2¼	2 5/8	2.587	.0580	11	1¼	11/16
2½	3	2.960	.0580	11	1¼	11/16
2¾	3 1/4	3.210	.0580	11	1 3/8	13/16
3	3 1/2	3.460	.0580	11	1 3/8	13/16
3¼	3 3/4	3.700	.0580	11	1½	7/8
3½	4	3.950	.0580	11	1½	7/8
3¾	4 1/4	4.200	.0580	11	1½	7/8
4	4 1/2	4.450	.0580	11	1 5/8	1
4½	5	4.950	.0580	11	1 5/8	1
5	5 1/2	5.450	.0580	11	1¾	1 1/8
5½	6	5.950	.0580	11	1 7/8	1¼
6	6 1/2	6.450	.0580	11	2	1 3/8
7	7 1/2	7.450	.0640	10	2 1/8	1 3/8
8	8 1/2	8.450	.0640	10	2¼	1½
9	9 1/2	9.450	.0640	10	2¼	1½
10	10 1/2	10.450	.0640	10	2 3/8	1 5/8
11	11 1/2	11.450	.0800	8	2½	1 5/8
12	12 1/2	12.450	.0800	8	2½	1 5/8
13	13 3/4	13.680	.0800	8	2 5/8	1 5/8
14	14 3/4	14.680	.0800	8	2¾	1¾
15	15 3/4	15.680	.0800	8	2¾	1¾
16	16 3/4	16.680	.0800	8	2 7/8	1 7/8
17	17 3/4	17.680	.0800	8	3	2
18	18 3/4	18.680	.0800	8	3	2

The above information taken from the British Engineering Standards Association Report No. 21—1909

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Threading of Material
For Use With
Oil Country Tubular Goods

How to designate Threading: Owing to the various kinds of casings used in the oil fields today, it is necessary when ordering valves, fittings, nipples, etc., to be tapped or threaded with casing threads, to designate the threading information in the following manner:

Specifications for valves and fittings tapped with A. P. I. Standard Threads should include the following:

Size, external diameter or external diameter of upset, threads per inch, standard and type of joint.

For Example: 8⅝-inch — 8⅝-inch O.D.— 8 threads, A. P. I. Standard Casing Threads.
8⅝-inch — 8⅝-inch O.D.— 8 threads, A. P. I. Grade "D" Casing Threads.
5¾-inch — 6-inch U.D.— 10 threads, A. P. I. Standard External Upset Casing Threads.
5⅝-inch — 5⅝-inch O.D.— 8 threads, A. P. I. Standard Drill Pipe Threads.
3-inch — 3½-inch O.D.— 11½ threads, A. P. I. Standard Plain Tubing Threads.
3-inch — 3¾-inch U.D.— 10 threads, A. P. I. Standard External Upset Tubing Threads.

Specifications for valves and fittings tapped with Casing Threads other than A. P. I. Standard Threads should include the following:

Size, external diameter or external diameter of Upset, threads per inch, included taper per foot, and trade name of casing.

For Example: 6⅝-inch — 7-inch O.D.— 11½ threads, ⅜-inch included taper per foot, Boston Casing Threads.
6⅝-inch — 7-inch O.D.— 10 threads, ⅜-inch included taper per foot, California Diamond B. X. Casing Threads.
3-inch — 3¾-inch U.D. of Upset — 10 threads, ¾-inch included taper per foot, External Upset Tubing Threads.

For valves and fittings it is unnecessary to specify Inside Diameter or weight of casing per foot.

Specifications for Casing, Pipe or Nipples should include the same information listed above for valves and fittings, also adding the weight per foot (threads and couplings).

For Example: 8⅝-inch — 8⅝-inch O.D.— 38 pounds — 8 threads, A. P. I. Standard Casing.
5⅝-inch — 5⅝-inch O.D.— 19 pounds — 8 threads, A. P. I. Standard Drill Pipe.
6¼-inch — 7-inch O.D.— 17 pounds — 11½ threads, ¾-inch included taper per foot, Boston Casing.
6⅝-inch — 7-inch O.D.— 30 pounds — 10 threads, ⅜-inch included taper per foot, California Diamond B. X. Casing.

Standard (125-pound) and Extra Heavy (250-pound) Material with casing threads will be tapped in accordance with information on page 603 unless otherwise specified by the customer.

§A. P. I. Threading Specifications

The following information covers briefly the various A. P. I. Standard Threads now specified in the American Petroleum Institute (A. P. I.) Pipe Specifications, A. P. I. Standards No. 5A, Ninth Edition, August, 1935, and A. P. I. Line Pipe Specifications, A. P. I. Standards No. 5L, Sixth Edition, August, 1935.

The A. P. I. Pipe Specifications were prepared with the object of standardizing the Oil Country Tubular Goods nationally, and are now being used throughout the country.

A. P. I. Standard Casing Threads: The form of the A. P. I. Standard Casing Thread is identical with the American Standard Pipe Thread, having an included angle of 60 degrees, the tops and bottoms of the threads being truncated .033 times the pitch, and is perpendicular to the axis of the pipe. See Fig. No. 1.

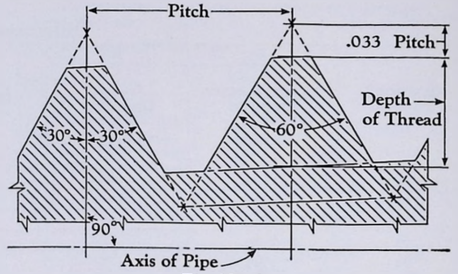
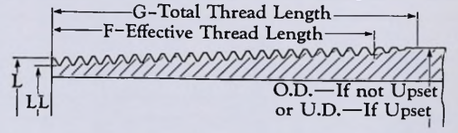


Fig. No. 1
Enlarged section of A. P. I. Standard Casing Thread



Dimensions, in Inches

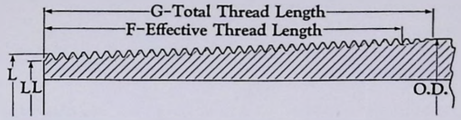
Size	External Diameter O.D.	External Diameter Upset U.D.	Number of Threads per Inch	Included Taper per Foot	F Effective Thread Length	G Total Thread Length	L Outside Diameter of Thread at Small End	LL Root Diameter of Thread at Small End
4¾	4.750	5.000	10	⅜	2.475	2.875	4.932	4.772
*4¾	4.750		10	⅜	2.150	2.550	4.689	4.529
5¾	5.750		10	⅜	2.725	3.125	5.674	5.514
5¾	5.750	6.000	10	⅜	3.225	3.625	5.909	5.749
*6⅝	6.625		10	⅜	2.600	3.000	6.550	6.390
*7	7.000		10	⅜	2.600	3.000	6.925	6.765
7⅝	7.625		8	¾	2.875	3.250	7.461	7.261
‡8⅛	8.125		10	⅜	3.225	3.625	8.034	7.874
‡8⅛	8.125	8.375	10	⅜	3.225	3.625	8.284	8.124
†8⅝	8.625		8	¾	2.875	3.250	8.461	8.261
†9	9.000		8	¾	2.875	3.250	8.836	8.636
†9⅝	9.625		8	¾	2.875	3.250	9.461	9.261
10¾	10.750		8	¾	3.250	3.625	10.563	10.363
†11¾	11.750		8	¾	2.875	3.250	11.586	11.386
13⅜	13.375		8	¾	3.500	3.875	13.172	12.972
16	16.000		8	¾	3.500	3.875	15.797	15.597
18⅝	18.625		8	¾	3.500	3.875	18.422	18.222
21½	21.500		8	¾	3.500	3.875	21.297	21.097
24½	24.500		8	¾	3.500	3.875	24.297	24.097

*Same threading as Diamond B. X. Casing.
†Same threading as Diamond B. 8 Casing. ‡Inactive.

§A. P. I. Threading printed by permission of American Petroleum Institute

A. P. I. Grade "D" Casing Threads

The use of Grade "D" Casing, carrying a thread longer than the regular A. P. I. Standard Casing Threads, has become general in California. This longer thread has the same form of thread, pitch, and diameters at the large end as the regular A. P. I. Standard Casing Threads, the additional thread length being added at the small end along the same taper. This longer thread is intended for use on extremely high pressure materials ONLY.



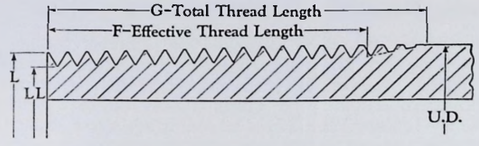
Dimensions, in Inches

Size	External Diameter O.D.	Number of Threads per Inch	Included Taper per Foot	F Effective Thread Length	G Total Thread Length	L Outside Diameter of Thread at Small End	LL Root Diameter of Thread at Small End
5¾	5.750	10	⅜	2.900	3.300	5.669	5.509
6⅝	6.625	10	⅜	3.400	3.800	6.525	6.365
7	7.000	10	⅜	3.650	4.050	6.892	6.732
7⅝	7.625	8	¾	3.750	4.125	7.4063	7.2063
*8⅛	8.125	10	⅜	3.900	4.300	8.0125	7.8525
8⅝	8.625	8	¾	4.375	4.750	8.367	8.167
9	9.000	8	¾	4.875	5.250	8.711	8.511
9⅝	9.625	8	¾	4.875	5.250	9.336	9.136
11¾	11.750	8	¾	5.125	5.500	11.445	11.245
13⅜	13.375	8	¾	5.125	5.500	13.070	12.870

*Inactive.

A. P. I. Standard Tubing Threads, External Upset

The form of thread is identical with the A. P. I. Standard Casing Thread shown in Fig. No. 1.



Dimensions, in Inches

Size	External Diameter O.D.	External Diameter Upset U.D.	Number of Threads per Inch	Included Taper per Foot	F Effective Thread Length	G Total Thread Length	L Outside Diameter of Thread at Small End	LL Root Diameter of Thread at Small End
1¼	1.660	1.81250	11½	¾	1.1141	1.3750	1.7537	1.6146
1½	1.900	2.09375	11½	¾	1.1766	1.4375	2.0311	1.8919
2	2.375	2.59375	10	¾	1.6375	1.9375	2.5039	2.3439
2½	2.875	3.09375	10	¾	1.8250	2.1250	2.9922	2.8322
3	3.500	3.75000	10	¾	2.0750	2.3750	3.6328	3.4728
3½	4.000	4.25000	10	¾	2.2000	2.5000	4.1250	3.9650
4	4.500	4.75000	10	¾	2.3250	2.6250	4.6172	4.4572

A. P. I. Standard Drill Pipe Threads

The form of thread differs from the A. P. I. Standard Casing Thread. The tops and bottoms of this A. P. I. Standard Drill Pipe Thread are rounded, the included angle being 60 degrees. See Fig. No. 2.

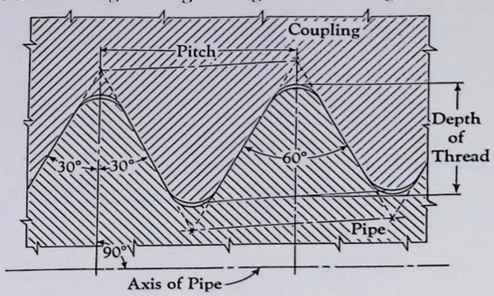
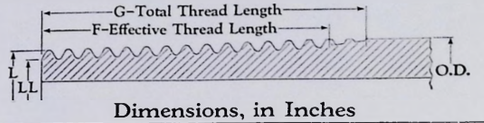


Fig. No. 2
Enlarged section of A. P. I. Standard Drill Pipe Thread



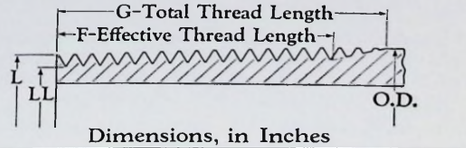
Dimensions, in Inches

Size	External Diameter O.D.	Number of Threads per Inch	Included Taper per Foot	F Effective Thread Length	G Total Thread Length	L Outside Diameter of Thread at Small End	LL Root Diameter of Thread at Small End
*2⅜	2.375	10	⅜	1.925	2.125	2.317	2.206
2⅜	2.375	8	¾	1.875	2.125	2.273	2.130
2⅞	2.875	8	¾	2.375	2.625	2.742	2.599
3½	3.500	8	¾	2.375	2.625	3.367	3.224
4½	4.500	8	¾	3.125	3.375	4.320	4.177
5 9/16	5.563	8	¾	3.375	3.625	5.367	5.225
6⅝	6.625	8	¾	3.625	3.875	6.414	6.271
*7⅝	7.625	8	¾	4.000	4.250	7.390	7.248
*8⅝	8.625	8	¾	4.375	4.625	8.367	8.224

*These sizes are special.

A. P. I. Standard Tubing Threads, Plain

The form of thread is identical with the A. P. I. Standard Casing Thread shown in Fig. No. 1.



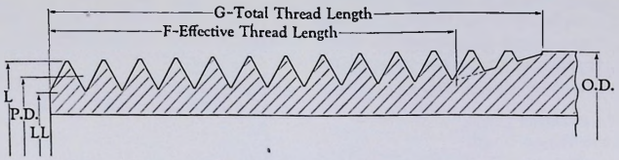
Dimensions, in Inches

Size	External Diameter O.D.	Number of Threads per Inch	Included Taper per Foot	F Effective Thread Length	G Total Thread Length	L Outside Diameter of Thread at Small End	LL Root Diameter of Thread at Small End
1½	1.900	11½	¾	1.1139	1.3748	1.8412	1.7021
2	2.375	11½	¾	1.3641	1.6250	2.3006	2.1615
2½	2.875	11½	¾	1.8016	2.0625	2.7733	2.6341
3	3.500	11½	¾	2.0516	2.3125	3.3826	3.2435
3½	4.000	10	¾	2.0750	2.3750	3.8828	3.7228
4	4.500	10	¾	2.2625	2.5625	4.3711	4.2111

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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asbestosclaims.law/library/21275/317

A. P. I. Line Pipe Threads

The form of thread is identical with the A. P. I. Standard Casing Thread shown in Fig. No. 1.



Dimensions, in Inches

Size	External Diameter O.D.	Number of Threads Per Inch	Included Taper Per Foot	F Effective Thread Length	G Total Thread Length	L Outside Diameter of Thread at Small End	P.D. Pitch Diameter of Thread at Small End	LL Root Diameter of Thread at Small End	† Amount A.P.I. Line Pipe Thds. Is Longer than Am. Std. Pipe Thds.
* 1/8	.405	27	3/4	.26385	.37496	.39314	.36351	.33388	None
* 1/4	.540	18	3/4	.40178	.56844	.52183	.47739	.43294	None
* 3/8	.675	18	3/4	.40778	.57444	.65646	.61201	.56757	None
* 1/2	.840	14	3/4	.53371	.74800	.81557	.75843	.70129	None
* 3/4	1.050	14	3/4	.54571	.76000	1.02482	.96768	.91054	None
* 1	1.315	11 1/2	3/4	.68278	.94365	1.28320	1.21363	1.14407	None
* 1 1/4	1.660	11 1/2	3/4	.70678	.96765	1.62670	1.55713	1.48757	None
* 1 1/2	1.900	11 1/2	3/4	.72348	.98435	1.86565	1.79609	1.72652	None
2	2.375	11 1/2	3/4	1.10435	1.36522	2.31685	2.24728	2.17772	.34785
2 1/2	2.875	8	3/4	1.20000	1.57500	2.81563	2.71563	2.61563	.06250
* 3	3.500	8	3/4	1.20000	1.57500	3.44063	3.34063	3.24063	None
3 1/2	4.000	8	3/4	1.42500	1.80000	3.92656	3.82656	3.72656	.17500
4	4.500	8	3/4	1.42500	1.80000	4.42656	4.32656	4.22656	.12500
5	5.563	8	3/4	1.65630	2.03130	5.47511	5.37511	5.27511	.25000
6	6.625	8	3/4	1.76250	2.13750	6.53047	6.43047	6.33047	.25000
8	8.625	8	3/4	1.96250	2.33750	8.51797	8.41797	8.31797	.25000
10	10.750	8	3/4	2.17500	2.55000	10.62969	10.52969	10.42969	.25000
12	12.750	8	3/4	2.37500	2.75000	12.61719	12.51719	12.41719	.25000
14 O.D.	14.000	8	3/4	2.50000	2.87500	13.85938	13.75938	13.65938	.25000
15 O.D.	15.000	8	3/4	2.60000	2.97500	14.85313	14.75313	14.65313	.25000
16 O.D.	16.000	8	3/4	2.70000	3.07500	15.84688	15.74688	15.64688	.25000
17 O.D.	17.000	8	3/4	2.70000	3.07500	16.84688	16.74688	16.64688	.15000
18 O.D.	18.000	8	3/4	2.70000	3.07500	17.84688	17.74688	17.64688	.05000
*20 O.D.	20.000	8	3/4	2.85000	3.22500	19.83750	19.73750	19.63750	None

*These sizes are the same as the American Standard Taper Pipe Threads.

†The A. P. I. Line Pipe Thread has a longer thread length in most cases than the American Standard Taper Pipe Thread, otherwise they are identical. The extra thread length is at the small end.

The A. P. I. Line Pipe Threads are gauged with American Standard Taper Pipe Thread gauges, allowing for the differences in the male thread lengths. Valves, and Fittings tapped with American Standard Taper Pipe Threads may be used with A. P. I. Line Pipe Threads providing there are no obstructions in the thread chambers to interfere with the longer A. P. I. male threads.

A. P. I. Thread Gauges

The thread gauges, male and female, used by Crane Co. are made to dimensions as specified in the A. P. I. Standards No. 5A, ninth edition, August, 1935, except that we have located a gauging notch on the male gauge. The gauging of valves and fittings is quite different from the gauging of couplings and therefore this added feature of a gauging notch is required.

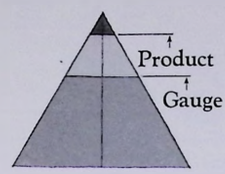


Fig. No. 3
Truncation of Gauge and Product (A. P. I. Standard Casing Thread)

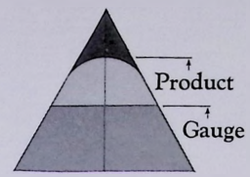


Fig. No. 4
Truncation of Gauge and Product (A. P. I. Standard Drill Pipe Thread)

The form of threads on these thread gauges differs from the product itself. The threads on the gauges have truncated tops and sharp bottoms, or undercut bottoms to facilitate grinding or lapping when making gauges.

There are two standard truncations used on A. P. I. gauges. One is .1 times the pitch and is used on A. P. I. Casing, Plain Tubing, and External Upset Tubing gauges. The other truncation is used on A. P. I. Drill Pipe gauges ONLY.

For comparison of the A. P. I. Thread truncation on product and gauges, see Fig. Nos. 3 and 4.

This difference in truncation between the product and gauges allows for some wear on tap or die without affecting the gauging or the product assembly.

The general construction of A. P. I. gauges used by Crane Co., is as shown in Fig. No. 5 female, and Fig. No. 6 male.

For gauging of A. P. I. Line Pipe Threads, see page 598.

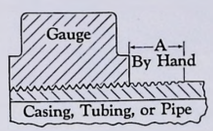


Fig. No. 5
Application of female gauge as used by Crane Co. for A. P. I. Threads on Casing, Tubing or Pipe

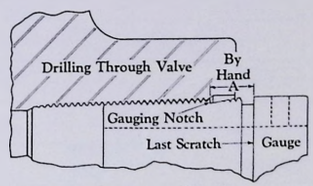


Fig. No. 6
Application of male gauge as used by Crane Co. for A. P. I. Threads in Drilling Through Valve

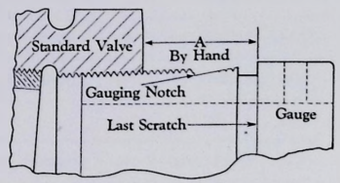


Fig. No. 7
Application of male gauge as used by Crane Co. for A. P. I. Threads in Standard Pressure Valve

A. P. I. Threading Tolerances

The tolerances in threading are maintained as specified in the A. P. I. Standards and are as follows:

1—A. P. I. Standard Casing, Grade "D" Casing, Drill Pipe, Plain Tubing, and External Upset Tubing Threads—one turn large or small for 8 threads per inch, 3/4" total taper per foot; one and one-half turns large or small for 10 and 11 1/2 threads per inch.

2—A. P. I. Line Pipe Threads—one and one-half turns large or small.

Other Crane Casing, Drive Pipe, Rotary Pipe, Tubing Threads, and Thread Gauges

The following information covers briefly various other threads still being used in the oil industry, but which in due time will be replaced by the A. P. I. Standards.

There are no established standards for these various threads and thread gauges. The number of threads per inch, diameters of pipe, and taper of threads have been fairly well established by common use. The thread lengths vary considerably as different conditions require.

The form of thread is identical with the A. P. I. Standard Casing Thread shown in Fig. No. 1 except the Interior Upset Rotary Pipe which is furnished with either the form of thread as shown in Fig. No. 1 or with the A. P. I. Drill Pipe Thread form as shown in Fig. No. 2. Material will be furnished with the A. P. I. Standard Casing Thread form unless otherwise specified.

The general practice for all these threads is to have two threads with perfect bottoms but imperfect tops above the last perfect thread or basic size and three or four threads imperfect top and bottom for lead on die. The four thread lead is used on California D. B. Casing only. See Fig. No. 8.

The number of lead threads made on die cutters is very often reduced without shortening the total length of the thread with the result that instead of having only two threads with perfect bottoms and imperfect tops they have three or four, all of which are considered usable for making joints since they have the continued true taper of the thread.

The following gives the best information available at the present time regarding threads and gauges still being used on various pipes and casings in the oil industry.

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Casing Thread Data

Dimensions, in Inches

Size	External Diameter of Casing O.D.	California D.B.X. Casing: Number of Threads per Inch	California D.B.X. Casing: Included Taper per Foot	California D.B.X. Casing: Effective Thread § Length	California D.B.8 Casing: Number of Threads per Inch	California D.B.8 Casing: Included Taper per Foot	California D.B.8 Casing: Effective Thread § Length	South Penn Casing: Number of Threads per Inch	South Penn Casing: Included Taper per Foot	South Penn Casing: Effective Thread § Length	Boston Casing: Number of Threads per Inch	Boston Casing: Included Taper per Foot	Boston Casing: Effective Thread § Length	A.P.I. Casing¶: Number of Threads per Inch	A.P.I. Casing¶: Included Taper per Foot	A.P.I. Casing¶: External Diameter of Upset U.D.
2	2.250										14	3/8	.9679			
2 1/4	2.500										14	3/8	.9929			
2 1/2	2.750										14	3/8	1.0179			
2 3/4	3.000										14	3/8	1.0429			
3	3.250										14	3/8	1.0679			
3 1/4	3.500										14	3/8	1.0929			
3 1/2	3.750										14	3/8	1.1179			
3 3/4	4.000										14	3/8	1.1429			
4	4.250										14	3/8	1.1679			
4 1/4	4.500										14	3/8	1.1929			
4 1/2	4.750	**10	3/8	2.1500	8	3/4	2.1875				14	3/8	1.2179			
4 3/4	4.750													10	3/8	
														†10	†3/8	†5.000
4 3/4	5.000	10	3/8	*2.1500	8	3/4	*2.1875									
		10	3/8	2.4000	8	3/4	2.4375				14	3/8	1.2429			
5	5.250										14	3/8	1.2679			
											11 1/2	3/8	1.2989			
5 3/16	5.500	10	3/8	2.3500				11 1/2	3/8	*1.6240	14	3/8	1.2929			
								11 1/2	3/8	1.8740						
5 5/8	6.000	10	3/8	2.3500	8	3/4	2.3750				14	3/8	1.3429			
											11 1/2	3/8	1.3739			
5 3/4	5.750													10	3/8	
														†10	†3/8	†6.000
6 1/4	6.625	**10	3/8	2.6000	8	3/4	2.6250	11 1/2	3/8	*1.7370	14	3/8	1.4054			
								11 1/2	3/8	1.9870						
6 5/8	6.625													10	3/8	
6 5/8	7.000	**10	3/8	2.6000	8	3/4	2.6250	10	3/8	*1.8000	14	3/8	1.4429			
								10	3/8	2.2000	11 1/2	3/8	1.4739			
7	7.000													10	3/8	
7 1/4	7.625										14	3/8	1.5054			
7 5/8	7.625													8	3/4	
7 5/8	8.000	10	3/8	2.8500	8	3/4	2.8750				11 1/2	3/8	1.5739			
8 1/8	8.125													10	3/8	
														†10	†3/8	†8.375
8 1/4	8.625	10	3/8	2.8500	**8	3/4	2.8750	8	3/4	1.9630	11 1/2	3/8	1.6364			
8 5/8	8.625													8	3/4	
8 5/8	9.000	10	3/8	2.8500	**8	3/4	2.8750				11 1/2	3/8	1.6739			
9	9.000													8	3/4	
9 1/4	9.625				**8	3/4	2.8750									
9 5/8	9.625													8	3/4	
9 5/8	10.000	10	3/8	2.8500	8	3/4	2.8750				11 1/2	3/8	1.7739			
10	10.750	10	3/8	2.8500	8	3/4	2.8750	8	3/4	2.1750						
10 5/8	11.000										11 1/2	3/8	1.8739			
10 3/4	10.750													8	3/4	
11	11.750	10	3/8	2.8500	**8	3/4	2.8750									
11 5/8	12.000	10	3/8	2.8500	8	3/4	2.8750				11 1/2	3/8	1.9739			
11 3/4	11.750													8	3/4	
12 1/2	13.000	10	3/8	2.8500	8	3/4	2.8750	8	3/4	2.6870	11 1/2	3/8	2.0739			
13 3/8	13.375													8	3/4	
13 1/2	14.000	10	3/8	3.3500	8	3/4	3.3750				11 1/2	3/8	2.1739			
14 1/2	15.000										11 1/2	3/8	2.2739			
15 1/2	16.000	10	3/8	3.3500	8	3/4	3.3750				11 1/2	3/8	2.3739			
16	16.000													8	3/4	
18 5/8	18.625													8	3/4	
20 O.D.	20.000				8	3/4	3.8750									
21 1/2	21.500													8	3/4	
24 1/2	24.500													8	3/4	

*Material will be furnished with, or to suit this shorter effective thread length unless otherwise specified.
†A.P.I. External Upset Casing.
§Effective thread length shown in Fig. No. 8.
¶For details of A.P.I. Casing Threads see page 596. **Same Threading as A.P.I. Casing with corresponding O.D.

Drive Pipe, Rotary Pipe, Drill Pipe, and Tubing Thread Data

Dimensions, in Inches

Size	External Diameter of Pipe or Tubing O.D.	External Diameter of Upset U.D.	Drive Pipe: Number of Threads per Inch	Drive Pipe: Included Taper per Foot	†Interior Upset Rotary Pipe: Number of Threads per Inch	†Interior Upset Rotary Pipe: Included Taper per Foot	A.P.I. Drill Pipe: Number of Threads per Inch	A.P.I. Drill Pipe: Included Taper per Foot	Oil Well Tubing: Number of Threads per Inch	Oil Well Tubing: Included Taper per Foot	A.P.I. Tubing, Plain: Number of Threads per Inch	A.P.I. Tubing, Plain: Included Taper per Foot	External Upset Tubing: Number of Threads per Inch	External Upset Tubing: Included Taper per Foot	A.P.I. Tubing, External Upset: Number of Threads per Inch	A.P.I. Tubing, External Upset: Included Taper per Foot
3/4	1.050								14	3/4						
1	1.315								11 1/2	3/4						
1 1/4	1.660	1.813							11 1/2	3/4			11 1/2	3/4	11 1/2	3/4
1 1/2	1.900	2.094							11 1/2	3/4	11 1/2	3/4	11 1/2	3/4	11 1/2	3/4
2	2.375	2.594	11 1/2	3/16 or 3/4					11 1/2	3/4	11 1/2	3/4			10	3/4
		2.603											11 1/2	3/4		
2 3/8	2.375						10	3/8								
							8	3/4								
2 1/2	2.875	3.094	8	3/16 or 3/4	8	3/4			8 or 11 1/2	3/4	11 1/2	3/4	10 or 11 1/2	3/4	10	3/4
2 7/8	2.875						8	3/4								
3	3.500	3.750	8	3/16 or 3/4	8	3/4			8 or 11 1/2	3/4	11 1/2	3/4	10 or 11 1/2	3/4	10	3/4
3 1/2	3.500						8	3/4								
	4.000	4.250	8	3/16 or 3/4					8,10 or 11 1/2	3/4	10	3/4			10	3/4
4	4.500	4.750	8	3/16 or 3/4	8	3/4			8,10 or 11 1/2	3/4	10	3/4	10	3/4	10	3/4
4 1/4	4.750		‡10	3/8 or 3/4												
4 1/2	4.500						8	3/4								
	5.000		‡10	3/8 or 3/4												
			8	3/16 or 3/4	8	3/4										
5	5.563		8	3/16 or 3/4	8	3/4										
5 9/16	5.563						8	3/4								
6	6.625		8	3/16												
6 5/8	6.625															
7	7.625		8	3/16												
7 5/8	7.625						8	3/4								
8	8.625		8	3/16												
8 5/8	8.625															
9	9.625		8	3/16												
10	10.750		8	3/16												
11	11.750		8	3/16												
12	12.750		8	3/16												
14 O.D.	14.000		8	3/16												
15 O.D.	15.000		8	3/16												
16 O.D.	16.000		8	3/16												
17 O.D.	17.000		8	3/16												
18 O.D.	18.000		8	3/16												
20 O.D.	20.000		8	3/16												

†Material will be furnished with the A.P.I. Standard Casing Thread form unless otherwise specified. See page 596.
‡D.B.X. Drive Pipe.

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Casing Thread Gauges (Not A. P. I.) For Valves and Fittings

Male Gauges

The basic size on the male gauge has the same pitch diameter as the last perfect thread on the casing. This pitch diameter is calculated from the outside diameter of the casing and the depth of thread, as follows:

$D = G$ — Depth of Thread (Product)

where D = Pitch Diameter at Last Perfect Thread
G = Outside Diameter of Casing.

Crane Co. has established the gauging notch on the working gauge for high pressure valves and fittings when tapped for casing threads, two threads below the basic size or last perfect thread on the casing, thereby assuring four threads with perfect bottoms for making joints before coming in contact with the three or four threads with imperfect tops and bottoms. See Fig. Nos. 8 and 9.

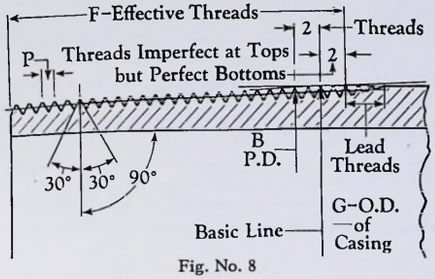


Fig. No. 8
Location of Crane Notch "B" for High Pressure Valves and Fittings

While this is slightly less than allowed between coupling and casing it should be remembered that valves and fittings are designed with rigid thread ends which allow screwing up by power without danger of "galling" the threads.

The pitch diameter at the gauging notch is calculated from the following formula:

$$B = D - \left(\frac{\text{Total Taper Per Foot}}{12} \times 2P\right)$$

where B = Pitch Diameter at the Gauging Notch on Male Gauges. (See Fig. No. 8.)
D = Pitch Diameter at Last Perfect Thread
P = Pitch of Thread.

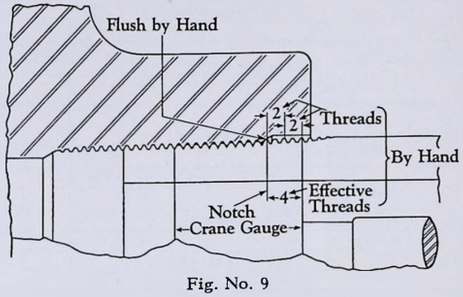


Fig. No. 9
Gauging of High Pressure Valves, showing the four threads for make up

Female Gauges

The female gauge is fitted to the male gauge coming flush at the small end and at the gauging notch when screwed together by hand. The application and design of these female gauges are shown in Fig. No. 10.

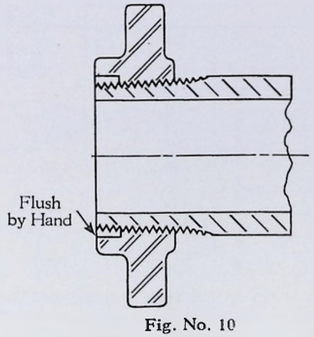


Fig. No. 10
Application and Design of Female Gauges

Casing, Drive Pipe, Rotary Pipe, and Tubing Threading Tolerances (Not A. P. I. Threading)

The Tolerances in threading are maintained as follows:

1—One turn large or small for 8 threads per inch, ¾ total taper per foot.

2—One and one-half turns large or small for all other threads.

For A. P. I. Tolerances in threading, see page 599.

Standard (125-Pound) and Extra Heavy (250-Pound) Valves, Fittings, and Flanges

Tapped for Casing Threads

Standard (125-pound) and Extra Heavy (250-pound) Materials are often ordered tapped to suit casings with long threads such as A. P. I., D. B. X., and D. B. 8. If this material is tapped to the same size as high pressure valves the end of the casing would come in contact with the internal parts of the valve, or the other openings in the fittings, before making a joint in the threaded end along the taper. To overcome this condition it is necessary to either shorten the thread on the casing or tap the valve or fitting to a smaller thread size. It is our practice to tap all such material small to gauge so that the end of the regular casing does not come in contact with the internal parts of the valve or the other openings of the fitting yet allowing the casing to screw in the maximum amount. This results in exposed threads on the casing after the joint has been made up. The length of exposed thread depends on the fitting or valve, and casing thread. See Fig. Nos. 11, 12 and 13.

The difference in thread size (gauging) of a standard (125-pound) valve or fitting compared with that of a Drilling Through (high pressure) Valve is clearly shown by the "A" distance in Fig. Nos. 6 and 7.

The thread lengths in Standard (125-pound) and Extra Heavy (250-pound) Material tapped for casing threads are not increased over that regularly furnished when tapped for American Standard Pipe Threads.

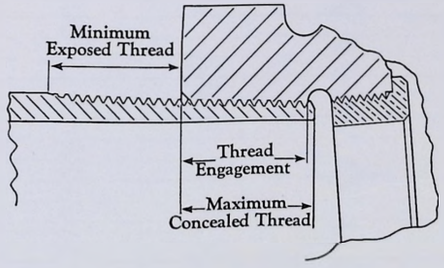


Fig. No. 11
Standard (125-Pound) Valve Casing Thread Assembly

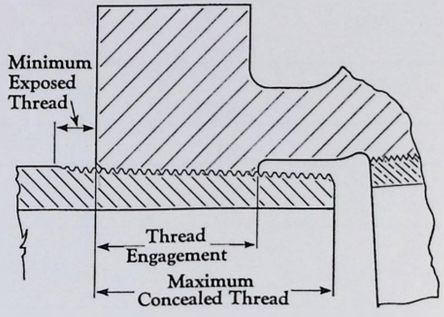


Fig. No. 12
Extra Heavy (250-Pound) Valve Casing Thread Assembly

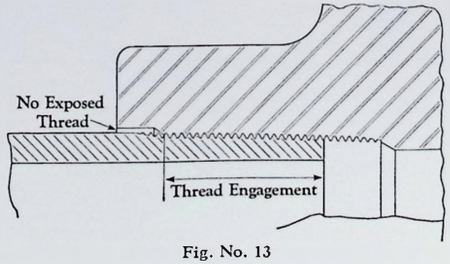


Fig. No. 13
Drilling Through Valve Casing Thread Assembly

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Malleable Iron and Cast Steel Fittings

With Casing Threads

Standard malleable iron refinery oil fittings, page 181; heavy malleable iron fittings, page 184; 1000-pound cast steel fittings, page 330; and 2000-pound cast steel fittings, page 331, can be tapped for the casing sizes shown in the table below.

Dimensions, in Inches

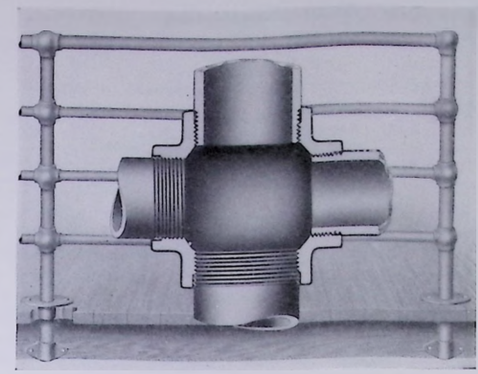
Fitting Size	**A. P. I. Casing Size (Actual O. D.)	California D. B. X. Casing Size (Nominal)	California D. B. 8 Casing Size (Nominal)	Boston Casing Size (Nominal)	South Penn Casing Size (Nominal)	Actual O. D. of Casing
2				2		2¼
2½				2¼		2½
				2½		2¾
				2¾		3
3				3		3¼
				3¼		3½
3½				3½		3¾
				3¾		4
4				4		4¼
				4¼		4½
*5⅜16	4¾	4½	4½	4½		4¾
		4¾	4¾	4¾		5
				5		5¼
		5⅜16		5⅜16	5⅜16	5½
6	5¾					5¾
		5⅝	5⅝	5⅝		6
	6⅝	6¼	6¼	6¼	6¼	6⅝
*6⅝	7	6⅝	6⅝	6⅝	6⅝	7
	7⅝			7¼		7⅝
8		7⅝	7⅝	7⅝		8
	8⅛					8⅛
	8⅝	8¼	8¼	8¼	8¼	8⅝
10	9	8⅝	8⅝	8⅝		9
	9⅝		9¼			9⅝
		9⅝	9⅝	9⅝		10
	10¾	10	10		10	10¾
12				10⅝		11
	11¾	11	11			11¾
		11⅝	11⅝	11⅝		12

*These are casing sizes. Standard Malleable Iron Refinery Oil Fittings, Heavy Malleable Iron Fittings, and Cast Steel Fittings are listed in the 5⅜ and 6⅝-inch sizes.

**A. P. I. Casing is known by its actual outside diameter; other Casings listed above are designated by their nominal size.

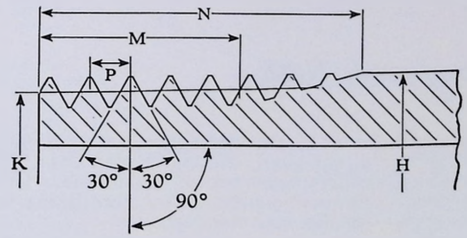
See page 596 when ordering Casing Fittings.

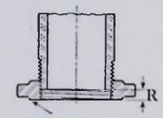
Crane Railing Pipe Threads



Crane Railing Fitting Thread Assembly

The recess in the fitting provides a covering for the last scratch or imperfect thread on the Railing Pipe making a neat appearing joint.





Am. Std. Pipe Thread Gauge

Total Taper ¾-inch per Foot

Dimensions, in Inches

Nominal Pipe Size	H Outside Diameter of Pipe	Number of Threads Per Inch	Depth of Thread	K Pitch Diameter at End of Male Thread	M Length of Effective Thread	N Total Length of Male Thread (Maximum)	P Pitch of Thread	R Amount Male Thread Is Large to Am. Std. Pipe Thread Gauge	
								Threads	Inches
½	.840	14	.05714	.77182	.3194	.4980	.07143	3	.2143
¾	1.050	14	.05714	.98107	.3314	.5100	.07143	3	.2143
1	1.315	11½	.06957	1.22993	.4219	.6393	.08696	3	.2609
1¼	1.660	11½	.06957	1.57343	.4459	.7068	.08696	3	.2609
1½	1.900	11½	.06957	1.81239	.4626	.7235	.08696	3	.2609
2	2.375	11½	.06957	2.28532	.4956	.7565	.08696	3	.2609
2½	2.875	8	.10000	2.75078	.6375	1.0125	.12500	4	.5000
3	3.500	8	.10000	3.37188	.7000	1.0750	.12500	4	.5000
3½	4.000	8	.10000	3.86875	.7500	1.1250	.12500	4	.5000
4	4.500	8	.10000	4.36563	.8000	1.1750	.12500	4	.5000

Cutting Railing Pipe Threads

The above Railing Pipe Threads are the same as the American Standard Taper Pipe Threads except they are shortened at the small end by 3 or 4 threads as shown in Column "R". Regular solid or adjustable dies may be used, making allowance for the 3 or 4 threads that this thread is shortened. The dies, therefore, should only be run on far enough to provide the specified "R" dimension.

The total thread length "N" is maximum and if necessary may be shorter provided the length of imperfect threads caused by the lead of the die is reduced the same amount.

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American Tentative Standard
Wrought-Iron and Wrought-Steel Pipe
ASA B36.10-1935

In November, 1935, the American Standards Association approved the American Tentative Standard for Wrought-Iron and Wrought-Steel Pipe.

In developing this American Tentative Standard the Sectional Committee, composed of members from The American Society for Testing Materials and the American Society of Mechanical Engineers, with the co-operation of the industry, selected from the existing list of over-lapping sizes and thicknesses certain well defined schedules of pipe wall thicknesses covering a wide range of pressure-stress ratios. In this way the diversified needs of the piping industry have been provided for with the smallest practicable number of pipe wall thicknesses in each size.

Introductory Notes

1 Scope: These standards shall be known as the "American Standard for Wrought-Iron and Wrought-Steel Pipe". The word "pipe" is used as distinguished from "tubing", restricting the term "pipe" and therefore the scope of these standards, to apply to tubular products of dimensions and materials commonly used for pipe lines and connections.

2 Size: The "size" of pipe for all schedules in Tables 2, 3, 4, and 5 is identified by the "nominal pipe size". For 14 inches and larger, "size" corresponds to the outside diameter of the pipe.

3 Materials: The dimensional standards for pipe described herein are based on products such as are covered by the A.S.T.M. and A.P.I. specifications outlined in Table 1.

It is recommended that material be ordered and made in accordance with these specifications or any subsequent revisions thereof.

4 Wall Thickness: The nominal wall thicknesses are given in Table 2 for steel pipe, and in Table 4 for wrought-iron pipe.

5 Weights: The nominal weights of steel pipe are listed in Table 3, and correspond to the respective wall thicknesses given in Table 2. The nominal weights of wrought-iron pipe are listed in Table 5 and correspond to the respective wall thicknesses given in Table 4.

A pipe size may be designated by giving the nominal pipe size and wall thickness, or the nominal pipe size and weight per foot.

6 Permissible Variations: Unless otherwise provided by the specification, the actual wall thickness at any point shall not be more than 12.5 per cent under the nominal wall thickness shown in the tables. Permissible variations for other dimensions are indicated in each specification.

7 Screw Threads: Unless otherwise specified, the screw threads of threaded pipe and couplings shall conform to American Standard for Pipe Threads (ASA B2) as approved by American Standards Association; or in the case of threaded line pipe as used in the petroleum and gas industries, the screw threads shall conform to the standard of the American Petroleum Institute for line pipe (A.P.I. 5-L).

8 Schedule Numbers: As stated under Tables 2, 3, 4, and 5 the schedule numbers indicate approximate values for the expression $1000 \times P/S$. This permits an approximation of the wall thickness if the service pressure and the value of allowable stress for the material and service conditions are known. Recommended values of "S", the allowable stress, may be obtained by reference to engineering codes such as the A.S.M.E. Boiler Code, the American Standard Code for Pressure Piping (ASA B31.1), etc.

It is contemplated that the user will compute the exact value of wall thickness suitable for the conditions for which the pipe is required, as described in detail in the A.S.M.E. Boiler Code, American Tentative Standard Code for Pressure Piping (ASA B31.1), etc. From the schedules of nominal thicknesses contained herein, a thickness may then be selected to suit the value computed to fulfill the conditions for which the pipe is desired.

Table 1

Specifications for Pipe, With the Tensile Strengths Called for, and the Corresponding Uses for Which Each Material Is Intended

ASA Designation	Title Standard Specifications	Tensile Strength Lbs. per Sq. In.	Scope
B36.1	Welded and Seamless Steel Pipe (A.S.T.M. A 53)	Welded, bessemer, 50,000 min Welded, open-hearth, 45,000 min Seamless, low carbon, 48,000 min Seamless, medium, 62,000 min	Commercial steel pipe for general uses, also for coiling, bending, flanging, and similar forming operations when so specified.
B36.2	Welded Wrought-Iron Pipe (A.S.T.M. A 72)	40,000 min	Commercial wrought-iron pipe for general uses, also for coiling, bending, flanging, and other special purposes.
B36.3	Lap-Welded and Seamless Steel Pipe for High Temperature Service (A.S.T.M. A 106)	Welded, open-hearth, 45,000 min Seamless, Grade A, 48,000 min Seamless, Grade B, 62000 min Seamless, Grade C, 75,000 min	Lap-welded and seamless steel pipe for high temperature service. Suitable for bending, flanging, and similar forming operations.
B36.4	Electric-Fusion-Welded Steel Pipe, Sizes 30 Inch and Over (A.S.T.M. A 134)	Material as specified from a list of A.S.T.M. Standards included in A 134	Covers pipe 30 inch diam. and over in wall thicknesses up to ¾ inch, inclusive, fabricated from steel plates by electric fusion welding.
B36.5	Electric-Resistance-Welded Steel Pipe (A.S.T.M. A 135)	Grade A, 48,000 min Grade B, 60,000 min	Pipe up to 30 inch inclusive intended for conveying liquids, gas, or vapor at temperatures below 450° F. Adapted for flanging, bending, and similar forming operations in Grade A class.
B36.6	Forge-Welded Steel Pipe (A.S.T.M. A 136)	Grade A, 45,000 min Grade B, 50,000 min	Covers sizes 14 inch to 96 inch, wall thicknesses ¼ inch to 1¼ inch, forge-welded from steel plates and intended for various uses.
B36.7	Lock-Bar Steel Pipe (A.S.T.M. A 137)	Plates, 55,000 to 65,000 Lock-bars, 40,000 to 50,000	Covers sizes 20 inch to 72 inch, wall thicknesses 3/16 inch to ½ inch, fabricated from plates with H-shaped lock bars for the longitudinal seams. Suitable for conveying liquids or gases.
B36.8	Riveted Steel and Wrought-Iron Pipe (A.S.T.M. A 138)	Plates, steel, 55,000 to 65,000 Plates, wrought-iron, Class A, 48,000 min, Class B, 47,000 min Rivet bar stock, steel, 45,000 to 55,000; Wrought-iron, 47,000 min	Shop-fabricated pipe suitable for conveying liquids or gases; made from steel or wrought-iron plates with riveted seams.
B36.9	Electric-Fusion-Welded Steel Pipe, 8 Inch to but Not Including 30 Inch (A.S.T.M. A 139)	Grade A, 48,000 min Grade B, 60,000 min or other suitable material as specified from a list of A.S.T.M. Standards	Covers sizes 8 inch up to but not including 30 inch in wall thicknesses not over 5/8 inch, fabricated from steel plates by electric fusion welding. Intended for conveying liquids, gas, or vapor at temperatures below 450° F. Adapted for flanging and bending.
G8.7	Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Uses (A.S.T.M. A 120)	(*See Footnote*)	Commercial steel pipe for ordinary uses such as low-pressure steam, liquid or gas lines. Not intended for coiling or close bending, nor for high temperature service.
A.P.I. 5-L	Line Pipe Specifications	Furnace welded: Bessemer, 50,000 min Open-hearth, Class I, 45,000 min Open-hearth, Class II, 48,000 min Wrought iron, 42,000 min	Pipe for line pipe purposes, to convey gas, water or oil. Sizes covered, ⅛ inch nominal size to 24 inch outside diameter.
		Seamless or electric welded: Open-hearth, Grade A, 48,000 min Open-hearth, Grade B, 60,000 min Open-hearth, Grade C, 75,000 min	Couplings for threaded line pipe are of special design. Threads on pipe and in couplings are subject to official gage limits.
		Seamless or furnace welded: Open-hearth iron, 42,000 min	Due to the heavier weight of couplings the nominal weights of line pipe are somewhat greater than given in Tables 3 and 5.

No physical test requirements are called for in A.S.T.M. A 120 except the mill hydrostatic tests on each length, which are for the same pressures as called for in B36.1 for the respective types and sizes of pipe. As indicated in the title, the purpose of the Society in framing A.S.T.M. A 120 is to provide a medium for the purchase of pipe from warehouse stocks for use under conditions where the physical and chemical properties of the material are of lesser moment.

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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Table 2. *Dimensions of Welded and Seamless Steel Pipe

Nominal Pipe Size	Outside Diam.	Nominal Wall Thicknesses for Schedule Numbers									
		Schedule 10	Schedule 20	Schedule 30	Schedule 40	Schedule 60	Schedule 80	Schedule 100	Schedule 120	Schedule 140	Schedule 160
⅛	.405				.068		.095				
¼	.540				.088		.119				
⅜	.675				.091		.126				
½	.840				.109		.147				.187
¾	1.050				.113		.154				.218
1	1.315				.133		.179				.250
1¼	1.660				.140		.191				.250
1½	1.900				.145		.200				.281
2	2.375				.154		.218				.343
2½	2.875				.203		.276				.375
3	3.500				.216		.300				.437
3½	4.00				.226		.318				
4	4.500				.237		.337		.437		.531
5	5.563				.258		.375		.500		.625
6	6.625				.280		.432		.562		.718
8	8.625		.250	.277	.322	.406	.500	.593	.718	.812	.906
10	10.75		.250	.307	.365	.500	.593	.718	.843	1.000	1.125
12	12.75		.250	.330	.406	.562	.687	.843	1.000	1.125	1.312
14 O.D.	14.00	.250	.312	.375	.437	.593	.750	.937	1.062	1.250	1.406
16 O.D.	16.00	.250	.312	.375	.500	.656	.843	1.031	1.218	1.437	1.562
18 O.D.	18.00	.250	.312	.437	.562	.718	.937	1.156	1.343	1.562	1.750
20 O.D.	20.00	.250	.375	.500	.593	.812	1.031	1.250	1.500	1.750	1.937
24 O.D.	24.00	.250	.375	.562	.687	.937	1.218	1.500	1.750	2.062	2.312
30 O.D.	30.00	.312	.500	.625							

Table 3. Nominal Weights of Welded and Seamless Steel Pipe[1]

Nominal Pipe Size (Inches)	Sched. 10	Sched. 20	Schedule 30		Schedule 40		Sched. 60	Sched. 80	Sched. 100	Sched. 120	Sched. 140	Sched. 160
	Plain Ends	Plain Ends	Plain Ends	Threads[2] and Couplings	Plain Ends	Threads[2] and Couplings	Plain Ends	Plain Ends	Plain Ends	Plain Ends	Plain Ends	Plain Ends
⅛					.25	.25		.32				
¼					.43	.43		.54				
⅜					.57	.57		.74				
½					.86	.86		1.09				1.31
¾					1.14	1.14		1.48				1.94
1					1.68	1.69		2.18				2.85
1¼					2.28	2.29		3.00				3.77
1½					2.72	2.74		3.64				4.86
2					3.66	3.68		5.03				7.45
2½					5.80	5.82		7.67				10.0
3					7.58	7.62		10.3				14.3
3½					9.11	9.21		12.5				
4					10.8	10.9		15.0		19.0		22.6
5					14.7	14.9		20.8		27.1		33.0
6					19.0	19.2		28.6		36.4		45.3
8		22.4	24.7	25.0	28.6	28.8	35.7	43.4	50.9	60.7	67.8	74.7
10		28.1	34.3	35.0	40.5	41.2	54.8	64.4	77.0	89.2	105	116
12		33.4	43.8	45.0	53.6	55.0	73.2	88.6	108	126	140	161
14 O.D.	36.8	45.7	54.6		63.3		85.0	107	131	147	171	190
16 O.D.	42.1	52.3	62.6		82.8		108	137	165	193	224	241
18 O.D.	47.4	59.0	82.0		105		133	171	208	239	275	304
20 O.D.	52.8	78.6	105		123		167	209	251	297	342	374
24 O.D.	63.5	94.7	141		171		231	297	361	416	484	536
30 O.D.	99.0	158	197									

*All dimensions are given in inches.

*The decimal thicknesses listed for the respective pipe sizes represent their nominal or average wall dimensions and include an allowance for mill tolerance of 12.5 per cent under the nominal thicknesses.

[1] Weights are given in pounds per linear foot and are for pipe with plain ends except for sizes which are commercially available with threads and couplings for which both weights are listed.

[2] Weights for line pipe with couplings are slightly greater than shown in Schedules 30 and 40 and may be found in A.P.I. Spec. 5-L.

Thicknesses and weights shown in bold face type in Schedules 30 and 40 are identical with those for "standard weight" pipe shown in former lists; those in Schedules 60 and 80 are identical with thicknesses and weights for "extra strong" pipe in former lists.

The Schedule Numbers indicate approximate values of the expression $1000 \times P/S$.

Table 4. Dimensions of Welded Wrought-Iron Pipe

Nominal Pipe Size	Outside Diameter	Nominal Wall Thicknesses for Schedule Numbers					
		Schedule 10	Schedule 20	Schedule 30	Schedule 40	Schedule 60	Schedule 80
⅛	.405				.070		.098
¼	.540				.090		.122
⅜	.675				.093		129
½	.840				.111		151
¾	1.050				.115		157
1	1.315				.136		183
1¼	1.660				.143		195
1½	1.900				.148		204
2	2.375				.158		.223
2½	2.875				.208		282
3	3.500				.221		306
3½	4.000				.231		325
4	4.500				.242		344
5	5.563				263		383
6	6.625				286		441
8	8.625			.283	.329		510
10	10.75			.313	.372	510	606
12	12.75			.336	.414	.574	.702
14 O.D.	14.00	.250	.312	.375	.437	.625	.750
16 O.D.	16.00	.250	.312	.375	.500	.687	
18 O.D.	18.00	.250	.312	.437	.562	.750	
20 O.D.	20.00		.375	.500	.562		

All dimensions are given in inches.

The decimal thicknesses listed for the respective pipe sizes represent their nominal or average wall dimensions and include an allowance for mill tolerance of 12.5 per cent under the nominal thicknesses.

Thicknesses shown in bold face type in Schedules 30 and 40 are identical with thicknesses for "standard weight" pipe in former lists; those in Schedules 60 and 80 are identical with thicknesses for "extra strong" pipe in former lists.

The Schedule Numbers indicate approximate values of the expression $1000 \times P/S$.

Table 5. Nominal Weights of Welded Wrought-Iron Pipe[1]

Nominal Pipe Size (Inches)	Schedule 10	Schedule 20	Schedule 30		Schedule 40		Schedule 60	Schedule 80
	Plain Ends	Plain Ends	Plain Ends	Threads and Couplings	Plain Ends	Threads and Couplings	Plain Ends	Plain Ends
⅛					.25	.25		32
¼					.43	.43		54
⅜					.57	.57		74
½					.86	.86		1.09
¾					1.14	1.14		1.48
1					1.68	1.69		2.18
1¼					2.28	2.29		3.00
1½					2.72	2.74		3.64
2					3.66	3.68		5.03
2½					5.80	5.82		7.67
3					7.58	7.62		10.3
3½					9.11	9.21		12.5
4					10.8	10.9		15.0
5					14.7	14.9		20.8
6					19.0	19.2		28.6
8			24.7	25.0	28.6	28.8		43.4
10			34.3	35.0	40.5	41.2	54.8	64.4
12			43.8	45.0	53.6	55.0	73.2	88.6
14 O.D.	36.0	44.8	53.6		62.2		87.6	104
16 O.D.	41.3	51.4	61.4		81.2		111	
18 O.D.	46.5	57.9	80.5		103		136	
20 O.D.		77.0	103		115			

[1] Weights are given in pounds per linear foot and are for pipe with plain ends except for sizes which are commercially available with threads and couplings for which both weights are listed.

Weights shown in bold face type in Schedules 30 and 40 are identical with weights for "standard weight" pipe in former lists; those in Schedules 60 and 80 are identical with weights for "extra strong" pipe in former lists.

The Schedule Numbers indicate approximate values of the expression $1000 \times P/S$.

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Internal Fluid Pressures for Pipe

D = Outside diameter in inches. t = Thickness of wall in inches.

Based on Barlow's Formula $P = 2f\frac{t}{D}$ P = Pressure in pounds per square inch. f = Fiber stress in pounds per square inch.

Size	External diameter	Thickness	Ultimate bursting pressure		Pressures at various factors of safety							
			Butt-weld	Lap-weld	Factor of safety=5		Factor of safety=6		Factor of safety=8		Factor of safety=10	
			Fiber stress 40,000 lbs. per sq. in.	Fiber stress 50,000 lbs. per sq. in.	Butt-weld fiber stress= 8,000 lbs. per sq. in.	Lap-weld fiber stress= 10,000 lbs. per sq. in.	Butt-weld fiber stress= 6,667 lbs. per sq. in.	Lap-weld fiber stress= 8,333 lbs. per sq. in.	Butt-weld fiber stress= 5,000 lbs. per sq. in.	Lap-weld fiber stress= 6,250 lbs. per sq. in.	Butt-weld fiber stress= 4,000 lbs. per sq. in.	Lap-weld fiber stress= 5,000 lbs. per sq. in.
Standard Pipe												
⅛	.405	.068	13432		2686		2239		1679		1343	
¼	.540	.088	13037		2607		2173		1630		1304	
⅜	.675	.091	10785		2157		1798		1348		1079	
½	.840	.109	10381		2076		1730		1298		1038	
¾	1.050	.113	8610		1722		1435		1076		861	
1	1.315	.133	8091		1618		1349		1011		809	
1¼	1.660	.140	6747	8434	1349	1687	1124	1406	843	1054	675	843
1½	1.900	.145	6105	7632	1221	1526	1018	1272	763	954	611	763
2	2.375	.154	5187	6484	1037	1297	865	1081	648	811	519	648
2½	2.875	.203	5649	7061	1130	1412	941	1177	706	883	565	706
3	3.500	.216	4937	6171	987	1234	823	1029	617	771	494	617
3½	4.000	.226		5650		1130		942		706		565
4	4.500	.237		5267		1053		878		658		527
4½	5.000	.247		4940		988		823		618		494
5	5.563	.258		4638		928		773		580		464
6	6.625	.280		4226		845		704		528		423
7	7.625	.301		3948		790		658		493		395
8	8.625	.277		3212		642		535		401		321
8	8.625	.322		3733		747		622		467		373
9	9.625	.342		3553		711		592		444		355
10	10.750	.279		2595		519		433		324		260
10	10.750	.307		2856		571		476		357		286
10	10.750	.365		3395		679		566		424		340
11	11.750	.375		3191		638		532		399		319
12	12.750	.330		2588		518		431		324		259
12	12.750	.375		2941		588		490		368		294
14 O.D.	14.000	.375		2679		536		446		335		268
15 O.D.	15.000	.375		2500		500		417		313		250
16 O.D.	16.000	.375		2344		469		391		293		234
17 O.D.	17.000	.393		2312		462		385		289		231
18 O.D.	18.000	.409		2272		454		379		284		227
20 O.D.	20.000	.409		2045		409		341		256		205
Extra Strong Pipe												
⅛	.405	.095	18765		3753		3128		2346		1877	
¼	.540	.119	17630		3526		2938		2204		1763	
⅜	.675	.126	14933		2987		2489		1867		1493	
½	.840	.147	14000		2800		2333		1750		1400	
¾	1.050	.154	11733		2347		1956		1467		1173	
1	1.315	.179	10890		2178		1815		1361		1089	
1¼	1.660	.191	9205	11506	1841	2301	1534	1918	1151	1438	920	1151
1½	1.900	.200	8421	10526	1684	2105	1404	1754	1053	1316	842	1053
2	2.375	.218	7343	9179	1469	1836	1224	1530	918	1147	734	918
2½	2.875	.276	7680	9600	1536	1920	1280	1600	960	1200	768	960
3	3.500	.300	6857	8571	1371	1714	1143	1429	857	1071	686	857
3½	4.000	.318		7950		1590		1325		994		795
4	4.500	.337		7489		1498		1248		936		749
4½	5.000	.355		7100		1420		1183		888		710
5	5.563	.375		6741		1348		1124		843		674
6	6.625	.432		6521		1304		1087		815		652
7	7.625	.500		6557		1311		1093		820		656
8	8.625	.500		5797		1159		966		725		580
9	9.625	.500		5195		1039		866		649		519
10	10.750	.500		4651		930		775		581		465
11	11.750	.500		4255		851		709		532		426
12	12.750	.500		3922		784		654		490		392
Double Extra Strong Pipe												
½	.840	.294	28000		5600		4667		3500		2800	
¾	1.050	.308	23467		4693		3911		2933		2347	
1	1.315	.358	21779		4356		3630		2722		2178	
1¼	1.660	.382	18410		3682		3068		2301		1841	
1½	1.900	.400	16842	21053	3368	4211	2807	3509	2105	2632	1684	2105
2	2.375	.436	14686	18358	2937	3672	2448	3060	1836	2295	1469	1836
2½	2.875	.552	15360	19200	3072	3840	2560	3200	1920	2400	1536	1920
3	3.500	.600		17143		3429		2857		2143		1714
3½	4.000	.636		15900		3180		2650		1988		1590
4	4.500	.674		14978		2996		2496		1872		1498
4½	5.000	.710		14200		2840		2367		1775		
5	5.563	.750		13482		2696		2247		1685		1420
6	6.625	.864		13042		2608		2174		1630		1348
7	7.625	.875		11475		2295		1913		1434		1304
8	8.625	.875		10145		2029		1691		1268		1148
												1014

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Crane Fabricated Piping

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Advantages of Crane Shop Fabrication ..... pages 614 and 615
Scope of Crane Shop Facilities ..... page 615
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Estimating and Ordering Services ..... page 616
Crane Shop Fabricating Facilities ..... pages 617 to 620
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Flange Facings and Finishes ..... pages 638 to 643
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A complete line — not the fabricated piping only!

Crane Shop Fabrication assures uniform accuracy and quality.

Integrated piping systems from a single manufacturing source — one responsibility for proper and complete fabrication

List Prices of Fabricated Piping

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Crane Fabricated Piping

Foreword

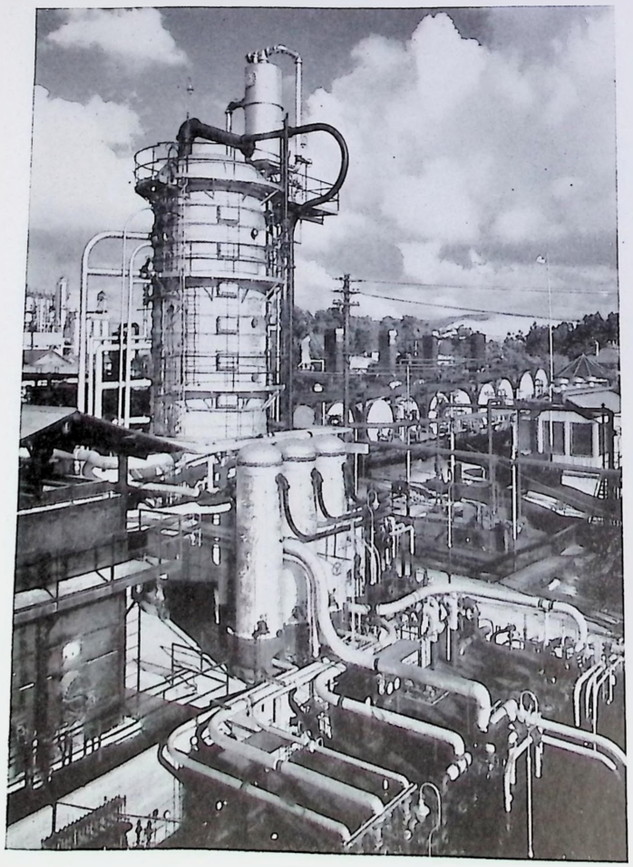
The increasing use of higher pressures and temperatures has elevated the art of designing, erecting, and purchasing fabricated piping to its rightful position of importance. Discriminating buyers now realize that the purchase of piping requires the same careful thought and attention to details as does the selection of steam generators, prime movers, refinery cracking stills, valves, and other major items of modern plants.

Years ago, Crane Co. realized the desirability of having the production and development of its fabricated piping go hand in hand with the constant improvement in its valves, fittings, and allied articles. In this manner, materials of uniform standards of design, workmanship, and performance have been developed.

In his search for dependable fabricated piping, the purchaser is interested in the historical background of the manufacturer. It should reflect a continuity of progress. Crane Co. can point to a long experience in the production of fabricated piping, and is numbered among the earliest pioneers. Crane Co. has contributed to the advancement of the industry a long succession of improvements, and today, as for more than a half century, offers fabricated piping recognized and accepted as the standard.

With this background of experience and long record of achievement, Crane Co. presents this section covering fabricated piping, confident that the excellent facilities, modern equipment, and precision manufacturing methods outlined will acquaint users with its ability to cope with their problems.

The nature of fabricated piping precludes any attempt to list completely the variety of materials and operations available in a modern shop. The special and peculiar requirements of industry and its processes daily present problems which must be solved. Your attention is invited to the following pages which are offered as a partial presentation of our service, with the request that any special needs not found in this section be submitted for advice and full information.



Vacuum Distillation Plant — a unit of a modern lubricating oil refinery

This unit of the plant is used to closely fractionate various grades of oil before solvent refining.

Crane Fabricated Piping, Valves, Flanged Fittings, and Welding Fittings provide an installation of uniform accuracy and quality of materials and workmanship.

Advantages of One Source of Supply

A complete line—not the fabricated piping only!

Exacting users of materials for piping installations will recognize the advantages of purchasing the fabricated piping from a manufacturer who also produces a complete line of valves, fittings, bolts, gaskets, hangers, supports, and accessories. The principal advantages are:

One responsibility: When the task of furnishing all of the material rests with Crane Co., there is but one responsibility—one uniform standard of materials, workmanship, and service. Whether the joints used are threaded, flanged, or beveled for welding, the same standards and gauging systems are used uniformly on the pipe, valves, and fittings for threading, for facing and drilling, or for finishing the beveled ends to exact size and angle.

This assures the user that the component parts of the piping system will fit accurately, provide reliability and safety, and that the line will be erected easily with a minimum of erection and maintenance costs.

Simplicity of ordering: An order for the complete piping job is handled as an integral unit; there is not the division of responsibility regarding the dimensions and related details of the various items, as may occur when the component parts of a piping system are ordered from several sources of supply.

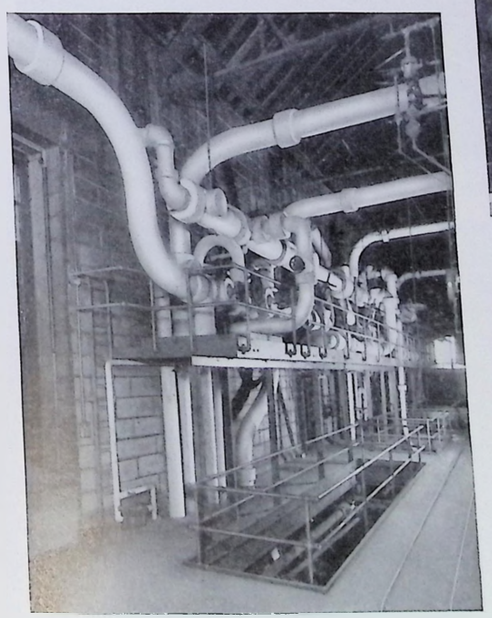
Time saving: There is a saving in time and expense when orders and detailed drawings are prepared for only one source of supply.

Satisfactory deliveries: The delays caused by shipments from several sources are eliminated. Instead, deliveries are expedited, and this reduces materially the erection cost.

Ease of maintenance: When repairs or replacements are necessary because of the demands of service, they are effected easily when all of the original material was secured from one source of supply.

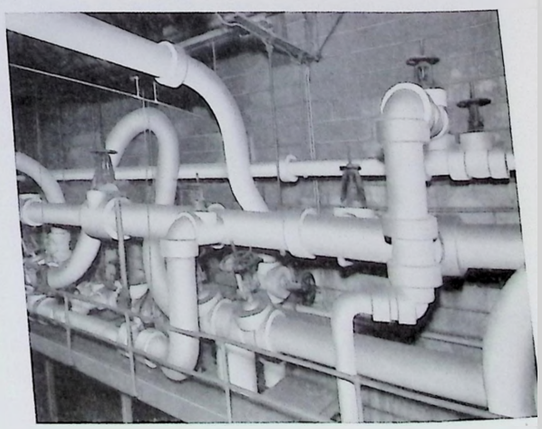
At the right
Crane Fabricated Piping
serves the gas and oil industry.
A battery of 8-inch Compound Pipe Bends and Crane Steel Gate Valves connected to Absorbers





Above
The boiler room of a water works pumping station
Crane 300-Pound Steel Valves, Flanged Fittings, and Fabricated Piping with Forged Steel Cranelap Flanged Joints

An integrated piping system from a single manufacturing source—one responsibility for proper and complete fabrication

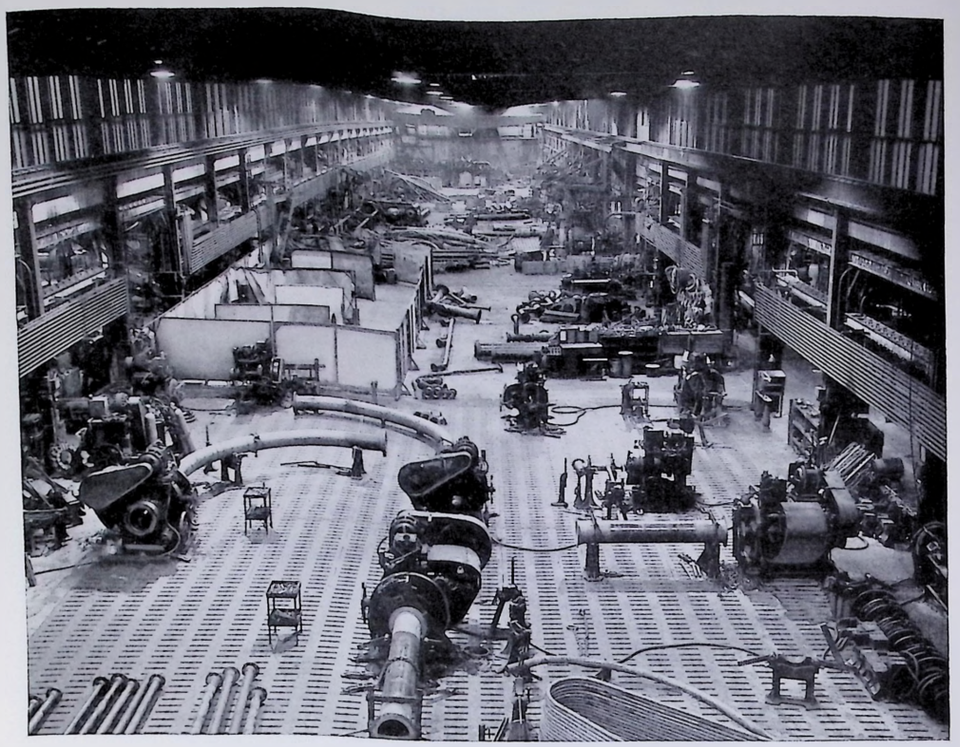


A "close-up" of 300-Pound Main and Auxiliary Steam Headers — with an 8 inch Expansion Bend in the Main Header

A complicated assembly—requiring accurate piping fabrication

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Advantages of Crane Shop Fabrication



Showing a portion of the Crane Fabricated Piping Shop in Chicago

The advantages of Crane shop fabrication are reflected in:

Accuracy: A piping system, when placed in service, should develop the predetermined results and fulfill all of the expectations of a proper design. This should be accomplished expeditiously and at a minimum of final erected cost consistent with the use of good materials and workmanship. Obviously, this purpose will be defeated unless each piece, large or small, of both simple and complex piping systems, receives the attention necessary to assure accuracy and a high quality of workmanship. Crane Shop Fabrication makes possible the accomplishment of this desirable end.

Proficiency: In the Crane Fabricating Shops the mechanics are employed solely on the production of fabricated piping. Such continuity of practice means that they do not lose their proficiency, which is particularly desirable for welding and other complex operations.

Safety: Safety is a prime requisite of every piping installation. Crane Shop Fabrication assures purchasers that every necessary precaution has been employed to eliminate hidden hazards of piping. A weld may appear excellent on the exterior, yet under the surface it may contain gas pockets or have faulty penetration. A threaded flange joint gives no indication in its external appearance of improper threading. These are but two of the many hidden hazards of piping.

Shop appliances: Shop fabrication permits the use of special machinery, clamps, jigs, and other convenient appliances which are impractical for field service. This equipment permits the alignment and squaring-up of all flanged faces or ends of piping, also accuracy of dimensions and angles—all within the closest practical limits. Such characteristics assure the final fitting of every piece into position without alteration or improper strain, resulting in increased safety, and a saving of time and labor. Stress relieving, annealing, or heat treating, when necessary, are readily performed in the shop. All of these advantages are almost impossible of accomplishment in the field.

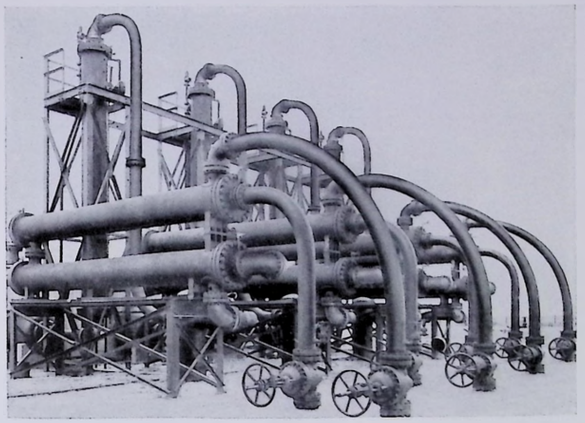
Working conditions: Working conditions, almost invariably, are better in the shop than in the field. The shop has facilities for handling heavy or bulky pieces, therefore each mechanic is working at all

Advantages of Crane Shop Fabrication

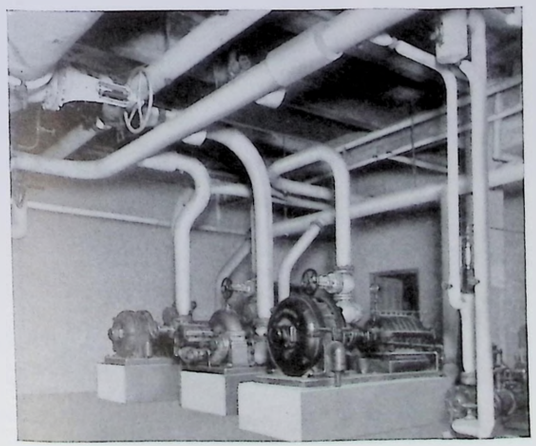
times in a comfortable position and is not concerned about his safety. His work is not affected by the unfavorable conditions usually obtaining in the field.

Testing: Crane shop fabrication assures dependability because the product is tested and proved sound before shipment. Piping which is fabricated in the field usually must be installed in its final position before it can be tested and, in the event of failure, the removal for replacement or repair proves expensive and causes delay.

Simplified assembly: The erecting force in the field should only be called upon to assemble a piping system. It should neither be expected to design and fabricate piping, nor to manufacture economically, under adverse field conditions, a product comparable with that of the modern fabricating shop.

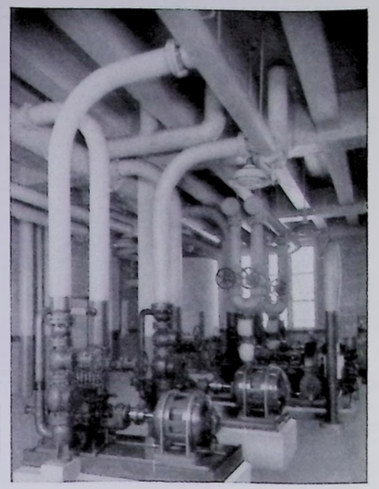


Crane Fabricated Piping
serves the gas and oil industry.



Crane Fabricated Piping in the power-house of a cement manufacturing plant

High Pressure Boiler Feed Lines — 300-Pound Cranelap Joints on piping — Crane Steel Valves and Fittings



Above
Crane Pipe Bends and Shop Welded Headers in the pump room of a large railroad terminal power-house

At the left
Crane Pipe Bends, Cast Steel Valves and Fittings connected to Heat Exchangers

Scope of Crane Shop Facilities

Crane Co. can supply advantageously any piping for any industry.

Shops at strategic points: Crane Co. maintains many shops for supplying the piping needs of industry. Most of the Crane Branch Houses are equipped for the simpler jobs—the larger Branch Houses for more elaborate jobs—and fabricating shops embracing the full line of pipe fabrication are located at strategic centers throughout the country.

All types of joints: Crane Co. can furnish any type of joint—screwed, flanged, welded, or special. The selection of any type of joint presents a basic engineering or mechanical problem. Crane Co. makes its recommendations accordingly—having an all-inclusive line, it can exercise a degree of impartiality conducive to best serving the interests of the purchaser.

Large stocks: Crane Co. carries large stocks of the various kinds of pipe, flanges, valves, fittings, and accessories at all fabricating shops and branches.

Crane Co. is prepared for the job, whether it calls for a single piece of pipe cut to length, or the complete piping equipment of an industry.

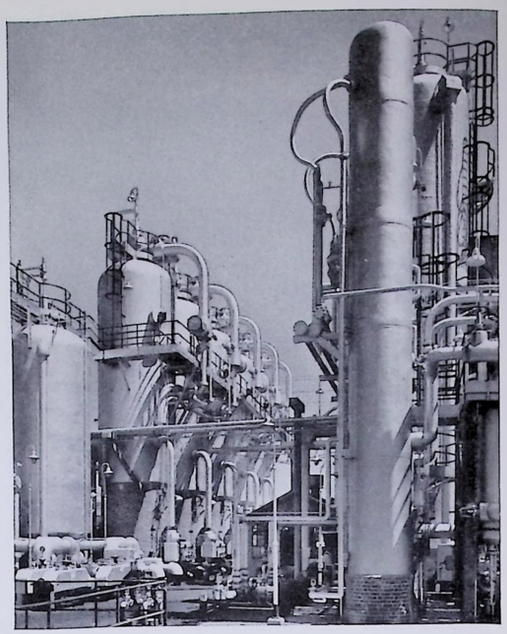
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Metallurgical and Engineering Control

Laboratory: In the year 1888, Crane Co. established a chemical laboratory with full control over the raw materials which went into Crane products. This department expanded with the growing business into a complete metallurgical and testing laboratory, constantly checking all materials and testing all products. The testing of the product is severe, even to the minutest detail. This organization has long been a dominant factor in the development of the product. All of the accumulated data held by this department—the applied experience of Crane research men—are utilized in the production of Crane Fabricated Piping.

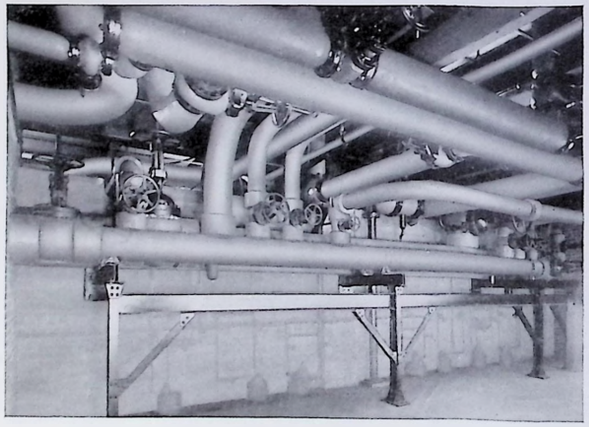
Engineering: All fabrication of piping in the Crane shops is under a system of constant procedure control. A thorough gauging system is employed in all operations. Trained engineers are responsible at all times for the design, superintendence during manufacture, and constant checking of the product.

The services outlined above eliminate guess work in the production of Crane Fabricated Piping.



Below
Main and Auxiliary Steam Headers and Miscellaneous Lines in a light plant 400 pounds steam working pressure

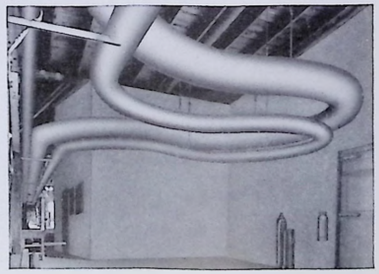
Above
Crane Fabricated Piping, Steel Valves, and Fittings in a de-waxing unit of a lubricating oil plant



Crane Pipe Bends and Shop Fabricated Welded Headers

Shop fabrication assured the realization of the predetermined results of a proper design.

Below
Crane Fabricated Piping in a salt manufacturing plant



Expansion Bends in 5-inch high pressure and 14-inch low pressure steam lines. These bends take care of the expansion and contraction of lines 260 feet long.

Estimating and Ordering Services

Competent Engineering Sales Departments are maintained at the various Crane Fabricating Shops and at the larger Branch Houses.

Estimates: A reliable estimate of the cost of any piping system will be furnished promptly upon receipt of an inquiry accompanied by blue-prints and specifications. No matter how complex the layout or how involved the specification, a complete and accurate quotation is assured.

Orders: Crane Co. has specialized for many years in the handling of orders for fabricated piping. Men, well trained and experienced in this work, enter the shop orders direct from complete blue-prints, detail sketches, or bills of material, constantly checking all dimensions and details. Accuracy is the watchword.

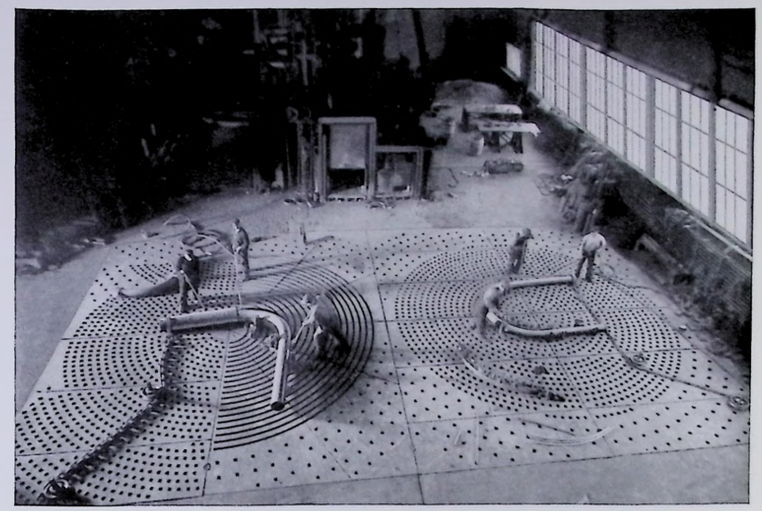
Submit your inquiries to the nearest Crane representative.

Crane Shop Fabricating Facilities

The Crane Shops are fully equipped with machinery and facilities for the various operations required in the production of a complete line of fabricated piping.

Much of the shop equipment is special—designed and built to develop the manufacturing technique necessary for the fabrication of piping of high, uniform accuracy and quality of workmanship.

The many forms of special jigs and appliances, which are a necessary adjunct, are employed constantly to supplement the effectiveness of the machines and other facilities.



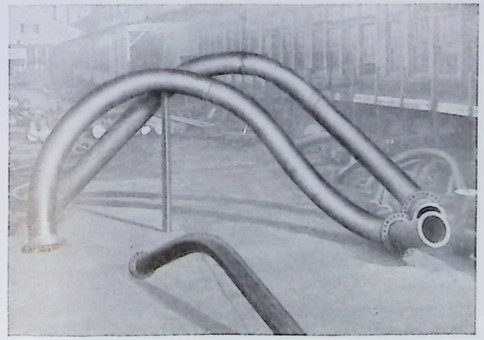
The pipe bending plate in the Crane Fabricated Piping Shop in Chicago

In the background is one of the furnaces for heating the pipe before bending.

Pipe bending: In Crane Shops, the art of bending pipe has been developed to a high degree—pipe bends of all sizes and a variety of shapes are in constant production.

Pipe bends have a wide range of usefulness. No two general piping installations are alike, hence pipe bends are especially adapted to solve the many problems of space requirements. The proper proportions of a pipe bend usually are essentially a matter of bending pipe to the dimensions necessary to fit into the available space.

To meet these needs of industry, Crane pipe bending facilities are available—shops are equipped to fabricate pipe bends from a large range of sizes, weights, and kinds of pipe.



Compound Pipe Bends made from 18-inch O. D. pipe, 2½-inch thick and with 400-Pound Cranelap Flanges



An unusual assembly involving bending, welding, and flanging

Extremely accurate shop fabrication is necessary for the production of piping of this character.

Detailed information on Pipe Bends . . . pages 621 to 624

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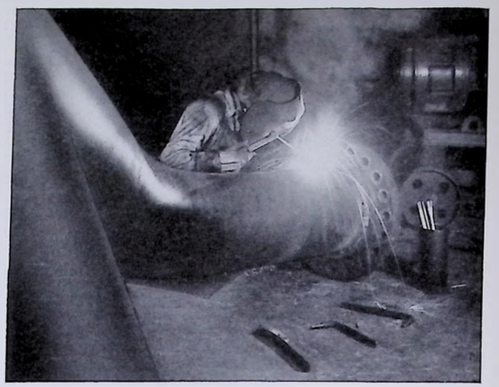
Crane Shop Fabricating Facilities

Welding: Crane Co. pioneered in the welding of fabricated piping. Welding equipment has been used for over twenty-five years in the production of headers and other products.

Untiring research and experiment in Crane Shops during this long period are responsible for the constant refinement in the technique of Crane welding.

Crane welders use both the electric arc and oxy-acetylene methods of welding with equal facility, and are subjected periodically to qualification tests.

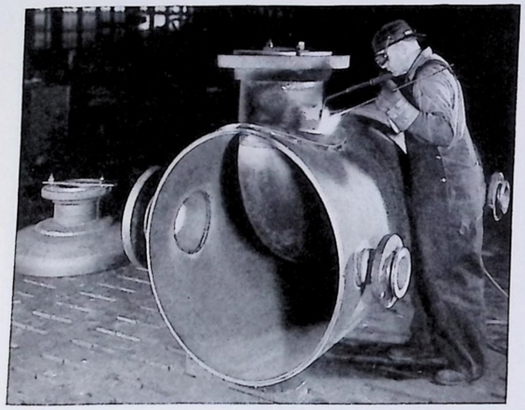
Crane Fabricated Piping includes an almost infinite variety of shop-welded product.

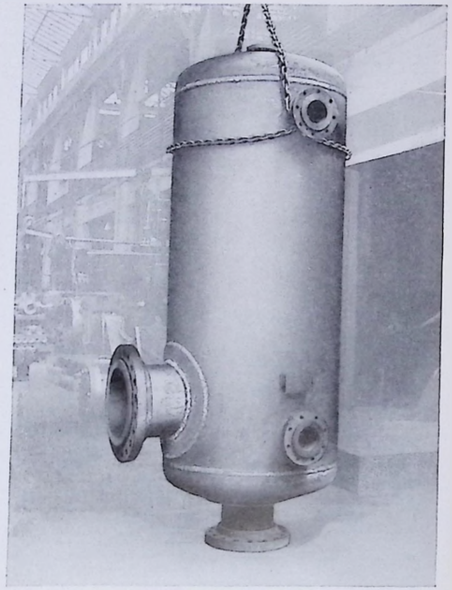


At the right

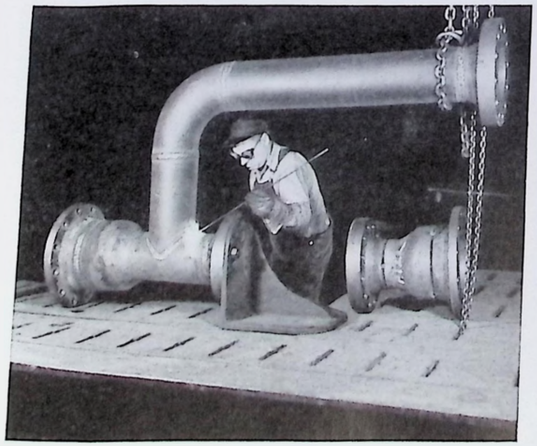
A Crane welder at work, backwelding the steel flange on a 12-inch Compound Pipe Bend

The electric arc method of welding is illustrated.





The finished product of the welder — a 16-inch Special Welded Receiver Steam Separator — 3'6" Dia. x 9'9" over-all height — approximate weight 5160 pounds.



Above — Crane Welders at work



The finished product of the welder — Welded Assemblies made of 12 and 8-inch Seamless Steel Tubing, Crane Welding Elbows, and Welding Neck Flanges — 500 pounds kerosene test pressure.

Detailed information on welding . . . pages 644 to 649

Crane Shop Fabricating Facilities

Flanging: Crane shop facilities include equipment for producing the many types of flanged joints in current use. These can be furnished not only in their regular forms, but also in the various modifications and special adaptations required.

Precision gauges govern every operation, assuring the utmost accuracy.



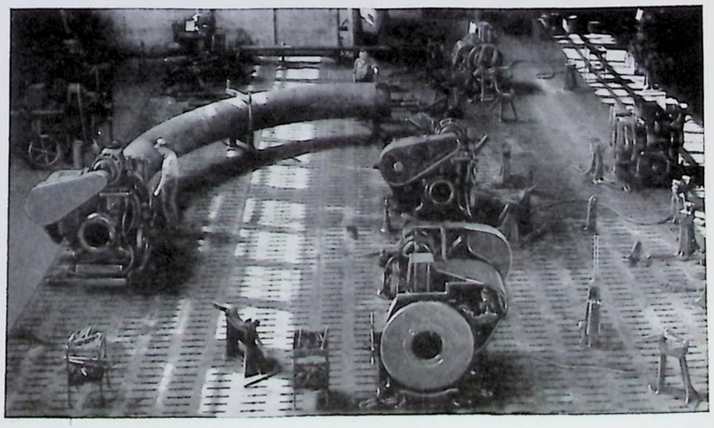
Showing one of the Cranelapping machines and furnaces in the Crane Fabricated Piping Shop in Chicago.

A large pipe, at forging heat, is ready for lapping.

For detailed information on flanged joints, see pages 625 to 637.

Finishing: Special finishing machines enable Crane Shops to furnish fabricated piping with a variety of finishes—regular and special.

Cutting, beveling, threading, making on screwed flanges, facing all types of flanges, machining Cranelap Joints, and various other operations for finishing the ends of Crane Fabricated Piping are performed on these machines with precision and a close adherence to accurate gauging standards.



Showing a portion of the finishing floor in the Crane Fabricated Piping Shop in Chicago

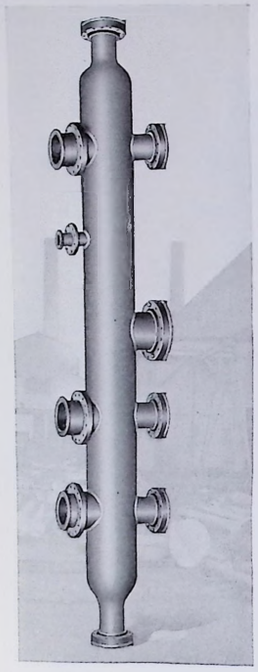
At the left of the picture a 30-inch O.D. Pipe Bend is being cut to proper length.

Flange facings and finishes . . . pages 638 to 643

Threading . . . page 654

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Crane Shop Fabricating Facilities



Swedging: Swedging facilities are available for all sizes of pipe. The facilities include furnaces for heating, powerful forging hammers, and dies to assure accurate fabrication.

The photographs of product illustrate the character of the swedging performed in the Crane Shops.

For detailed information on Swedging, see page 660.

Testing: Crane shop facilities include equipment for testing fabricated piping as specified in the various codes, or in accordance with the provisions of a specification. The usual hydrostatic tests are supplemented by air-under-water, kerosene, and other special tests if required.

For detailed information on testing, see page 653.

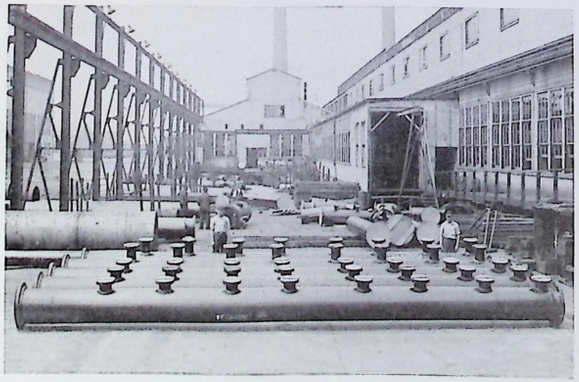
Cutting and threading pipe: Crane Co. Shops are equipped to cut and thread pipe for all commercial services—regular and special threads can be furnished.

The accurate threading to gauge, so characteristic of Crane screwed products, is similarly found in pipe cut to length and threaded in Crane Shops.

For detailed information on cutting and threading pipe, see page 654.

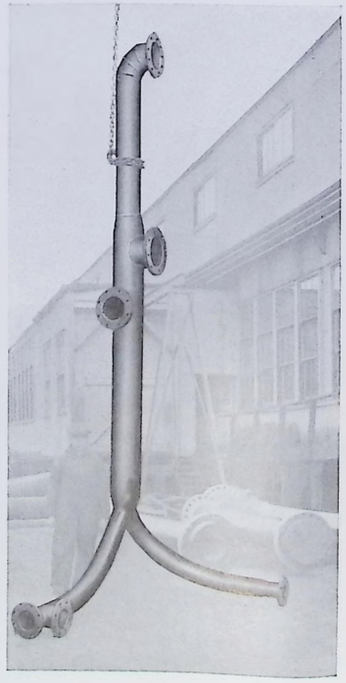
At the left

An 18-inch Welded Header with the ends swedged to 10-inch — Cranelap Flanged Joints on all ends



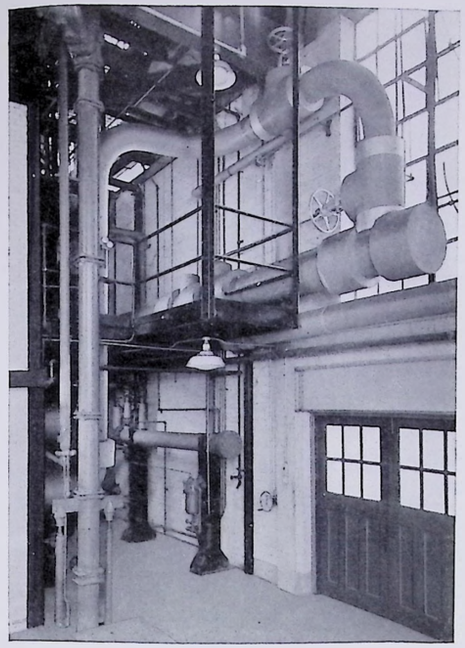
A group of Welded Headers and fabricated piping with flange protectors applied — ready for shipment

Crane Shop Fabrication assures accuracy in complicated sections of piping as well as in simple pieces.

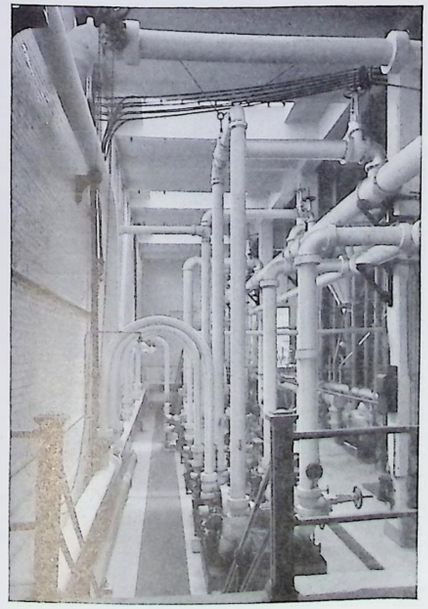


An unusual combination of pipe bending, welding, and swedging

Crane Pipe Bends



Boiler lead and portion of header
Crane Fabricated Piping with Cranelap Joints and Crane Steel Valves and Fittings
600 pounds steam working pressure



Crane Fabricated Piping, Valves, and Fittings in a salt plant

Crane Pipe Bends have a variety of uses but are employed principally to provide flexibility to compensate for the expansion and contraction of piping; reduce the number of joints in a piping system; and avoid obstructions, such as columns, foundations, other pipe lines, etc.

Crane Pipe Bends are made from pipe which is filled with sand, heated carefully until the entire sand core produces a uniform temperature, then clamped on the bending floor to forms which have been accurately laid out. Power winches are applied to draw the pipe around the forms to proper shape and angle—the point of power application is repeatedly shifted to prevent the formation of wrinkles on the inside wall.

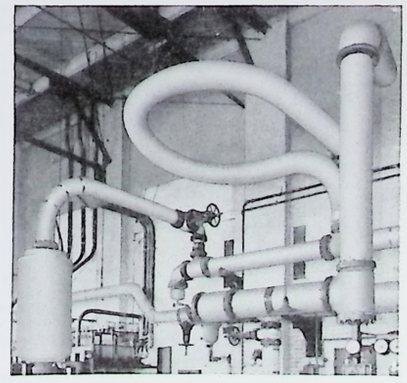
When bent to proper angle, the pipe bend is permitted to cool before the sand is removed. A new heat is made for each bend in a piece of pipe.

All bends are completed in the pipe before trimming, threading, or flanging. On the finishing floor the dimensions of the pipe bend are again laid out, the bent pipe is moved into position and clamped, the finishing heads are then brought into position and securely anchored before the trimming of the pipe bend takes place.

The pipe bend is cut to length, threaded, or flanged without moving the head, thereby eliminating the possibility of error. If fitted with Cranelap Joints, the pipe bend is accurately cut to length, and the ends are heated and lapped before going to the finishing floor. Finally, Crane Pipe Bends are cleaned of all scale, chips, and oil.

A system of repeated checking assures that every dimension and angle of the completed pipe bend will be accurate, and that the ends or flanges will be square with the axis of the pipe.

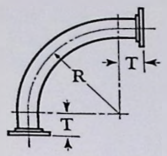
Crane Pipe Bends are characteristically of full area, free from wrinkles, buckles, and thin spots—they are easy to erect, fitting into place exactly, causing no unnecessary or unintentional strains to pull them into position.



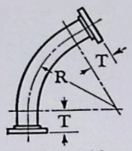
8-inch Compound 270-degree and Quarter Pipe Bend in a chemical plant

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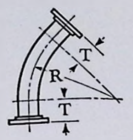
Standard Types of Pipe Bends



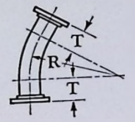
No. 1
Quarter Bend
90°



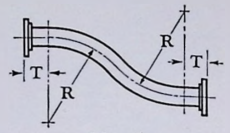
No. 1½
Angle Bend
46° to 89°



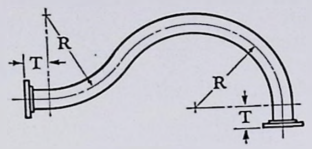
No. 3
45° Bend



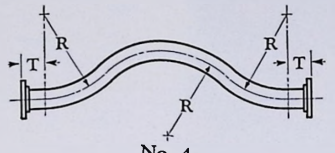
No. 3½
Angle Bend
Less than 45°



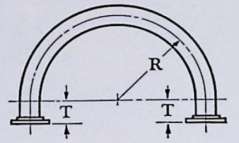
No. 5
Offset Bend



No. 2
Single Offset Quarter Bend



No. 4
Crossover Bend



No. 7
U-Bend — 180°

Radii and Tangents of Pipe Bends

Size of Pipe Inches	Column "A" R Minimum Recommended Radius — Steel or Genuine Wrought Iron Pipe — Standard or Extra Strong Weight Inches	Column "B" R Shortest Radii to which pipe can be bent (*See Cautionary Note on page 623*) — Steel Pipe Only — Threaded Ends, Screwed, or Welded Flanges — Standard Weight Pipe Inches	Extra Strong Weight Pipe Inches	Cranelap Joints — Standard Weight Pipe Inches	Extra Strong Weight Pipe Inches	Genuine Wrought Iron Pipe — Threaded Ends, Screwed, or Welded Flanges — Standard Weight Pipe Inches	Extra Strong Weight Pipe Inches	Cranelap Joints — Standard Weight Pipe Inches	Extra Strong Weight Pipe Inches	Column "C" T Minimum Length of Tangent (*See Cautionary Note on page 623*) — Steel or Genuine Wrought Iron Pipe — Standard or Extra Strong Weight — Threaded Ends or Screwed Flanges Inches	Cranelap Joints Inches
¼	1¼	1	⅝			1½	1			1	
⅜	1⅞	1¼	¾			2	1½			1¼	
½	2½	1½	1	2	2	2½	2	2½	2	1½	2
¾	3¾	1¾	1¼	3	3	3	2½	3	3	1¾	2
1	5	2	1½	4	4	4	3	4	4	2	2
1¼	6¼	2¼	1¾	4	4	5	4	5	4	2	2½
1½	7½	2½	2	5	5	6	5	6	5	2½	3
2	10	3	2½	6	6	8	5	8	6	3	4
2½	12½	5	4¼	10	10	10	8	10	10	4	5
3	15	8	6	12	12	12	10	12	12	4	6
3½	17½	10	8	12	12	14	12	14	12	5	6
4	20	12	10	14	14	16	12	16	14	5	6
5	25	18	14	18	14	20	15	20	15	6	7
6	30	22	15	22	15	26	18	26	18	7	7
8	40	30	23	30	23	30	28	30	28	9	8
10	50	36	30	36	30	36	32	36	32	12	10
12	60	46	36	46	36	46	42	46	42	14	10
*14 OD	70	60	48	60	48	60	54	60	54	16	14
*16 OD	96	80	60	80	60	80	70	80	70	18	16
*18 OD	108	90	66	90	66	90	80	90	80	18	18
*20 OD	120	100	72	100	72	100	90	100	90	18	18
*24 OD	144	144	108	144	108	144	122	144	122	18	20

*For sizes 14-inch O.D. and larger pipe, the radii shown under headings of "Standard Weight Pipe" are based upon using pipe with a wall thickness of ⅜-inch or lighter; the radii shown under headings of "Extra Strong Weight Pipe" are based upon using pipe with a wall thickness of ½-inch or heavier.

See pages 617 and 621 for description of the pipe bending process.

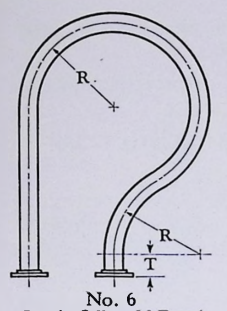
Notes on Pipe Bends on pages 623 and 624

See pages 656 to 660 for list prices of bending labor, flanges, etc.

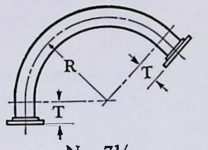
Illustrations of Standard Types of Pipe Bends continued on page 623

Continued on next page

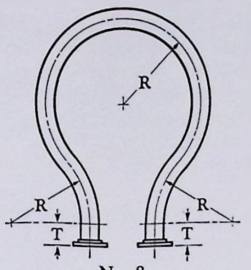
Standard Types of Pipe Bends



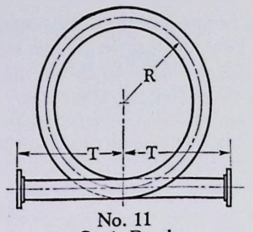
No. 6
Single Offset U-Bend



No. 7½
Angle Bend
91° to 179°

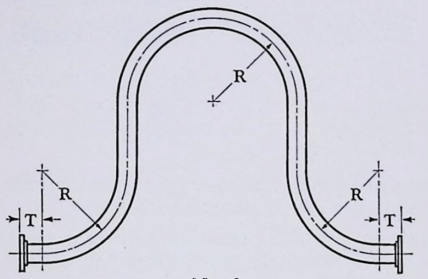


No. 8
Double Offset U-Bend



No. 11
Circle Bend

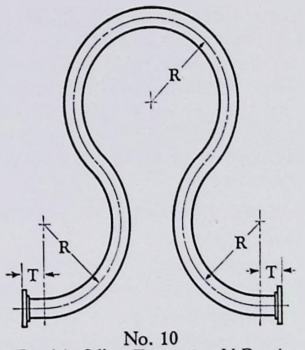
For Table of Radii and Tangents, see page 622.



No. 9
Expansion U-Bend

Pages 672 to 679 illustrate a variety of pipe bends which cover the major portion of ordinary requirements. Buyers will find it convenient to use these pages for ordering, eliminating the necessity of preparing a sketch in many cases.

See paragraph on page 624 entitled "Inquiries and Orders".



No. 10
Double Offset Expansion U-Bend

Notes on Pipe Bends

Minimum recommended radius: The figures shown in Column "A" represent a schedule of dimensions that is consistent with good practice for determining ordinary minimum radii of pipe bends.

Shortest radius: The dimensions shown in Column "B" are based upon actual manufacturing conditions and should not be lowered. *Refer to the cautionary note below.*

Minimum length of tangent: The dimensions shown in Column "C" are based upon actual manufacturing conditions for tangents with a threaded end, screwed flange, or Cranelap Joint. These dimensions must be maintained without deviation for minimum lengths. *Refer to the cautionary note below.*

Tangents for pipe bends with plain or beveled ends: Pipe bends with the ends plain or beveled for welding can be furnished without tangents. However, for convenience in erection, it is recommended that pipe bends with beveled ends have tangents at least equal to the minimum lengths given in the table for threaded ends in Column "C". Such tangents will provide space for applying jigs or clamps to line up and fasten the piping before welding.

Tangents for pipe bends with Welding Flanges: Pipe bends fitted with Slip-On Welding Flanges can be furnished with a minimum length of tangent equal to the length through the hub of the Slip-On Welding Flange being used.

For dimensions of Slip-On Welding Flanges, see page 347.

Pipe bends fitted with Welding Neck Flanges can be furnished without tangents, since these flanges may be butt-welded directly at the end of the arc of pipe bends with beveled ends.

This is only recommended when minimum dimensions must be maintained. When possible, the use of a tangent is desirable for the same reasons as outlined in the paragraph pertaining to pipe bends with beveled ends.

For dimensions of Welding Neck Flanges, see page 346.

Cautionary note regarding the use of Minimum Radii and Tangents:

The table shown on page 622 and the preceding paragraphs outline the minimum radii and tangents which can be furnished for various conditions. *The use of such minimum dimensions is not desirable, nor is it recommended except when absolutely necessary.*

The radii of pipe bends preferably should equal or exceed the dimensions shown in Column "A", defining "Minimum Recommended Radius".

When possible, the tangents of pipe bends should be greater than the dimensions shown in Column "C", defining "Minimum Length of Tangent". The tangents can be of any dimensions up to the limits imposed by the length of pipe available or the shipping facilities. Refer to the paragraph on "Long Lengths of Pipe" on page 624.

See pages 617 and 621 for description of the pipe bending process. *Notes on Pipe Bends continued on next page*

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Notes on Pipe Bends

Compound and unusual bends: Compound and unusual pipe bends can be supplied in any practical shape. Our facilities are not limited only to the production of the common types shown on pages 622 and 623. Some of the photographs included in this fabricated piping section illustrate a few of the uncommon pipe bends manufactured in the Crane Shops.

Compound pipe bends or bends in more than one plane do not require any tangent or straight portion between the arcs.

Long lengths of pipe: When designing or ordering pipe bends, consideration should be given to the maximum lengths of welded or seamless pipe available. Extra long or double random lengths of steel pipe are carried in stock for the fabrication of pipe bends requiring a long length of pipe, and when the elimination of an intermediate joint is practical and desirable.

For the maximum finished lengths of steel pipe, see page 665.

Genuine wrought iron pipe is only available in regular random mill lengths of approximately 19 feet average length.

When the necessary lengths are not available, two or more pieces of steel or genuine wrought iron pipe can be welded together or provided with intermediate flanged joints to produce a desired bend. The intermediate joint should be definitely located if its location is an important factor in erection.

Shipping facilities present the only practical limit to the shape or length of pipe bends. Care must be used, when ordering large or complicated pipe bends, to keep the over-all dimensions within the maximum shipping facilities and clearances between the factory and the destination.

For information on shipping limitations, see page 665.

Ends of pipe bends: Pipe bends can be supplied with the ends plain, beveled for welding, threaded, or flanged, utilizing any of the types of flanged joints which are listed.

For the various types of flanged joints, see pages 625 to 637.

Special materials: Pipe bends can be made from special piping materials—a few are brass, aluminum, nickel, monel, Everdur, rubber-lined or lead-lined pipe, as well as numerous alloy steels. Facilities for heat-treating alloy steels after fabrication are available when required.

Full information and prices will be quoted on application.

Commercial pipe bends: Pipe bends for downspouts, ash handling, railings, and other non-fluid and non-pressure mechanical purposes, when made to approximate dimensions only, can be furnished at prices lower than those of regular pipe bends.

Prices will be quoted upon receipt of inquiry giving full details as to quantities, size and kind of pipe, service, and dimension tolerances.

Copper tubing pipe bends: For pipe bends made of copper tubing, see pages 480 and 481.

Testing: Crane Pipe Bends are regularly tested before shipment.

For the schedule of tests, see page 653.

Protectors and Painting: All pipe bends are given an exterior coat of paint to serve as a protective coating against rust.

All flanged ends are provided with flange protectors; all threaded ends have thread protectors.

Pipe: For the various kinds of pipe, see pages 583 to 588, and 662.

Galvanized pipe bends: Pipe bends can be furnished galvanized on the inside and outside, or galvanized on the outside only. Information and prices will be furnished on application.

Engineering data: For the amount of pipe in the various types of pipe bends, see pages 686 to 689.

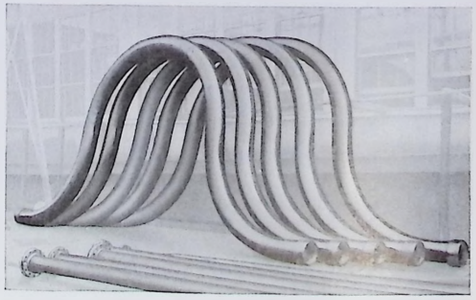
For data on designing pipe bends for taking care of the expansion and contraction of pipe lines, and determining deflection forces, see pages 691 to 723.

Inquiries and orders: Inquiries or orders should specify the quantity; size, weight, and kind of pipe; also if the ends are to be plain, beveled, threaded, or flanged. If flanged, the kind of flange, facing, and type of joint should be specified.

Pages 672 to 679 illustrate a variety of pipe bends which cover the major portion of ordinary requirements. Buyers will find it convenient to use these pages for ordering, as it will eliminate the necessity of preparing a sketch in many cases.

The details of a pipe bend can be specified by giving the sketch number, dimensions, and information designated by the letters.

If the required pipe bend is not illustrated on pages 672 to 679, a sketch should accompany the inquiry or order.



A group of 8-Inch Expansion U-Bends

For Table of Radii and Tangents, see page 622.

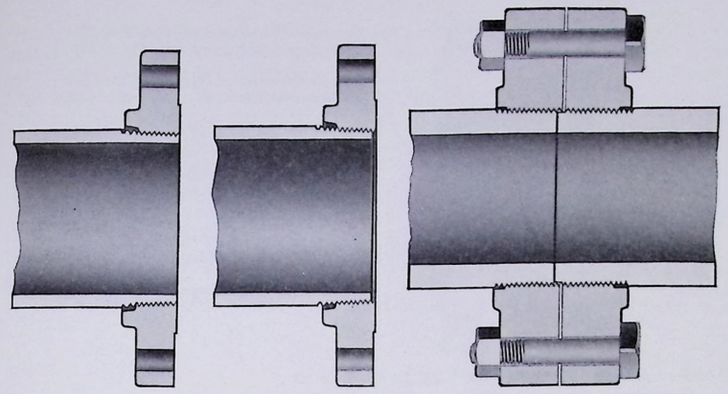
Standard Types of Bends are illustrated on pages 622 and 623.

See pages 617 and 621 for description of the pipe bending process.

See pages 656 to 661 for list prices of bending labor, flanges, etc.

Crane Flanging Processes

Screwed Flanged Joints



Screwed Flange Made On and Refaced

Screwed Flange Made On—Not Refaced

800-Pound Hydraulic Joint Small Male and Female

For Flanges
Brass.....page 262
Iron.....pages 289 to 294
Steel.....pages 332 to 335

Dimensions of Flanges
Brass.....page 262
Iron.....pages 289 to 294
Steel.....pages 332 to 335

Galvanized Flanges.....page 295

Drilling Templates..pages 369 to 377

Crane Thread Lubricants are used for making up Crane Screwed Flanged Joints. For information on Thread Lubricants, see page 366.

The Screwed Flanged Joint has proved its general utility and satisfactory performance, primarily for the low and moderate pressure and temperature services—especially when fabricated in the Crane Shops, and with the use of proper threading and pulling-up machines.

Application: The Screwed Flanged Joint can be applied to straight pipe, pipe bends, the ends and nozzles of welded headers, and to the flanged ends of welded assemblies.

This Joint can be applied to buttwelded and lapwelded steel, or genuine wrought iron pipe, and seamless steel pipe—all commercial weights and thicknesses.

Flanges: The Screwed Flanged Joint can be furnished using any of the screwed flanges listed in this catalogue—Cast Iron, Ferrosteel, Malleable Iron, Forged Steel, and Brass—straight or reducing sizes.

Special piping materials: The Screwed Flanged Joint can be furnished on special piping materials—a few are brass, copper, aluminum, nickel, monel, and Everdur. Flanges of the same material as the pipe can be furnished.

Full information is available on application.

Threading: The threading of both the pipe and the flange is to accurate gauge. The flange is secure on the pipe after the joint is made up.

Alignment of bolt holes: Crane Shop Fabrication assures proper alignment of the bolt holes in all flanges.

When specified, special alignment of the bolt holes can be furnished.

The individual details of the three types of Joints illustrated above are outlined in the following:

Screwed Flange—Made On and Refaced: After the flange and the pipe have been properly threaded, the flange is made up tight by a powerful machine until the end of the pipe projects slightly beyond the face of the flange. A light refacing cut is then taken across both the face of the flange and the end of the pipe.

The refacing assures that the end of the pipe will be flush with the face of the flange, thus providing a proper gasket-bearing surface to the inside of the pipe. The refacing also assures perfect alignment of the flange face at 90 degrees with the center line of the pipe.

Screwed Flange—Made On, not Refaced: After the flange and the pipe have been properly threaded, the flange is made up tight by a powerful machine until the end of the pipe is within one-half to one thread from the face of the flange.

Attention is directed to the advantages of refacing as outlined above.

The 800-Pound Hydraulic Joint—Small Male and Female: This style of joint is used largely on high pressure hydraulic lines where some shock is likely to occur.

In this joint, straight threads are used for both the pipe and the flange. The recess extends only to the outside edge of the pipe. The ends of the pipe are machined square and provide the only gasket-bearing surfaces, utilizing a narrow gasket.

The pipe used must be of sufficient wall thickness to provide a proper gasket-bearing surface.

800-Pound Hydraulic Joint—¼" Raised Face: An 800-Pound Hydraulic Screwed Flanged Joint, which utilizes the regular 800-Pound Hydraulic Companion Flange with ¼-inch raised face is available.

It is desirable that this joint be made up by refacing as described for the Screwed Flange—Made On and Refaced.

Facings available....pages 638 to 643

Prices of "Threading Pipe, Making-On, and Refacing Flanges"....pages 660 and 661

The 800-Pound Hydraulic Joints described above are made in straight sizes only.

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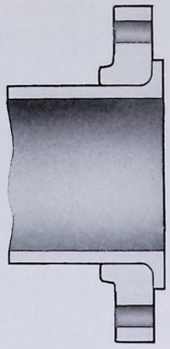
Crane Flanging Processes

The Cranelap Joint

Cranelap Joints
No. 561½, 150-Pound
No. 180 E, 300-Pound
No. 660 E, 400-Pound
No. 859 E, 600-Pound
No. 1268 E, 900-Pound
No. 1559 E, 1500-Pound

For list of sizes made and list prices, see page 657.

Regular Cranelap Joints are made on both steel and genuine wrought iron pipe. See note on page 628.



For modifications of the Regular Cranelap Joint, see pages 628 to 630.

For dimensions of Regular Cranelap Joints and Flanges, see page 632.

For dimensions of Modified Cranelap Joints, see page 633.

For dimensions of Ring Joint Cranelap Joints, see pages 642 and 643.

For extra length of bolts and studs, see note on page 630.

For Finish of Facings, see pages 640 to 643.

Regular Cranelap Joint with Plain Face, Serrated Finish

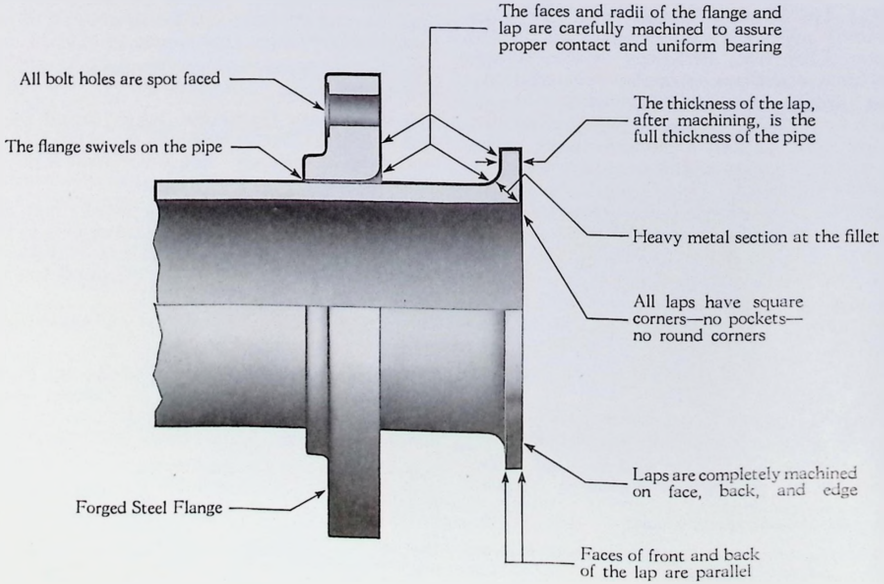
The Cranelap Joint approaches more closely than any other type the function of an all-purpose flanged pipe joint. It eliminates the individual, inherent disadvantages of the other types of joints.

The Cranelap Joint is predominantly the most effective and practical joint. With either plain facing or the numerous modifications it has given such universal satisfaction over a long period of time that it is recommended for intermediate, high pressure, and high temperature steam and water lines, also for many other difficult services. The wide range of utility and service applications makes the Cranelap Joint a modern flanged joint with very few limitations.

Cranelap Joints are not only adapted to high pressure work but are well suited for low pressure service, particularly in those sizes where large flange diameters are employed.

In the Cranelap Joint the end of the pipe is lapped to produce a square corner at the junction of the inside periphery of the pipe and the face of the lap. When bolted up, the joint is made directly on the pipe itself — there is no thread in the flange to leak under distortion due to bolting load, pressure and temperature, or expansion and contraction strains.

These laps are made by a process which is a combination of upsetting and forging — this operation is performed while the metal is at a proper forging heat.



Crane Flanging Processes

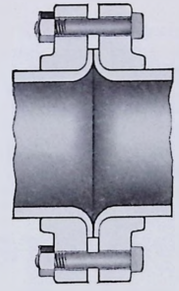
The Development of Lapped Pipe Joints

Crane Co. was a pioneer in the development of lapped pipe joints. In 1906 the R. T. Crane patent introduced one of the first improvements in the early Van Stone lapped joint. This improved joint had a heavier metal section through the fillet, but still retained the round corner lap.

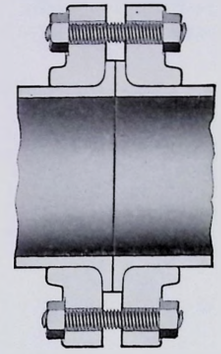
Realizing the inherent disadvantages of the round corner lap, which produced at each joint a pocket where condensate and sediment could accumulate, and which also lacked strength because of the relatively light metal section through the fillet and in the thickness of the lap as compared with the pipe thickness, Crane Co. continued its research and experiments for further improvement.

In 1910 Crane Co. filed an application for patent on a "Pipe Flanging Machine", and in 1911, on a "Process of Pipe Flanging"; these patents were granted in 1913. In 1911 Crane Co. introduced the improved Square Corner Cranelap Joint, the result of the development work responsible for the two patents issued.

A comparison of the round corner lap joint and the Cranelap Square Corner Joint



The Round Corner Lap Joint
Notice the pocket formed at the joint, also the light metal section through the fillet.



The Square Corner Cranelap Joint
Notice the absence of any pocket at the joint, also the heavy metal section through the fillet.

The principal features and advantages of the Cranelap Joint are:

Square corner laps: The Cranelap Joint has a square corner lap—it should not be confused or compared with a joint having a round corner lap.

The square corner lap assures a smooth joint on the inside of the pipe, without a pocket or depression. The formation of the square corner provides a metal thickness at the turn, or fillet, which is much heavier in section than the round corner lap, consequently much greater strength is developed.

Full thickness laps: The rough laps of all Plain Cranelap Joints are of sufficient thickness to produce, after machining both the front and the back, a finished thickness of lap equal to or greater than the wall thickness of the pipe on which the lap is made.

Male and Female, Tongue and Groove, Double Thickness, Ring Joint, and Radial Back Cranelap Joints have the laps of sufficient thickness to permit these facings to be machined without reducing the thickness of the lap at any point to less than that of the pipe wall.

Machining of the laps and flanges: All laps are completely machined on the front, back, and edge. The back of the lap is machined to provide a face which is parallel to the front or contact face. The face and the radius of the flange are carefully machined to match the corresponding face and radius of the lap on the pipe. The bolt holes of the flanges are spot faced.

The features of the machining outlined above are important. The spot facing of the bolt holes of the flange provides a uniform bearing surface for the nuts of the bolts or studs. In addition to this, the facing of the flange and the parallel facing of the back and front of the lap assure an even bearing throughout the joint, and a uniform pressure on the gasket.

Swivel flanges of forged steel: The flanges on Cranelap Joints swivel on the pipe. This facilitates alignment of the piping and makes erection easier, because the swivel flange accommodates itself readily to any variations in the position of adjacent bolt holes or to the setting of piping at odd angles.

All flanges used on Cranelap Joints are of Forged Steel—unbreakable, and of high strength. This type of joint precludes the use of any flange material other than steel.

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Crane Flanging Processes

Notes on Cranelap Joints

Pipe: Cranelap Joints with plain face are regularly made from lapwelded steel or lapwelded genuine wrought iron pipe, using Standard, Extra Strong, or Double Extra Strong weights—or from seamless steel pipe, using any of the thicknesses listed on page 662.

Cranelap Joints with Radial Back, Ring Joint, Double Thickness or 200% lap, Male and Female, or Tongue and Groove Facing require the use of lapwelded or seamless steel pipe only, and of a wall thickness equal to Extra Strong weight or heavier.

In pipe sizes smaller than are obtainable in lapwelded steel pipe, Cranelap Joints, whether with plain face or otherwise, are only made on seamless steel pipe.

For welded pipe, see pages 583 to 588.

For seamless pipe, see page 662.

Van Stone Joints: Whenever Van Stone Joints are specified, Cranelap Joints will be furnished.

Plain Face: Cranelap Joints with plain face, serrated finish, as illustrated on page 626, will always be furnished unless otherwise specified.

Application of Cranelap Joints: Cranelap Joints can be applied to straight pipe, pipe bends, the ends and nozzles of welded headers, and the flanged ends of welded assemblies.

Cranelap Joints on special piping materials: Cranelap Joints can be fabricated on many special piping materials—a few are brass, aluminum, nickel, monel, Everdur, Toncan Iron, and copper-bearing steel, as well as numerous alloy steels. Facilities for heat-treating alloy steels after fabrication are available when required.

Full information and prices will be furnished on application.

Reducing Cranelap Flanges: Reducing Cranelap Flanges are not furnished or recommended. Another type of flanged joint or connection should be used.

For Finish of Facings, see page 640.

Modifications of the Cranelap Joint and Facings

Modifications: The modifications of Cranelap Joints and facings, illustrated on pages 628 to 630, will be furnished as follows:

All of these modified Cranelap Joints—Radial Back, Ring Joint, Double Thickness Lap, Male and Female, and Tongue and Groove—have the following common or characteristic requirements.

Pipe: The modified Cranelap Joints require the use of lapwelded or seamless steel pipe only, and of a wall thickness equal to Extra Strong weight or heavier.

Pressures: The modified Cranelap Joints are applicable to primary service pressures of 300 pounds and higher.

Laps: The modified Cranelap Joints have the laps completely machined—on the face, back, and edge.

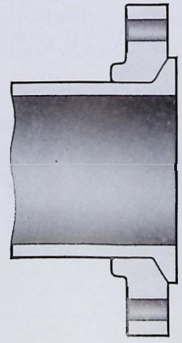
With the exception of the Radial Back, all of the modified Cranelap Joints have a straight face on the back. For the facing of the back of Radial Back Cranelap Joints, see the paragraph following which describes this joint.

Sizes and prices: For a list of the sizes made and for list prices, see page 657.

The modified Cranelap Joints, in addition to having the common characteristics listed before, are as follows:

Radial Back Cranelap Joints

No. 179 E,	300-Pound
No. 670 E,	400-Pound
No. 869 E,	600-Pound
No. 1278 E,	900-Pound
No. 1569 E,	1500-Pound



Radial Back Cranelap Joint

Radial Back Cranelap Joints: Radial Back Cranelap Joints, illustrated above, derive their name from the shape of the back—they have a radial back instead of the straight back as furnished on other Cranelap Joints.

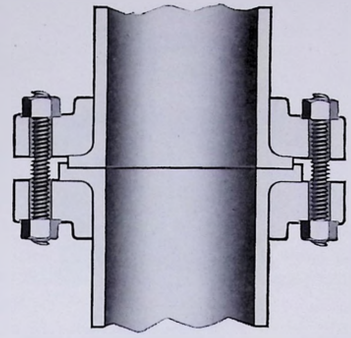
The regular Cranelap Forged Steel Flanges are used, except that the faces have a radius machined to fit the radius on the back of the lap on the pipe.

Dimensions of Radial Back Cranelap Joints will be furnished on application.

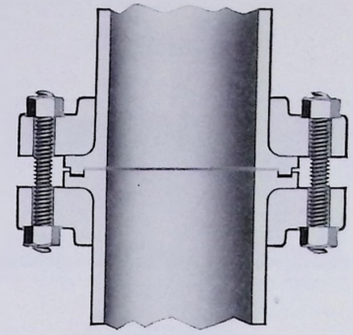
For extra length of bolts and studs, see Note, page 630.

Crane Flanging Processes

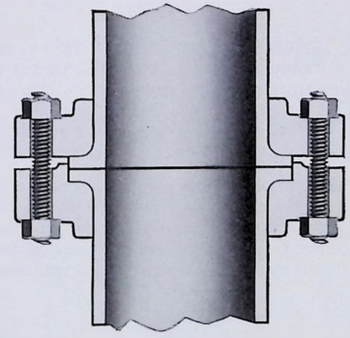
Modifications of the Cranelap Joint and Facings



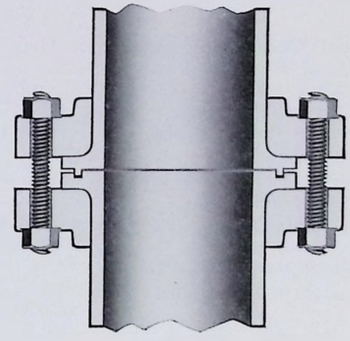
Large Male and Female Cranelap Joint (female in the lap)



Large Tongue and Groove Cranelap Joint



Large Male and Female Cranelap Joint (female in the flange)



Small Tongue and Groove Cranelap Joint

Large Male and Female Cranelap Joints: Large Male and Female Cranelap Joints, illustrated above, can be furnished in two types—one has the female in the lap, and the other has the female in the flange.

When Large Male and Female Cranelap Joints are ordered, the "female in the lap" type will always be furnished unless otherwise specified.

In either the lapped end with male face or the lapped end used for "female in the flange", the thickness of the lap, after machining, will be the wall thickness of the pipe used, except that the minimum thickness of lap will be ¼-inch when the wall thickness of the smaller sizes of Extra Strong weight pipe is less than ¼-inch, i.e. 2-inch and smaller.

In the lapped end used for "female in the lap", the thickness of the lap, after machining, will be the wall thickness of the pipe used, plus the depth of the female facing.

For dimensions of Large Male and Female Cranelap Joints with "female in the lap", see page 633.

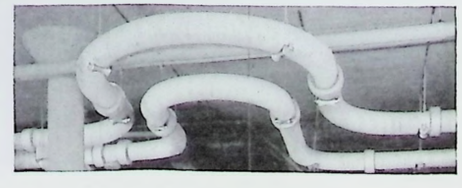
Dimensions of this joint with "female in the flange" will be furnished on application.

Large Tongue and Groove—Small Tongue and Groove Cranelap Joints: These two types of joints are illustrated above.

Orders must specify whether Large Tongue and Groove, or Small Tongue and Groove Cranelap Joints are wanted.

In either the Large Tongue and Groove, or Small Tongue and Groove Cranelap Joint the thickness of the lap, after machining, will be the wall thickness of the pipe used, plus the height of the tongue or the depth of the groove.

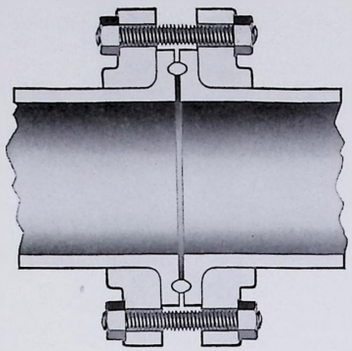
For dimensions of Large Tongue and Groove, and Small Tongue and Groove Cranelap Joints, see page 633.



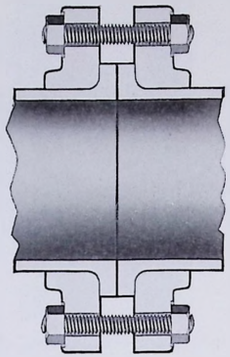
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Crane Flanging Processes

Modifications of the Cranelap Joint and Facings



Ring Joint
Cranelap Joint



Double Thickness, or
200% Lap, Cranelap Joint

Ring Joint Cranelap Joints: The Ring Joint Cranelap Joint is furnished with a specially designed groove which employs a steel ring, this combination making a pressure-tight joint. A gasket, other than the ring, is not needed in this joint. Refer to the illustration above.

The Ring Joint should not be used against iron or brass valves, fittings, or flanges.

The Ring Joint Cranelap Joint has a thickness of lap, after machining, equal to the wall thickness of the pipe used, plus the depth of the groove.

For dimensions of Ring Joints, see pages 642 and 643.

Double Thickness, or 200% Lap, Cranelap Joints: Double Thickness, or 200% Lap, Cranelap Joints, illustrated above, are exactly the same as the regular Cranelap Joint with plain face, except that the thickness of the lap, after machining, is twice the wall thickness of the pipe used.

For dimensions of Double Thickness, or 200% Lap, Cranelap Joints, use the dimensions of Plain Cranelap Flanges on page 632. A dimension of twice the wall thickness of the pipe should be used in establishing the thickness of the lap for obtaining dimension "L".



Piping to test table and manifold
Crane Fabricated Piping with Cranelap
Ring Joints for 900 pounds steam pressure

Marine service: Cranelap Joints comply with the regulations of the following bureaus: U. S. Dept. of Commerce, Bureau of Navigation and Steamboat Inspection—Lloyds Register of Shipping, Ships Registered in U.S.A.—American Bureau of Shipping, Special Inspection Required.

The bolts or bolt-studs for Cranelap Joints will be proportionately longer than for other styles of joints used for primary service pressures up to 300 pounds.

Triplex Steel Bolt-Studs . . . page 355

Machine Bolts . . . . page 354

Sarlun and Sargol Cranelap Joints . . . page 631

Flange Protectors . . . page 653

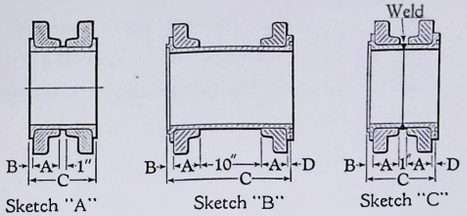
Finish of Facings . . . . pages 638 to 643

Painting . . . . page 653

Testing . . . page 653

Crane Flanging Processes

Minimum Face to Face Dimensions of Piping with Cranelap Joints



Sketch "A" Sketch "B" Sketch "C"

The minimum face to face dimensions of straight pipe with Cranelap Joints are obtained by using the formulas given below.

All face to face dimensions are to be taken to the contact surfaces. See page 671 of the section on "Ordering Fabricated Piping", which illustrates the relation of dimensions to contact surfaces.

Sketch "A": The minimum face to face dimension obtainable on all sizes and pressure ratings of straight pipe with Plain Face Cranelap Joints is in accordance with the formula:

$$C = 1'' + 2(A + B)$$

Sketch "B": The minimum face to face dimension obtainable on all sizes and pressure ratings of straight pipe with the Modified Cranelap Joints—Male and Female, Tongue and Groove, Ring Joint, Radial Back, and Double Thickness Lap—is in accordance with the formula:

$$C = 10'' + (2A) + B + D$$

Sketch "C": The minimum face to face dimension outlined for Sketch "B" can be reduced if a butt weld is located between the flanges, as illustrated in Sketch "C".

If the procedure of Sketch "C" is followed, the minimum face to face dimensions of straight pipe with the Modified Cranelap Joints is in accordance with the formula:

$$C = 1'' + (2A) + B + D$$

For dimensions of flanges, facings, etc., see other pages of this section.

The Sarlun Joint

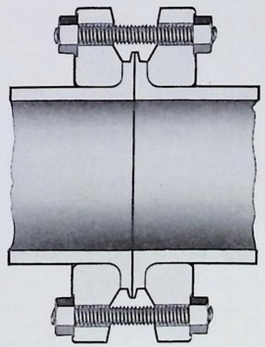
(Patented)

Sarlun Joints (Cranelap)

No. 183 E,	300-Pound
No. 665 E,	400-Pound
No. 861 E,	600-Pound
No. 1269 E,	900-Pound
No. 1560 E,	1500-Pound

For list of sizes made, see pages 634 and 635.

Sarlun Joints are made on seamless steel pipe only.



Dimensions . . . . pages 634 and 635

Testing . . . . page 653

Flange Protectors . . . . page 653

Prices . . . . page 657

Crane Co. is prepared to manufacture fabricated piping, valves, and fittings with Sarlun Joints. This joint is patented; license to use it must be secured from Sargent & Lundy, Inc., Chicago, Ills.

Description of the joint: The Sarlun Joint is made metal to metal on machined surfaces having extended lips on the outer periphery of the contact faces.

These lips provide a means for sealing the joint; the seal is accomplished by fusing the two lips together. The extended lips are sufficiently thin to permit fusing by the application of heat without causing distortion of the contact faces. This type of joint eliminates the use of gaskets.

Welding of the seal: The welding or fusing of the extended lips is performed after the joint has been assembled and tested to prove its tightness.

Finish of the faces: The faces of Sarlun Joints have a "cold-water" smooth tool finish only.

This joint requires extremely accurate machine work on piping, valves, and fittings—the advantages of one source of supply, as outlined on page 613, are therefore readily apparent.

Flanges: The Sarlun Joint on fabricated piping is only furnished with Cranelap Flanges.

The flanges are Forged Steel and in accordance with dimensions recommended by Sargent & Lundy, Inc.

Sargol Joint: Fabricated piping, valves, and fittings can be furnished equipped with Sargol Joints.

The Sargol Joint is the predecessor of the Sarlun Joint. Dimensions and information will be furnished on application.

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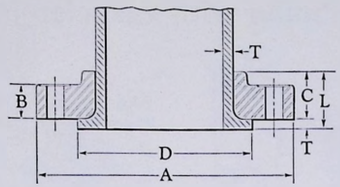
Crane Flanging Processes

Dimensions of Forged Steel Plain Cranelap Flanges

Dimension "L" is obtained by adding the thickness of the pipe, "T", to the length of the hub of the flange, "C".

For thicknesses of welded pipe, see pages 583 to 588.

For thicknesses of seamless pipe, see page 662.



Facings....page 640

Sarlun Joints....page 631

Ring Joints....pages 642 and 643

Flange Protectors....page 653

Prices....page 657

Dimensions, in Inches

Size of Pipe	No. 561½ 150-Pound A	B	C	D	No. 180 E 300-Pound A	B	C	D	No. 660 E 400-Pound A	B	C	D
½	c 3½	c 3/8	c 5/8	1 3/8	c 3¾	c 9/16	c 5/8	1 3/8	3¾	9/16	7/8	1 3/8
¾	c 3⅞	c 7/16	c 5/8	1 11/16	c 4⅝	c 5/8	c 1	1 11/16	4⅝	5/8	1	1 11/16
1	4¼	7/16	11/16	2	c 4⅞	c 11/16	c 1 11/16	2	4⅞	11/16	1 11/16	2
1¼	4⅝	½	13/16	2½	c 5¼	c ¾	c 1 11/16	2½	5¼	13/16	1⅛	2½
1½	5	9/16	⅞	2⅞	c 6⅛	c 13/16	c 1 13/16	2⅞	6⅛	⅞	1¼	2⅞
2	6	⅝	1	3⅝	6½	⅞	1 5/16	3⅝	6½	1	1 7/16	3⅝
2½	7	11/16	1⅛	4⅛	7½	1	1½	4⅛	7½	1⅛	1⅝	4⅛
3	7½	¾	13/16	5	8¼	1⅛	1 11/16	5	8¼	1¼	1 13/16	5
3½	8½	13/16	1¼	5½	9	1 13/16	1¾	5½	9	1⅜	1 15/16	5½
4	9	15/16	15/16	6 3/16	10	1¼	1⅞	6 3/16	10	1⅜	2	6 3/16
5	10	15/16	1 7/16	7 5/16	11	1⅜	2	7 5/16	11	1½	2⅛	7 5/16
6	11	1	1 9/16	8½	12½	1 7/16	2 1/16	8½	12½	1⅝	2¼	8½
8	13½	1⅛	1¾	10⅝	15	1⅝	2 7/16	10⅝	15	1⅞	2 11/16	10⅝
10	16	1 3/16	1 15/16	12¾	17½	1⅞	3¾	12¾	17½	2⅛	4	12¾
12	19	1¼	2 3/16	15	20½	2	4	15	20½	2¼	4¼	15
14 OD	21	1⅜	3⅛	16¼	23	2⅛	4⅜	16¼	23	2⅜	4⅝	16¼
16 OD	23½	1 7/16	3 7/16	18½	25½	2¼	4¾	18½	25½	2½	5	18½
18 OD	25	1 9/16	3 13/16	21	28	2⅜	5⅛	21	28	2⅝	5⅜	21
20 OD	27½	1 11/16	4 1/16	23	30½	2½	5½	23	30½	2¾	5¾	23
24 OD	32	1 7/8	4⅜	27¼	36	2¾	6	27¼	36	3	6¼	27¼
Size of Pipe	No. 859 E 600-Pound A	B	C	D	No. 1268 E 900-Pound A	B	C	D	No. 1559 E 1500-Pound A	B	C	D
½	3¾	9/16	⅞	1 3/8					c 4¾	c 7/8	c 1¼	1 3/8
¾	4⅝	⅝	1	1 11/16					c 5⅛	c 1	c 1 3/8	1 11/16
1	4⅞	11/16	1 1/16	2	5⅞	1⅛	1⅝	2	5⅞	1⅛	1⅝	2
1¼	5¼	13/16	1⅛	2½	6¼	1⅛	1⅝	2½	6¼	1⅛	1⅝	2½
1½	6⅛	⅞	1¼	2⅞	7	1¼	1¾	2⅞	7	1¼	1¾	2⅞
2	6½	1	1 7/16	3⅝	8½	1½	2¼	3⅝	8½	1½	2¼	3⅝
2½	7½	1⅛	1⅝	4⅛	9⅝	1⅝	2½	4⅛	9⅝	1⅝	2½	4⅛
3	8¼	1¼	1 13/16	5	9½	1½	2⅛	5	10½	1⅞	2⅞	5
3½	9	1⅜	1 15/16	5½								
4	10¾	1½	2⅛	6 3/16	11½	1¾	2¾	6 3/16	12¼	2⅛	4⅛	6 3/16
5	13	1¾	2⅜	7 5/16	13¾	2	3⅛	7 5/16	14¾	2⅞	4¾	7 5/16
6	14	1⅞	2⅝	8½	15	2 3/16	3⅜	8½	15½	3¼	5⅛	8½
8	16½	2 3/16	3	10⅝	18½	2½	4½	10⅝	19	3⅝	6⅝	10⅝
10	20	2½	4⅜	12¾	21½	2¾	5	12¾	23	4¼	7½	12¾
12	22	2⅝	4⅝	15	24	3⅛	5⅝	15	26½	4⅞	8⅜	15
14 OD	23¾	2¾	5	16¼	25¼	3⅜	6⅛	16¼				
16 OD	27	3	5½	18½	27¾	3½	6½	18½				
18 OD	29¼	3¼	6	21								
20 OD	32	3½	6½	23								
24 OD	37	4	7¼	27¼								

The dimensions of Cranelap Flanges conform to the American Steel Flange Standard (B16e-1932), except those marked "c" which are Crane Standard Forged Steel Lap Joint Flanges.

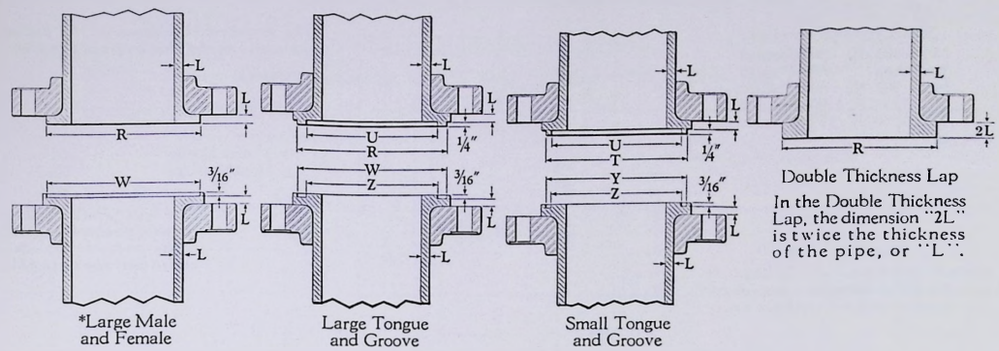
All flanges are faced, drilled, and spot faced.

All Cranelap Joints are completely machined—on the front, back, and edge of the lap.

Drilling Templates . . . pages 372 to 377

Crane Flanging Processes

Dimensions of Modified Cranelap Joints and Facings



*Large Male and Female

Large Tongue and Groove

Small Tongue and Groove

Double Thickness Lap

In the Double Thickness Lap, the dimension "2L" is twice the thickness of the pipe, or "L".

Modified Cranelap Joints

*Large Male and Female, Large Tongue and Groove, Small Tongue and Groove, and Double Thickness Lap

Dimensions of Facings, in Inches

Size of Pipe	Outside Diameter: Double Thickness Cranelap, Large Male, and Large Tongue R	Outside Diameter: Small Tongue T	I.D. of Large and Small Tongue U	Outside Diameter: Large Female and Large Groove W	Outside Diameter: Small Groove Y	I.D. of Large and Small Groove Z
½	1 3/8	1 3/8	1	1 7/16	1 7/16	1 5/16
¾	1 11/16	1 11/16	1 5/16	1¾	1¾	1¼
1	2	1 7/8	1½	2 1/16	1 15/16	1 7/16
1¼	2½	2¼	1 7/8	2 9/16	2 5/16	1 13/16
1½	2 7/8	2½	2⅛	2 15/16	2 9/16	2 1/16
2	3⅝	3¼	2 7/8	3 11/16	3 5/16	2 13/16
2½	4⅛	3¾	3⅜	4 3/16	3 13/16	3 5/16
3	5	4⅝	4¼	5 1/16	4 11/16	4 3/16
3½	5½	5⅛	4¾	5 9/16	5 3/16	4 11/16
4	6 3/16	5 11/16	5 3/16	6¼	5¾	5⅛
5	7 5/16	6 13/16	6 5/16	7⅜	6⅞	6¼
6	8½	8	7½	8 9/16	8 1/16	7 7/16
8	10⅝	10	9⅜	10 11/16	10 1/16	9 5/16
10	12¾	12	11¼	12 13/16	12 1/16	11 3/16
12	15	14 1/4	13½	15 1/16	14 5/16	13 7/16
14 OD	16¼	15½	14¾	16 5/16	15 9/16	14 11/16
16 OD	18½	17⅝	16¾	18 9/16	17 11/16	16 11/16
18 OD	21	20⅛	19¼	21 1/16	20 3/16	19 3/16
20 OD	23	22	21	23 1/16	22 1/16	20 15/16
24 OD	27¼	26¼	25¼	27 5/16	26 5/16	25 3/16

*Dimensions of Large Male and Female cover the joint with the female in the lap; dimensions of this joint with the female in the flange will be furnished on application.

This schedule of dimensions conforms to the American Steel Flange Standard (B16e-1932).

Flange dimensions . . . page 632

Drilling templates . . . pages 372 to 377

Dimensions of Radial Back Cranelap Joints are on application.

For details of the Modified Cranelap Joints and Facings, see pages 628 to 630.

Dimensions of Regular Cranelap Joints . . . page 632

Dimensions of Sarlun Joints . . . pages 634 and 635

Dimensions of Ring Joints . . . pages 642 and 643

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)

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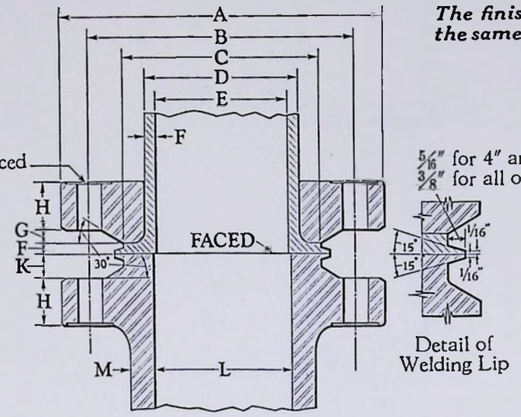
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Crane Flanging Processes

Dimensions of Sarlun Joints

Sarlun Joints (Cranelap)
No. 183 E, 300-Pound
No. 665 E, 400-Pound
No. 861 E, 600-Pound
No. 1269 E, 900-Pound
No. 1560 E, 1500-Pound



The finished thickness of the lap is the same as the thickness of the pipe.

Sarlun Joints are made on seamless steel pipe only. For description, see page 631.

Dimension "M"
Metal thickness of fittings is greater than American Standard; dimensions are on application.

Sarlun Joints (Patented)

Dimensions Recommended by Sargent & Lundy, Inc.
(All Dimensions Are in Inches)

300-Pound

Size of Pipe	A	B	C	D	E	F	G	H	K	L	No. of Studs	Dia. of Studs
2½	7½	5⅞	4⅛	2.875	2.469	.203	5/16	1	11/16	2½	8	¾
3	8¼	6⅝	5	3.500	3.068	.216	5/16	1⅛	11/16	3	8	¾
3½	9	7¼	5½	4.000	3.548	.226	⅜	13/16	11/16	3½	8	¾
4	10	7⅞	6⅜16	4.500	4.026	.237	13/32	1¼	¾	4	8	¾
5	11	9¼	7⅝16	5.563	5.047	.258	½	1⅜	⅞	5	8	¾
6	12½	10⅝	8½	6.625	6.065	.280	9/16	17/16	1	6	12	¾
8	15	13	10⅝	8.625	8.071	.277	⅝	1⅝	1⅛	8	12	⅞
10	17½	15¼	12¾	10.750	10.136	.307	¾	1⅞	1¼	10	16	1
12	20½	17¾	15	12.750	12.090	.330	13/16	2	15/16	12	16	1⅛
14 OD	23	20¼	16¼	14.00	13.250	.375	⅞	2⅛	1⅜	13¼	20	1⅛
16 OD	25½	22½	18½	16.00	15.250	.375	⅞	2¼	1⅜	15¼	20	1¼
18 OD	28	24¾	21	18.00	17.126	.437	1	2⅜	1½	17	24	1¼
20 OD	30½	27	23	20.00	19.000	.500	1⅛	2½	1⅝	19	24	1¼
24 OD	36	32	27¼	24.00	22.876	.562	1⅜	2¾	1⅞	23	24	1½

400-Pound

Size of Pipe	A	B	C	D	E	F	G	H	K	L	No. of Studs	Dia. of Studs
2½	7½	5⅞	4⅛	2.875	2.469	.203	5/16	1⅛	11/16	2½	8	¾
3	8¼	6⅝	5	3.500	3.068	.216	5/16	1¼	11/16	3	8	¾
3½	9	7¼	5½	4.000	3.548	.226	⅝	1⅜	11/16	3½	8	⅞
4	10	7⅞	6⅜16	4.500	4.026	.237	13/32	1⅜	¾	4	8	⅞
5	11	9¼	7⅝16	5.563	5.047	.258	½	1½	⅞	5	8	⅞
6	12½	10⅝	8½	6.625	6.065	.280	9/16	1⅝	1	6	12	⅞
8	15	13	10⅝	8.625	7.981	.322	⅝	1⅞	1⅛	8	12	1
10	17½	15¼	12¾	10.750	10.020	.365	¾	2⅛	1¼	10	16	1⅛
12	20½	17¾	15	12.750	11.938	.406	13/16	2¼	15/16	12	16	1¼
14 OD	23	20¼	16¼	14.00	13.126	.437	⅞	2⅜	1⅜	13⅛	20	1¼
16 OD	25½	22½	18½	16.00	15.000	.500	⅞	2½	1⅜	15	20	1⅜
18 OD	28	24¾	21	18.00	16.876	.562	1	2⅝	1½	17	24	1⅜
20 OD	30½	27	23	20.00	18.814	.593	1⅛	2¾	1⅝	18⅞	24	1½
24 OD	36	32	27¼	24.00	22.626	.687	1⅜	3	1⅞	22⅝	24	1¾

Dimension "M"—The metal thickness of fittings is greater than American Standard; dimensions are on application.

(Dimension table continued on next page)

Crane Flanging Processes

Dimensions of Sarlun Joints

(See opposite page for dimension drawing)

Sarlun Joints (Patented)

Dimensions Recommended by Sargent & Lundy, Inc.
(All Dimensions Are in Inches)

600-Pound

Size of Pipe	A	B	C	D	E	F	G	H	K	L	No. of Studs	Dia. of Studs
2½	7½	5⅞	4⅛	2.875	2.323	.276	5/16	1⅛	11/16	2½	8	¾
3	8¼	6⅝	5	3.500	2.900	.300	5/16	1¼	11/16	3	8	¾
3½	9	7¼	5½	4.000	3.364	.318	⅜	1⅜	11/16	3½	8	⅞
4	10¾	8½	6⅜16	4.500	3.826	.337	13/32	1½	¾	4	8	⅞
5	13	10½	7⅝16	5.563	4.813	.375	½	1¾	⅞	5	8	1
6	14	11½	8½	6.625	5.761	.432	9/16	1⅞	1	6	12	1
8	16½	13¾	10⅝	8.625	7.625	.500	⅝	2⅜16	1⅛	7⅞	12	1⅛
10	20	17	12¾	10.750	9.564	.593	¾	2½	1¼	9¾	16	1¼
12	22	19¼	15	12.750	11.376	.687	13/16	2⅝	15/16	11¾	20	1¼
14 OD	23¾	20¾	16¼	14.00	12.500	.750	⅞	2¾	1⅜	12⅞	20	1⅜
16 OD	27	23¾	18½	16.00	14.314	.843	⅞	3	1⅜	14¾	20	1½
18 OD	29¼	25¾	21	18.00	16.126	.937	1	3¼	1½	16½	20	1⅝
20 OD	32	28½	23	20.00	17.938	1.031	1⅛	3½	1⅝	18¼	24	1⅝
24 OD	37	33	27¼	24.00	21.564	1.218	1⅜	4	1⅞	22	24	1⅞

900-Pound

Size of Pipe	A	B	C	D	E	F	G	H	K	L	No. of Studs	Dia. of Studs
2½	9⅝	7½	4⅛	2.875	2.323	.276	5/16	1⅝	11/16	2¼	8	1
3	9½	7½	5	3.500	2.900	.300	5/16	1½	11/16	2⅞	8	⅞
3½	10¾	8½	5½	4.000	3.364	.318	⅜	1⅝	11/16	3⅜	8	1
4	11½	9¼	6⅜16	4.500	3.626	.437	13/32	1¾	¾	3⅞	8	1⅛
5	13¾	11	7⅝16	5.563	4.563	.500	½	2	⅞	4¾	8	1¼
6	15	12½	8½	6.625	5.501	.562	9/16	2⅜16	1	5¾	12	1⅛
8	18½	15½	10⅝	8.625	7.439	.593	⅝	2½	1⅛	7½	12	1⅜
10	21½	18½	12¾	10.750	9.314	.718	¾	2¾	1¼	9⅜	16	1⅜
12	24	21	15	12.750	11.064	.843	13/16	3⅛	15/16	11⅛	20	1⅜
14 OD	25¼	22	16¼	14.00	12.126	.937	⅞	3⅜	1⅜	12¼	20	1½
16 OD	27¾	24¼	18½	16.00	13.938	1.031	⅞	3½	1⅜	14	20	1⅝
18 OD	31	27	21	18.00	15.688	1.156	1	4	1½	15¾	20	1⅞
20 OD	33¾	29½	23	20.00	17.500	1.250	1⅛	4¼	1⅝	17½	20	2
24 OD	41	35½	27¼	24.00	21.000	1.500	1⅜	5½	1⅞	21	20	2½

1500-Pound

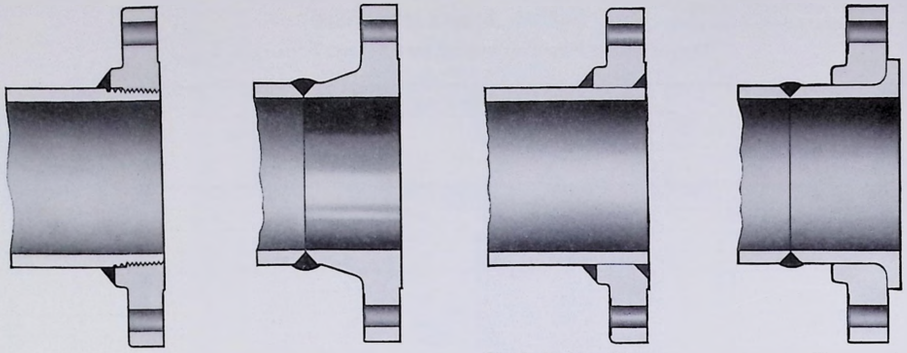
Size of Pipe	A	B	C	D	E	F	G	H	K	L	No. of Studs	Dia. of Studs
2½	9⅝	7½	4⅛	2.875	2.125	.375	5/16	1⅝	11/16	2¼	8	1
3	10½	8	5	3.500	2.626	.437	5/16	1⅞	11/16	2¾	8	1⅛
3½	11	8½	5½	4.000			⅜	2	11/16	3⅛	8	1⅛
4	12¼	9½	6⅜16	4.500	3.438	.531	13/32	2⅛	¾	3⅝	8	1¼
5	14¾	11½	7⅝16	5.563	4.313	.625	½	2⅞	⅞	4⅜	8	1½
6	15½	12½	8½	6.625	5.189	.718	9/16	3¼	1	5⅜	12	1⅜
8	19	15½	10⅝	8.625	6.813	.906	⅝	3⅝	1⅛	7	12	1⅝
10	23	19	12¾	10.750	8.500	1.125	¾	4¼	1¼	8¾	12	1⅞
12	26½	22½	15	12.750	10.126	1.312	13/16	4⅞	15/16	10⅜	16	2
14 OD	29½	25	16¼	14.00	11.188	1.406	⅞	5¼	1⅜	11⅜	16	2¼
16 OD	32½	27¾	18½	16.00	12.876	1.562	⅞	5¾	1⅜	13	16	2½
18 OD	36	30½	21	18.00	14.500	1.750	1	6⅜	1½	14⅝	16	2¾
20 OD	38¾	32¾	23	20.00	16.126	1.937	1⅛	7	1⅝	16⅜	16	3
24 OD	46	39	27¼	24.00	19.376	2.312	1⅜	8	1⅞	19⅝	16	3½

Dimension "M"—The metal thickness of fittings is greater than American Standard; dimensions are on application.

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Crane Flanging Processes

Welded Flanged Joints



Forged Steel Screwed Flange Back Welded and Refaced

Welding Neck Flange Butt Welded to Pipe

Slip-On Welding Flange Welded Front and Back and Refaced

Cranelap Flange with Welding Nipple Butt Welded to Pipe

Welded Flanged Joints can be furnished in the three types illustrated above. The Welding Nipple with Cranelap Flange, also illustrated, affords an auxiliary flanged connection for welding.

Application: Any of the Welded Flanged Joints shown above can be applied to straight pipe, pipe bends, the ends and nozzles of welded headers, and the flanged ends of welded assemblies.

Special shop equipment assures the perfect alignment of flange faces on all Crane Welded Flanged Joints.

Welding: The shop welding of these flanged joints is performed by Crane welders working under approved procedure control. All welds are tested and proved sound before shipment.

For details of the testing, see page 653.

Spot facing: All bolt holes are spot faced.

Special piping materials: These types of Welded Flanged Joints can be furnished on many special piping materials, including numerous alloy steels, with facilities for heat-treating after fabrication.

Information and prices will be furnished on application.

The individual details of the four types of Welded Flanged Joints are outlined in the following paragraphs.

The Forged Steel Screwed Flange Back Welded

Joint assembly: A Crane Forged Steel Screwed Flange is used in this joint. The pipe and the flange are accurately threaded; the flange is made up tight on the pipe, back welded, and then refaced. The joint is sealed by fillet welding the back of the flange to the pipe—this seal weld assures that no leakage will occur through the threads.

The refacing assures perfect alignment of the flange faces, and that the end of the pipe is flush with the face of the flange for a proper gasket-bearing surface to the inside of the pipe.

In this type of Welded Flanged Joint the threads retain the function of holding the flange securely on the pipe, hence there is no shearing action.

Flanges: Only Steel Flanges can be used for this type of joint. Crane Forged Steel Screwed Flanges are available in straight and reducing sizes.

For a list of sizes, primary service pressure ratings, and prices of this type of Welded Flanged Joint, see page 658.

For flanges only, see pages 332 to 335.

For dimensions of Forged Steel Screwed Flanges, see pages 332 to 335. Dimensions not shown will be furnished on application.

The Forged Steel Welding Neck Flange

Joint assembly: Crane Welding Neck Flanges are of Forged Steel. They are machined with a beveled end and bored to match the thickness of the pipe to which they are applied.

A butt weld is used to attach the Welding Neck Flange to the pipe, which is also machine beveled.

Sizes of flanges: Welding Neck Flanges are only made in straight sizes; reducing sizes are not available.

For a list of sizes, primary service pressure ratings, prices, and dimensions, see pages 341 and 346. Dimensions not shown will be furnished on application.

Facings . . . pages 638 to 643 *Flange Protectors . . . . page 653* *Testing . . . . page 653*

Crane Flanging Processes

Welded Flanged Joints

(For illustrations, see opposite page.)

The Slip-On Welding Flange

Joint assembly: Crane Slip-On Welding Flanges are of Forged Steel. They are bored for a snug fit on the pipe, and are welded at the front and at the back.

After the welding, the flanges are refaced to assure perfect alignment of the flange faces, and that the end of the pipe is flush with the face of the flange for a proper gasket-bearing surface to the inside of the pipe.

Attention is called to the advantage of Crane Shop Fabrication, in that our method of welding this type of joint at the front and the subsequent refacing eliminates the pocket which is produced by the fillet weld necessary in field welding the front of the Slip-On Welding Flange.

Page 341 illustrates the fillet weld which is necessary for field attachment, and also for shop fabrication where refacing facilities are not available.

Pipe bends: Slip-On Welding Flange Joints can be advantageously used when very short tangents are necessary on pipe bends.

For details, see the note on page 623.

Sizes of flanges: Slip-On Welding Flanges are available in straight and in reducing sizes.

For a list of straight sizes, primary service pressure ratings, and prices, see page 341.

For reducing sizes regularly listed, see page 342.

For dimensions, see page 347; the dimensions of flanges not shown will be furnished on application.

Extra large sizes: Slip-On Welding Flange Joints for 150 and 300-Pound Primary Service Pressure Ratings can be furnished in sizes larger than 24-inch O.D., which is beyond the scope of the other types of flanged joints.

Information and prices will be furnished on application.

Code limitation: The use of the Slip-On Welding Flange Joint is limited to 300 pounds pressure and a temperature of 700° F., when piping must comply with either the Pressure Piping Code or the A.S.M.E. Unfired Pressure Vessel Code.

The Cranelap Welding Nipple and Flange

Joint assembly: The Cranelap Welding Nipple with Cranelap Flange can be applied to fabricated piping.

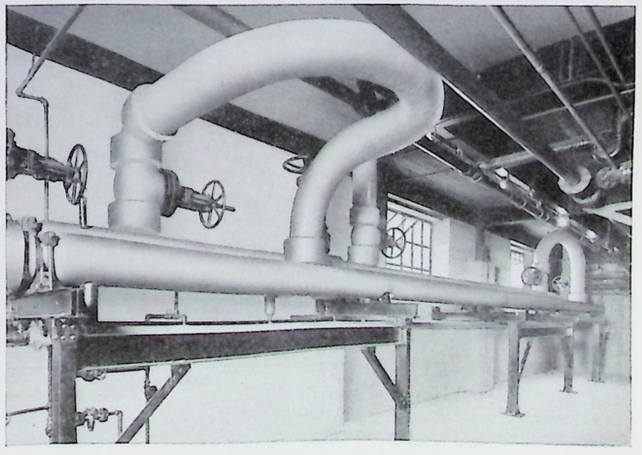
Both the welding nipple and the pipe are machine beveled. A butt weld is used to complete the joint.

This type of joint has all of the advantages of the regular Cranelap Joint, as described on pages 626 to 628. In most cases, piping can be fabricated with the Cranelap Joints applied directly, which eliminates the weld necessary for the application of the Cranelap Welding Nipple with Cranelap Flange.

For a list of sizes, primary service pressure ratings, prices, dimensions, and information on Cranelap Welding Nipples and Cranelap Flanges, see pages 340, 344, and 345.

Facings . . . . pages 638 to 643

Flange Protectors . . . . page 653 *Testing . . . . page 653*



Crane Shop Fabricated welded main and auxiliary steam headers with crossover pipe bends — Cranelap Joints 400 pounds steam working pressure

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Flange Facings and Finishes

Crane Fabricated Piping includes a variety of facings and finishes for flanged joints. The illustrations and descriptions outline the details of the facings and finishes which are regularly furnished for the various types of flanged joints, also the alternative finishes which are available on special orders.

There are two finishes for facings in general use and listed for the various facings described in this section, i. e., "smooth finish" and "serrated finish".

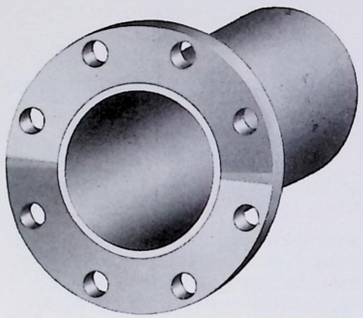
Smooth Finish: The machining of faces with this finish is smooth, designated "smooth finish".

Serrated Finish: The machining of faces with this finish is accomplished with a round nose or form tool which cuts concentric grooves, known as "serrated finish".

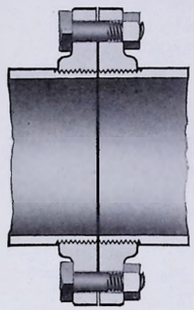
The serrations are approximately 16 per inch when used on Cast Iron and Ferrosteel Flange Facings, and approximately 32 per inch when used on Forged Steel Flange Facings.

Illustrations: The various facings and finishes are only illustrated with one type of flanged joint, however attention is directed to the descriptive matter which will indicate that many of the facings and finishes are applicable to the various types of flanged joints, such as Screwed, Welding Neck, Slip-On Welding, and Cranelap.

Plain Face—Smooth Finish



Plain Face — Smooth Finish



Plain Face
Smooth Finish

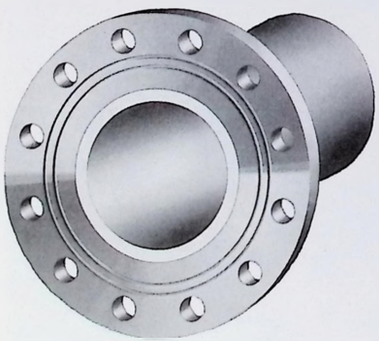
Flanged joints are regularly plain faced with smooth finish when 25 and 125-Pound Cast Iron, Ferrosteel, or Malleable Iron Screwed Flanges are used.

Serrated and special finishes can be furnished when ordered; special prices will apply.

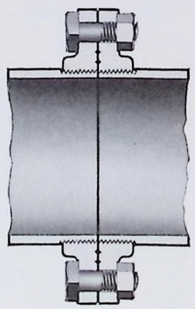
For 25 and 125-Pound Iron Flanges, see pages 289 to 291.

Drilling Templates....page 370

Plain Face—Smooth Finish—"V" Grooved



Plain Face — Smooth Finish — "V" Grooved



Plain Face — Smooth
Finish — "V" Grooved

Brass flanges should not be bolted against a raised face. See the cautionary note below.

For 150 and 300-Pound Brass Flanges, see page 262.

Drilling Templates....page 369

Brass flanged joints are regularly plain faced, with smooth finish and with two V-shaped concentric grooves between the port and the bolt holes, when 150 and 300-Pound Brass Flanges are used.

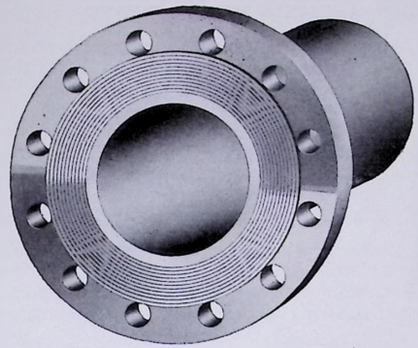
Caution: When brass flanged material is to be bolted against iron or steel material having a raised face, the raised face should be removed, and a plain face with smooth finish furnished, to prevent distortion of the brass flange under bolting load.

Gaskets: Full face gaskets should always be used when assembling any brass flanged joint with plain face and V-shaped grooves.

Metallic gaskets are not recommended for use with brass flanged joints.

Flange Facings and Finishes

1/16" Raised Face—Serrated Finish



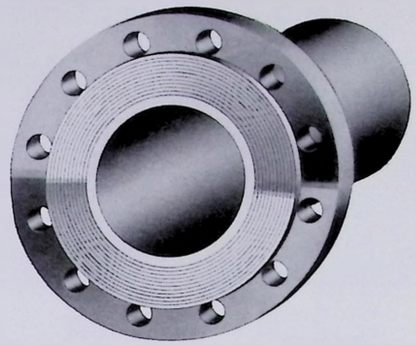
1/16-inch Raised Face — Serrated Finish

Flanged Joints are regularly furnished with a 1/16-inch high raised face when using 250-Pound Cast Iron and Ferrosteel Screwed Flanges; also 150 and 300-Pound Forged Steel Screwed, Welding Neck, or Slip-On Welding Flanges.

Finish: The 1/16-inch raised faces are regularly furnished with a serrated finish.

Smooth finish and special finishes can be furnished when ordered; special prices will apply.

1/4" Raised Face—Serrated Finish



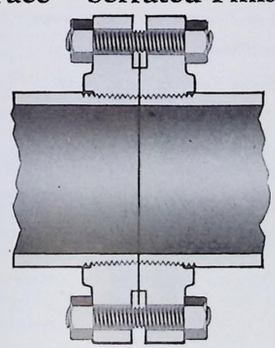
1/4-inch Raised Face — Serrated Finish

Flanged joints are regularly furnished with a 1/4-inch high (large male) face when using 800-Pound Hydraulic Ferrosteel Screwed Flanges; also 400, 600, 900, and 1500-Pound Forged Steel Screwed, Welding Neck, or Slip-On Welding Flanges.

Finish: The 1/4-inch raised faces are regularly furnished with a serrated finish.

Smooth finish, special facings, and special finishes can be furnished when ordered; special prices will apply.

1/4" High Double Male Face—Serrated Finish



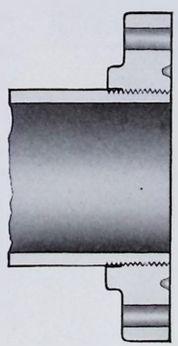
1/4-inch High Double Male Face
Serrated Finish

Flanged Joints can be furnished with 1/4-inch High Double Male Faces when using 250-Pound Cast Iron or Ferrosteel Screwed Flanges; 800-Pound Hydraulic Ferrosteel Screwed Flanges; also 150, 300, 400, 600, 900, and 1500-Pound Forged Steel Screwed, Welding Neck, or Slip-On Welding Flanges.

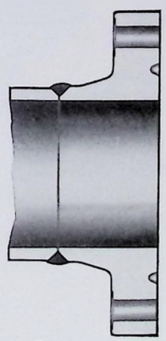
Finish: The 1/4-inch raised faces are regularly furnished with a serrated finish.

Smooth finish and special finishes can be furnished when ordered; special prices will apply.

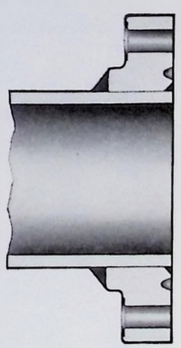
Ring Joint Face



Ring Joint on
Screwed Flange



Ring Joint on
Welding Neck Flange



Ring Joint on
Slip-On Welding Flange

Flanged joints can be furnished with Ring Joint Facing when using 300, 400, 600, 900, and 1500-Pound Forged Steel Screwed, Welding Neck, or Slip-On Welding Flanges.

Ring Joint Facing has a specially designed groove which employs a steel ring, this combination making a pressure-tight joint. A gasket, other than the ring, is not needed in this joint.

The Ring Joint Facing should not be used with or against iron or brass valves, flanges, or fittings.

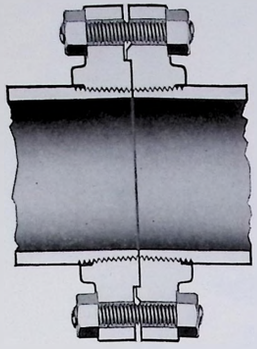
The Ring Joint Face is also furnished on Cranelap Joints—see page 630.

Dimensions of Ring Joint Facings....pages 642 and 643

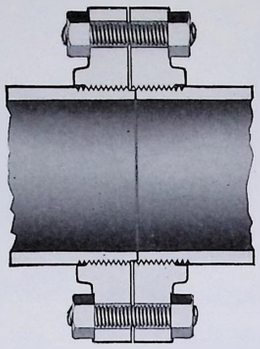
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Flange Facings and Finishes

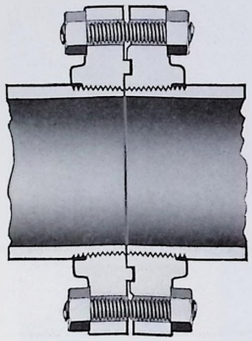
Large Male and Female — Small Male and Female
Large Tongue and Groove — Small Tongue and Groove



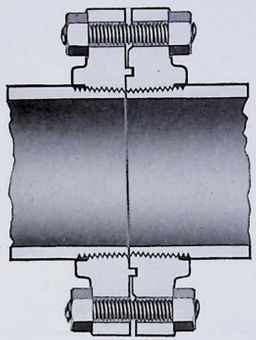
Large Male and Female



Small Male and Female



Large Tongue and Groove



Small Tongue and Groove

Flanged Joints can be furnished with Large Male and Female, Small Male and Female, Large Tongue and Groove, and Small Tongue and Groove Facing when using 250-Pound Cast Iron or Ferrosteel Screwed Flanges; 800-Pound Hydraulic Ferrosteel Screwed Flanges; also 150, 300, 400, 600, 900, and 1500-Pound Forged Steel Screwed, Welding Neck, or Slip-On Welding Flanges.

Finish: The male faces are regularly furnished with serrated finish. All female faces, tongue faces, and groove faces are regularly furnished with smooth finish.

Smooth finish can be furnished on the male faces when ordered; special prices will apply.

Caution: Care should be taken in the use of Small Male and Female Joints to insure that the pipe is thick enough to permit sufficient bearing surface to prevent crushing the gasket.

Gaskets: Corrugated metallic gaskets are recommended only when used with smooth finish flanged joints.

Dimensions of Special Facings . . . . page 641

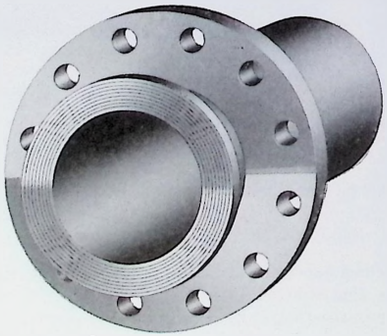
Drilling Templates . . . . pages 369 to 377

Prices of Special Facings . . . . page 353

Sarlun Facing and Finish . . . . page 631

Ring Joint . . . . page 639

Cranelap Joint Facing Finishes



Cranelap Joint — Plain Face Serrated Finish

Regular Cranelap Joint: The regular Cranelap Joint with raised face is regularly furnished with a serrated finish, approximately 32 serrations per inch. Smooth finish can be furnished when specified.

Modified Cranelap Joints: The Modified Cranelap joints and facings are finished as follows:

Radial Back and Double Thickness Lap Cranelap Joints, with raised face, are regularly furnished with a serrated finish, approximately 32 serrations per inch.

Smooth finish can be furnished when specified.

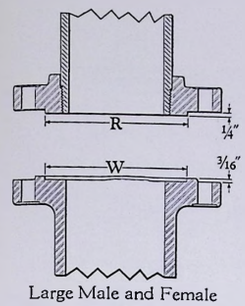
Large Male and Female, Large Tongue and Groove, and Small Tongue and Groove Cranelap Joints are regularly furnished with a serrated finish (approximately 32 serrations per inch) on the male faces, and with smooth finish on the female, tongue, and groove faces.

Smooth finish can be furnished on the male faces when specified.

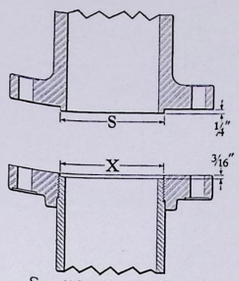
Gaskets: Corrugated metallic gaskets are recommended only when used with smooth finish flanged joints

Dimensions of Cranelap Joints . . . . page 632
Dimensions of Ring Joints . . . . pages 642 and 643
Dimensions of Facings on Cranelap Joints . . . page 633

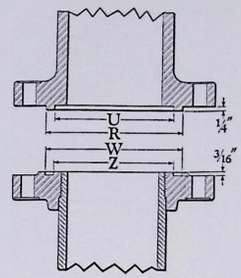
Dimensions of American Standard Flange Facings



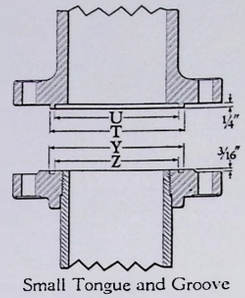
Large Male and Female



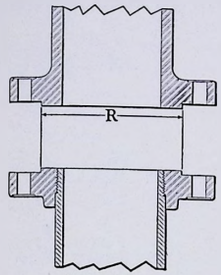
Small Male and Female



Large Tongue and Groove



Small Tongue and Groove



Raised Face

For finish of facings and illustrations, see pages 638 to 640.

For dimensions of Facings on Cranelap Joints, see pages 632 and 633.

For dimensions of Sarlun Facings, see pages 634 and 635.

For dimensions of Ring Joint Facings, see pages 642 and 643.

For drilling templates, see pages 370 to 377.

For dimensions of flanges, refer to catalogue pages covering the class of flanges under consideration.

For prices of special facings, see page 353.

For length of bolts and bolt-studs, see pages 369 to 377.

*150, 300, 400, 600, 900, and 1500-Pound Steel
Raised Face, Large Male and Female, Small Male and Female, Large Tongue and Groove, and Small Tongue and Groove

Dimensions of Facings, in Inches

Size of Pipe	Outside Diameter			I.D. of Large and Small Tongue	Outside Diameter			I.D. of Large and Small Groove
	Raised Face, Large Male, and Large Tongue	Small Male	Small Tongue		Large Female and Large Groove	Small Female	Small Groove	
	R	S	T	U	W	X	Y	Z
½	1⅜	23/32	1⅜	1	1 7/16	25/32	1 7/16	1 5/16
¾	1 11/16	1 5/16	1 11/16	1 5/16	1¾	1	1¾	1¼
1	2	1 3/16	1⅞	1½	2 1/16	1¼	1 15/16	1 7/16
1¼	2½	1½	2¼	1⅞	2 9/16	1 9/16	2 5/16	1 13/16
1½	2⅞	1¾	2½	2⅛	2 15/16	1 13/16	2 9/16	2 1/16
2	3⅝	2¼	3¼	2⅞	3 11/16	2 5/16	3 5/16	2 13/16
2½	4⅛	2 11/16	3¾	3⅜	4 3/16	2¾	3 13/16	3 5/16
3	5	3 5/16	4⅝	4¼	5 1/16	3⅜	4 11/16	4 3/16
3½	5½	3 13/16	5⅛	4¾	5 9/16	3⅞	5 3/16	4 11/16
4	6 3/16	4 5/16	5 11/16	5 3/16	6¼	4⅜	5¾	5⅛
5	7 5/16	5⅜	6 13/16	6 5/16	7⅜	5 7/16	6⅞	6¼
6	8½	6⅜	8	7½	8 9/16	6 7/16	8 1/16	7 7/16
8	10⅝	8⅜	10	9⅜	10 11/16	8 7/16	10 1/16	9 5/16
10	12¾	10½	12	11¼	12 13/16	10 9/16	12 1/16	11 3/16
12	15	12½	14¼	13½	15 1/16	12 9/16	14 5/16	13 7/16
14 OD	16¼	13¾	15½	14¾	16 5/16	13 13/16	15 9/16	14 11/16
16 OD	18½	15¾	17⅝	16¾	18 9/16	15 13/16	17 11/16	16 11/16
18 OD	21	17¾	20⅛	19¼	21 1/16	17 13/16	20 3/16	19 3/16
20 OD	23	19¾	22	21	23 1/16	19 13/16	22 1/16	20 15/16
24 OD	27¼	23¾	26¼	25¼	27 5/16	23 13/16	26 5/16	25 3/16

These facing dimensions are also used for the 800-Pound Hydraulic Standard in sizes 2 to 12-inch, inclusive; likewise for the 250-Pound Cast Iron Standard in sizes 1 to 24-inch O. D., inclusive, for the Large Male and Female, Small Male and Female, Large Tongue and Groove, and Small Tongue and Groove Facings.

Regular facing for the 150 and 300-Pound Standards is a 1/16-inch raised face included in the minimum flange thickness.

Regular facing for the 400, 600, 900, and 1500-Pound Standards is a ¼-inch raised face not included in the minimum flange thickness.

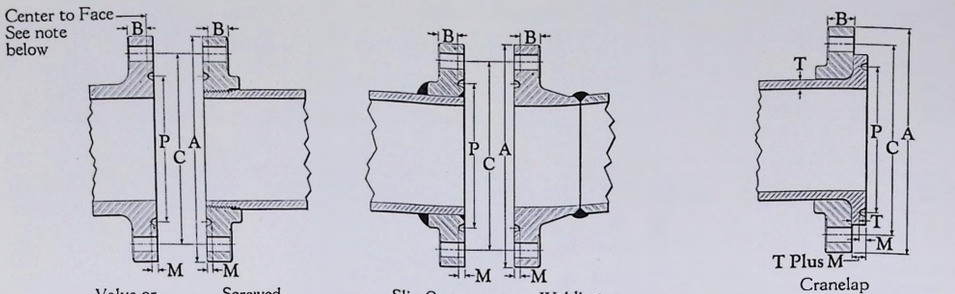
A tolerance of plus or minus 0.016-inch (1/64") is allowed on the inside and outside diameters of all facings.

Caution: Care should be taken in the use of Small Male and Female Joints, as they apply particularly on lines where the joint is made on the end of the pipe, to insure that the pipe used is thick enough to permit sufficient bearing surface to prevent crushing the gasket.

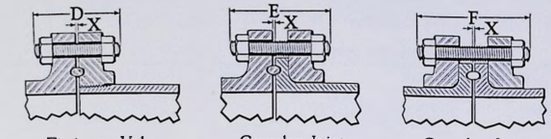
Gaskets for male and female, and tongue and groove joints should cover the bottom of the recess with minimum clearances taking into account the tolerances of 0.016 inch (1/64") noted before.

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Dimensions of Crane Ring Joints



*Bolt-Stud Lengths for Ring Joints



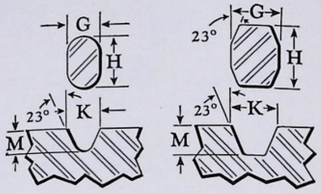
Fitting to Valve Fitting to Screwed, Slip-On, or Welding Neck Flange

Cranelap Joint to Flanged Fitting or Valve

Cranelap Joint to Cranelap Joint

*Bolt-Stud Lengths are from end to end of thread and not to top of crown.

Detail of Rings and Grooves



5/8 and 7/8-inch Rings and Grooves

1/2-inch and larger Rings and Grooves

Dimensions, in Inches

Size	Diameter of Flange A	Thickness of Flange B	Diameter of Bolt Circle C	Number of Bolt-Studs	Diameter of Bolt-Studs	*Pitch Diameter of Ring P	Width of Ring G	Height of Ring H	Width of Groove K	Depth of Groove M	**Length of Bolt-Studs with two nuts D	E	F	Seamless Pipe Thickness T	†Clearance of Joint X
300-Pound															
2	6 1/2	7/8	5	8	5/8	3 1/4	7/16	11/16	15/32	5/16	4	4 1/4	4 1/2	.218	7/32
2 1/2	7 1/2	1	5 7/8	8	3/4	4	7/16	11/16	15/32	5/16	4 1/2	4 3/4	5	.276	7/32
3	8 1/4	1 1/8	6 5/8	8	3/4	4 7/8	7/16	11/16	15/32	5/16	4 3/4	5	5 1/2	.300	7/32
3 1/2	9	1 3/16	7 1/4	8	3/4	5 3/16	7/16	11/16	15/32	5/16	4 7/8	5 1/4	5 1/2	.318	7/32
4	10	1 1/4	7 7/8	8	3/4	5 7/8	7/16	11/16	15/32	5/16	5	5 1/2	5 3/4	.337	7/32
5	11	1 3/8	9 1/4	8	3/4	7 1/8	7/16	11/16	15/32	5/16	5 1/4	5 3/4	6	.375	7/32
6	12 1/2	1 7/16	10 5/8	12	3/4	8 1/8	7/16	11/16	15/32	5/16	5 1/2	6	6 1/4	.432	7/32
8	15	1 5/8	13	12	7/8	10 3/8	7/16	11/16	15/32	5/16	6 1/4	6 3/4	7 1/4	.500	7/32
10	17 1/2	1 7/8	15 1/4	16	1	12 3/8	7/16	11/16	15/32	5/16	7	7 1/2	8	.500	7/32
12	20 1/2	2	17 3/4	16	1 1/8	14 3/8	7/16	11/16	15/32	5/16	7 1/2	8	8 1/2	.500	7/32
14 OD	23	2 1/8	20 1/4	20	1 1/8	15 5/8	1/2	11/16	17/32	11/32	7 3/4	8 1/4	8 3/4	.500	7/32
16 OD	25 1/2	2 1/4	22 1/2	20	1 1/4	17 7/8	1/2	11/16	17/32	11/32	8 1/2	9	9 1/2	.500	7/32
18 OD	28	2 3/8	24 3/4	24	1 1/4	20 3/8	1/2	11/16	17/32	11/32	8 3/4	9 1/4	9 3/4	.500	7/32
20 OD	30 1/2	2 1/2	27	24	1 1/4	22 1/4	1/2	11/16	17/32	11/32	9	9 1/2	10	.500	7/32
24 OD	36	2 3/4	32	24	1 1/2	26 1/2	5/8	13/16	21/32	13/32	10	10 1/2	11 1/4	.562	1/4

*Pitch Diameter of ring: The dimensions given in this column apply to Valves, Fittings, Screwed Flanges, Slip-On Welding Flanges, and Welding Neck Flanges.

The same pitch diameters of rings also apply to all sizes of Cranelap Joints with the exception of the 3-inch size in the 300 and 600-Pound Standards. The 3-inch Cranelap Joint in both the 300 and 600-Pound Standards has a pitch diameter of 4 5/8 inches and employs a ring 1/16-inch wide.

**Length of Bolt-Studs: Lengths "E" and "F" are calculated for full thickness laps for the pipe specified in the column headed "Seamless Pipe Thickness". If thicker pipe is used, a corresponding allowance must be made in the length of Bolt-Studs.

†Clearance of Joint: The column headed "Clearance of Joint", or "X", gives the approximate distance between flanges after the bolts have been pulled up and the ring has been compressed to make a tight joint.

Center to face: On 300-Pound valves and fittings with Ring Joint facing, the distance from the center line to the bottom of the groove in the flange is the same as the center-to-face dimensions given in the American Standard for Steel Flanged Fittings and Flanges, B16e-1932 for 300 pounds steam working pressure.

On 400, 600, 900, and 1500-Pound valves and fittings with Ring Joint facing, the distance from the center line to the bottom of the groove in the flange is 1/4-inch less than the center-to-face of the male shown in the American Standard for Steel Flanged Fittings and Flanges, B16e-1932 for the respective steam working pressures.

American Standard: The diameter of flanges, thickness of flanges, and drilling conform to the American Standard B16e-1932

Bolt Holes: All bolt holes are spot faced and are drilled 1/8-inch larger than the diameter of the Bolt-Studs.

Dimension Tables continued on opposite page

Dimensions of Crane Ring Joints

See opposite page for dimension drawings

Dimensions, in Inches

Size	Diameter of Flange A	Thickness of Flange B	Diameter of Bolt Circle C	Number of Bolt-Studs	Diameter of Bolt-Studs	*Pitch Diameter of Ring P	Width of Ring G	Height of Ring H	Width of Groove K	Depth of Groove M	**Length of Bolt-Studs with two nuts D	E	F	Seamless Pipe Thickness T	†Clearance of Joint X
400-Pound															
For sizes below 4-inch in the 400-Pound Standard, use the dimensions of 600-Pound Standard on the opposite page															
4	10	1 3/8	7 7/8	8	7/8	5 7/8	7/16	11/16	15/32	5/16	5 3/4	6 1/4	6 1/2	.337	7/32
5	11	1 1/2	9 1/4	8	7/8	7 1/8	7/16	11/16	15/32	5/16	6	6 1/2	6 3/4	.375	7/32
6	12 1/2	1 5/8	10 5/8	12	7/8	8 1/8	7/16	11/16	15/32	5/16	6 1/4	6 3/4	7	.432	7/32
8	15	1 7/8	13	12	1	10 3/8	7/16	11/16	15/32	5/16	7	7 1/2	8	.500	7/32
10	17 1/2	2 1/8	15 1/4	16	1 1/8	12 3/8	7/16	11/16	15/32	5/16	7 3/4	8 1/4	8 3/4	.500	7/32
12	20 1/2	2 1/4	17 3/4	16	1 1/4	14 3/8	7/16	11/16	15/32	5/16	8 1/4	8 3/4	9 1/4	.500	7/32
14 OD	23	2 3/8	20 1/4	20	1 1/4	15 5/8	1/2	11/16	17/32	11/32	8 3/4	9 1/4	9 3/4	.500	7/32
16 OD	25 1/2	2 1/2	22 1/2	20	1 3/8	17 7/8	1/2	11/16	17/32	11/32	9 1/4	9 3/4	10 1/4	.500	7/32
18 OD	28	2 5/8	24 3/4	24	1 3/8	20 3/8	1/2	11/16	17/32	11/32	10	10 3/4	11 1/4	.562	7/32
20 OD	30 1/2	2 3/4	27	24	1 1/2	22 1/4	1/2	11/16	17/32	11/32	11 1/4	12	12 3/4	.593	7/32
24 OD	36	3	32	24	1 3/4	26 1/2	5/8	13/16	21/32	13/32				.687	1/4
600-Pound															
3/4	4 5/8	5/8	3 1/4	4	5/8	1 11/16	5/16	9/16	11/32	7/32	3 3/8	3 5/8	3 3/4	.154	3/16
1	4 7/8	11/16	3 1/2	4	5/8	2	5/16	9/16	11/32	7/32	3 1/2	3 3/4	3 7/8	.179	3/16
1 1/4	5 1/4	13/16	3 7/8	4	5/8	2 3/8	5/16	9/16	11/32	7/32	3 3/4	4	4 1/4	.191	3/16
1 1/2	6 1/8	7/8	4 1/2	4	3/4	2 11/16	5/16	9/16	11/32	7/32	4 1/4	4 1/2	4 3/4	.200	3/16
2	6 1/2	1	5	8	5/8	3 1/4	7/16	11/16	15/32	5/16	4 1/4	4 1/2	4 3/4	.218	3/16
2 1/2	7 1/2	1 1/8	5 7/8	8	3/4	4	7/16	11/16	15/32	5/16	4 3/4	5	5 1/4	.276	3/16
3	8 1/4	1 1/4	6 5/8	8	3/4	4 7/8	7/16	11/16	15/32	5/16	5	5 1/4	5 3/4	.300	3/16
3 1/2	9	1 3/8	7 1/4	8	7/8	5 3/16	7/16	11/16	15/32	5/16	5 3/4	6	6 1/2	.318	3/16
4	10 3/4	1 1/2	8 1/2	8	7/8	5 7/8	7/16	11/16	15/32	5/16	6	6 1/2	6 3/4	.337	3/16
5	13	1 3/4	10 1/2	8	1	7 1/8	7/16	11/16	15/32	5/16	6 3/4	7 1/4	7 1/2	.375	3/16
6	14	1 7/8	11 1/2	12	1	8 1/8	7/16	11/16	15/32	5/16	7 3/4	8 1/4	8 3/4	.432	3/16
8	16 1/2	2 3/16	13 3/4	12	1 1/8	10 3/8	7/16	11/16	15/32	5/16	8 3/4	9 1/2	10	.500	3/16
10	20	2 1/2	17	16	1 1/4	12 3/8	7/16	11/16	15/32	5/16	9	9 3/4	10 1/2	.593	3/16
12	22	2 5/8	19 1/4	20	1 1/4	14 3/8	7/16	11/16	15/32	5/16	9 1/2	10 1/4	11	.687	3/16
14 OD	23 3/4	2 3/4	20 3/4	20	1 3/8	15 5/8	1/2	11/16	17/32	11/32	10 1/4	11 1/4	12	.750	3/16
16 OD	27	3	23 3/4	20	1 1/2	17 7/8	1/2	11/16	17/32	11/32	11	12	13	.843	3/16
18 OD	29 1/4	3 1/4	25 3/4	20	1 5/8	20 3/8	1/2	11/16	17/32	11/32	11 1/2	12 1/2	13 1/2	.937	3/16
20 OD	32	3 1/2	28 1/2	24	1 5/8	22 1/4	1/2	11/16	17/32	11/32	12	13 1/2	14 3/4	1.031	3/16
24 OD	37	4	33	24	1 7/8	26 1/2	5/8	13/16	21/32	13/32	13 1/2	14 3/4	16	1.218	7/32
900-Pound															
1	For sizes below 3-inch in the 900-Pound Standard, use the dimensions of 1500-Pound Standard (given below), for the dimensions not shown in this table.										5	5 1/4	.179	1/8	
1 1/4											5 1/4	5 1/4	.191	1/8	
1 1/2											5 3/4	6	.200	1/8	
2											6	6 1/4	.218	1/8	
2 1/2											6 1/2	6 3/4	.276	5/32	
3	9 1/2	1 1/2	7 1/2	8	7/8	4 7/8	7/16	11/16	15/32	5/16	6	6 1/2	6 3/4	.300	5/32
4	11 1/2	1 3/4	9 1/4	8	1 1/8	5 7/8	7/16	11/16	15/32	5/16	7	7 1/2	8	.437	5/32
5	13 3/4	2	11	8	1 1/4	7 1/8	7/16	11/16	15/32	5/16	7 3/4	8 1/4	8 3/4	.500	5/32
6	15	2 3/16	12 1/2	12	1 1/8	8 1/8	7/16	11/16	15/32	5/16	7 3/4	8 1/4	9	.562	5/32
8	18 1/2	2 1/2	15 1/2	12	1 3/8	10 3/8	1/2	11/16	17/32	11/32	9	9 3/4	10 1/4	.593	5/32
10	21 1/2	2 3/4	18 1/2	16	1 3/8	12 3/4	1/2	11/16	17/32	11/32	9 1/2	10 1/4	11	.718	3/16
12	24	3 1/8	21	20	1 3/8	15	5/8	13/16	21/32	13/32	10 1/2	11 1/2	12 1/4	.843	3/16
14 OD	25 1/4	3 3/8	22	20	1 1/2	16 1/4	3/4	15/16	25/32	15/32	11 1/4	12 1/4	13 1/4	.937	3/16
16 OD	27 3/4	3 1/2	24 1/4	20	1 5/8	18 1/2	3/4	15/16	25/32	15/32	11 3/4	12 3/4	13 3/4	1.031	7/32
18 OD	31	4	27	20	1 7/8	21	7/8	1 1/16	29/32	17/32	13 1/2	14 3/4	15 3/4	1.156	7/32
20 OD	33 3/4	4 1/4	29 1/2	20	2	23	7/8	1 1/16	29/32	17/32	14 1/2	15 3/4	17	1.250	7/32
24 OD	41	5 1/2	35 1/2	20	2 1/2	27 1/4	1	1 1/4	1 1/16	5/8	18 1/4	19 3/4	21 1/4	1.500	
1500-Pound															
1	5 1/8	1 1/8	4	4	7/8	2	5/16	9/16	11/32	7/32	4 7/8	5 1/4	5 1/2	.250	1/8
1 1/4	6 1/4	1 1/8	4 3/8	4	7/8	2 3/8	5/16	9/16	11/32	7/32	5 1/2	5 1/4	5 1/2	.250	1/8
1 1/2	7	1 1/4	4 7/8	4	1	2 11/16	5/16	9/16	11/32	7/32	5 3/4	5 3/4	6 1/4	.281	1/8
2	8 1/2	1 1/2	6 1/2	8	7/8	3 3/4	7/16	11/16	15/32	5/16	6 1/4	6 3/4	6 1/2	.343	1/8
2 1/2	9 5/8	1 5/8	7 1/2	8	1	4 1/4	7/16	11/16	15/32	5/16	7	7 1/2	7	.375	1/8
3	10 1/2	1 7/8	8	8	1 1/8	5 3/8	7/16	11/16	15/32	5/16	8	8 1/2	8	.437	1/8
4	12 1/2	2 1/8	9 1/2	8	1 1/4	6 3/8	7/16	11/16	15/32	5/16	10	10 3/4	9	.531	1/8
5	14 3/4	2 7/8	11 1/2	8	1 1/2	7 5/8	7/16	11/16	15/32	5/16	10 1/2	11 1/4	11 1/4	.625	1/8
6	15 1/2	3 1/4	12 1/2	12	1 3/8	8 5/16	7/16	11/16	15/32	11/32	11 3/4	12 3/4	12	.718	1/8
8	19	3 5/8	15 1/2	12	1 5/8	10 3/8	1/2	13/16	21/32	13/32	13 3/4	15	13 1/2	.906	5/32
10	23	4 1/4	19	12	1 7/8	12 3/4	5/8	1 1/16	29/32	17/32	15 1/2	17	18 1/4	1.125	3/16
12	26 1/2	4 7/8	22 1/2	16	2	15	7/8	1 1/16	29/32	17/32				1.312	

Refer to the foot notes on the opposite page which also apply to the tables above.

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Crane Welded Piping

Crane Fabricated Piping includes a wide variety of shop welded product—headers, welded assemblies, receiver separators, vessels, etc.—for all current operating pressure and temperature services.

Codes: Crane Welded Piping can be fabricated to conform to the requirements of the various codes.

Shop fabrication: Welded headers, receivers, and other complicated assemblies require high grade workmanship and the utilization of shop facilities, hence should be given the advantages of shop fabrication for best results.

For the advantages of Crane Shop Fabrication, see pages 614 and 615.

Welding processes: Both the electric arc and oxy-acetylene methods of fusion welding are employed in the fabrication of Crane Welded Piping.

When orders do not specify which process should be used, we employ the method which is best adapted to the character of the work and which will produce the best results.

Qualification of welders: Crane welders must periodically pass tests in accordance with the A. S. M. E. Unfired Pressure Vessel Code and the A. S. A. Code for Pressure Piping, under the supervision of the Hartford Steam Boiler Inspection and Insurance Co.

The qualification is for both electric arc and oxy-acetylene welding.

Crane welders also can be qualified by customers' inspectors or by other recognized inspection bureaus, for both carbon and alloy steels, when so specified.

Stress relieving: Crane Welded Piping will be stress relieved in accordance with Paragraph No. 523-K of the Pressure Piping Code.

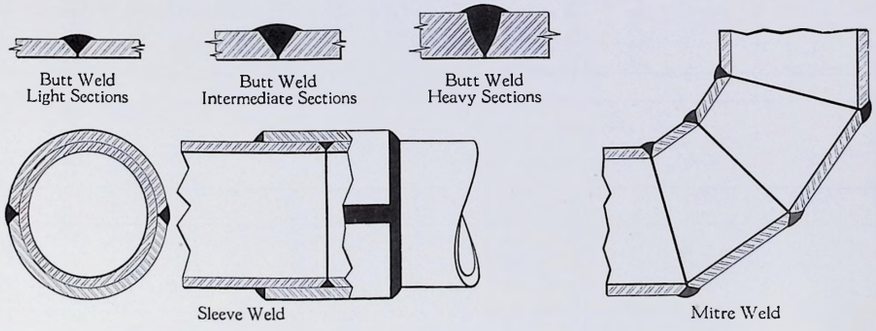
Welded Nozzles, in both the unreinforced and reinforced types, and other welds are stress relieved when it is considered necessary, even though the Pressure Piping Code does not stipulate that stress relief is required.

The practice of stress relief as outlined above will be followed, unless orders or inquiries specify otherwise.

For unusual conditions, information on stress relief will be furnished on receipt of specific inquiries.

Types of Welds

There are numerous types of welds for various connections and purposes — those in general use are as follows:



Butt Welds: Three types of butt welds are furnished as illustrated above—for light sections, intermediate sections, and heavy sections.

All piping is beveled before butt welds are applied.

For list prices of butt welds, see page 659.

Sleeve Weld: The sleeve weld, illustrated above, is sometimes used when a reinforced weld is wanted, or when unusual stresses occur, as in a pipe bend.

In making a sleeve weld, the piping is first butt welded; the weld is ground flush with the outside of the piping; and then a close-fitting split sleeve is applied and welded, as illustrated above.

For list prices of sleeve welds, see page 660.

Mitre Weld: The mitre weld, illustrated above, is used for fabricated piping, especially in the larger sizes, or for unusual conditions.

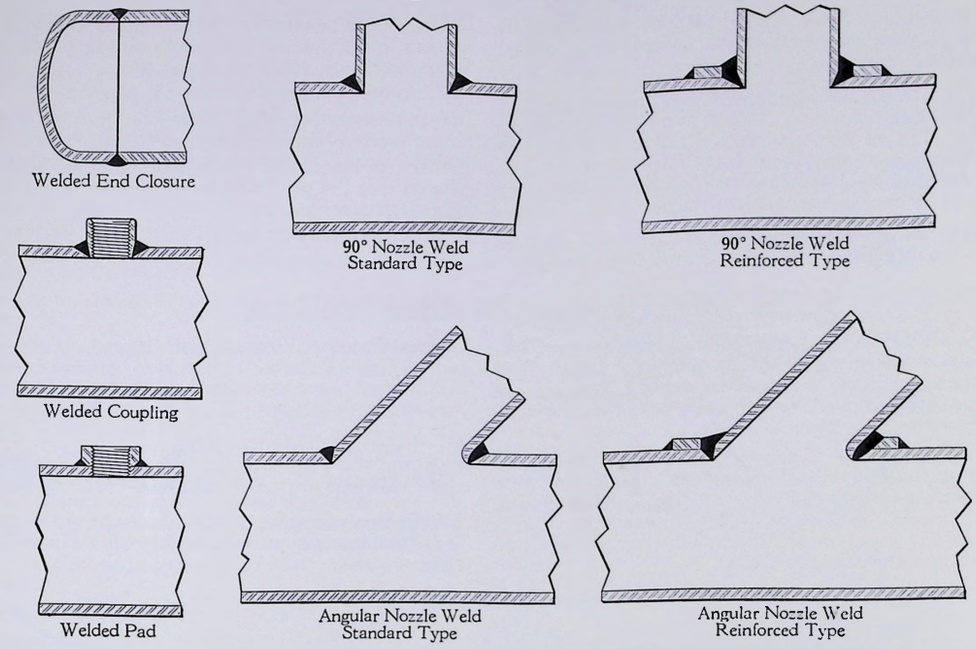
The use of pipe bends or welding elbows is recommended in preference to mitre welds. However, when the limitations of space, design, or the sizes of welding elbows available do not suffice, mitre welding can be used.

Mitre welds can be made up of various combinations of segments, angles, etc. and must be designed for each condition encountered.

For list prices of mitre welds, see note under butt welds on page 659.

Crane Welded Piping

Types of Welds



Welded End Closure: The welded end closure regularly furnished on Crane Fabricated Piping is illustrated above. Crane Welding Caps (ellipsoidal shape) are used. For Welding Caps, see page 338.

Other types of end closures, such as flat head, dished head, etc. can be furnished when ordered.

Unless otherwise specified, Crane Welding Caps, as illustrated, will be used.

For list prices of welded end closures, see page 660.

For dimensions of Welding Caps, see page 338.

Welded Couplings and Welded Pads: There are two types of welded connections furnished for the smaller sizes of screwed connections—welded couplings and welded pads. Both types are illustrated above.

For welded couplings, the regular practice is to use a half coupling of the extra heavy pattern; one end is beveled and the weld is made as illustrated.

For welded pads, the regular practice is to use a section of steel bar stock or a forged steel pad; one end is beveled; the weld is made; and the threaded opening is drilled and tapped as the final operation.

Orders and inquiries should specify whether "welded couplings" or "welded pads" are wanted.

For list prices of welded couplings and welded pads, see page 661.

Welded Nozzles: Crane Fabricated Piping includes two types of welded nozzles—the "Standard Type", which is unreinforced, and the "Reinforced Type", which, as the name implies, provides reinforcement of the nozzle weld.

Welded nozzles can be furnished in the 90° or angular types, either "Standard" or "Reinforced", as illustrated above.

"Standard Type" welded nozzles will be furnished on orders unless otherwise specified, however, the use of the "Reinforced Type" is recommended when the nozzle diameter approaches the header diameter in size.

For list prices of welded nozzles, see page 659.

Reinforcement of Welded Nozzles: When a header or pressure vessel has a relatively large size welded nozzle, it is advisable to reinforce the nozzle weld to compensate for the reduction in strength caused by the nozzle connection.

The ring type of nozzle reinforcement, illustrated in the reinforced welded nozzles shown above, is recognized by the A.S.M.E. Unfired Pressure Vessel Code and the Hartford Steam Boiler Inspection and Insurance Co.

This ring type of reinforcement will be furnished in the absence of definite specifications on orders for fabricated piping with reinforced welded nozzles.

Other types of reinforcement can be furnished according to individual specifications, when so stipulated.

For list prices of reinforced welded nozzles, see page 659.

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Crane Welded Piping

Crane Welded Headers

The welding of shop fabricated piping probably finds its greatest usefulness in the production of welded headers from pipe.

A few of the advantages of welded headers are: the elimination of joints; a saving in weight; a conservation of space when necessary; the location of branches or nozzles at any desired, practical intervals; continuity of insulation; and the freedom to apply any type of joint to the nozzles or connections.

Shop fabrication of welded headers is recommended. See pages 614 and 615 for the "Advantages of Crane Shop Fabrication".

Crane welded headers are fabricated by competent welders working under approved procedure control. When necessary, welds are stress relieved.

For information on stress relief, see page 644.

For information on the dimensions and design of Crane Welded Headers, see pages 648 and 649.

For list prices of the component parts of welded headers, see the price section on fabricated piping, pages 657 to 661.

Refer to the notes on welded product on page 647.

For information regarding testing, see page 653.

Miscellaneous Welded Products

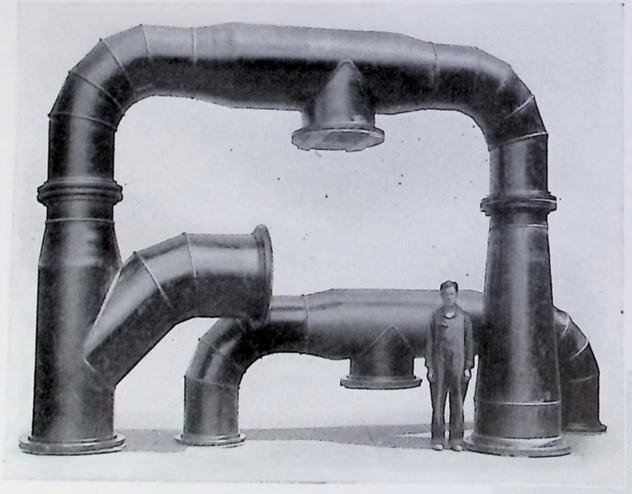
Crane welding and shop facilities permit the production of numerous products other than headers and the usual piping fabricated by welding. The nature of this product precludes any attempt to list completely the variety of items available.

Welded receiver separators and other types of pressure vessels; welded assemblies made up of pipe, welding fittings, flanged joints, etc., as illustrated on pages 680 to 682; as well as other miscellaneous welded products, are included in the scope of Crane shop and welding facilities.

Unfired Pressure Vessels: Unfired pressure vessels, such as Crane Receiver Type Steam Separators, can be furnished to comply with the A. S. M. E. Unfired Pressure Vessel Code.

All of the requirements of this code are complied with and the manufacturing procedure is checked under Hartford Inspection, unless otherwise specified.

Information regarding the details of the design and the manufacture of pressure vessels will be furnished on application.



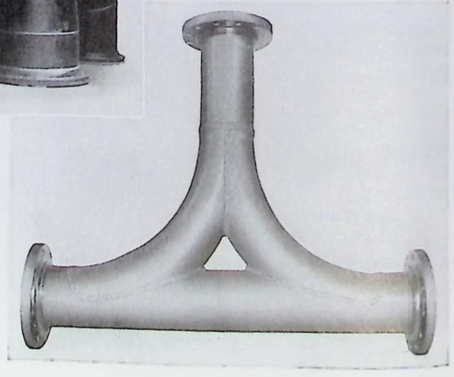
Left

2 – 24 x 30-inch
Special Manifold Connections

1 – 36 x 24-inch
Special Lateral

1 – 36 x 24-inch
Special Swedged Reducer

For high pressure
natural gas service



Right

An 8-inch Special Welded Assembly with 300-Pound Forged Steel Screwed Flanges
For gas line service

Crane Welded Piping

Notes on Crane Welded Piping

Ends of welded piping: Welded headers and piping can be supplied with the ends plain, beveled for welding, threaded, or flanged, utilizing any of the types of flanged joints which are listed.

For the various types of flanged joints, see pages 625 to 637.

Long lengths of pipe: When designing or ordering welded headers and piping, consideration should be given to the maximum lengths of welded or seamless pipe available.

For the maximum average lengths of steel pipe, see page 665.

When the necessary lengths are not available, two or more pieces of pipe can be welded together or provided with intermediate flanged joints to produce the desired header or welded assembly. Any intermediate joint should be definitely located if its location is an important factor in erection.

Shipping facilities present the only practical limit to the shape or length of welded headers and assemblies. Care must be used to keep the over-all dimensions within the maximum shipping facilities and clearances between the factory and the destination.

For information on shipping limitations, see page 665.

Special materials: Facilities are available for welding or brazing into headers and various types of fabricated assemblies, piping materials such as brass, copper, aluminum, monel, Everdur, and others. The application of yellow brasses, however, is somewhat limited.

Numerous alloy steels also can be welded. Facilities for heat-treating alloy steels after fabrication are available when required.

Crane Shops have welding rods and electrodes for welding alloy steels which give the deposited metals approximately the same characteristics as the parent metals.

Detailed information regarding the welding or brazing of special materials will be furnished on application.

Pipe: For the various kinds of pipe, see pages 583 to 588, and 662.

Galvanizing: Welded headers and welded piping can be furnished galvanized on the inside and outside, or galvanized on the outside only. The galvanizing is done after fabrication.

Information and prices are available on application.

Testing, Protectors, and Painting: All Crane welded products are tested, painted, and provided with protectors on flanged or threaded ends.

For information on testing, see page 653; for painting, page 653; for protectors, page 653.

Inquiries and orders: Inquiries or orders for welded products should specify the quantity; size, weight, and kind of pipe; also if the ends are to be plain, beveled for welding, threaded, or flanged. If flanged, the kind of flange, facing, and type of joint should be specified.

Pages 683 to 685 illustrate a variety of welded headers and assemblies. Buyers will find it convenient to use these pages when ordering.

The details of a welded header or assembly can be specified by giving the sketch number and the dimensions and information designated by the letters.

It is advisable to have a sketch accompany all orders or inquiries.



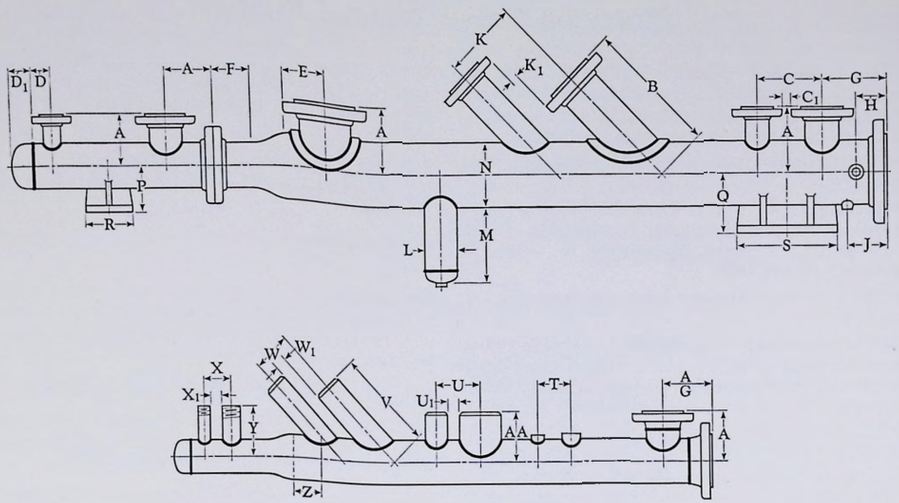
A 30 x 30 x 20 x 20-inch Special Welded Double Lateral with Cranelap Flanged Joints — used in a water distribution system — approximate weight 2200 pounds



24 x 16-inch Welded Headers — Crane Welding Elbows and 300-Pound Cranelap Flanged Joints — for an extraction steam line

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Dimensions of Crane Welded Headers



Design recommendations: It is impossible to outline in complete detail fixed recommendations for the dimensions of welded headers, because the specific requirements often necessitate the use of special or unusual dimensional design. However, for the major portion of ordinary requirements, it is possible to keep within the limitations of standard practice.

To this end, the composite header sketches shown above and the data following are presented as a guide for designing and for determining the dimensions of welded headers.

Caution: In the data following, reference is made, in many cases, to recommended minimum dimensions. The principles of good header design preclude the use of these minimum dimensions, and consequent close clearances, except when necessary.

As an example, refer to dimension "C" (center to center of adjacent flanged end nozzles) in the sketch above and in the data section following, and note that the recommended minimum should be used only when close nesting of the branch outlet piping is required, or when the space for the header length is limited. Obviously, the use of the minimum dimension "C" is not desirable when greater spacing of adjacent nozzles can be effected.

Recommended minima: While the recommended minimum dimensions appearing in the following data are accurate for general purposes, slight variations are possible. For specific problems of this nature, full information will be furnished upon receipt of inquiries, which preferably should be accompanied by a sketch.

Dimensions "A" and "B": The center to face dimension of flanged end welded nozzles should be the same as the corresponding dimensions of flanged fittings of similar pressure rating and of similar type. If Sarlun or Sargol Flanged Joints are used, refer to the explanatory note on page 649.

Dimensions "C"-"C_1" and "K"-"K_1": The recommended minimum center to center dimension of adjacent flanged end welded nozzles should be one-half the diameter of one outlet flange, plus one-half the diameter of the other outlet flange, plus one inch (1″). This will provide sufficient clearance for welding the nozzles to the header and also for bolting up the adjacent flanged joints.

If the nozzle welds are reinforced, certain types of reinforcement may require more than one inch of clearance between adjacent flanges of nozzles. However, if ring reinforcement is used, this qualification does not apply, as the one inch clearance between adjacent flanges (Dimensions "C_1" and "K_1") provides sufficient clearance for the application of welded reinforcing rings. If Sarlun or Sargol Flanged Joints are used, refer to the explanatory note on page 649.

Dimensions "D" and "E": The dimension "D" (center of welded nozzle to center of the butt weld of an end closure) and the dimension "E" (center of welded nozzle to the beginning of a swedged reduction in the diameter of the header) should not be less than one-half the diameter of the flange on the welded nozzle.

Dimension "D_1": For dimensions of the Welding Caps used for end closures, see page 338. See page 337 for the working pressures of Welding Caps.

Dimensions of Welding Cap end closures for pressures greater than those shown on page 338 will be furnished on application.

Dimensions of Crane Welded Headers

Dimension "F": The minimum lengths of tangents on swedged or reduced ends should be the same as the minimum tangents used on pipe bends. See Column "C" in the table on page 622 and the notes relating to tangents on page 623.

Dimension "G": When the diameter of the welded nozzle is smaller than the diameter of the header, it is possible, in some instances, to make the dimension from center of nozzle to face of header flange less than the normal dimension ("A"), which is the corresponding flanged fitting dimension.

Dimension "G" should not be less than one-half the diameter of the outlet flange, plus the length through the hub of the header flange (including welding neck type), plus any additional space, if necessary, for the insertion of bolts.

Sarlun and Sargol Flanged Joints: When Sarlun or Sargol Flanged Joints are used, the center to face dimensions of the corresponding flanged fittings can not be used. Dimension "A" must be lengthened to provide adequate clearance for the longer studs or bolts used in these types of joints.

Likewise, the distance from center to center of adjacent flanged welded nozzles (Dimension "C") must provide ample space between the flanges (Dimension "C_1") for welding the lips at the junction of the lapped faces.

Dimensions and full information are available on application.

Dimension "H": The pipe connection for flow meter purposes should be located according to the requirement of the flow meter manufacturer. However, clearance for the hub of the flange is necessary.

Dimension "J": Welded coupling nozzles or welded pads for a drain or other purposes should be so located that dimension "J" provides ample clearance for the hub of the header flange, and also for the insertion or removal of the bolts for the header flange when piping is connected to the welded coupling nozzle or pad.

Dimensions "L" and "M": The diameter of welded drip pockets ("L") should be approximately one-half to two-thirds of the diameter of the header ("N"). The length of welded drip pockets ("M") should be, as a recommended minimum, approximately two to three times the diameter ("L"). It is recommended that the drain connection be not less than 1-inch, also that the size should be based on the service requirement.

For low pressure, saturated steam lines, drip pockets should be larger than those used on high pressure, superheated steam lines, because more condensate will be present in the low pressure, saturated steam lines than in the high pressure, superheated steam lines.

Drip pockets should not be located immediately opposite and below a vertical branch outlet of a header, because the flow from the header through the vertical branch will produce a syphonic action and render the drip pocket partially or even entirely ineffective, especially when a high velocity of flow is employed.

Dimensions "P" and "Q": The fabrication of headers by welding readily permits variations in the location, design, and dimensions of supports and anchorage bases.

In the absence of any special requirement, it is recommended that the dimension "P" (center of header to face of base support) and the dimension "Q" (center of header to face of anchorage base) be the same as the corresponding dimensions of base fittings of similar pressure rating and of similar type.

These recommended dimensions provide clearance for the application of insulation.

Dimensions "R" and "S": The dimensions of the support bases ("R") should be the same as the corresponding dimensions of base fittings of similar pressure rating and type.

The dimensions of anchorage bases ("S") should be larger than those of support bases and should be developed to suit the conditions.

When bases are to be drilled for bolts, the size and the location of the holes should be detailed or specified.

When an anchorage base is used, it should be bolted securely, however, the supporting base should then be free, in order not to interfere with the longitudinal movement of the header when expanding or contracting.

Dimension "T": The minimum center to center dimension of adjacent welded coupling nozzles or welded pads ("T") is governed by the pipe sizes of these connections. Adequate space should be provided for the installation of any valves, unions, etc. in the connected piping.

Dimensions "AA", "V", and "Y": It is recommended that the center to end dimension of beveled end welded nozzles ("AA" and "V") and threaded end welded nozzles ("Y") be the same as the center to face dimensions of corresponding flanged fittings of similar pressure rating and type.

When necessary, it is possible to reduce dimensions "AA", "V", and "Y" below the standard recommended above, but in such a case care should be used to have these dimensions of adequate length for proper butt welding or screwing-up of the branch piping to the ends of the nozzles in the header.

Dimensions "U"-"U_1", "W"-"W_1", and "X"-"X_1": The minimum center to center dimension of adjacent beveled end or threaded end welded nozzles is governed by the pipe sizes of these nozzles. Adequate space should be provided for the installation of any valves, unions, flanges, etc. in the piping connected to the nozzles.

It is also necessary that the dimensions "U_1", "W_1", and "X_1" be of sufficient length to provide adequate space for the welding of the nozzles to the header.

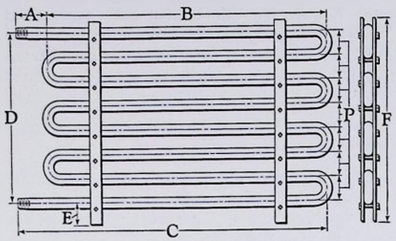
Dimension "Z": The dimension "Z" can be determined by the same formula used for dimension "E", i. e., the same as one-half the flange diameter on a 90° welded nozzle.

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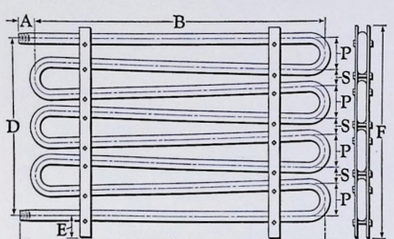
Pipe Coils

Pipe Coils can be furnished in many types. A few of those in general use are illustrated by the drawings below and on the opposite page. The photographs show unusual coils and indicate our ability to handle special coil fabrication.

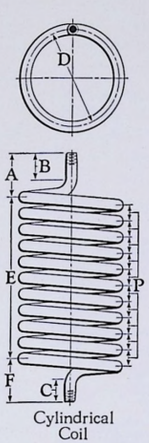
Pipe Coils are regularly made from any of the commercial sizes and weights of steel and genuine wrought iron pipe. Information about coils made from piping materials other than steel or genuine wrought iron will be furnished on application.



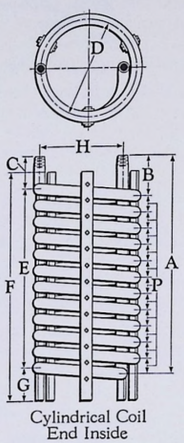
Flat Coil



Flat Zig Zag Coil

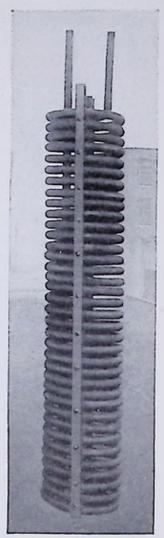


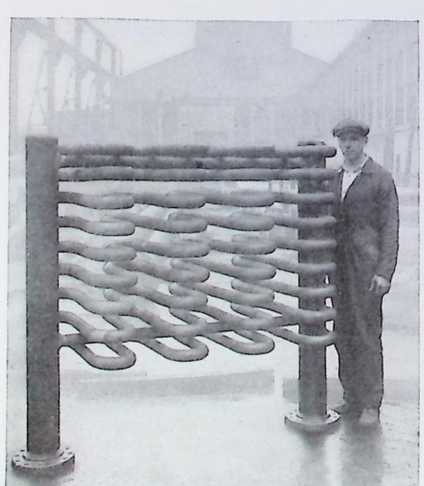
Cylindrical Coil



Cylindrical Coil End Inside

Minimum center to center dimensions . . . . . page 651


1½-inch Cylindrical Coil—1′ 7″ O.D. 7′ 9″ high


Special Preheater Coils
Made of 6 and 2-inch Seamless Pipe

Inquiries and orders: Inquiries and orders for Pipe Coils should specify the quantity; service; size, weight, and kind of pipe; also if the ends are to be plain, beveled, threaded, or flanged. If flanged, the kind of flange, facing, and type of joint should be specified.

The essential dimensions, as indicated by the letters in the drawings of coils shown on these pages, should be given in a specification, or preferably in a sketch.

Threaded ends: If Pipe Coils are to have threaded ends, they can be furnished with regular threads, locknut threads, or straight threads. If the threads are other than regular, full details should be given.

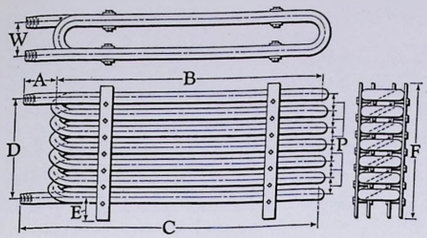
Galvanizing: Pipe Coils can be furnished galvanized on the outside only. It is possible, in limited instances, to galvanize coils on the inside and outside. Full information will be furnished on receipt of specific inquiries.

Shipping facilities: Shipping facilities present the only practical limit to the shape or length of Pipe Coils. Care must be used to keep the overall dimensions within the maximum shipping facilities and clearances between the factory and the destination.

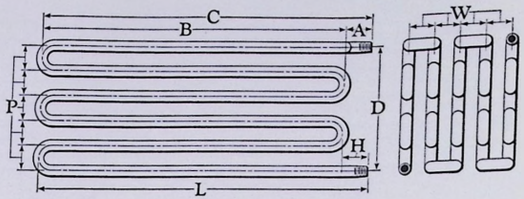
For information on shipping limitations, see page 665.

For the various kinds of pipe, see pages 583 to 588, and 662.

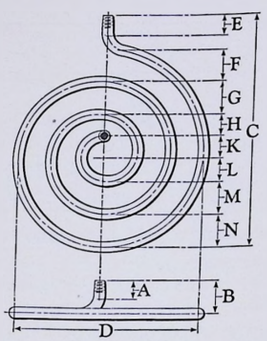
Pipe Coils



Oval Coil



Box Coil



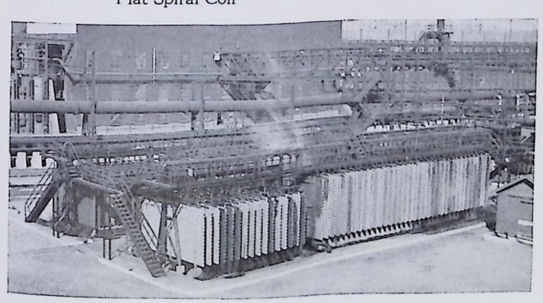
Flat Spiral Coil

Center to Center Dimensions
(All Dimensions Are in Inches)

Size of Pipe	Recommended and Advisable Minimum		Shortest center to center dimensions		Size of Straps
	Standard	Extra Strong	Standard	Extra Strong	
¾	3½	2½	3½	2½	1¼ x ¼
1	4	3	4	3	1¼ x ¼
1¼	5	4	4½	3½	1½ x ¼
1½	6	5	5	4	1½ x ⅜
2	8	6	6	5	2 x ⅜

Dimensions: The above table lists the "recommended minimum", also the "shortest center to center dimensions" to which Pipe Coils can be fabricated in sizes ¾ to 2-inch, inclusive.

Information on sizes smaller than ¾-inch and larger than 2-inch will be furnished on application.


Cooling Coils in the by product plant of a large steel company
Fabricated in the Birmingham Shop of Crane Co.

Straps: The column "size of straps" lists the regular practice for strapping coils, when strapping is necessary.

If any other sizes of straps are needed, orders and inquiries should indicate what is wanted.

Prices: Prices of Pipe Coils are furnished on application.

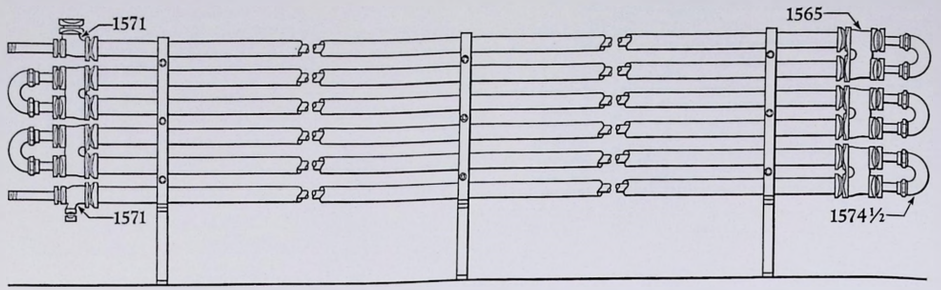
For the various kinds of pipe, see pages 583 to 588, and 662.


Special Coils for a Condenser
Made of 8, 6, 5, 4, and 3-inch Pipe
Weight 5700 pounds each


Four Pipe Coil Assemblies
fabricated in a Crane Shop

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Crane Double Pipe Heat Exchangers



Crane Shops can fabricate heat exchangers of the type illustrated above. They are formed of two sets of piping, one placed inside of the other, and utilizing Crane double pipe return bends and fittings.

Special types of double pipe heat exchangers can be fabricated by welding, as illustrated by the photograph below.

Application: Crane Double Pipe Heat Exchangers have a wide range of application, in various installations, to serve as the medium for heat transfer between fluids, gases, etc. The usual arrangement is to provide counter flows, or directions of travel, in the inside of the smaller, or inner piping, and the annular space between the inner piping and the outer piping.

Pipe sizes: Three sizes of heat exchangers are regularly made: 2 x 1¼-inch, 2½ x 1¼-inch, and 3 x 2-inch. A fourth size, 4 x 3-inch, can be made up on special orders.

The sizes commonly used are 2 x 1¼-inch and 3 x 2-inch.

Length and height: Crane Double Pipe Heat Exchangers are regularly made in any length up to 20 feet long. Lengths over 20 feet can be made up on special orders.

These heat exchangers can be any number of pipes in height, however, the usual practice limits the height to 12 pipes.

Construction: Crane Double Pipe Heat Exchangers are regularly constructed with No. 1565 Double Pipe Return Bends; No. 1571 Double Pipe Tees, for the inlet and outlet; and No. 1574½ Union End Return Bends or No. 1569 Flanged End Return Bends.

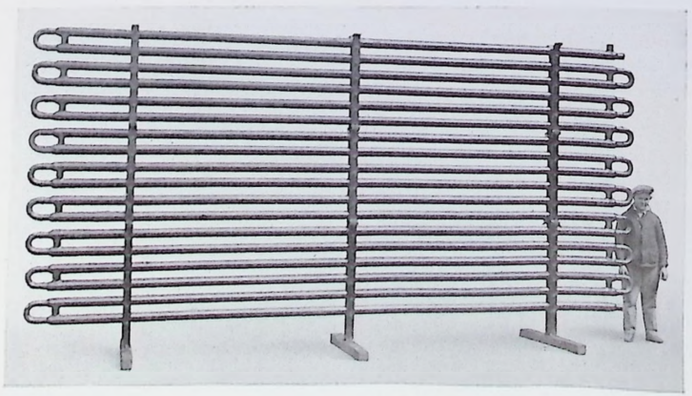
All flanged joints have tongue and groove facing.

For double pipe fittings, return bends, bases and pipe stands, and for pressure ratings of these fittings, see pages 518 to 520.

Packing: Through the use of special packings and gaskets in the double pipe fittings, these heat exchangers are made suitable for use with various oils, gases, etc.

Headers for multiple stands: When two or more stands of double pipe heat exchangers are used in a battery, welded piping headers for connecting the inlets and outlets are recommended.

Testing and assembly: Crane Double Pipe Heat Exchangers are regularly subjected to a 300-pound air-under-water test, and are shipped in complete sections, ready for erection. When too large for shipment, they are assembled in partial sections, ready for final assembly in the field.



Double Pipe Heat Exchanger fabricated by welding. Made in the Chicago Shop of Crane Co.

Inquiries and Orders

Inquiries or orders should specify the quantity; size, weight, and kind of pipe; service, pressure, and temperature; over-all length and number of pipes; number of stands; center to center dimensions of stands, when headers are wanted; and whether or not valves and any additional connections are wanted on the inlets and outlets.

Prices

Prices will be quoted on application.

For the various kinds of pipe, see pages 583 to 588, and 662.

Testing of Fabricated Piping

Crane Fabricated Piping is regularly tested in accordance with the following practice.

Items regularly tested: Pipe bends, welded headers, welded assemblies or any piping containing shop welds, and swedged piping will be regularly subjected to the hydrostatic tests given in the table below. (If Sarlun Flanges are used, refer to the special paragraph below).

Hydrostatic Test Pressures

*Primary Service Pressure			Hydrostatic Tests	
25 Pounds Steam			50 Pounds	
125	"	"	250	"
150	"	"	350	"
250	"	"	500	"
300	"	"	750	"
400	"	"	1000	"
800	"	Hydraulic	1000	"
600	"	Steam	1500	"
900	"	"	2000	"
1500	"	"	3500	"

*Primary Service Pressure is the pressure under which iron and steel valves, fittings, flanges, pipe, etc., are classified in the American Standards.

Welds: During hydrostatic pressure tests, welds are hammered by striking sharp, vibratory blows on the material on alternate sides of the weld and close to it. The blows are hard enough to jar the weld without seriously denting the material.

After the impact test, the pressure is maintained for a sufficient length of time to permit a careful inspection of all joints and connections.

Special tests: Items other than those listed before as being regularly tested can be tested when specified, in which case an extra charge will be made.

Special tests, other than the usual hydrostatic, are available at a special price. Some of the special tests are steam, air-under-water, and kerosene. Full information will be furnished on application.

Unfired Pressure Vessels: The schedule of hydrostatic tests given above does not apply to Unfired Pressure Vessels, such as Separators, Tanks, etc. These are regularly tested in accordance with the A.S.M.E. Unfired Pressure Vessel Code, unless otherwise specified.

Sarlun Joints: All faces of Sarlun Joints have a "cold-water" smooth tool finish.

The hydrostatic tests are made before the final "cold-water" finish is applied; after the "cold-water" finish, no further tests are made in the shop. When the piping is installed, the final test should be made when the joints are completed, which includes the sealing of the Sarlun lips.

Protectors, Painting, and Marking

Protectors

Crane Fabricated Piping will be regularly protected against dirt and damage in transit by protectors, which will be provided for threaded ends and for flanged ends as follows:

Threaded ends: Female threads will be fitted with tin plug protectors; male threads, with thread protectors.

Flanged ends: Flanged ends except those with a Cranelap Joint will be fitted with wood protectors.

Cranelap Joints: Cranelap Joints will have flange protectors as follows:

Regular Cranelap Joints with raised face will have wood protectors. The list prices of Plain Cranelap Joints include the flange protector.

Male and Female, Tongue and Groove, Double Thickness Lap, Ring Joint, and Radial Back Cranelap Joints will have special cast steel protectors. These flange protectors will be invoiced as an extra, and credited when returned.

Sarlun Cranelap Joints will have special cast steel protectors, which are designed to protect the welding lips, also the faces of the joints. These flange protectors will be invoiced as an extra, and credited when returned.

Painting

Crane Fabricated Piping is regularly painted on the outside with a black paint to serve as a protective coating against rust while in transit, the only exceptions being galvanized and non-ferrous fabricated piping, which is not painted.

There is no charge for this regular painting, however there will be an extra charge for any special painting or coating.

Marking

The various pieces of fabricated piping on an order will be marked as indicated on drawings, or as specified on the order.

The sketches on page 654 and the piping layout on pages 665 to 667 indicate suggested schemes for marking the sections of a fabricated piping assembly.



Right
A group of Welded Headers and Welded Assemblies for high pressure service on the shipping platform. Note the ring reinforcement of welded nozzles.

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Pipe Cut to Length and Threaded

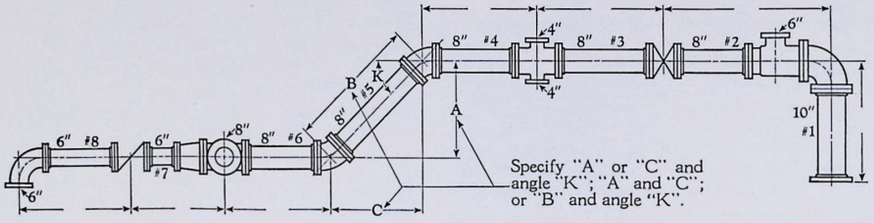
Crane Shops are equipped to cut and thread pipe in sizes ⅛ to 24-inch O.D., inclusive. This branch of the shop work is handled by experienced and skilled mechanics. Buyers will find that the purchase of shop fabricated cut pipe is economical because of the time saved in accurate assembly.

Pipe can be cut to the net lengths specified by the purchaser, or fabricated to the correct lengths needed for use with fittings when assembly dimensions are given on a sketch.

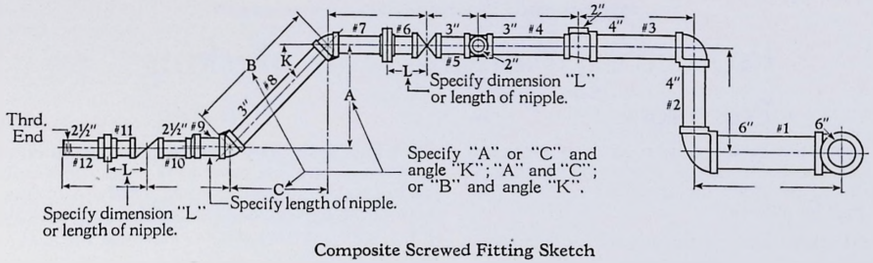
Cut pipe can be furnished with screwed fittings made up tight on individual pieces, or assembled into runs with multiple fittings, the only limitation being that imposed upon over-all length by the delivery or shipping facilities available.

Similarly, flanged piping can be fabricated to correct lengths when used with flanged fittings, or beveled end pipe when used with welding fittings — working from sketches giving the dimensions for the final assembly. Pipe can be furnished for use with any combination of screwed, flanged, or welding fittings.

The composite assembly sketches shown below will serve as examples to indicate how dimensions and information as to sizes, details, etc. can be conveniently outlined.



Composite Flanged Fitting Sketch



Composite Screwed Fitting Sketch

Orders and inquiries: Orders or inquiries for pipe cut to length to suit specific dimensions from center to center of fittings, etc. should be accompanied by a sketch outlining all the information necessary for correct handling.

The size, kind, and weight of pipe, valves, flanges, fittings, etc. should be clearly specified.

Threading: Pipe can be threaded to suit any of the screwed end valves or fittings shown in this catalogue.

Unless otherwise specified, American Standard Pipe Threads will be furnished. Locknut threads, straight threads, and other special threads on pipe are available. All threading is according to accurate gauge.

Marking: If desired, the various pieces of pipe can be marked with an identification symbol for convenience in sorting out and erection. The composite sketches show a simple method of marking.

Thread Lubricants: Crane Thread Lubricants are used for making up screwed joints. For information on Crane Thread Lubricants, see page 366.

List prices of threads . . . page 661

Fabricated Piping for Mechanical Purposes

Crane Co. Shops can supply Fabricated Piping for mechanical purposes, such as frames, racks, hangers, ladders, handles, posts, columns, bumpers, rolls, structural work utilizing pipe, and many other allied services.

Crane Shop equipment for bending, welding, etc. facilitates the production of this class of piping.

Inquiries and orders should preferably include a sketch or a full specification of the requirements.

Pipe Railings

Crane Shops can furnish Pipe Railings of all descriptions and for a large variety of services. They can be manufactured from any kind of commercial pipe, using any of the regular railing fittings listed, or special types.

Threading: Pipe for railings is provided with special threads to suit the tapping of railing fittings. When the pipe is made up in the fittings, no threads are exposed.

See page 605 for details of railing threads.

Regular types of fabrication: Pipe Railings can be supplied in numerous forms—loose or "knock-down", with the pipe cut to correct length and threaded, ready for complete assembly in the field—small railings completely assembled, ready for erection—long or bulky railings partially assembled, and with the sections connecting the parts fabricated to correct length, ready for final field assembly.

Long railings: Care should be used, when ordering railings assembled completely or in sections, to keep the over-all lengths within the limits of the shipping or delivery facilities available.

Special types of fabrication: In addition to the regular types of fabrication listed above, Crane Co. can supply Pipe Railings made up with special fittings, and in all sorts of combinations—fittings with a portion or all of the openings reamed—fittings with a portion or all of the openings reamed and drilled for pins. The pipe can be furnished to suit the connections used in the fittings.

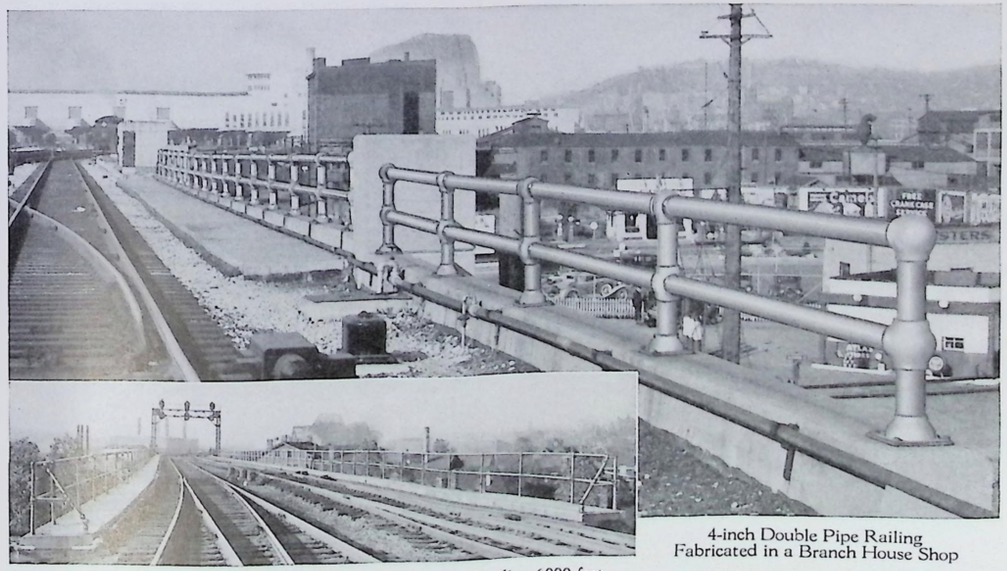
For extremely long horizontal railings, a practical plan is to purchase the posts assembled, using threaded connections for the vertical openings of the fittings, and with all horizontal connections or runs of the fittings reamed. Random pipe can then be used for the horizontal rails, with couplings at all of the intermediate joints, and the final end connections pinned.

As an alternate construction, the posts can be assembled as described above, but with all horizontal connections, or runs of the fittings, reamed and also drilled for pins. The horizontal rails can then be furnished cut to proper length, or they can be cut in the field from random pipe. After the horizontal members of the railing are inserted through the reamed and drilled runs of the fittings, the pipe is drilled and then pinned to the fittings in the field.

Bending and welding: Shop facilities for bending and welding enable us to furnish special Pipe Railings requiring bent sections or welded construction.

Orders and inquiries: Orders and inquiries for price or information on Pipe Railings should be accompanied by a sketch showing dimensions. In the case of stair railings, the angle, or the rise and tread of the steps should be specified.

Inquiries or orders should also specify the kind and finish of the pipe, the type or figure number of the fittings, details regarding the openings, and whether or not partially or completely assembled. For pipe, see pages 583 to 588.



2-inch Galvanized Double Pipe Railing — total length of railing 6000 feet
Fabricated in a Branch House Shop

4-inch Double Pipe Railing
Fabricated in a Branch House Shop

Railing Fittings . . . . pages 263 to 268

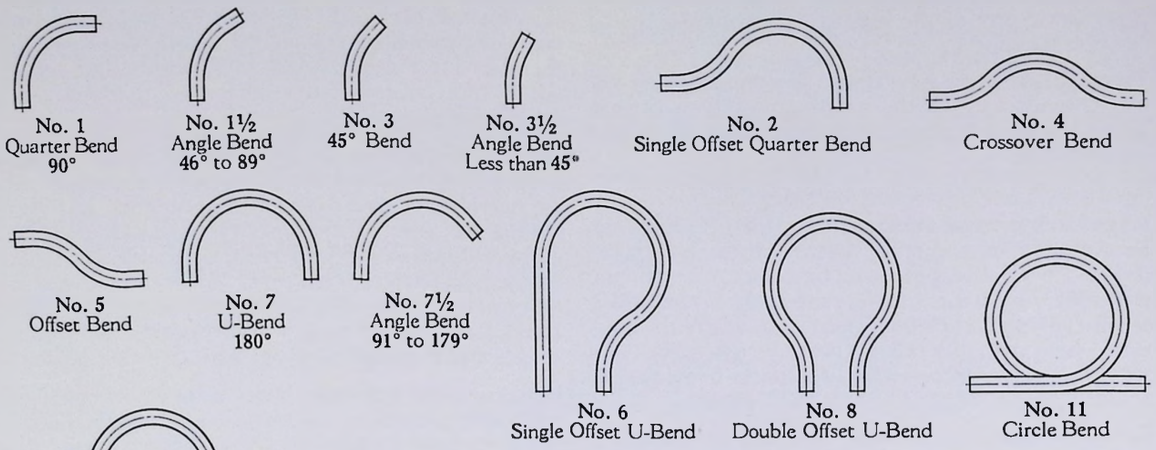
Thread Engagement of Railing Fittings . . . . page 367

List Prices of Threads . . . . page 661

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List Prices of Fabricated Piping

Standard Types of Pipe Bends



No. 1 Quarter Bend 90°
No. 1½ Angle Bend 46° to 89°
No. 3 45° Bend
No. 3½ Angle Bend Less than 45°
No. 2 Single Offset Quarter Bend
No. 4 Crossover Bend
No. 5 Offset Bend
No. 7 U-Bend 180°
No. 7½ Angle Bend 91° to 179°
No. 6 Single Offset U-Bend
No. 8 Double Offset U-Bend
No. 11 Circle Bend
No. 9 Expansion U-Bend
No. 10 Double Offset Expansion U-Bend

List Prices, per Bend

Size of Pipe Inches	Bending Labor only for Making Plain End Pipe Bends							
	No. 1, No. 1½ No. 3, No. 3½	No. 7 No. 7½	No. 5	No. 2	No. 6	No. 4 No. 9	No. 8	No. 10 No. 11
1	9.75	11.50	15.00	18.50	23.00	24.50	27.00	30.00
1¼	11.00	13.25	17.50	21.25	27.00	28.00	32.00	35.00
1½	12.00	15.50	20.25	24.00	31.00	32.00	36.00	41.00
2	14.50	19.25	23.00	28.00	36.00	38.00	42.00	46.00
2½	15.75	22.50	26.00	32.00	40.00	42.00	48.00	52.00
3	17.00	25.50	29.50	35.00	45.00	47.00	53.00	59.00
3½	23.50	29.00	33.00	43.00	54.00	57.00	62.00	67.00
4	25.00	35.00	39.00	48.00	61.00	64.00	70.00	77.00
5	33.00	42.00	46.00	59.00	75.00	79.00	85.00	91.00
6	40.00	49.00	53.00	69.00	88.00	92.00	102.00	137.00
8	53.00	70.00	72.00	95.00	130.00	137.00	151.00	164.00
10	70.00	97.00	98.00	126.00	175.00	186.00	203.00	223.00
12	95.00	125.00	125.00	165.00	249.00	263.00	289.00	373.00
14 OD	123.00	245.00	161.00	245.00	466.00	490.00	539.00	588.00
16 OD	154.00	308.00	203.00	308.00	588.00	616.00	679.00	739.00
18 OD	196.00	392.00	256.00	392.00	746.00	784.00	861.00	938.00
20 OD	263.00	525.00	350.00	525.00	998.00	1050.00	1155.00	1260.00
24 OD	403.00	805.00	476.00	805.00	1530.00	1610.00	1771.00	1932.00

The above list prices include cutting the pipe when necessary

Pipe: The price of the pipe must be added in all cases.

Threaded Ends: For bends with threaded ends only, add the price of threading pipe bends shown on page 660.

Screwed Flanges: For bends fitted with screwed flanges, add the price of cutting and threading pipe and making on flanges shown on page 660; also add the price of the flanges.

Cranelap Flanges: For bends fitted with Cranelap Flanges, add the prices of Cranelap Joints shown on page 657.

Welded Flanges: For bends with welded flanges, add the price of welding for bends shown on page 658; also add the price of the flanges.

Offset and U-Bends: List prices of Offset Bends and U-Bends cover bends with continuous arcs, or with the distance joining the arcs 2′-0″ or less; if such distance is longer than 2′-0″, bends will be priced as Double Angle Bends, Double Quarter Bends, etc.

Compound Bends: Prices of bends other than the standard types illustrated and of bends in more than one plane are obtained by adding together the prices of the bends that are combined to produce the compound bend.

Welding Long Bends: Where it is necessary to weld together two or more pieces of pipe to produce the required bend, add for the welding, using prices shown for bends on page 659.

Special Metals: Prices for bends made of non-ferrous metals or alloy steels will be quoted on application.

Description and dimensions . . . . pages 621 to 624

List Prices of Fabricated Piping

Cranelap Joints

List Prices, per Joint

Size of Pipe Inches	Steel Pipe Only: Plain Cranelap Joints with full thickness lap, including labor, Forged Steel Flange, pipe required for lap, and Flange Protector as noted						*Male and Female, Tongue and Groove, Double Thickness, Ring Joint, or Radial Back Cranelap Joints, including labor, Forged Steel Flange, and pipe required for lap				
	150 Pound	300 Pound	400 Pound	600 Pound	900 Pound	1500 Pound	300 Pound	400 Pound	600 Pound	900 Pound	1500 Pound
½	c 17.50	c 18.00	21.50	25.50	c 32.00	c 35.00	c 33.00	37.00	40.00	c 51.00	c 55.00
¾	c 17.50	c 18.00	21.50	25.50	c 32.00	c 35.00	c 33.00	37.00	40.00	c 51.00	c 55.00
1	17.50	c 18.00	22.00	26.00	32.00	35.00	c 33.00	37.00	40.00	51.00	55.00
1¼	18.00	c 18.50	22.50	26.50	33.00	36.00	c 34.00	39.00	42.00	53.00	57.00
1½	18.50	c 19.00	23.00	27.25	36.00	38.00	c 36.00	40.00	43.00	54.00	58.00
2	19.00	20.00	23.50	27.75	39.00	41.00	38.00	42.00	45.00	57.00	60.00
2½	20.00	22.00	25.50	29.75	43.00	47.00	40.00	45.00	48.00	60.00	65.00
3	21.50	24.00	28.00	32.50	46.00	53.00	42.00	48.00	51.00	63.00	72.00
3½	23.50	27.00	31.00	36.50			47.00	52.00	56.00		
4	25.50	31.00	35.00	42.00	61.00	69.00	50.00	55.00	62.00	78.00	87.00
5	29.00	35.00	39.00	58.00	73.00	91.00	57.00	66.00	78.00	93.00	108.00
6	34.00	38.00	46.00	64.00	88.00	103.00	66.00	76.00	88.00	108.00	124.00
8	44.00	51.00	62.00	86.00	126.00	157.00	86.00	98.00	117.00	150.00	177.00
10	58.00	72.00	84.00	125.00	164.00	211.00	117.00	132.00	163.00	200.00	241.00
12	75.00	93.00	106.00	152.00	216.00	287.00	147.00	164.00	202.00	260.00	321.00
14 OD	92.00	128.00	147.00	200.00	291.00		188.00	215.00	253.00		
16 OD	110.00	162.00	177.00	251.00	377.00		229.00	260.00	314.00		
18 OD	129.00	192.00	217.00	288.00			280.00	316.00	370.00		
20 OD	156.00	226.00	262.00	400.00			333.00	392.00	490.00		
24 OD	213.00	325.00	369.00	517.00			463.00	538.00	650.00		

List Prices, per Joint

Size of Pipe Inches	Genuine Wrought Iron Pipe: Plain Cranelap Joints with full thickness lap, including labor, Forged Steel Flange, pipe required for lap, and Flange Protector as noted			
	150 Pound	300 Pound	400 Pound	600 Pound
2	19.50	21.00	23.50	27.75
2½	20.75	23.00	25.50	29.75
3	22.00	24.00	28.00	32.50
3½	24.00	27.00	31.00	36.50
4	26.00	29.00	35.00	42.00
5	30.00	33.00	39.00	58.00
6	35.00	39.00	46.00	64.00
8	46.00	51.00	62.00	86.00
10	59.00	71.00	84.00	125.00
12	75.00	90.00	106.00	152.00
14 OD	92.00	119.00	147.00	200.00
16 OD	108.00	145.00	177.00	251.00
18 OD	128.00	178.00	217.00	288.00
20 OD	154.00	210.00	262.00	400.00

***Pipe Thickness:** Male and Female, Tongue and Groove, Double Thickness, Ring Joint, or Radial Back Cranelap Joints require the use of lap-welded, or seamless pipe of a wall thickness at least equal to Extra Strong weight.

Flanges: The flanges on Cranelap Joints are American Standard Forged Steel Lap Joint Flanges, except in sizes indicated "c", which are Crane Forged Steel Lap Joint Flanges.

All flanges are faced, drilled, and spot faced.

Machining: All Cranelap Joints are completely machined on the front, back, and edge of the lap.

Facings: The list prices of Plain Cranelap Joints cover lap joints with plain faces, and serrated or smooth finish. The list prices of Male and Female, Tongue and Groove, Double Thickness, Ring Joint, or Radial Back Cranelap Flanges cover lap joints of sufficient thickness to permit these facings to be machined without reducing the thickness of the lap at any point to less than that of the pipe wall.

Sarlun Joints: For Sarlun Joints made from steel pipe only, add 30% to the prices of Plain Cranelap Joints for 300, 400, 600, 900, and 1500 pounds, respectively. These prices will not include the flange protector.

Protectors: The list prices of Plain Cranelap Joints include the flange protector. The list prices of Male and Female, Tongue and Groove, Double Thickness, Ring Joint, or Radial Back Cranelap Joints do not include the flange protector, but special flange protectors will be furnished, invoiced as an extra, and credited when returned. For Sarlun Joints, special metal flange protectors will be furnished, invoiced as an extra, and credited when returned.

Description and dimensions . . . . pages 626 to 635

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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asbestosclaims.law/library/21275/347

List Prices of Fabricated Piping

Welded and Refaced Forged Steel Flanges

(Labor Only)

List Prices, per End

Size of Pipe Inches	Screwed Flanges — Labor only for cutting and threading pipe, making-on, welding at back, and refacing flange, also furnishing Flange Protector; Flange not included — On Straight Pipe, Headers, or Nozzles						Slip-On Flanges — Labor only for cutting pipe, welding at front and back, and refacing flange, also furnishing Flange Protector; Flange not included — On Straight Pipe, Headers, or Nozzles				
	150 Pound	300 Pound	400 Pound	600 Pound	900 Pound	1500 Pound	150 Pound	300 Pound	400 Pound	600 Pound	900 Pound
1	5.25	c 6.00	6.50	6.50	7.25	7.25	3.25	e 3.50	4.00	4.25	4.75
1¼	5.50	c 6.00	6.75	6.75	7.50	7.50	3.50	e 3.75	4.25	4.50	5.00
1½	6.00	c 6.50	7.25	7.25	8.00	8.00	3.50	e 4.00	4.25	4.75	5.25
2	6.50	7.00	7.75	7.75	8.50	8.50	4.75	5.25	5.75	6.25	7.00
2½	7.00	7.75	8.50	8.50	9.25	9.25	5.75	6.50	7.00	7.75	8.50
3	7.50	8.25	9.25	9.25	10.00	11.00	7.00	7.75	8.50	9.50	10.25
3½	8.00	9.00	9.75	9.75			8.25	9.00	10.00	10.75	
4	8.50	9.50	10.50	11.50	12.75	14.00	9.50	10.50	11.50	12.75	14.00
5	9.75	10.75	11.75	13.00	14.25	15.75	11.75	13.00	14.50	15.75	17.50
6	11.00	12.00	13.25	14.50	16.00	17.75	14.25	15.75	17.25	19.00	21.00
8	14.25	15.75	17.25	19.00	c 21.00	c 23.00	19.00	21.00	23.00	26.00	28.00
10	18.25	20.00	22.00	24.00	c 27.00	c 30.00	24.00	26.00	29.00	32.00	35.00
12	21.00	23.00	26.00	28.00	c 31.00	c 34.00	29.00	32.00	35.00	39.00	43.00
14 OD	26.00	29.00					35.00	38.00	42.00	46.00	51.00
16 OD	33.00	36.00					41.00	45.00	49.00	54.00	59.00
18 OD	40.00	44.00					47.00	52.00	57.00	62.00	69.00
20 OD	48.00	53.00					58.00	63.00	70.00	77.00	84.00
24 OD	54.00	59.00					71.00	79.00	86.00	95.00	104.00
Size of Pipe Inches	**On Bends**						**On Bends**				
	150 Pound	300 Pound	400 Pound	600 Pound	900 Pound	1500 Pound	150 Pound	300 Pound	400 Pound	600 Pound	900 Pound
1	5.75	c 6.25	6.75	6.75	7.50	7.50	4.25	e 4.75	5.25	5.75	6.25
1¼	6.00	c 6.50	7.00	7.00	7.75	7.75	4.75	e 5.00	5.50	6.00	6.75
1½	6.25	c 7.00	7.75	7.75	8.50	8.50	4.75	e 5.25	5.75	6.25	7.00
2	6.75	7.50	8.25	8.25	9.00	9.00	6.25	7.00	7.50	8.25	9.25
2½	7.50	8.00	9.00	9.00	9.75	9.75	7.75	8.50	9.50	10.25	11.25
3	8.00	8.75	9.75	9.75	10.75	11.75	9.50	10.25	11.25	12.50	13.75
3½	8.50	9.50	10.50	10.50			11.00	12.00	13.00	14.50	
4	9.25	10.25	11.25	12.25	13.50	15.00	12.75	14.00	15.25	16.75	18.50
5	10.50	11.50	12.75	14.00	15.50	17.00	15.75	17.50	19.25	21.00	23.00
6	12.00	13.00	14.50	15.75	17.50	19.00	19.00	21.00	23.00	26.00	28.00
8	15.50	17.00	19.00	20.75	c 23.00	c 25.00	26.00	28.00	31.00	34.00	37.00
10	19.75	22.00	24.00	26.00	c 29.00	c 32.00	32.00	35.00	38.00	42.00	47.00
12	23.00	25.00	28.00	31.00	c 33.00	c 37.00	39.00	43.00	47.00	52.00	57.00
14 OD	28.00	31.00					46.00	51.00	56.00	61.00	68.00
16 OD	35.00	39.00					54.00	59.00	65.00	72.00	79.00
18 OD	43.00	47.00					62.00	69.00	76.00	83.00	92.00
20 OD	51.00	56.00					77.00	84.00	93.00	102.00	112.00
24 OD	61.00	67.00					95.00	105.00	115.00	127.00	139.00

Facings: The above list prices cover the regular 1/16-inch raised face for 150 and 300-pound flanges, and the regular ¼-inch male face for 400, 600, 900 and 1500-pound flanges. For the extra prices of special types of facings, see page 353.

Screwed Flanges: The screwed flanges are American Standard Forged Steel Screwed Flanges except in sizes marked "c", which are Crane Forged Steel Screwed Flanges.

All flanges are faced, drilled, and spot faced.

Slip-On Flanges: The Slip-On Flanges have American Standard Steel Flange diameters, drilling, and thicknesses except in sizes marked "e", which have American Standard Steel Flange diameters and drilling; see page 347.

All flanges are faced, drilled, and spot faced.

Description and dimensions . . . pages 636 and 637

List Prices of Fabricated Piping

Butt Welds and Welded Nozzles

List Prices, Each

Size of Pipe Inches	Butt Welds — Including scarfing and welding — On Straight pipe only				Welded Nozzles — Standard Type — Labor only for cutting, shaping, and welding nozzles; not including pipe, flange, etc. — For 90° Nozzles				Reinforced Type — Labor only for cutting, shaping, and welding nozzles and reinforcement; including reinforcement material, but not including pipe, flange, etc. — For 90° Nozzles			
	150 Pound	300 Pound	400 Pound	600 Pound	150 Pound	300 Pound	400 Pound	600 Pound	150 Pound	300 Pound	400 Pound	600 Pound
1	2.50	2.75	3.00	3.25	8.25	9.00	10.75	11.75				
1¼	2.75	3.00	3.25	3.50	9.25	10.00	12.00	13.00				
1½	2.75	3.00	3.25	3.75	9.75	10.75	12.50	13.75				
2	3.50	4.00	4.25	4.75	11.00	12.00	14.25	15.75	32.00	33.00	35.00	36.00
2½	4.50	5.00	5.50	6.00	13.00	14.25	16.75	18.50	36.00	38.00	40.00	42.00
3	5.50	6.00	6.50	7.25	15.50	17.00	20.25	22.50	43.00	44.00	47.00	49.00
3½	6.25	7.00	7.50	8.50	18.00	19.75	23.00	26.00	49.00	51.00	55.00	57.00
4	7.25	8.00	8.75	9.75	21.00	23.00	27.00	29.00	56.00	58.00	62.00	65.00
5	9.25	10.00	11.00	12.25	24.00	27.00	32.00	35.00	69.00	72.00	77.00	80.00
6	11.00	12.00	13.25	14.50	27.00	30.00	35.00	39.00	80.00	83.00	89.00	92.00
8	14.50	16.00	17.75	19.50	33.00	36.00	43.00	47.00	107.00	110.00	117.00	121.00
10	18.25	20.00	22.00	25.00	40.00	44.00	52.00	58.00	133.00	137.00	144.00	150.00
12	23.00	25.00	27.00	30.00	49.00	54.00	64.00	70.00	157.00	162.00	172.00	178.00
14 OD	27.00	29.00	32.00	35.00	66.00	72.00	85.00	94.00	200.00	207.00	220.00	229.00
16 OD	31.00	34.00	38.00	42.00	76.00	83.00	98.00	108.00	233.00	241.00	256.00	266.00
18 OD	36.00	40.00	44.00	48.00	86.00	94.00	112.00	123.00	268.00	276.00	293.00	304.00
20 OD	44.00	49.00	54.00	59.00	94.00	104.00	123.00	135.00	300.00	310.00	328.00	341.00
24 OD	55.00	60.00	66.00	73.00	107.00	117.00	139.00	153.00	348.00	359.00	380.00	394.00
Size of Pipe Inches	**On Bends Only**				**For 45° Nozzles**				**For 45° Nozzles**			
	150 Pound	300 Pound	400 Pound	600 Pound	150 Pound	300 Pound	400 Pound	600 Pound	150 Pound	300 Pound	400 Pound	600 Pound
1	3.25	3.75	4.00	4.50	11.00	12.25	14.25	15.75				
1¼	3.50	4.00	4.25	4.75	12.25	13.50	15.75	17.50				
1½	3.75	4.00	4.50	5.00	13.00	14.25	16.75	18.50				
2	4.75	5.25	5.75	6.00	14.75	16.00	19.00	21.00	35.00	37.00	40.00	42.00
2½	6.00	6.50	7.25	8.00	17.25	19.00	23.00	25.00	41.00	42.00	46.00	48.00
3	7.25	8.00	8.75	9.50	21.00	24.00	27.00	30.00	48.00	51.00	53.00	57.00
3½	8.25	9.00	10.00	11.00	24.00	26.00	31.00	34.00	55.00	57.00	62.00	65.00
4	9.75	10.75	11.75	13.00	27.00	30.00	36.00	39.00	63.00	66.00	71.00	75.00
5	12.25	13.50	14.75	16.25	33.00	36.00	42.00	46.00	77.00	81.00	87.00	91.00
6	14.75	16.00	17.75	19.50	36.00	40.00	47.00	52.00	89.00	93.00	100.00	105.00
8	19.50	21.50	24.00	26.00	44.00	48.00	57.00	63.00	118.00	122.00	131.00	137.00
10	25.00	27.00	30.00	33.00	54.00	59.00	70.00	75.00	146.00	152.00	161.00	169.00
12	30.00	33.00	36.00	40.00	65.00	72.00	85.00	93.00	173.00	180.00	193.00	201.00
14 OD	36.00	39.00	43.00	47.00	88.00	96.00	114.00	125.00	222.00	231.00	248.00	260.00
16 OD	42.00	46.00	50.00	55.00	101.00	111.00	131.00	144.00	259.00	269.00	289.00	302.00
18 OD	48.00	53.00	58.00	64.00	114.00	126.00	149.00	163.00	296.00	308.00	330.00	345.00
20 OD	59.00	65.00	71.00	79.00	126.00	138.00	164.00	180.00	332.00	344.00	369.00	386.00
24 OD	73.00	81.00	89.00	97.00	142.00	157.00	185.00	203.00	384.00	398.00	426.00	445.00

Mitre Welds: For mitre welds, add 50% to the list prices of Butt Welds for straight pipe only.

Butt Welds on Bends: When a straight pipe is butt welded to a bend, or when two bends are butt welded together, use list prices of Butt Welds for Bends only.

Duplicate Welded Headers: A quantity discount for labor only of welded nozzles will be allowed when duplicate welded headers of identical dimensions are ordered at the same time.

Description and dimensions . . . pages 644 to 649

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List Prices of Fabricated Piping

Sleeve Welds, Cup Welds, Welded Drip Pockets, and End Closures

List Prices, Each

Size of Pipe Inches	Sleeve Welds: Including Sleeve and Welding, or Screwed Coupling back welded; Straight Pipe or Bends: 150 Pound	300 Pound	400 Pound	600 Pound	Cup Welds: Welding and labor cupping pipe; Straight Pipe or Bends: 150 Pound	300 Pound	400 Pound	600 Pound	Drip Pockets: *Including welding and necessary material: 150&300 Pound	400&600 Pound	End Closures: Butt weld and necessary closure material: 150&300 Pound	400&600 Pound
1½	8.75	9.00	14.00	14.00	13.25	13.25	15.75	15.75	24.00	33.00	8.00	9.00
2	9.50	9.75	15.75	15.75	14.50	14.50	17.00	17.00	27.00	37.00	8.50	10.00
2½	13.50	14.00	19.00	19.00	15.75	15.75	19.75	19.75	30.00	43.00	10.00	12.00
3	18.25	18.75	25.00	25.00	21.00	21.00	24.00	24.00	37.00	50.00	13.00	14.00
3½	21.50	22.00	28.00	28.00	24.00	24.00	28.00	28.00	42.00	56.00	16.00	17.00
4	25.00	26.00	31.00	31.00	27.00	27.00	32.00	32.00	47.00	64.00	18.50	20.00
5	31.00	32.00	42.00	42.00	31.00	31.00	36.00	36.00	53.00	75.00	21.00	24.00
6	35.00	36.00	48.00	48.00	33.00	33.00	40.00	40.00	62.00	87.00	25.00	28.00
8	47.00	48.00	63.00	63.00	40.00	40.00	46.00	46.00	76.00	107.00	34.50	37.00
10	61.00	63.00	78.00	79.00	46.00	46.00	52.00	52.00	100.00	135.00	46.00	49.00
12	71.00	74.00	100.00	102.00	50.00	50.00	61.00	61.00	120.00	160.00	57.00	63.00
14 OD	83.00	106.00	160.00	163.00	53.00	65.00	84.00	84.00	166.00	228.00	75.00	83.00
16 OD	103.00	149.00	194.00	198.00	61.00	83.00	95.00	95.00	187.00	260.00	93.00	95.00
18 OD	117.00	173.00	229.00	234.00	66.00	90.00	107.00	107.00	211.00	295.00	103.00	107.00
20 OD	126.00	215.00	302.00	307.00	71.00	104.00	130.00	130.00	230.00	344.00	120.00	129.00
24 OD	168.00	286.00	426.00	433.00	76.00	122.00	163.00	163.00	264.00	442.00	137.00	153.00

***Drip Pockets:** List prices include 18 inches of pipe for all Drip Pockets 8-inch and smaller, and 30 inches of pipe for 10-inch and larger sizes. Any additional pipe will be charged at regular pipe prices.

Swedged Ends

List Prices, Each

Labor only for making concentric or eccentric swedged ends with the reduced end plain or beveled for butt welding

Size of large end Inches	Size of small end Inches	150 and 300 Pound	400 and 600 Pound
2	1½ or smaller	9.50	11.50
2½	2 "	12.00	14.00
3	2½ "	14.00	14.50
3½	3 "	17.00	17.50
4	3½ "	17.50	19.00
5	4 "	24.00	26.00
6	5 "	28.00	30.00
8	6 "	41.00	43.00
10	8 "	64.00	67.00
12	10 "	68.00	73.00
14 OD	12 "	95.00	103.00
16 OD	14 OD "	102.00	104.00
18 OD	16 OD "	151.00	155.00
20 OD	18 OD "	199.00	208.00
24 OD	20 OD "	225.00	240.00

Reduced End: If the reduced end is to be provided with a thread, welded, or flanged connection, it will be additional at regular prices.

Additional Sizes: Sizes of the large end smaller than 2-inch and larger than 24-inch O.D. can be furnished; prices on application.

Threading Ends Making-on Screwed Flanges Flange Protectors

List Prices, per End

Size of Pipe Inches	*Bends, Headers, or Nozzles, only: Labor only for cutting and threading pipe	Labor only for cutting and threading pipe, making-on and refacing Screwed Flange, not including flange	Furnishing and attaching Wooden Flange Protector
½	.21		
¾	.28		
1	.28	4.30	.85
1¼	.28	4.50	.85
1½	.32	4.75	.85
2	.32	5.00	.85
2½	.42	5.25	.85
3	.65	5.50	1.05
3½	.75	5.75	1.05
4	1.05	6.00	1.05
5	1.60	6.75	1.05
6	1.85	7.50	1.05
8	2.65	9.50	1.25
10	4.00	12.25	1.50
12	6.60	13.75	1.50
14 OD	8.00	17.75	1.75
16 OD	12.00	23.25	2.00
18 OD	18.50	29.00	2.00
20 OD	22.50	35.50	2.25
24 OD	34.50	42.00	2.25

*For Straight Lengths of Pipe, use list prices on page 661

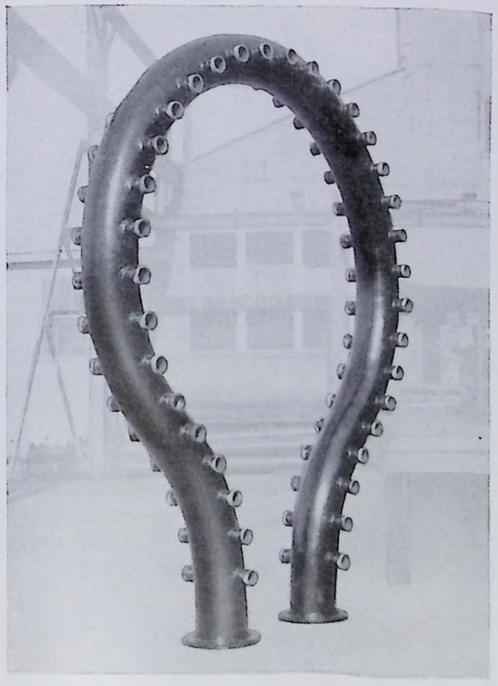
Description and dimensions . . . . pages 644 and 649

List Prices of Fabricated Piping

Welded Couplings and Pads

List Prices, Each

Size of Pipe Inches	Welded Couplings: Including welding, labor, and coupling	Welded Pads: Including welding, labor, and pad
¼	2.75	5.25
⅜	3.00	6.75
½	3.25	8.00
¾	3.75	9.25
1	4.00	10.50
1¼	4.75	13.25
1½	5.25	15.75
2	6.75	21.00
2½	8.00	27.00
3	9.25	32.00
3½	10.50	37.00
4	13.25	42.00



12-inch Double Offset "U" Bend with 70 – 2½-inch welded nozzles
Fabricated in the Chicago Shop of Crane Co.

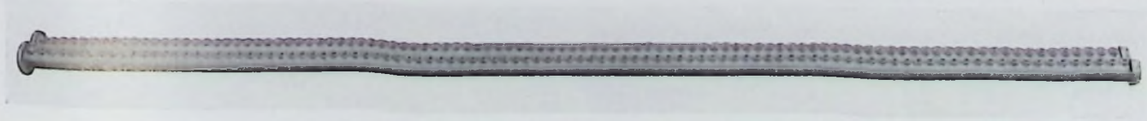
Threading Pipe, Making-On, and Refacing Flanges

List Prices, Each

Size of Pipe Inches	*Straight Pipe only: Labor threading wrought pipe: Standard Threads	Lock-nut Threads	**Labor only for cutting and threading pipe; making-on and refacing flanges; Not including flange: 125 Pound Iron and 150 Pound Steel	250 Pound Iron and 300 Pound Steel	800 Pound Hydraulic Ferrosteel
⅛	.05	.10			
¼	.05	.10			
⅜	.05	.10			
½	.05	.10			
¾	.05	.10			
1	.06	.12	1.45	2.15	
1¼	.07	.14	1.45	2.15	
1½	.08	.16	1.60	2.35	
2	.10	.20	1.75	2.50	3.15
2½	.15	.30	1.95	2.70	3.45
3	.20	.40	2.15	3.05	3.80
3½	.25	.50	2.35	3.25	4.15
4	.35	.70	2.50	3.40	4.30
5	.55		3.05	3.95	4.90
6	.70		3.60	4.50	5.75
8	1.00		4.65	5.55	7.00
10	1.50		6.10	7.15	9.00
12	2.50		8.60	9.85	12.50
14 OD	3.50		11.10	12.50	
16 OD	5.00		15.25	17.00	
18 OD	8.00		22.35	25.00	
20 OD	10.00		26.85	29.50	
24 OD	15.00		35.75	40.00	

*For Bends, Headers, and Nozzles, use list prices on page 660.

**Facings: The above list prices cover the regular plain face for 125-Pound Iron Flanges; the regular 1/16-inch raised face for 150-Pound Steel, 250-Pound Iron, and 300-Pound Steel Flanges; and the regular ¼-inch male face for 800-Pound Hydraulic Flanges. For the extra prices of special types of facing, see page 353.



5-inch Headers, 25 feet, 3 inches long with 100 – 1¼-inch welded pads on 3-inch centers
Fabricated in the Chicago Shop of Crane Co.

Description . . . . pages 645 and 649

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List Prices of Fabricated Piping

Seamless Steel Pipe

List Prices per Foot and Wall Thicknesses

Size of Pipe Inches	150 Pound		A. S. T. M. Serial Designation A-106-33T — Temperature 750° F.									
			300 Pound		400 Pound		600 Pound		900 Pound		1500 Pound	
	List Price per Foot	Wall Thickness Inches	List Price per Foot	Wall Thickness Inches	List Price per Foot	Wall Thickness Inches	List Price per Foot	Wall Thickness Inches	List Price per Foot	Wall Thickness Inches	List Price per Foot	Wall Thickness Inches
½			.08½	.109 s	.08½	.109 s	.11	.147 e	.11	.147 e	.13	.187
¾			.11½	.113 s	.11½	.113 s	.15	.154 e	.15	.154 e	.19	.218
1			.17	.133 s	.17	.133 s	.22	.179 e	.22	.179 e	.29	.250
1¼			.23	.140 s	.23	.140 s	.30	.191 e	.30	.191 e	.38	.250
1½			.27½	.145 s	.27½	.145 s	.36½	.200 e	.36½	.200 e	.49	.281
2			.37	.154 s	.37	.154 s	.50½	.218 e	.50½	.218 e	.75	.343
2½			.58½	.203 s	.58½	.203 s	.77	.276 e	.77	.276 e	1.00	.375
3			.76½	.216 s	.76½	.216 s	1.03	.300 e	1.03	.300 e	1.43	.437
3½			.92	.226 s	.92	.226 s	1.25	.318 e	1.25	.318 e		
4			1.09	.237 s	1.09	.237 s	1.50	.337 e	1.90	.437	2.26	.531
5			1.48	.258 s	1.48	.258 s	2.08	.375 e	2.71	.500	3.30	.625
6			1.92	.280 s	1.92	.280 s	2.86	.432 e	3.64	.562	4.53	.718
8			2.50	.277 s	2.88	.322 s	4.34	.500 e	5.09	.593	7.47	.906
10			3.50	.307 s	4.12	.365 s	6.44	.593	7.70	.718	11.60	1.125
12			4.50	.330 s	5.36	.406	8.86	.687	10.80	.843	16.10	1.312
14 OD	4.56	.312	5.46	.375	6.33	.437	10.70	.750	13.10	.937	19.00	1.406
16 OD	5.23	.312	6.26	.375	8.28	.500	13.70	.843	16.50	1.031	24.10	1.562 *
18 OD	5.90	.312	8.20	.437	10.50	.562	17.10	.937	20.80	1.156	30.40	1.750 *
20 OD	7.85	.375	10.50	.500	12.30	.593	20.90	1.031	25.10	1.250	37.40	1.937 *
24 OD	9.46	.375	14.10	.562	17.10	.687	29.70	1.218	36.10	1.500	53.60	2.312 *

Thicknesses marked "s" are identical with the thickness of Standard weight pipe
Thicknesses marked "e" are identical with the thickness of Extra Strong weight pipe

All ratings given in the above table conform to those determined by the use of the formula and stresses given in Section 1, A.S.A. Code for Pressure Piping on Power Piping Systems for *plain end pipe*, with the exception of the four sizes marked with an asterisk.

*These four sizes of 1500-pound pipe, i.e., 16-inch O.D., 18-inch O.D., 20-inch O.D., and 24-inch O.D., do not comply with the Code for Pressure Piping, Section 1, for 1500 pounds primary service pressure; they do, however, comply with the code for pressures up to 1465 pounds at 750° F.

Seamless Pipe Thicknesses: The above table lists the recommended pipe wall thicknesses of Grade "A" Seamless Steel Pipe for primary service pressures of 300, 400, 600, 900, and 1500 pounds, with the addition of recommended thicknesses for 14-inch O.D., and larger sizes for 150 pounds primary service pressure.

Threaded Pipe: It is recommended that, when pipe is threaded, a weight at least equal to the 600-pound class be used for 300 and 400-pound primary service pressure ratings for pipe, size 6-inch and smaller, in order to furnish added mechanical strength.

It also is recommended that the 14-inch O.D., 16-inch O.D., and 18-inch O.D. sizes in the 150-pound class be at least .375" thick when threaded.

Adjusted Service Pressure Ratings: The adjusted service pressure ratings of pipe at temperatures other than the primary service pressure ratings (500° F. for 150-pound and 750° F. for 300, 400, 600, 900, and 1500-pound), will be furnished on application.

Inquiries: When inquiries for seamless steel pipe do not specify the wall thickness, we shall quote on the thicknesses given in the above table for the proper primary service pressure rating.

Pipe: For list prices and wall thicknesses of Standard, Extra Strong, Double Extra Strong, Large O.D Pipe, etc., see pages 583 to 588.

Ordering Fabricated Piping

Foreword

This section, "Ordering Fabricated Piping," presents a unique plan for assisting the men who design piping systems or who are actually engaged in the erection of fabricated piping by providing sketches showing various types of pipe bends, welded and cast headers, and welded assemblies which have been found to be those most commonly used. It provides a means for giving accurate dimensions and other information necessary to fabricate piping equipment.

No attempt has been made to include specifications for materials nor standards for valves and fittings.

The sketches given in this section will enable Crane Co.'s customers to order by wire or telephone compound bends, headers or welded assemblies as illustrated needed in an emergency. It has heretofore been necessary to send an order and a sketch for such items by mail. Pipe bends, headers, or welded assemblies will be fabricated at the plant most advantageously located which enables Crane Co. to serve its customers promptly and completely.

Bends, welded headers and welded assemblies can be ordered by giving the sketch number and dimensions designated by letters on the sketch. The size and thickness of welded or seamless pipe should be specified and also whether ends are wanted plain, beveled for welding, threaded or flanged. If flanged, give dimensional and drilling standard, also specify material, type of facing and method of attaching to pipe. Any other information not covered by the sketches should be clearly given.

Welded headers and welded piping will be fabricated in accordance with Crane Co.'s regular shop practice. New and improved welding rods and advancement in welding technique, together with special welding specifications coming to Crane Co. through the trade, necessitate changes in welding methods from time to time. It is important, therefore, when ordering welded headers or welded piping to advise the working pressure and temperature and any other special welding specifications or codes that might apply.

This section may also be referred to when ordering cast headers and fittings. All orders should be accompanied by a sketch giving complete dimensions and specifications. *On telephone and telegraph orders, a sketch should be forwarded immediately with confirming order which will permit a final check before shipment.*

RULES FOR PIPING SHIPMENTS

When ordering fabricated piping or bends, consideration should be given to the maximum lengths of welded or seamless pipe available. Fabrication limits such as minimum radii and tangents should be avoided, if possible. In case of bends or headers with large over-all dimensions where two or more lengths of pipe are required, the intermediate joints should be definitely located. Care must be exercised when ordering large and complicated bends to keep the over-all dimensions within the maximum shipping clearances between factory and destination. Shipping lengths as outlined below must also be taken into consideration.

Usually wrought iron or steel pipe, pipe bends, headers, or other articles in lengths 22 ft. and under, and not over 24 inches in diameter or other dimension, can be loaded through the center side doorway of a 36 ft. box car; and ordinarily the 4th class rate of freight applies. The railroads make an extra charge for hauling longer lengths and larger pipe in less than carload lots.

A shipment which contains an article longer than 22 ft., but not exceeding 36 ft. in length, nor 12 inches in diameter, or other dimension, will be charged at the actual weight and authorized freight rate, subject, however, to a minimum charge of 1,000 lbs. at the first-class freight rate for the entire shipment.

When an article exceeds 22 ft. in length but not more than 30 ft., and is greater than 12 inches in diameter or other dimension, the shipment will be subject to a minimum charge of 4,000 lbs. at the first-class rate for the entire shipment.

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TYPICAL PIPING LAYOUT

Fig. 1 (pages 666 and 667) has been prepared to illustrate the use of these various sketches and to show how they can be used to order material by wire or telephone. This typical layout of a main steam line connecting three boilers and two steam turbines illustrates the various features that enter into the execution of clear and complete drawings, i.e., plans, elevations, dimensions, drilling details, marking symbols and the specifying of material.

Plans and Elevations

To convey the correct idea of the shape and dimensions of fittings, headers, bends or any special article, it is usually necessary to show more than one view. Because errors easily occur when plans and elevations are not shown in correct relation to one another, it is important that careful attention is given to the proper location or marking of views so that misinterpretations will be avoided. For example, the shape and dimensions of the header and the compound bends that are not shown in the plan view of the typical layout are shown in the end elevation and view "B-B".

Specifications

A simple and condensed form of specification is shown on the piping layout. It is a form that can be followed for most installations. When, however, material for special service is required, specifications should be given in greater detail. Complete information should always be given to insure the estimating or furnishing of the correct material.

The chart below shows a classification arrangement and for illustration applies to the main steam line of the typical layout.

SERVICE	Steam
PRESSURE	225#
TEMPERATURE	600°

CLASS OF MATERIAL	TYPE	FIGURE NO.	PRESSURE	MATERIAL	STYLE	SPECIAL FEATURES
VALVES	Stop-Check Gate	Crane 28-A Crane 34-XR	300# 300#	Cast Steel Cast Steel	Flanged Flanged	Tapped for drain.
FITTINGS			300#	Cast Steel	Flanged	
FLANGES	Cranelap		300#	Forged Steel		
PIPE				Lap-weld Steel 14" O.D. x .437" thick Grade "A" Seamless 8⅝" O.D. x .322" thick		Welded Header with closed ends and anchor bases.
GASKETS				Cranite		
BOLTING	Bolt Studs			Triplex		Oil quenched hex. nuts.

Boiler Feed and Blow-off Piping:

All ratings for boiler feed and blow-off piping used in connection with the piping system as shown should be based on 80 per cent of the steam ratings of the piping, valves and fittings used. This requirement is necessary to comply with the A.S.M.E. Boiler Code and also Insurance Specifications.

Dimensions

In order to fabricate piping to correct lengths, it is obvious that all necessary face to face, center to face, and center to center dimensions must be given. That, of course, includes the face to face or center to face of valves, regulators, separators, etc., that already are on hand and are, therefore, not to be furnished, and also the center to face of openings on boilers, generators, pumps, condensers and other equipment.

The piping layout and the numerous details shown illustrate this feature of proper dimensioning.

Sometimes conditions arise when certain dimensions cannot be given accurately. In such cases the pieces involved should be marked "closer" and held for final dimensions.

Drilling Details

Details of flanges on equipment or parts not to be furnished should always be given so as to insure the furnishing of adjacent parts with flanges of the correct diameter, thickness, facing and drilling.

Marking Symbols

Experience has demonstrated the desirable advantages of "marking symbols" so that designers are incorporating them on their drawings in a great many cases.

By merely giving the symbol, any particular line or part in a line can be quickly identified when referred to in any form of communication; letter, telegram or telephone.

Fabricating, shipping and receiving can be done with greater dispatch, and in the field the erector will save considerable time in assembling material, when parts are marked with symbols called for on the drawings.

The steam and exhaust lines in the typical layout have both been numbered 1 and up. The steam line has been given the prefix S and the exhaust line the prefix E. Below are the prefixes for pipe lines commonly found in power plant layouts.

PIPE LINE	PREFIX
Air Cooler Piping	AC
Ash Sluice	ASL
Auxiliary Exhaust	AE
Auxiliary Steam	AS
Boiler Feed Pump Suction	BFS
Boiler Feed Pump Discharge	BFD
Boiler Wash Piping	BW
Blow Off Piping	BO
City Water Line	CW
Circulating Pump Suction	CPS
Circulating Pump Discharge	CPD
Condensate Piping	CP
Distilled Water Piping	DW
Exhaust	E
Economizer Piping	ECO
Fuel Oil Piping	FO
Gas Piping	G
Heater Drain	HD
Heater Over Flow	HO
Hotwell Pump Suction	HWS
Hotwell Pump Discharge	HWD
Lubricating Oil	LO
Makeup Water	MU
Safety Valve Discharge	SVD
Salt Water	SAW
Screen Wash	SCW
Service Pump Suction	SPS
Service Pump Discharge	SPD
Steam	S
Sump Pump Piping	SUP
Soot Blower	SB
Transformer Oil	TO
Turbine Bleeder	TBL
Vacuum Pump Suction	VPS
Vacuum Pump Discharge	VPD
Water Treating System	WTS

BENDS AND FABRICATED PIPING

The numerous designs of bends, welded assemblies, and headers shown on pages 672 to 685 will be found helpful in designing, estimating or ordering this class of material. As it is impossible to show all types of bends, welded assemblies and headers which may be used in piping installations, those given in this section cover only typical designs which include 73 bends, 26 welded assemblies, and 12 headers. In every case each header represents a different style of construction.

All sketches are given a figure number, with letters, indicating the required dimensions. The ends of each sketch are also lettered to facilitate reference to the type of connection, facing, etc. The various styles of flange facings are shown on page 671. For special drilling of flanges, refer to page 668.

Long lengths and designs of large dimensions should always be taken into consideration in designing or ordering, first, because they involve higher freight rates; second, because of maximum shipping clearances between factory and destination. Double offset expansion "U" bends, for example, are sometimes made in three sections when too large to ship in one section. As all installations present their own problems and conditions, the designer must decide whether long or double length pipe (38 to 40 feet) and fewer joints should be used in preference to single lengths (19 to 21 feet) and a greater number of joints.

Double random lengths of pipe are regularly carried in stock as follows:

Standard and Extra Strong Lap-welded Steel Pipe.
Sizes 4" to 12", inclusive—Average length 39 feet.

Grade "A" Seamless Steel Pipe—Standard weight.
Sizes 2" to 12", inclusive (except 3½" size)—Average length 39 feet.

Grade "A" Seamless Steel Pipe—Extra Strong weight.
Sizes 1½" to 10", inclusive (except 3½" size)—Average length 39 feet; 12" size average length 31 feet.

3½" Grade "A" Seamless Steel Pipe—Standard and Extra Strong weights.
Single random lengths only, 19 to 21 feet.

Genuine Wrought Iron Pipe is made in single random lengths only.

Information on other sizes, longer lengths, and pipe for other service pressures will be furnished on application.

In order to illustrate the use of the various sketches and miscellaneous data, an example is given below which is based on the Typical Piping Layout, Fig. 1.

EXAMPLE:

Bend No. S24 as shown in Fig. 1 can be ordered as follows:

1–8⅝" O.D. × .322" thick Grade "A" Seamless Steel Pipe **Bend No. 4NB – 12** with following dimensions:

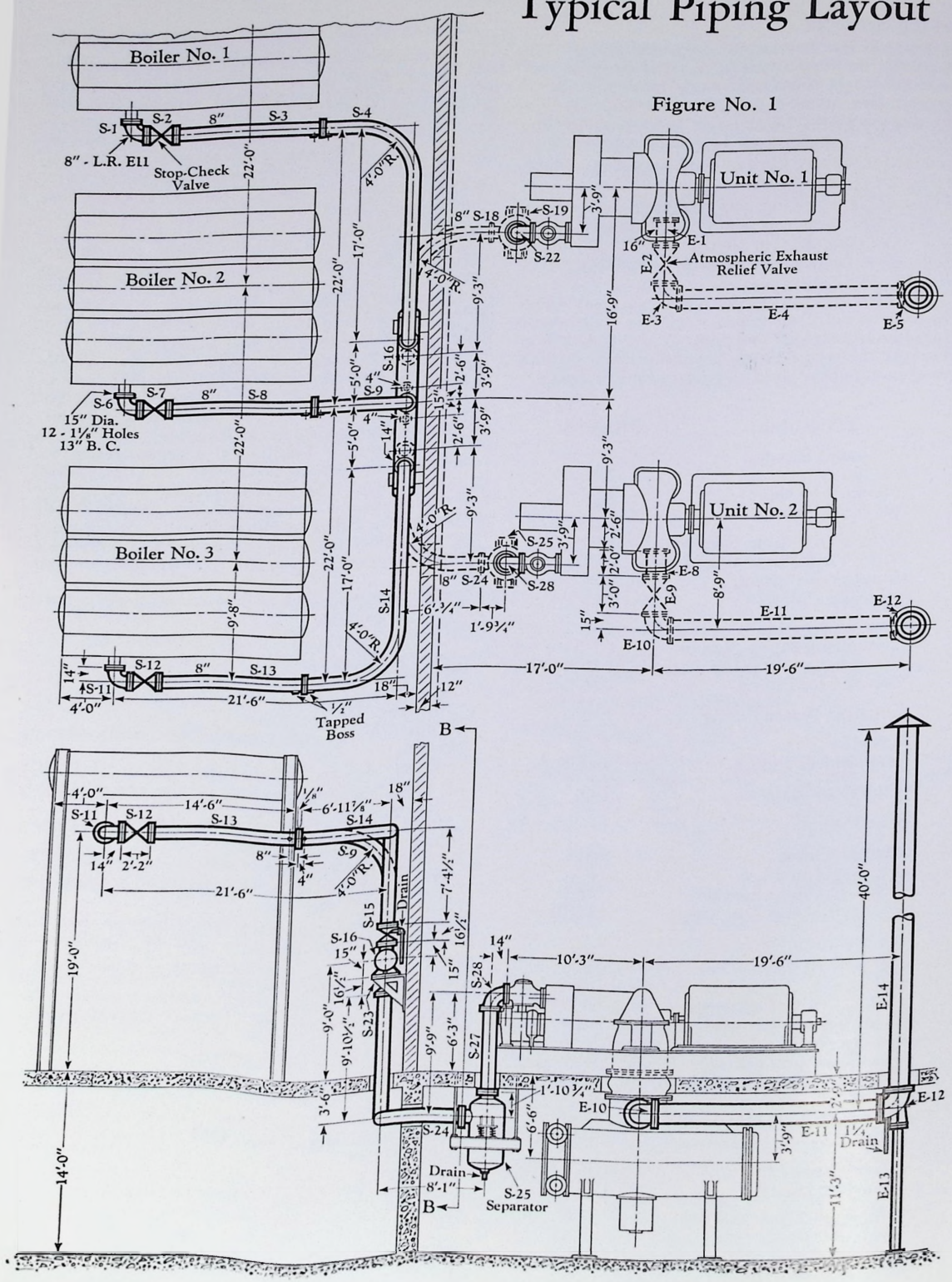
A & B 4'–0"
C 0'–10⅜" } Allowance has been
D 0'– 3⅛" } made for gaskets.
E 0'– 3"

Flanges G & H, 8" × 15" 300 lb. Forged Steel Cranelap, faced and drilled.

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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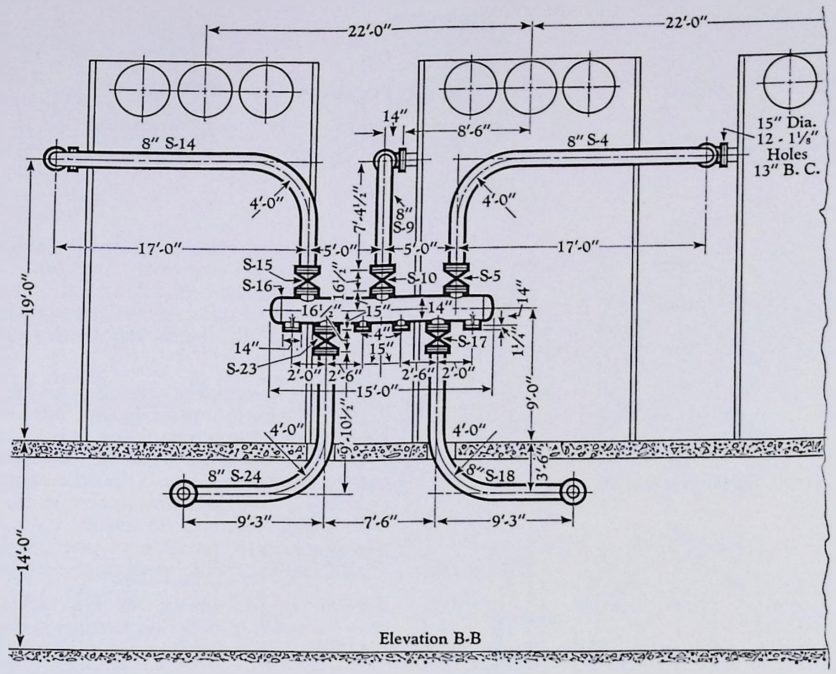
Typical Piping Layout

Figure No. 1



Typical Piping Layout

Elevation B-B of Figure No. 1



Material

Main Steam Line 225 pounds, 600° F.	
Stop-Check Valves	— Crane No. 28 A
Gate Valves	— Crane No. 34XR, motor operated, with control panel and one "Open-Stop-Close" push button control station, suitable for 220 volts A.C., 3 phase, 60 cycle current. Valves to be tapped for drain
Fittings	— Crane 300-Pound Cast Steel
Flanges	— Crane 300-Pound Forged Steel Cranelap
Pipe	— 14" O.D. × .437" Thick Lap Welded Wrought Steel, and 8" × .322" Thick Grade "A" Seamless
Gaskets	— Cranite 1/16" thick
Bolts	— Crane Triplex Steel, with medium carbon oil-quenched steel nuts

Exhaust Steam Line	
Exhaust Relief Valve	— Crane No. 415 H
Fittings	— Crane Standard Cast Iron
Flanges	— Crane Standard Cast Iron Screwed
Pipe	— 16" O.D. × 5/16" Thick Lap Welded Wrought Steel to Base Elbow—No. 14 gauge galvanized spiral riveted to atmosphere
Gaskets	— Cranite 1/16" thick
Bolts	— Square head machine bolts with hexagon nuts

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Flange Drilling Details

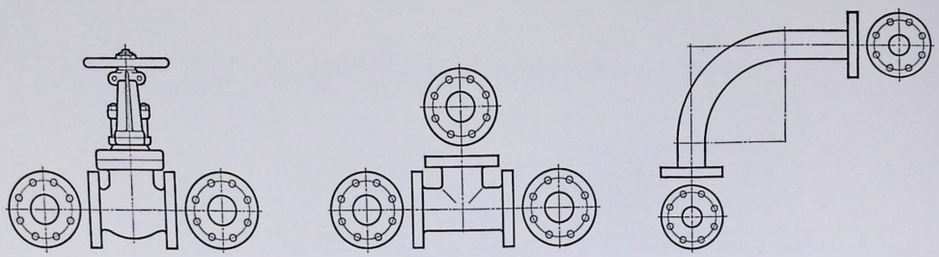


Figure No. E4 - 2A

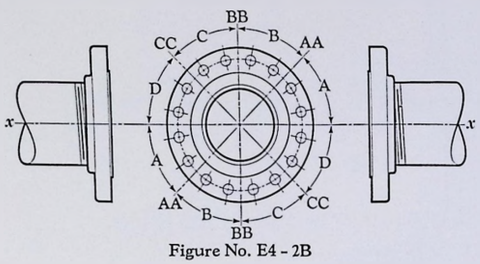


Figure No. E4 - 2B

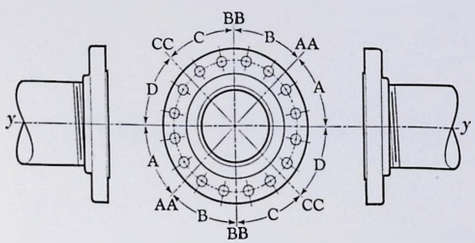


Figure No. E4 - 2C

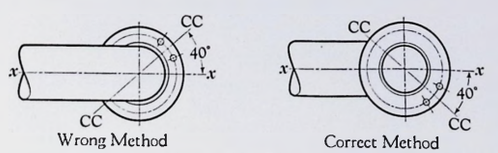


Figure No. E4 - 2D

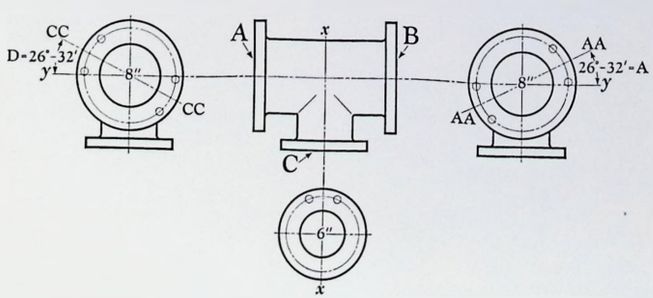


Figure No. E4 - 2E

It is regular practice to furnish flanged material drilled to the "American Standard", with bolt holes straddle centerlines, and such material will be so furnished unless otherwise specified. Figure No. **E4 - 2A** illustrates the term "straddle centerline".

If a flange is required drilled with bolt holes not "straddle centerline", Figures No. **E4 - 2B** and **E4 - 2C** provide a means for specifying the drilling. These sketches show two drilling templates, one for flanges on axis ***x-x*** and the other for flanges on axis ***y-y***. All sketches in this section are shown with flanges located on either axis ***x-x*** or ***y-y***, which makes it possible to specify flanges with special drilling by reference to these two templates.

Similar use of Figures No. **E4 - 2B** and **E4 - 2C** may be made in ordering fittings shown in Figure No. **E4 - 3** or valves shown in Figure No. **E4 - 4.**

When ordering flanges on flanged material drilled special, location of drilling should be made when looking at the face of the flange, never from the back of it. This condition is illustrated in Figure No. **E4 - 2D.**

Fitting Example

Figure No. **E4 - 2E** shows an 8 × 8 × 6 Standard Cast Iron Flanged Tee, faced and drilled, with special drilling on the run. This fitting would be ordered as follows:

1 — 8 × 8 × 6 Standard Cast Iron Flanged Tee, faced and drilled, as follows:

Flange A drilled straddle CC, angle D = 26° 32′

Flange B drilled straddle AA, angle A = 26° 32′

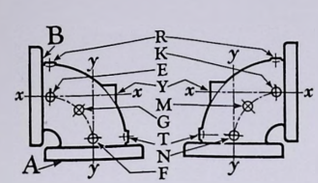
per Figure No. E4 - 2C

Flange C drilled straddle *xx* per Figure No. E4 - 2B

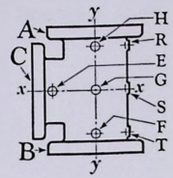
Important:
When flanged material with special drilling is wanted, orders should be accompanied by a sketch showing the drilling.

Figure No. E4 - 3

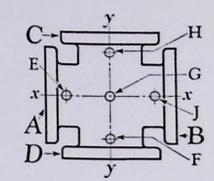
Taps and Drains for Iron and Steel Flanged Fittings
Method of Designating Location and Size of Tapped Holes



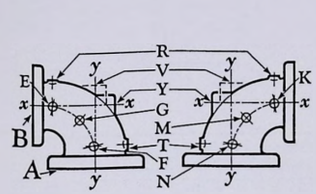
90° Elbow
Straight Size



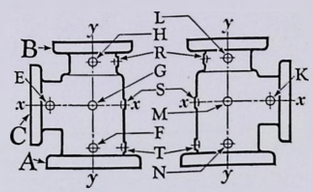
Tee
Straight Size



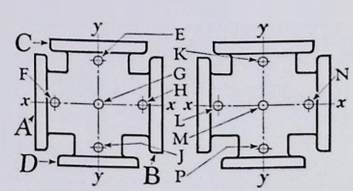
Cross
Straight Size



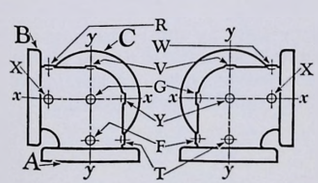
90° Elbow
Reducing Size



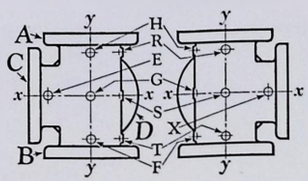
Tee
Reducing Size



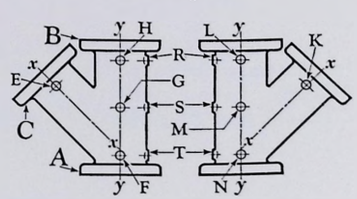
Cross
Reducing Size



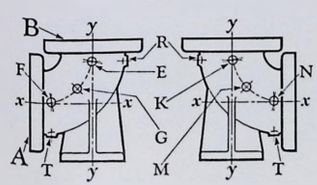
Side Outlet Elbow
Straight Size



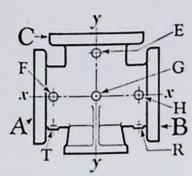
Side Outlet Tee
Straight Size



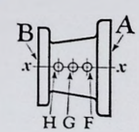
45° Lateral
Straight Size



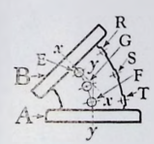
90° Base Elbow



Base Tee
Straight Size



Reducer



45° Elbow

Maximum Size of Tapped Hole in Fitting Without Adding Bosses

Size of Fitting Inches	2-3	4-5	6	8	10	12	14-24
Size of Tapping Inches	⅜	½	¾	1	1¼	1½	2

Notes

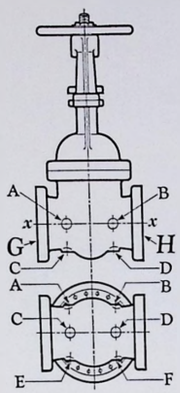
1. These recommendations apply to ferrous fittings of weights suitable for pressure ratings of 125 pounds or higher.

2. When a tapped connection is required at the heel of an elbow without a boss, the tapping should be done at right angles to the point of tangency of the radius or sweep of the fitting. This shall be standard practice, and where the tapping is required parallel to the run (at locations V and Y), the fitting shall be furnished with a boss.

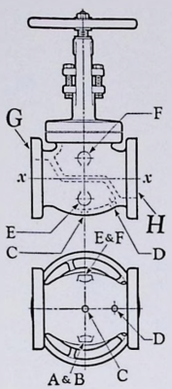
Published by AsbestosClaims.Law
asbestosclaims.law/library/21275/353

Figure No. E4 - 4

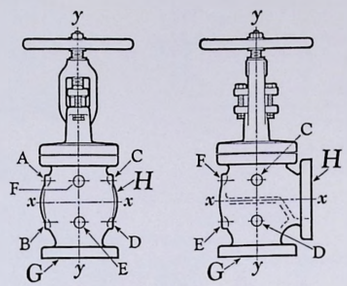
Taps and Drains for Iron and Steel Flanged Valves
Method of Designating Location and Size of Tapped Holes



Gate Valve



Globe Valve



Angle Valve

Maximum Size of Tapped Hole in Valve Without Adding Bosses (See Note No. 2)

Size of Valve Inches	2 - 3	4 - 5	6	8	10	12	14 - 24
Size of Tapping Inches	⅜	½	¾	1	1¼	1½	2

Notes

1. These recommendations apply to ferrous valves of weights suitable for pressure ratings of 125 pounds or higher.
2. The size of tapping into a valve body, with or without a boss, is limited chiefly by the location of the tapping with respect to the internal design of the body. Tappings with boss may be one size larger than given in the above table when so ordered.

Location of By-Passes on Iron and Steel Flanged Valves

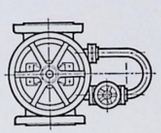
Gate valves: When gate valves are ordered with by-pass attached, it shall be regular practice to attach said by-pass at the side of the main valve with the stems of both valves parallel, pointing vertically upward.

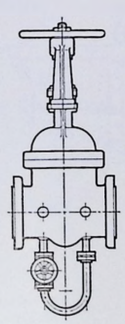
The more common of the "special" attached-locations is on the center of the flow line, at the bottom of the main valve, with the stem of the by-pass valve at right angles to the main valve stem. This is designated as the bottom "attachment", or defined as "by-pass at bottom". When any other "special" attached-location or other position of the by-pass valve stem is desired, a sketch should be submitted.

Globe valves: When globe valves are ordered with by-pass attached, it shall be regular practice to attach said by-pass at the right-hand side of the main valve, with the stems of both valves parallel, pointing vertically upward. When by-pass is "specially" required attached at the left-hand side, the designation shall be "left-hand attachment".

Right-hand side of a globe valve is the side at the right, when facing the flow-port which leads to the under side of the disc.

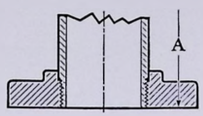
Angle valves: When angle valves are ordered with by-pass attached, it shall be regular practice to attach said by-pass at the back of the main valve, with the stems of both valves parallel, pointing vertically upward. When by-pass is "specially" required attached at the right or left-hand side, the designations shall be "right-hand attachment" or "left-hand attachment". Right-hand side of an angle valve is at the right, when facing the back of the valve.


Gate Valve with By-Pass on Side

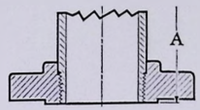

Gate Valve with By-Pass at Bottom

Method of Designating Center to Face or Face to Face Dimensions of Flanged Material

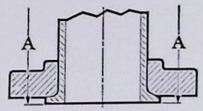
All face to face and center to face dimensions of flanged fabricated material shown in this section are to be taken to the contact surface as illustrated in the following sketches.



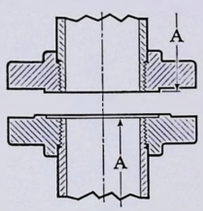
Screwed Flange No Raised Face



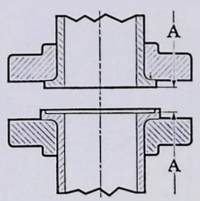
Screwed Flange with Raised Face



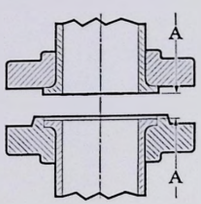
Regular Cranelap — Radial Back Cranelap



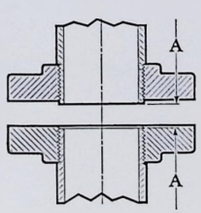
Large Male and Female



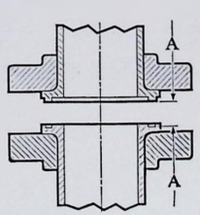
Large Male and Female Female in Lap



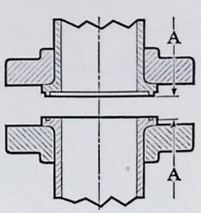
Large Male and Female Female in Flange



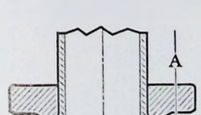
Small Male and Female



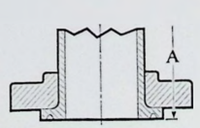
Large Tongue and Groove



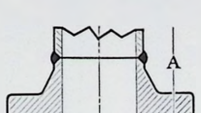
Small Tongue and Groove



Sarlun Flange

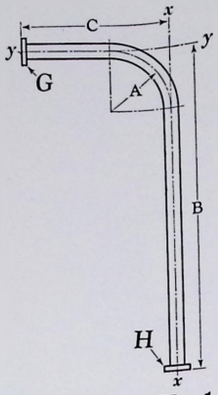


Ring Joint Flange

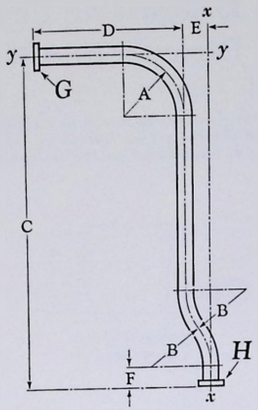


Welding Neck Flange

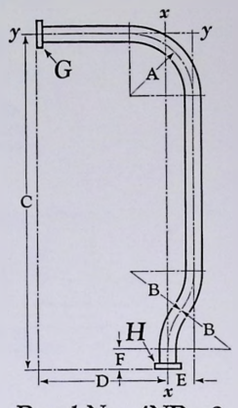
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asbestosclaims.law/library/21275/354



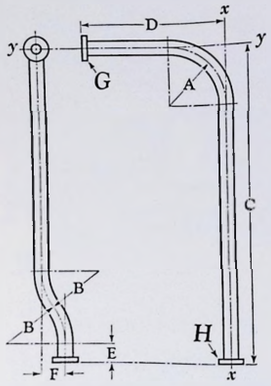
Bend No. 4NB – 1



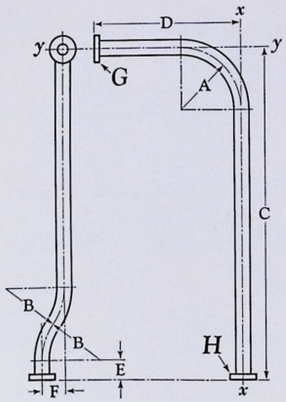
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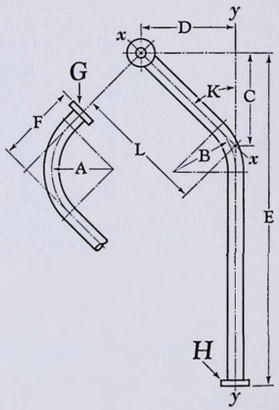
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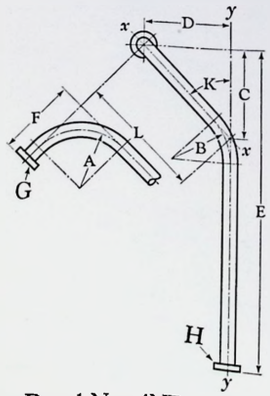
Bend No. 4NB – 4



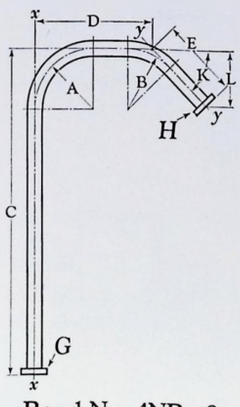
Bend No. 4NB – 5



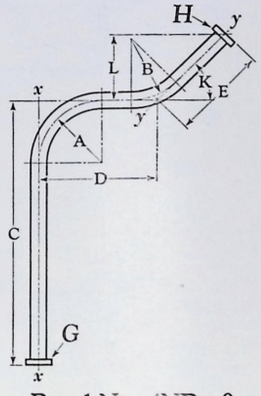
Bend No. 4NB – 6A



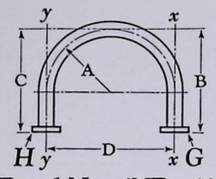
Bend No. 4NB – 7A



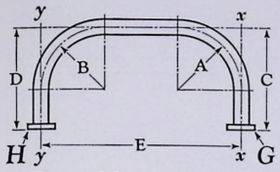
Bend No. 4NB – 8



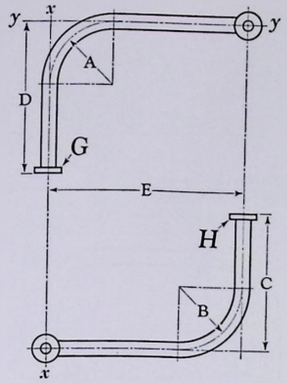
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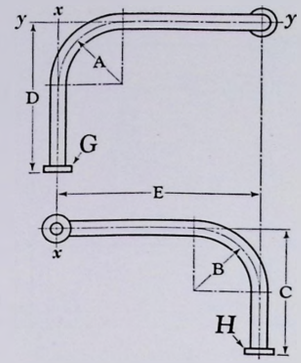
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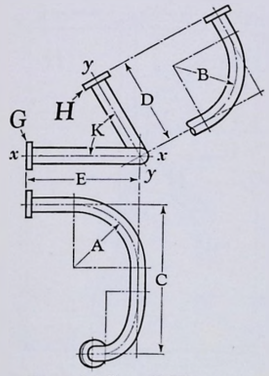
Bend No. 4NB – 11



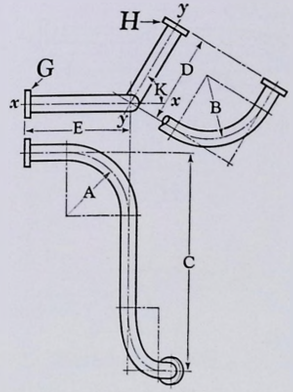
Bend No. 4NB – 12



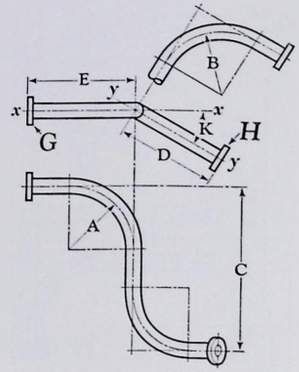
Bend No. 4NB – 13



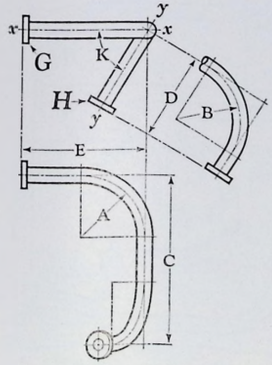
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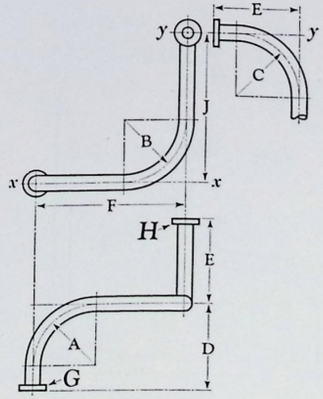
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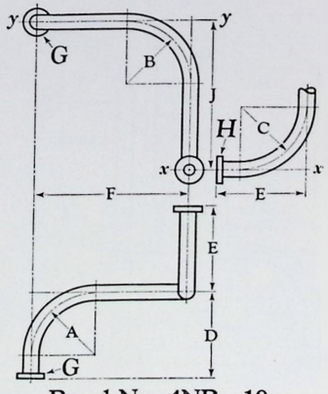
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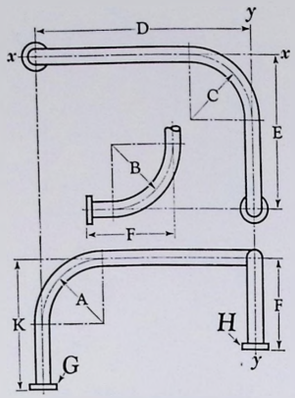


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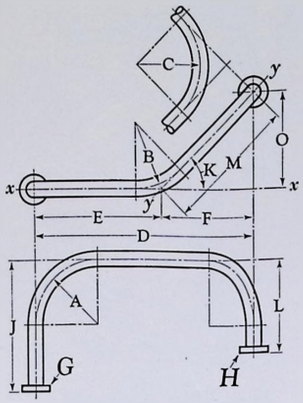


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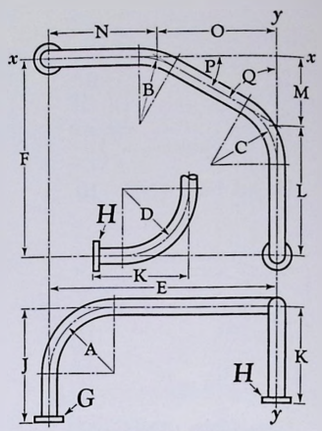
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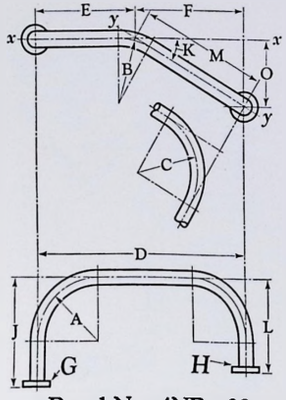
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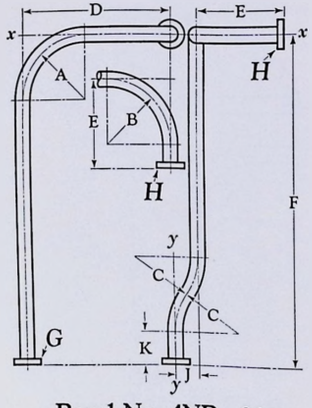
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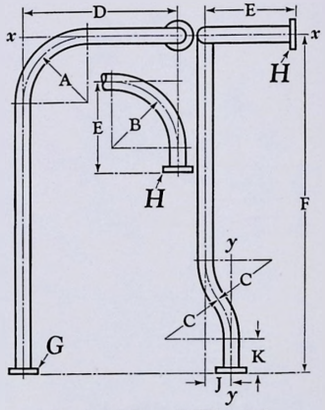
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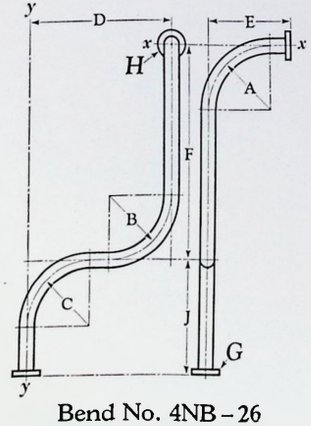
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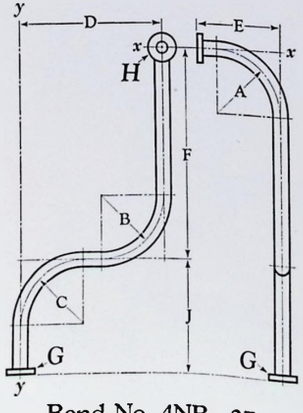
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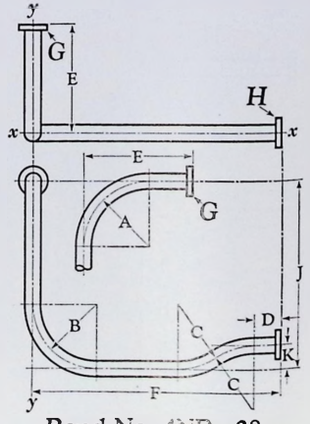
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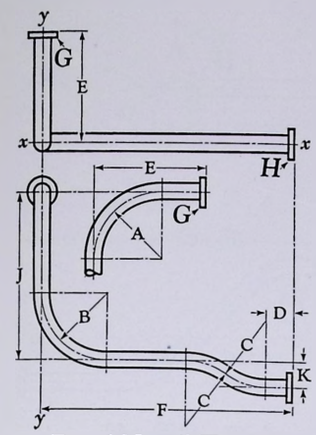
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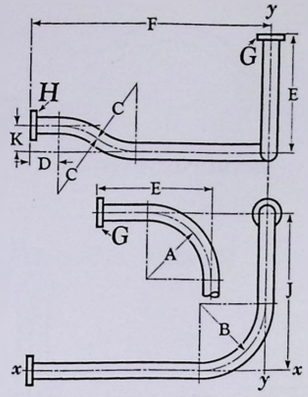
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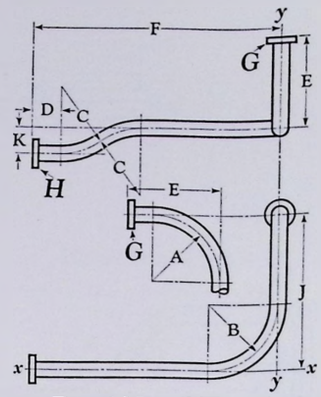
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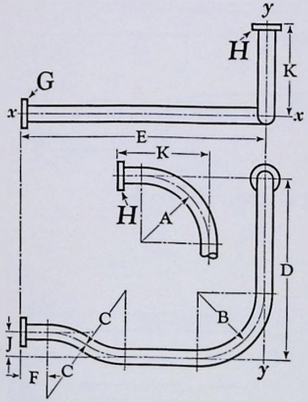
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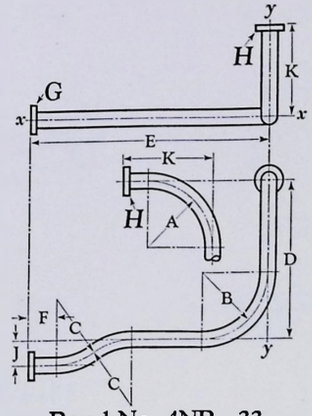
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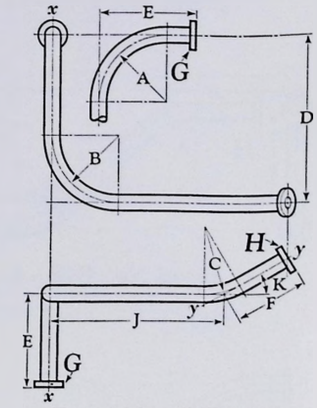
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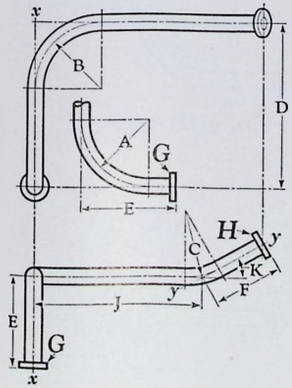
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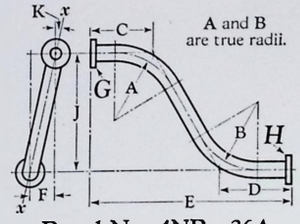
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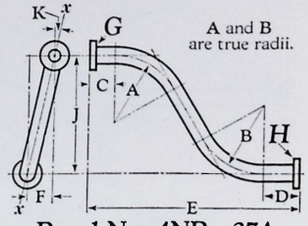
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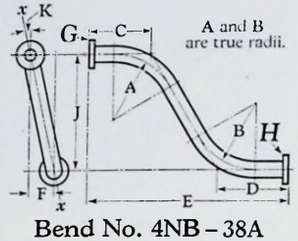
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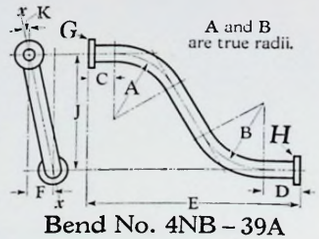
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Bend No. 4NB – 37A

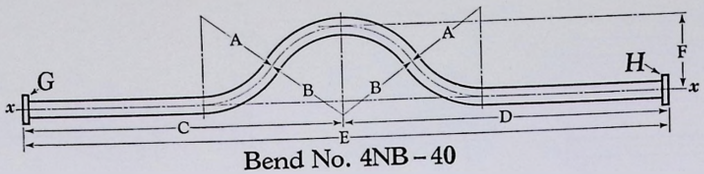


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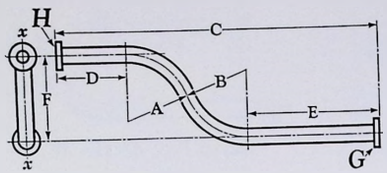


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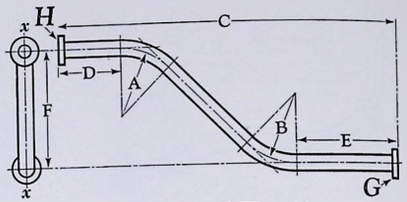
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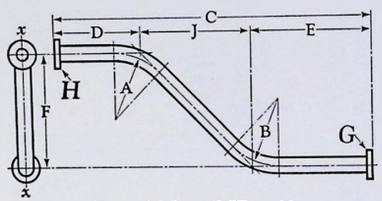
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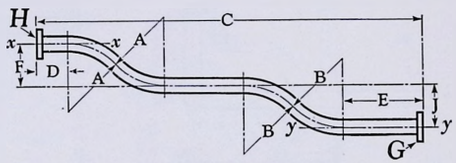
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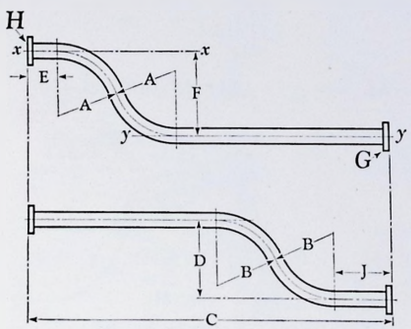
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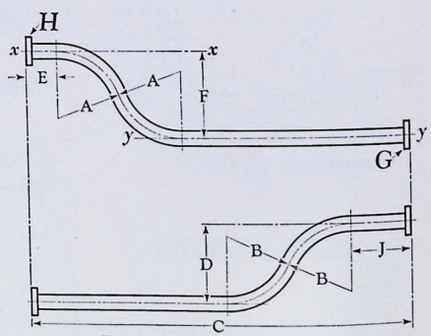
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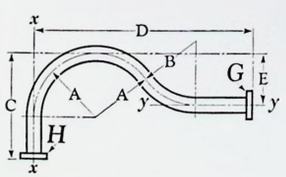
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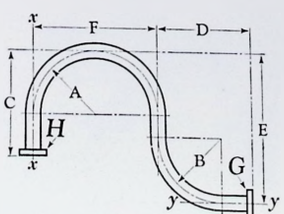
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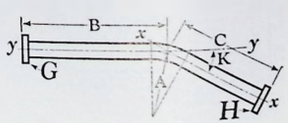
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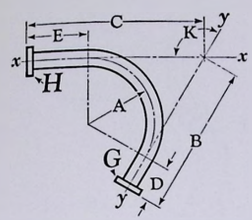
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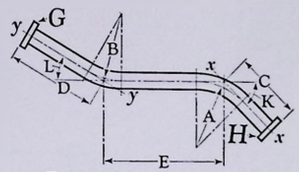
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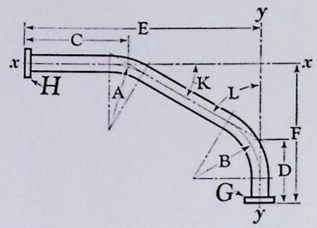
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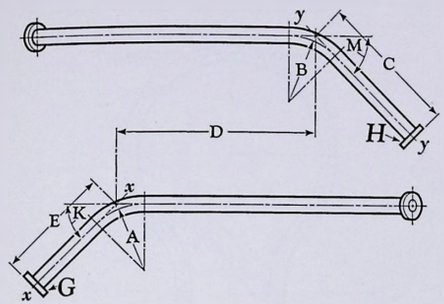
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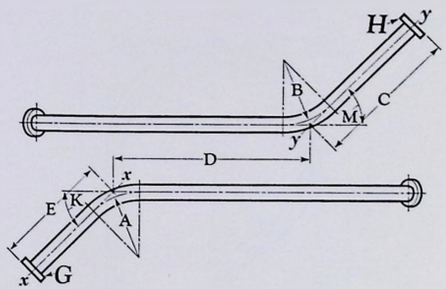
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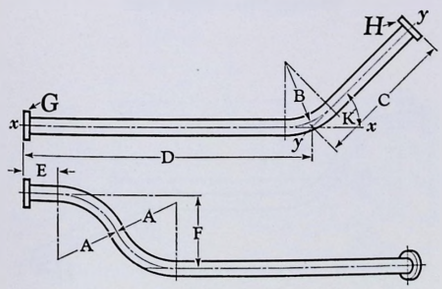
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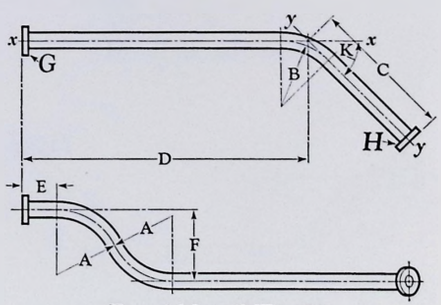
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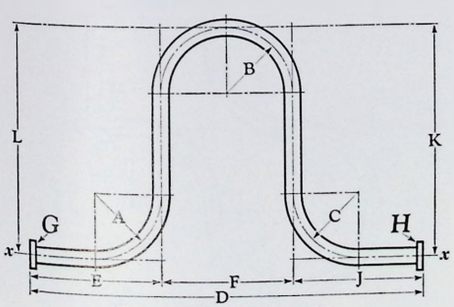
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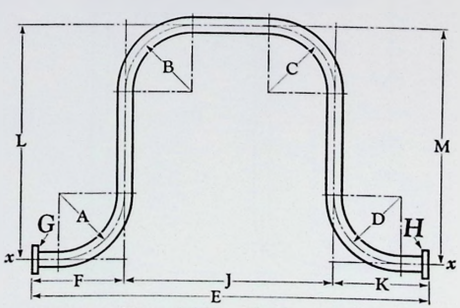
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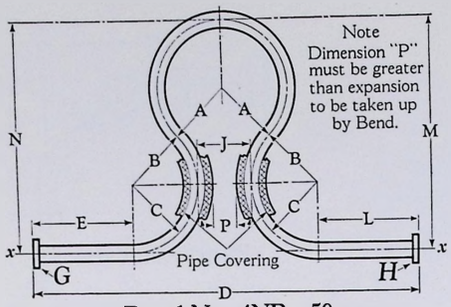
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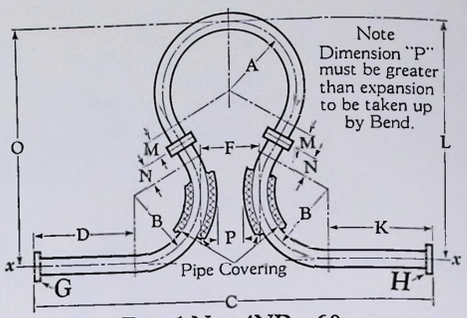
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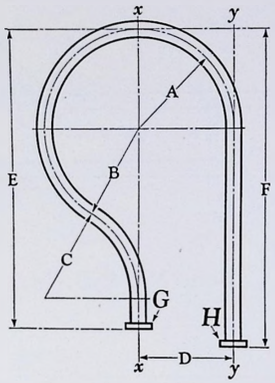
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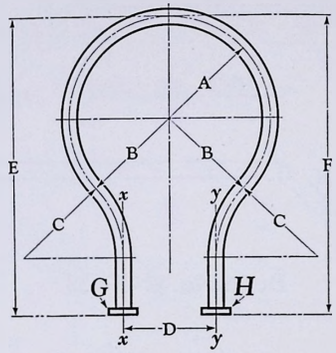
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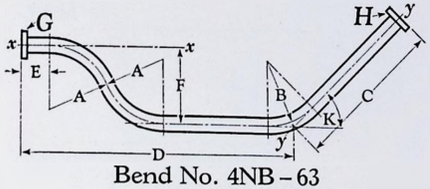
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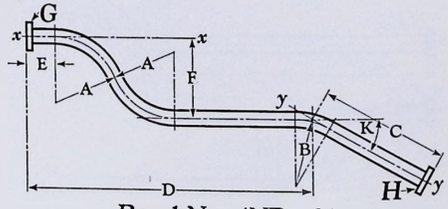
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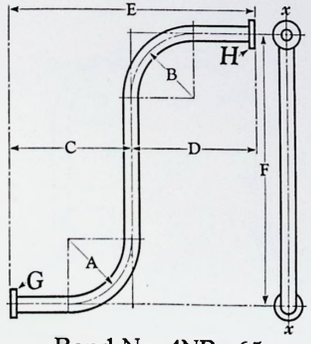
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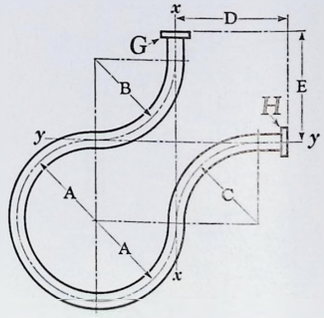
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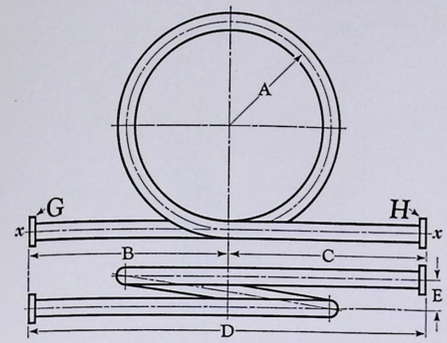
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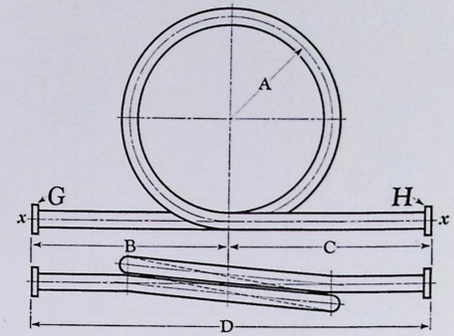
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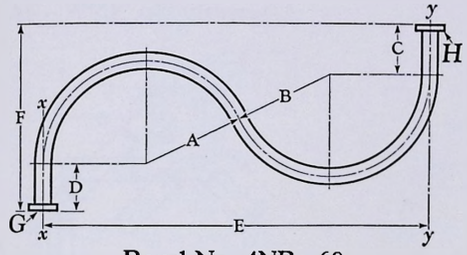
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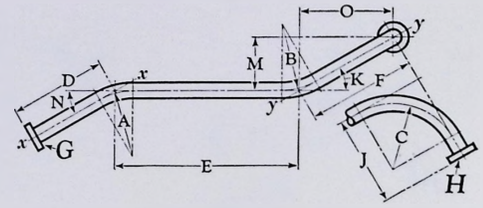
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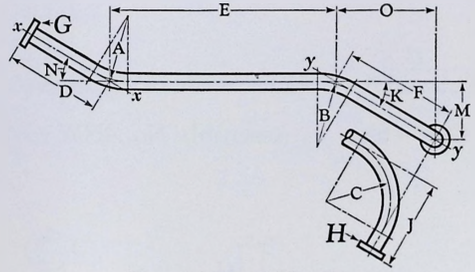
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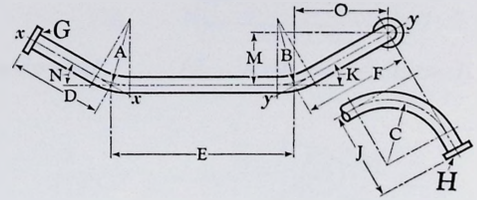
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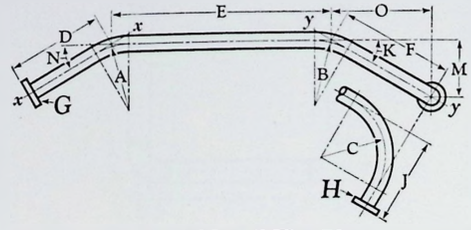
Bend No. 4NB – 70



Bend No. 4NB – 71

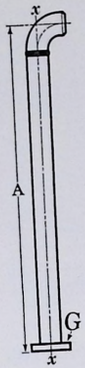


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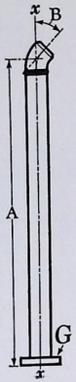


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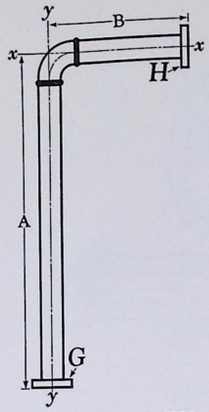
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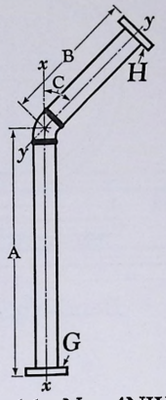
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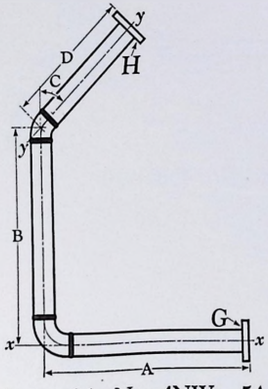
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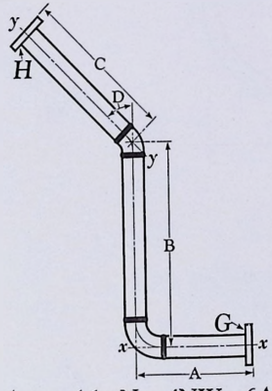
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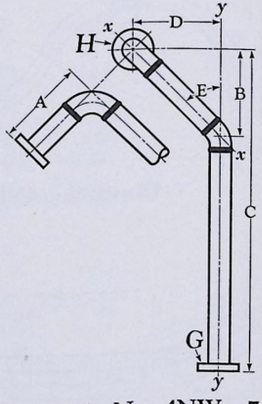
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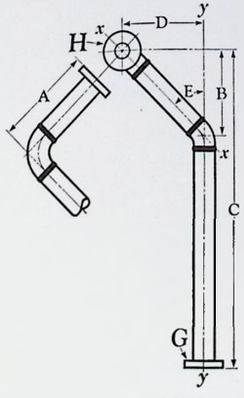
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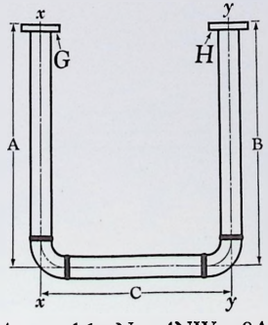
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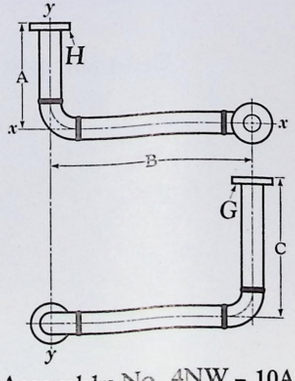
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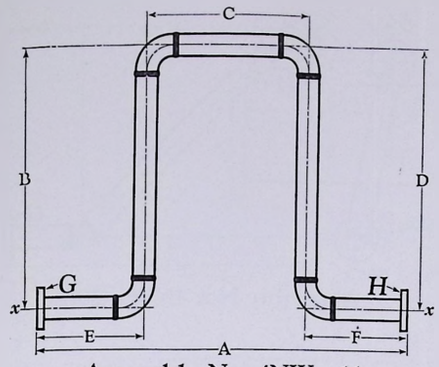
Assembly No. 4NW – 8A



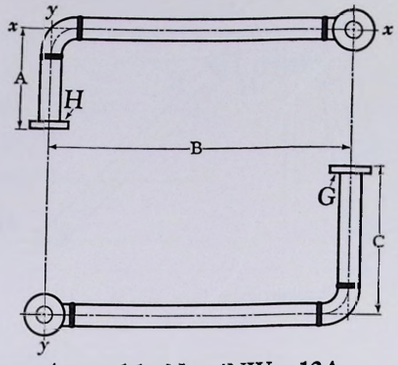
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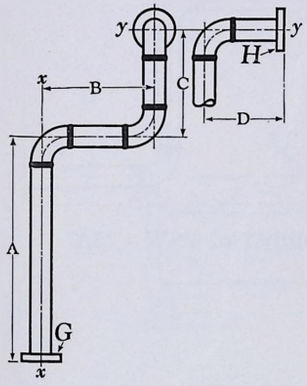
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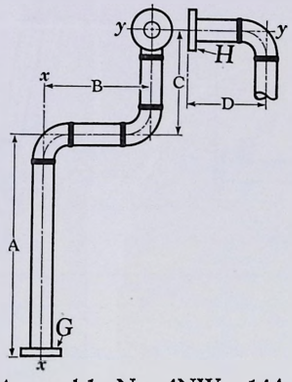
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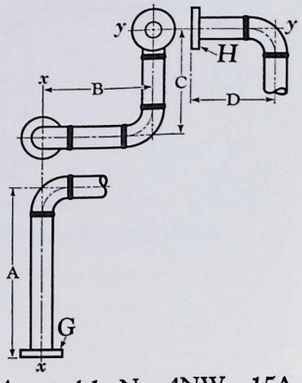
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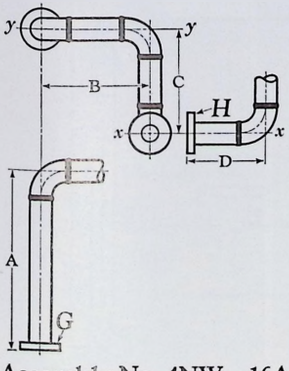
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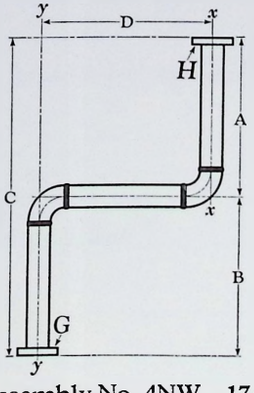
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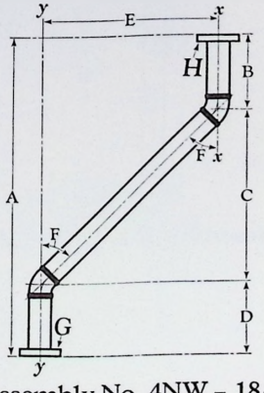
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Assembly No. 4NW – 16A

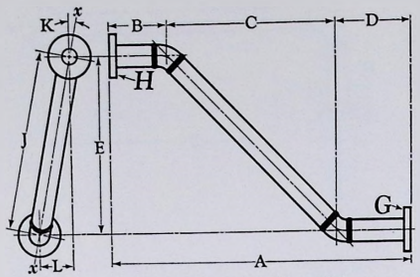


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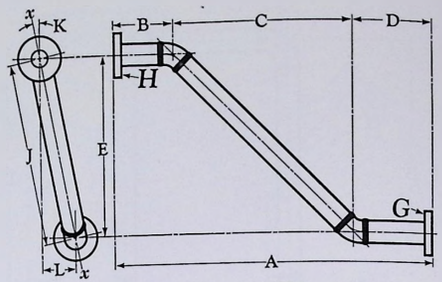


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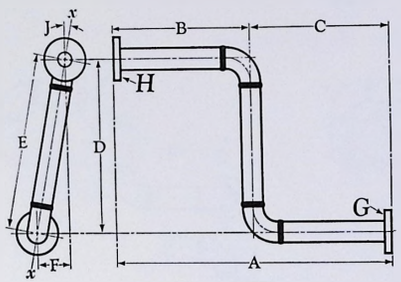
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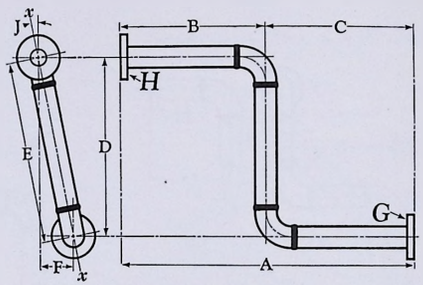
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Assembly No. 4NW – 20A



Assembly No. 4NW – 21A



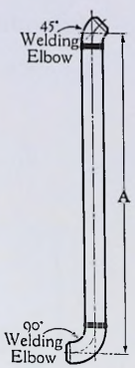
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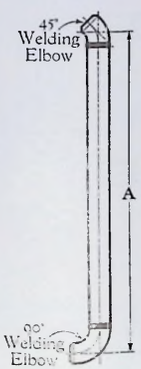
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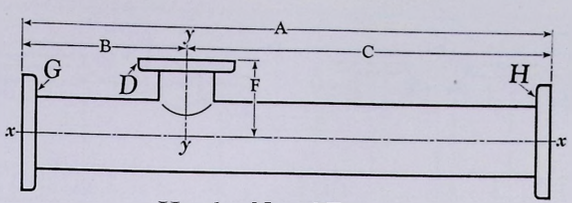
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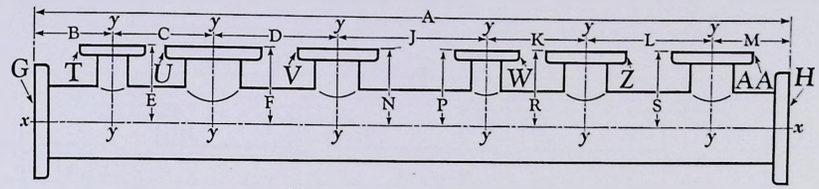
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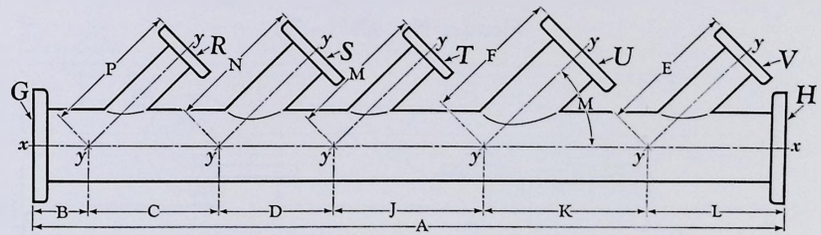
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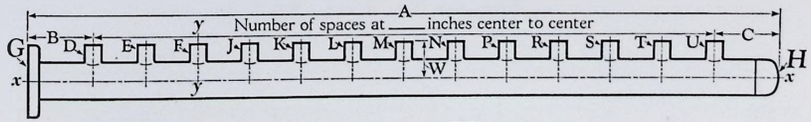
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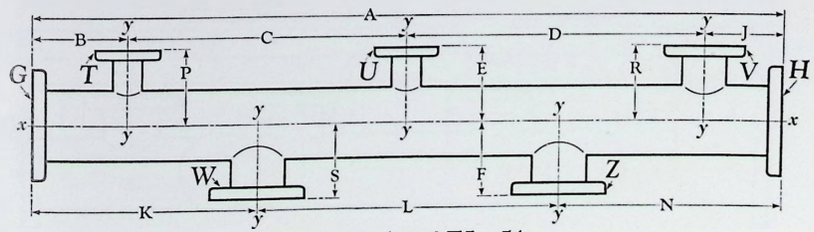
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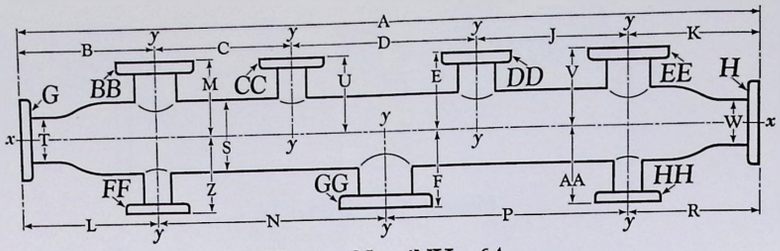


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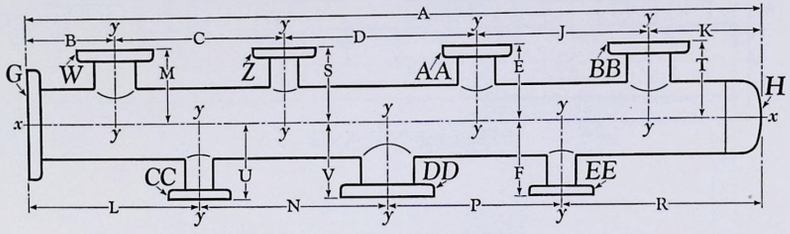


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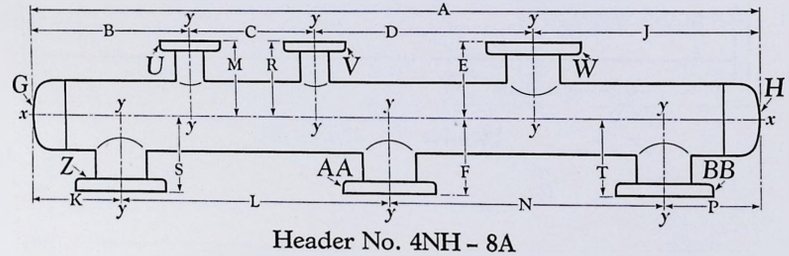
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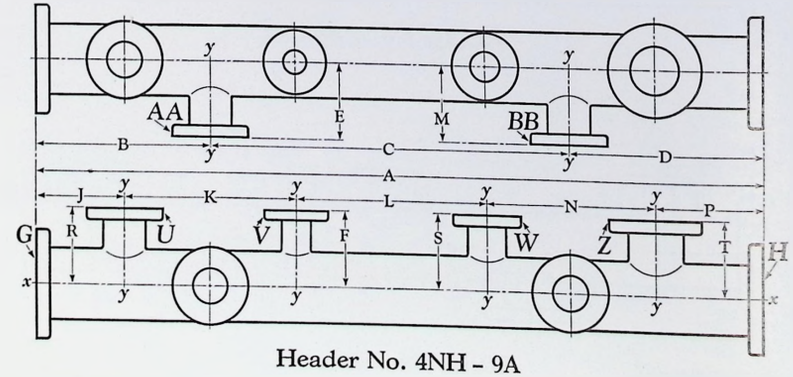
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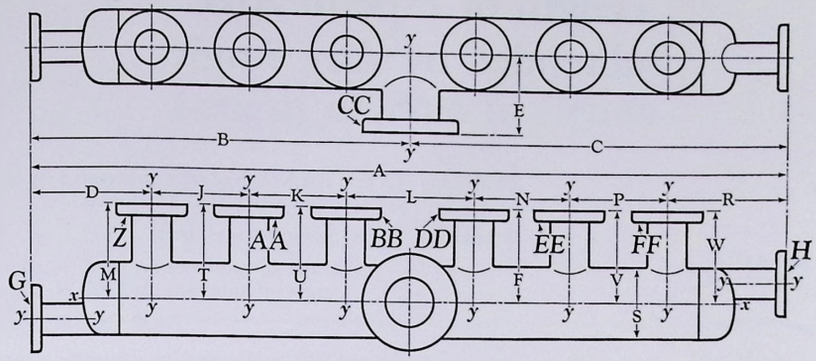
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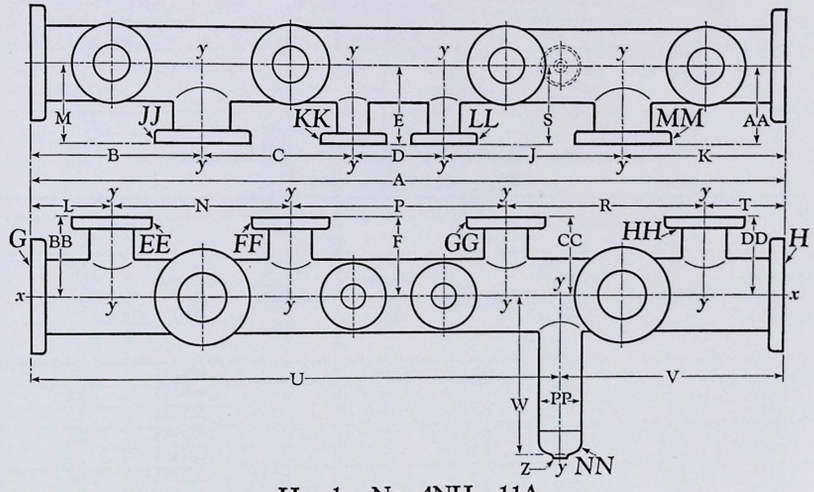
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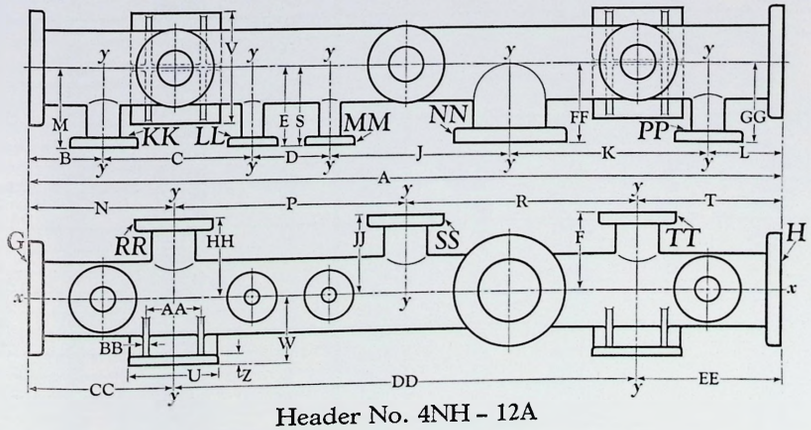
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Header No. 4NH – 10A



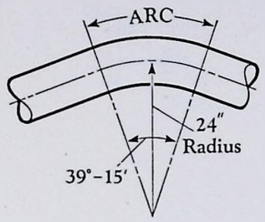
Header No. 4NH – 11A



Header No. 4NH – 12A

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Length of Pipe in ARC Subtended by Any Angle



Problem: To find the length of pipe subtended by an angle of 39° 15′ with a radius of 24 inches.

Solution: Assuming radius = 1″, then

Angle 39° subtends an ARC = .6807″
Angle 15′ subtends an ARC = .00436″
Total ARC = .68506″

But the ARC subtended by any angle is directly proportional to the radius.

$$\frac{1''}{24''} = \frac{.68506}{\text{ARC}}$$

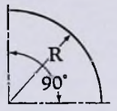
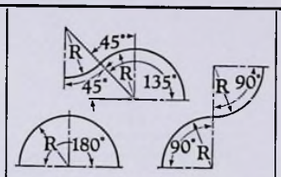
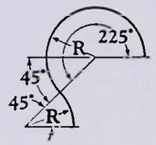
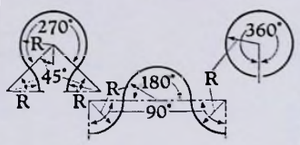
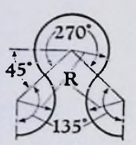
Therefore .68506 × 24″ = 16.44″ = 16 7/16″

Degree and Minute Constants for ARC Lengths Where Radius = One

Degrees	Length of ARC	Degrees	Length of ARC	Degrees	Length of ARC
1	.0175	31	.5411	61	1.0647
2	.0349	32	.5585	62	1.0821
3	.0524	33	.5760	63	1.0996
4	.0698	34	.5934	64	1.1170
5	.0873	35	.6109	65	1.1345
6	.1047	36	.6283	66	1.1519
7	.1222	37	.6458	67	1.1694
8	.1396	38	.6632	68	1.1868
9	.1571	39	.6807	69	1.2043
10	.1745	40	.6981	70	1.2217
11	.1920	41	.7156	71	1.2392
12	.2094	42	.7330	72	1.2566
13	.2269	43	.7505	73	1.2741
14	.2443	44	.7679	74	1.2915
15	.2618	45	.7854	75	1.3090
16	.2793	46	.8029	76	1.3265
17	.2967	47	.8203	77	1.3439
18	.3142	48	.8378	78	1.3614
19	.3316	49	.8552	79	1.3788
20	.3491	50	.8727	80	1.3963
21	.3665	51	.8901	81	1.4137
22	.3840	52	.9076	82	1.4312
23	.4014	53	.9250	83	1.4486
24	.4189	54	.9425	84	1.4661
25	.4363	55	.9599	85	1.4835
26	.4538	56	.9774	86	1.5010
27	.4712	57	.9948	87	1.5184
28	.4887	58	1.0123	88	1.5359
29	.5061	59	1.0297	89	1.5533
30	.5236	60	1.0472	90	1.5708

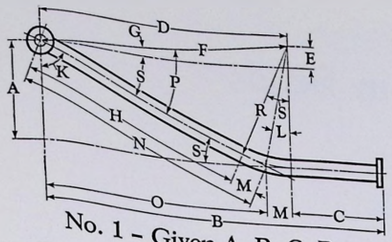
Minutes	Length of ARC	Minutes	Length of ARC
1	.000291	31	.009018
2	.000582	32	.009308
3	.000873	33	.009599
4	.001164	34	.009890
5	.001454	35	.010181
6	.001745	36	.010472
7	.002036	37	.010763
8	.002327	38	.011054
9	.002618	39	.011345
10	.002909	40	.011636
11	.003200	41	.011926
12	.003491	42	.012217
13	.003782	43	.012508
14	.004072	44	.012799
15	.004363	45	.013090
16	.004654	46	.013381
17	.004945	47	.013672
18	.005236	48	.013963
19	.005527	49	.014254
20	.005818	50	.014544
21	.006109	51	.014835
22	.006400	52	.015126
23	.006690	53	.015417
24	.006981	54	.015708
25	.007272	55	.015999
26	.007563	56	.016290
27	.007854	57	.016581
28	.008145	58	.016872
29	.008436	59	.017162
30	.008727	60	.017453

Length of Pipe in Bends

Radius in Inches					
5″	7¾″	15¾″	23½″	31½″	47¼″
6	9½	18¾	28¼	37¾	56½
7	11	22	33	44	66
8	12½	25¼	37¾	50¼	75½
9	14¼	28¼	42½	56½	84¾
10	15¾	31½	47¼	62¾	94¼
11	17¼	34½	51¾	69¼	103¾
12	18¾	37¾	56½	75½	113
13	20½	40¾	61¼	81¾	122½
14	22	44	66	88	132
15	23½	47¼	70¾	94¼	141½
20	31½	62¾	94¼	125¾	188½
25	39¼	78½	117¾	157	235½
30	47¼	94¼	141½	188½	282¾
35	55	110	165	220	330
40	62¾	125¾	188½	251¼	377
45	70¾	141½	212	282¾	424
50	78½	157	235½	314¼	471¼
60	94¼	188½	282¾	377	565½
70	110	220	330	439¾	659¾
80	125¾	251¼	377	502¾	754
90	141½	282¾	424	565½	848¼
100	157	314¼	471¼	628¼	942½
110	172¾	345½	518½	691¼	1036¾
120	188½	377	565½	754	1131
130	204¼	408½	612½	816¾	1225¼
140	220	439¾	659¾	879¾	1319½
150	235½	471¼	706¾	942½	1413¾
160	251¼	502¾	754	1005¼	1508
170	267	534	801	1068¼	1602¼
180	282¾	565½	848¼	1131	1696½
190	298½	597	895½	1193¾	1790¾
200	314¼	628¼	942½	1256¾	1885

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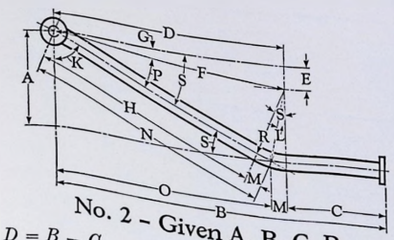
Calculation of Pipe Bends



No. 1 – Given A, B, C, R

$D = B - C$
$E = R - A$
$F = \sqrt{D^2 + E^2}$
$\frac{E}{F} = \sin \angle G$
$H = \sqrt{F^2 - R^2}$

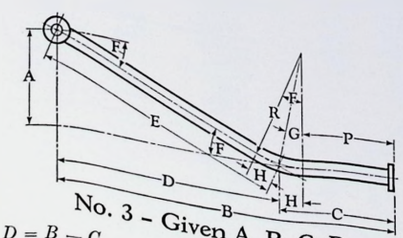
$\frac{R}{F} = \sin \angle P$
$\angle S = \angle P - \angle G$
$\angle K = 90° - \angle S$
$\angle L = \frac{1}{2} \angle S$
$M = \tan \angle L \times R$
$N = H + M$
$O = B - C - M$



No. 2 – Given A, B, C, R

$D = B - C$
$E = A - R$
$F = \sqrt{D^2 + E^2}$
$\frac{E}{F} = \sin \angle G$
$H = \sqrt{F^2 - R^2}$

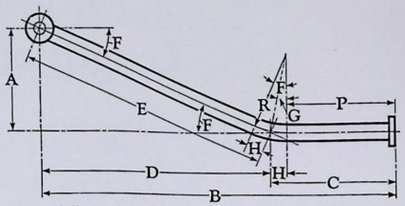
$\frac{R}{F} = \sin \angle P$
$\angle S = \angle P + \angle G$
$\angle K = 90° - \angle S$
$\angle L = \frac{1}{2} \angle S$
$M = \tan \angle L \times R$
$N = H + M$
$O = B - C - M$



No. 3 – Given A, B, C, R

$D = B - C$
$E = \sqrt{A^2 + D^2}$
$\frac{A}{E} = \sin \angle F$

$\angle G = \frac{1}{2} \angle F$
$H = \tan \angle G \times R$
$P = C - H$

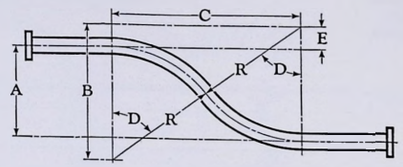


No. 4 – Given A, B, C, R

$D = B - C$
$E = \sqrt{A^2 + D^2}$

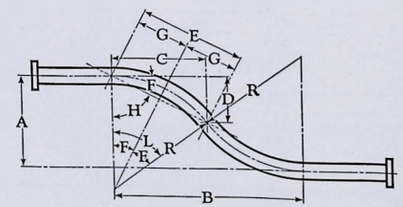
$\frac{A}{E} = \sin \angle F$
$\angle G = \frac{1}{2} \angle F$

$H = \tan \angle G \times R$
$P = C - H$



No. 5 – Given A, R

$B = 2R - A$
$C = \sqrt{(2R)^2 - B^2}$
$\frac{C}{2R} = \sin \angle D$

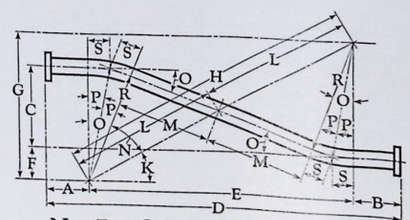


No. 6 – Given A, B

$C = \frac{1}{2} B$
$D = \frac{1}{2} A$
$E = \sqrt{C^2 + D^2}$

$\frac{D}{E} = \sin \angle F$
$G = \frac{1}{2} E$

$\angle H = 90° - \angle F$
$R = \frac{G}{\sin \angle F}$
$L = 2F$



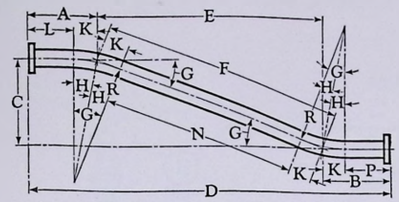
No. 7 – Given A, B, C, D, R

$E = D - A - B$
$F = R - C$
$G = R + F$
$H = \sqrt{E^2 + G^2}$

$G/H = \sin \angle K$
$L = \frac{1}{2} H$
$M = \sqrt{L^2 - R^2}$

$M/L = \sin \angle N$
$\angle O = 90° - \angle K - \angle N$
$\angle P = \frac{1}{2} \angle O$
$S = \tan \angle P \times R$

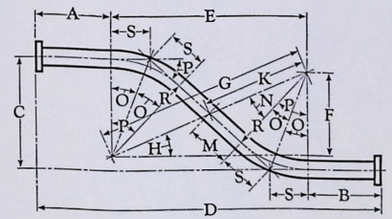
Calculation of Pipe Bends



No. 8 – Given A, B, C, D, R

$E = D - A - B$
$F = \sqrt{E^2 + C^2}$
$\frac{C}{F} = \sin \angle G$

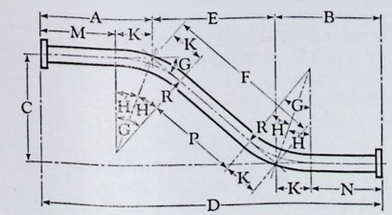
$\angle H = \frac{1}{2} \angle G$
$K = \tan \angle H \times R$
$L = A - K$
$P = B - K$
$N = F - 2K$



No. 9 – Given A, B, C, D, R

$E = D - A - B$
$F = 2R - C$
$G = \sqrt{E^2 + F^2}$
$\frac{F}{E} = \tan \angle H$
$K = \frac{1}{2} G$

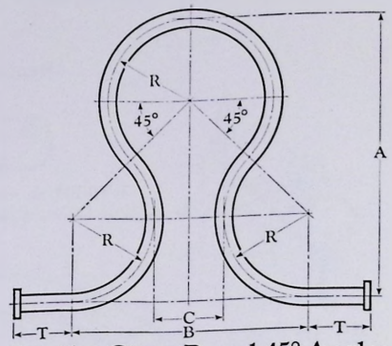
$M = \sqrt{K^2 - R^2}$
$\frac{M}{K} = \sin \angle N$
$\angle P = 90° - \angle H - \angle N$
$\angle O = \frac{1}{2} \angle P$
$S = \tan \angle O \times R$



No. 10 – Given A, B, C, D, R

$E = D - A - B$
$F = \sqrt{C^2 + E^2}$
$\frac{C}{F} = \sin \angle G$

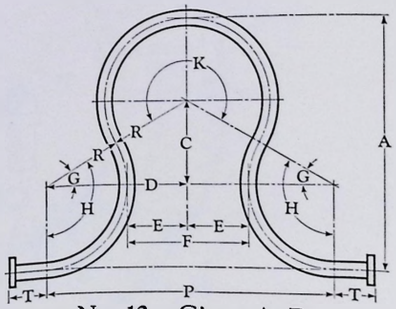
$\angle H = \frac{1}{2} \angle G$
$K = \tan \angle H \times R$
$M = A - K$
$N = B - K$
$P = F - 2K$



No. 11 – Given R and 45° Angles

$A = 3.414 \times R$
$B = 2.828 \times R$
$C = 0.828 \times R$

T = Tangent
Length of Pipe in Bend = $9.425 \times R + 2T$

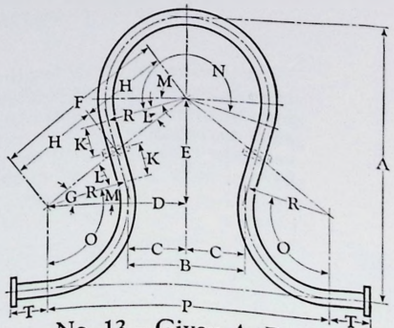


No. 12 – Given A, R

$C = A - 2R$
$D = \sqrt{(2R)^2 - C^2}$

$P = 2D$
$E = D - R$
$F = 2E$

$C/2R = \sin \angle G$
$\angle H = 90° + \angle G$
$\angle K = 180° + 2 \angle G$



No. 13 – Given A, B, R

$C = \frac{1}{2} B$
$D = R + C$
$E = A - 2R$
$F = \sqrt{D^2 + E^2}$

$E/F = \sin \angle G$
$H = \frac{1}{2} F$
$K = \sqrt{H^2 - R^2}$
$K/H = \sin \angle L$

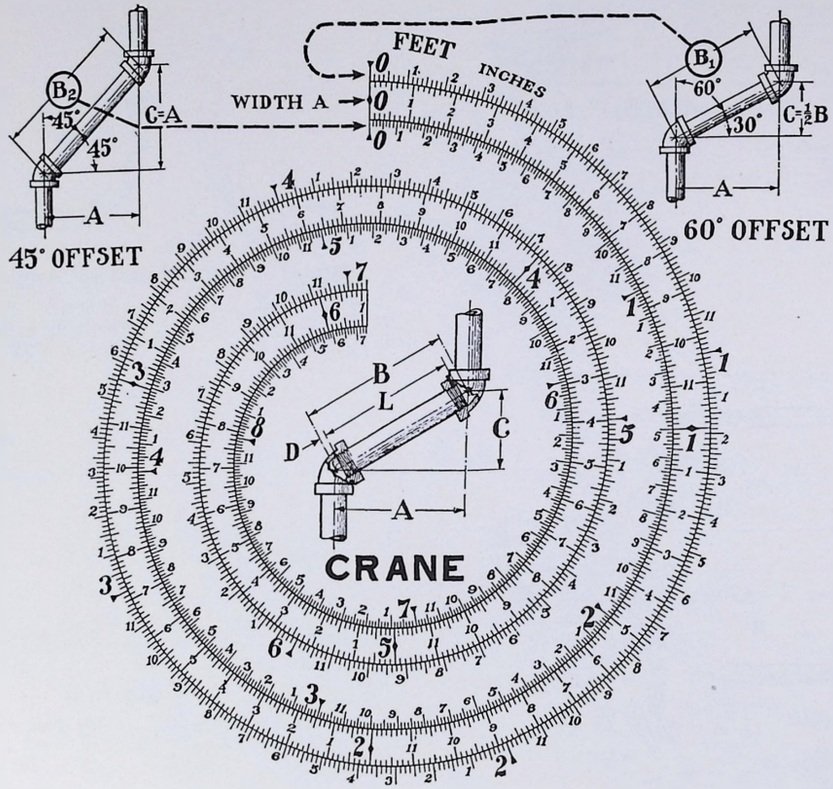
$\angle M = \angle G - \angle L$
$\angle N = 180° + 2 \angle M$
$\angle O = 90° + \angle M$
$P = 2D$

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45° & 60° Offset Chart

For Use with Crane STD. C. I. Screwed Fittings

Reading to ⅛ Inches



To determine the actual length of pipe, L, to use for length B, find in the table below the amount to deduct for the desired pipe size and subtract it from length B. For example, using the chart a 45° offset of width $A = 4'-2\frac{1}{8}''$ gives the length of run $B = 5'-10\frac{7}{8}''$ center to center. If it is a 2″ pipe then using the table below find the amount to deduct is $1\frac{7}{8}''$. Subtracting this from $5'-10\frac{7}{8}''$ gives 5′-9″ as the length of pipe to cut, L.

Pipe size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½
45° deduct	Inches	¾	⅞	¾	⅞	⅞	1¼	1½	1⅞	2
60° deduct	Inches			1	1	1⅛	1½	1⅞	2⅓	2½

Pipe size	Inches	3	3½	4	5	6	8	10	12	
45° deduct	Inches	2⅜	2⅝	3	3⅝	4¼	5⅝	7⅛	8½	
60° deduct	Inches	3		3¾	4½	5½	9⅛	9⅛		

Note—The above figures represent 2xD. To find D divide by 2.

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Engineering Data

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Thermal Properties of Water.....page 726
Flow of Water Through Standard Wrought Iron or Steel Pipe.....page 727
Pressure Drop in Elbows and Bends.....page 728
Discharge of Water Through Pipes, Orifices, and Valves.....pages 729 to 731
Resistance of Valves and Fittings to Flow of Fluids.....pages 732 to 733
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Steam and Steam Data.....pages 741 to 742
Properties of Saturated Steam.....pages 743 to 748
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Properties of Saturated Ammonia.....pages 753 to 755
Mensuration of Plane Figures.....page 756
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Natural Trigonometric Functions.....pages 762 to 764

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For greater convenience, certain data of an engineering nature have been included in other sections of this catalogue with products to which they definitely pertain. Refer to the pages indicated below.

Normal Engagement Between Male and Female Threads.....page 367
American and British Standard Pipe Threads.....pages 594 to 595
Threading Material for Oil Country Tubular Goods.....pages 596 to 604
Railing Pipe Threads.....page 605
Formula for Determining Size of Stop-Check Valves.....page 380
Formula for Determining Size of Steam or Oil Separators.....page 430
Expansion of Wrought Iron, Steel, Brass, or Copper Pipe.....page 436
Expansion of Copper Tubing.....page 481
Spacing of Pipe Supports.....page 578
Deflection of Horizontal Pipe Lines.....page 579
Standard, Extra Strong, and Double Extra Strong Pipe Data.....page 593
Internal Fluid Pressures for Pipe.....page 610
Length of Pipe in Arc and in Bends.....pages 686 to 687
Calculation of Pipe Bends.....pages 688 to 689
45° and 60° Offset Chart.....page 690

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Design of Pipe Bends

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Design of Piping Systems....page 693
Definition of Symbols....page 694
Definition of Terms....pages 695 and 696
Pipe Bend Formulas....page 697
"K" and "β" Flattening Factors....page 698
"K" Values....page 699
Safe Deflection and Corresponding Force Values....page 700
Deflection and Force Factors....page 701
Cold Springing....page 702
Determining Pipe Bend Dimensions....pages 703 and 704

Tables of Safe Deflection Values and Force to Produce Deflection for Double Offset Expansion "U" Bends made of Grade "A" Pipe
3-Inch....page 705
3½-Inch....page 706
4-Inch....page 707
5-Inch....pages 708 and 709
6-Inch....pages 710 and 711
8-Inch....pages 712 and 713
10-Inch....pages 714 and 715
12-Inch....pages 716 and 717
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16-Inch....pages 720 and 721

Formulas for Special Types of Bends....pages 722 and 723

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For information on Pipe, Crane Shop Fabrication and Shop Facilities, Standard Types of Pipe Bends, and other allied subjects, see the section of this catalogue devoted to Pipe and Fabricated Piping, pages 581 to 690.

Design of Pipe Bends

— Foreword —

Crane Co., one of the outstanding pioneers in piping design, has provided reliable data on piping materials and pipe bends which has been used for many years. As early as 1914 tests were conducted on pipe bends to establish data to determine the safe expansion values of bends. This information was published in Crane catalogues and has been reproduced extensively in handbooks, engineering text books, etc.

Due to the fact that higher pressures and temperatures are now being used in both the oil and power piping industries, a pressing need has developed for more accurate information on the strength of piping materials and pipe bends. As this section pertains primarily to pipe bend design and not to the strength of the pipe materials, the former subject is described in detail, while only necessary references are made to the latter.

To correctly design a piping installation, there is a fundamental rule which must be followed. Pipe bends should absorb the total expansion of the pipe line without developing excessive stresses in the bends or anchors. Realizing the need for accurate and simplified data on this subject, Crane Co. investigated the problem thoroughly, conducted tests to check theoretical calculations, and simplified the information by preparing tables of safe deflection values, together with the resulting anchorage loads. The figures given in the tables are based on the common double-offset expansion "U" bend. Constants are given for the "U" bend with tangents and for the expansion "U" bend.

While it is true that the data presented covers only a small part of the analysis of stresses in a piping system, Crane Co.'s engineers are thoroughly capable of analyzing the reactions and stresses in any piping installation and are ready and willing to cooperate to the fullest extent with designers and engineers in the solution of more difficult problems.

××××××××××

Design of Piping Systems

A practical piping layout generally has many directional changes which are necessary to eliminate interference of the component parts. These changes in direction are usually provided for by ninety degree bends with long tangents and afford an excellent means for absorbing expansion of the piping caused by service temperatures. In many cases, however, where the pipe line is the connecting link between two headers or in long transmission lines, it is impractical to change the direction of the line and therefore, under these conditions, expansion bends or joints are required.

There are several types of bends which are generally used to care for the expansion of pipe lines, some of which are known as the double-offset expansion "U" bend as shown on page 701 in Figure No. 4, the expansion "U" bend, Figure No. 5, and the "U" bend with long tangents, Figure No. 6. It is the object of this section to present data covering the practical design of these bends.

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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Definition of Symbols

p = Pressure in pounds per square inch.
t = Thickness of pipe, inches.
OD = Outside diameter of pipe, inches.
ID = Inside diameter of pipe, inches.
r_o = Outside radius of pipe cross section, inches.
r = Mean radius of pipe cross section, inches.
r_i = Inside radius of pipe cross section, inches.
c = Distance to most strained fibre, inches.
ds = Element of arc, inches.
θ = Angle subtended by element of arc, degrees.
y = Distance of element of arc from axis of thrust, inches.
R = Radius of pipe bend, inches.
R_f = Radius of pipe bend, feet.
$\triangle$ = Deflection in direction of thrust, inches.
$\triangle_x$ = Deflection along X-axis, inches.
$\triangle_y$ = Deflection along Y-axis, inches.
F = Force or anchor reaction, pounds.
F_x = Force along X-axis, pounds.
F_y = Force along Y-axis, pounds.
M = Bending moment, inch pounds.
M_o = Resisting moment, foot pounds.
M_t = Torsional moment, inch pounds.
L =
L_o =
L_1 =
L_2 =
L_3 = } Length of tangents on bends.
E = Modulus of elasticity.
E_t = Modulus of elasticity at any specified temperature.
E_{32} = Modulus of elasticity at 32° Fahrenheit.
I = Moment of inertia of pipe, inches to the fourth power.
S = Longitudinal stress due to bending, pounds per square inch.
S_b = Transverse stress due to bending, pounds per square inch.
S_c = Allowable combined stress for pipe bends, pounds per square inch.
$S_{eq.}$ = Equivalent stress value, pounds per square inch.
S_l = Longitudinal stress due to internal pressure, pounds per square inch.
S_r = Radial stress due to internal pressure, pounds per square inch.
S_s = Shearing stress due to torsion, pounds per square inch.
S_t = Transverse stress due to internal pressure, pounds per square inch.
$h = \frac{tR}{r^2}$ = Factor which characterizes a pipe bend.
K = Rigidity factor
β = Longitudinal stress factor
γ = Transverse stress factor } Flattening factors for curved pipes.
C = Numerical coefficient of deflection-force formula.
N = Maximum moment arm ÷ R = stress-force coefficient.
$Q = \frac{C}{N}$ = Numerical coefficient of deflection-stress formula.
N_d = Deflection factor
N_f = Force factor } Constants for pipe bends.

Definition of Terms

Pipe bend design is associated closely with the strength and mechanics of materials. As these subjects are composed of terms which are not clearly understood by those who are not familiar with them, definitions of several terms closely affiliated with the design of pipe bends are given as follows:

STRESS:

Stress is the intensity of the force per unit area which resists a change in the shape of a body.

Stress may be caused by compressive, tensile, or shearing forces. A description of the various stress conditions is given below:

Stress due to internal pressure: A vessel subjected to internal pressure is under stresses which are illustrated in diagram below:

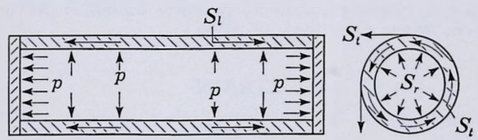


Figure No. 1

Radial stress, S_r — Radial stress is a compressive stress which is so small in comparison with other stresses that its effect can be neglected. Its magnitude may be considered to be equal to one half of the working pressure.

Transverse stress, S_t — Transverse, hoop, tangential, and circumferential stress are synonymous, describing a tensile stress in the pipe wall. The magnitude of this stress is given by the following formula:

$$S_t = \frac{p \times \text{ID}}{2t}$$

Longitudinal stress, S_l — Longitudinal stress due to internal pressure is a tensile stress which occurs in a pipe wall when the pipe has closed ends. The magnitude of this stress is given by the formula below:

$$S_l = \frac{p \times \text{ID}}{4t}$$

Stress due to bending:

Longitudinal stress, S — A longitudinal tensile stress set up in a beam due to bending is given by the formula:

$$S = \frac{Mc}{I}$$

When a curved pipe is subjected to bending, a flattening of the pipe cross section occurs which causes the stress in the fibres farthest removed from the neutral axis to be reduced. Professor W. Hovgaard* has conducted tests which indicate that the maximum longitudinal stress is at the mid-section of the pipe wall and can be obtained from the formula:

$$S = \frac{\beta M r}{I}$$

Transverse stress, S_b — Transverse stress due to bending is a tensile stress caused by flattening of the cross section of the pipe under a bending moment. It may be calculated by the following formula:

$$S_b = \frac{\gamma M r_o}{I} \qquad \text{Where: } \gamma = \frac{1.8h}{1 + 1.2h^2}$$

It was found by Professor Hovgaard that when a pipe bend, as a whole, is strained to the limit of proportionality, the calculated transverse stresses at their points of maximum value are ordinarily far in excess of the yield point. These stresses, however, are localized and are relieved by plastic flow, thus throwing the load on neighboring material. It was found that so long as the longitudinal stresses in the middle surface are within the limit of proportionality of the pipe material, the transverse stresses have no appreciable influence on the behavior of the pipe bend as a whole. Hence, in determining the allowable stress for pipe bends, Professor Hovgaard recommends — that the transverse stresses due to bending be neglected.

Shearing stress due to torsion, S_s — Shearing stress due to a torsional moment may be calculated by the following formula:

$$S_s = \frac{2M_t r_o}{\pi (r_o^4 - r_i^4)}$$

Allowable combined stress in pipe bends, S_c — According to the foregoing discussion, the following stresses must be considered:

S — the longitudinal stress due to bending
S_l — the longitudinal stress due to steam pressure
S_t — the transverse or hoop stress due to steam pressure
S_s — the shearing stress due to torsion

All these stresses are assumed to exist uniformly throughout the pipe wall.

*"Tests on High Pressure Pipe Bends", by Prof. William Hovgaard, Journal of Mathematics and Physics, M.I.T., Vol. 8, No. 4, 1929.

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Now, it was found by Professor Hovgaard, "that so long as the maximum longitudinal stress, tensile or compressive, at the middle surface does not exceed 20,000 pounds per square inch, there will be no appreciable set in a pipe bend. This rule is expected to hold for all pipes designed for moderate or high pressure, whether lap-welded or seamless, of a radius of curvature not less than some four or five diameters, provided also that the material from which the pipes are made is a ductile low-carbon steel or iron of good quality, with a yield point of not less than 25,000 pounds per square inch".

The tests on which this rule was based were made on pipes at ordinary room temperature and under no pressure. The longitudinal stress (S) referred to was entirely due to bending. As explained above, the transverse bending stresses due to flattening, although locally very high, could be disregarded, and thus the longitudinal stress could be adopted as a criterion of strength. There is under service conditions a longitudinal stress (S_l) which increases the total longitudinal stress, so that where the hoop stress due to steam pressure and the shearing stress due to torsion are insignificant, we need consider only the sum of the longitudinal stresses:

$$S + S_l = S_c$$

In cases where the pipe is subjected to a twisting moment and where the transverse stress can not be neglected, it is desirable to make use of the modern theory of strength developed by Dr. H. Hencky and described in Dr. A. Nadai's book: "Der Bildsame Zustand der Werkstoffe", pages 47-50 and 133-134. This theory is based on the hypothesis that the limit at which plastic flow begins depends on the elastic work of deformation. We have here a case of plane stress since the radial stress can be disregarded. The component stresses are then a longitudinal stress ($S + S_l$), a transverse stress (S_t), and a shearing stress (S_s).

Plastic flow will occur when the quantity:

$$S_{eq.} = \sqrt{(S + S_l)^2 - (S + S_l)S_t + S_t^2 + 3S_s^2}$$

reaches the value of the yield point under conditions of a simple tensional stress. We call $S_{eq.}$ the equivalent stress.

If there is no twisting moment on the pipe, $S_s = 0$

$$S_{eq.} = \sqrt{(S + S_l)^2 - (S + S_l)S_t + S_t^2}$$

In such a case, $(S + S_l)$ and S_t are principal stresses. $S_{eq.}$ is not an actually existing stress but a limiting quantity of the dimensions of a stress.

If S_t can also be disregarded, we have the condition of simple longitudinal stress.

In order to illustrate how the longitudinal stress compares with the equivalent stress found by combining the longitudinal and transverse stresses, the following example is given:

Assume a longitudinal tensile stress ($S + S_l$) of 12,000 pounds per square inch and a transverse stress due to pressure (S_t) of 3050 pounds per square inch

Then $S_{eq.} = \sqrt{12000^2 - 12000 \times 3050 + 3050^2} = \sqrt{116,702,500} = 10,800$

Therefore, it is noted that the equivalent stress is less than the longitudinal stress which indicates that it can not be used as the criterion of strength. If the transverse stress due to pressure is greater than the longitudinal stress, the equivalent stress will be the criterion of strength. As this condition very seldom occurs, it is suggested that the allowable combined stress be taken as the sum of the longitudinal stresses due to pressure and bending unless torsion is prevalent in the pipe line.

STRAIN

Strain is the linear deformation of a body under stress.

A metal bar which is subjected to a direct tensile load elongates uniformly throughout its entire length. This elongation is called strain, which is usually expressed as elongation per unit length.

MODULUS OF ELASTICITY

The modulus of elasticity of a material is the ratio of the stress to the corresponding strain.

In all elastic materials, the ratio of the stress to the corresponding strain is constant up to a certain figure, which is called the Proportional Limit of the material. Thus steel which elongates approximately .001" under a tensile stress of 30,000 pounds per square inch gives a constant of

$$\frac{30,000}{.001} = 30,000,000.$$

This figure is called Young's Modulus or the Modulus of Elasticity of the material.

Figure No. 3, page 700, gives the approximate modulus of elasticity for all carbon steels for temperatures up to 1200° F. and has been based upon the formula:

$$E_t = E_{32}\left[1 - \left(\frac{t-23}{1700}\right)^2\right]$$ Where "t" = Temperature

which has been developed by G. A. Orrok in his article on "High Pressure Steam Boilers" in A.S.M.E. Transactions of 1928.

MOMENT OF INERTIA

The expression for the moment of inertia of pipe is

$$I = .7854\ (r_o^4 - r_i^4)$$

Pipe Bend Formulas

The general mathematical expression for the horizontal deflection of a curved bar under load is given as

$$\text{Deflection} = \frac{M}{EI}y\,ds$$

Using the "U" bend as an example, the formula may be stated as follows:

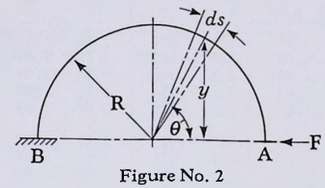


Figure No. 2

As; $F \times y = M$

$$\text{Deflection} = \triangle = \int_A^B \frac{Fy^2}{EI}\,ds = \frac{F}{EI}\int_o^\pi y^2 ds$$

$$y = R\sin\theta$$

$$ds = Rd\theta$$

$$\text{Therefore } \triangle = \frac{F}{EI}\int_o^\pi R^3\sin^2\theta d\theta$$

$$\triangle = \frac{FR^3}{EI}\left[\frac{\theta}{2} - \tfrac{1}{4}\sin 2\theta\right]_o^\pi$$

$$\triangle = \frac{\pi}{2} \times \frac{FR^3}{EI}$$

In this equation the factor $\frac{\pi}{2}$ is the deflection-force constant "C". The longitudinal stress set up in the U-bend made of solid bar stock may be expressed as

$$S = \frac{Mc}{I} = \frac{NFRr_o}{I}$$

Where:

$$M = NFR$$
$$c = r_o$$

In this equation the constant "N" is called the stress-force coefficient.

The formula for any pipe bend is the formula for a curved bar of the same contour with correction factors inserted to compensate for the flattening effect of the hollow circular cross section.

DEFLECTION—FORCE FORMULA:

$$\triangle = \frac{CKFR^3}{EI} \text{ or } F = \frac{\triangle EI}{CKR^3}$$

DEFLECTION—STRESS FORMULA:

$$\triangle = \frac{QKSR^2}{\beta Er} \text{ or } S = \frac{\triangle \beta Er}{QKR^2}$$

STRESS—FORCE FORMULA:

$$S = \frac{N\beta FRr}{I} \text{ or } F = \frac{SI}{N\beta Rr}$$

CORRECTION FACTORS TO INSERT IN CURVED BAR FORMULA

When a curved pipe is subjected to bending, the circular section tends to assume a flattened oval form, whereby the stresses in the material furthest from the neutral axis are relieved. The stresses, instead of following the usual linear law, will be maximum at a point nearer to the neutral axis, and the angular deflection of the bend will be increased over that obtained with a curved bar before equilibrium with a given bending moment is established. This fact was pointed out by Dr. Von Karman in Zeitschr., Vereines Deutscher Ingenieure, 1911, Volume 55, page 1889, who developed formulas for the flattening or "Rigidity Factor", as it is called.

In 1926 Professor William Hovgaard of the Massachusetts Institute of Technology, confirmed Karman's mathematical calculations by tests which are recorded in the "Journal of Mathematics and Physics", Volume VI, No. 2, November 1926, published by the Massachusetts Institute of Technology. He also developed a factor to insert in the stress deflection formula to compensate for the decrease in stress due to this flattening. The two formulas are listed below:

Rigidity Factor:

$$K = \frac{12h^2 + 10}{12h^2 + 1}$$

Longitudinal Stress Factor:

$\beta = \frac{2K}{3}\sqrt{\frac{6h^2+5}{18}}$ For values of "h" less than 1.472.

$\beta = \frac{12h^2 - 2}{12h^2 + 1}$ For values of "h" equal to or greater than 1.472.

Table No. 1 gives "K" and "β" values for values of "h" from .26 to 7.50.

Table No. 2 gives "K" values for pipe bends in sizes from 3" to 16" inclusive for varying radii and weights of pipe.

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"K" and "B" Flattening Factors for Pipe Bends

Table No. 1

h	K	β	h	K	β	h	K	β	h	K	β	h	K	β
.26	5.97	2.18	.76	2.13	.974	1.26	1.45	.867	1.76	1.236	.921	2.76	1.097	.968
.27	5.80	2.13	.77	2.11	.969	1.27	1.44	.867	1.78	1.231	.923	2.78	1.096	.968
.28	5.64	2.07	.78	2.08	.963	1.28	1.44	.870	1.80	1.226	.925	2.80	1.095	.968
.29	5.48	2.02	.79	2.06	.957	1.29	1.43	.870	1.82	1.221	.926	2.90	1.088	.971
.30	5.33	1.97	.80	2.04	.952	1.30	1.423	.870	1.84	1.216	.928	3.00	1.083	.972
.31	5.18	1.92	.81	2.01	.944	1.31	1.417	.871	1.86	1.211	.929	3.10	1.077	.974
.32	5.04	1.88	.82	1.99	.940	1.32	1.411	.871	1.88	1.207	.931	3.20	1.073	.976
.33	4.90	1.83	.83	1.97	.935	1.33	1.405	.872	1.90	1.203	.932	3.30	1.068	.977
.34	4.77	1.79	.84	1.95	.931	1.34	1.400	.873	1.92	1.199	.934	3.40	1.064	.979
.35	4.64	1.74	.85	1.93	.926	1.35	1.393	.874	1.94	1.195	.935	3.50	1.061	.980
.36	4.52	1.71	.86	1.91	.922	1.36	1.388	.875	1.96	1.191	.936	3.60	1.058	.981
.37	4.41	1.68	.87	1.89	.917	1.37	1.383	.876	1.98	1.187	.938	3.70	1.054	.982
.38	4.29	1.63	.88	1.87	.915	1.38	1.377	.877	2.00	1.184	.939	3.80	1.052	.983
.39	4.19	1.60	.89	1.86	.913	1.39	1.372	.878	2.02	1.180	.940	3.90	1.049	.984
.40	4.08	1.56	.90	1.84	.908	1.40	1.367	.879	2.04	1.177	.941	4.00	1.047	.984
.41	3.98	1.53	.91	1.82	.903	1.41	1.362	.880	2.06	1.173	.942	4.10	1.044	.985
.42	3.89	1.50	.92	1.81	.903	1.42	1.357	.881	2.08	1.170	.943	4.20	1.042	.986
.43	3.80	1.477	.93	1.79	.898	1.43	1.352	.883	2.10	1.167	.944	4.30	1.040	.987
.44	3.71	1.446	.94	1.78	.898	1.44	1.347	.884	2.12	1.164	.945	4.40	1.039	.987
.45	3.62	1.419	.95	1.76	.893	1.45	1.343	.886	2.14	1.161	.946	4.50	1.037	.988
.46	3.54	1.393	.96	1.75	.893	1.46	1.339	.887	2.16	1.158	.947	4.60	1.035	.988
.47	3.47	1.367	.97	1.73	.888	1.47	1.334	.888	2.18	1.155	.948	4.70	1.034	.989
.48	3.39	1.347	.98	1.72	.887	1.48	1.330	.890	2.20	1.152	.949	4.80	1.032	.989
.49	3.32	1.323	.99	1.70	.884	1.49	1.326	.891	2.22	1.150	.950	4.90	1.031	.990
.50	3.25	1.302	1.00	1.69	.880	1.50	1.321	.893	2.24	1.147	.951	5.00	1.030	.990
.51	3.18	1.280	1.01	1.68	.880	1.51	1.317	.894	2.26	1.144	.952	5.10	1.029	.990
.52	3.12	1.262	1.02	1.67	.879	1.52	1.313	.895	2.28	1.142	.953	5.20	1.028	.991
.53	3.06	1.243	1.03	1.66	.879	1.53	1.309	.897	2.30	1.140	.953	5.30	1.027	.991
.54	3.00	1.224	1.04	1.64	.873	1.54	1.305	.898	2.32	1.137	.954	5.40	1.026	.991
.55	2.94	1.205	1.05	1.63	.873	1.55	1.301	.899	2.34	1.135	.955	5.50	1.025	.992
.56	2.89	1.190	1.06	1.62	.872	1.56	1.298	.901	2.36	1.133	.956	5.60	1.024	.992
.57	2.84	1.176	1.07	1.61	.871	1.57	1.294	.902	2.38	1.130	.957	5.70	1.023	.992
.58	2.79	1.161	1.08	1.60	.871	1.58	1.291	.903	2.40	1.128	.957	5.80	1.022	.993
.59	2.74	1.146	1.09	1.59	.870	1.59	1.287	.903	2.42	1.126	.958	5.90	1.021	.993
.60	2.69	1.131	1.10	1.58	.869	1.60	1.283	.906	2.44	1.124	.959	6.00	1.020	.993
.61	2.65	1.122	1.11	1.57	.869	1.61	1.280	.907	2.46	1.122	.959	6.10	1.020	.993
.62	2.60	1.105	1.12	1.56	.867	1.62	1.277	.908	2.48	1.120	.960	6.20	1.019	.994
.63	2.56	1.094	1.13	1.55	.867	1.63	1.274	.909	2.50	1.118	.961	6.30	1.019	.994
.64	2.52	1.082	1.14	1.54	.867	1.64	1.270	.910	2.52	1.117	.961	6.40	1.018	.994
.65	2.48	1.069	1.15	1.53	.867	1.65	1.267	.911	2.54	1.115	.962	6.50	1.018	.994
.66	2.45	1.060	1.16	1.52	.867	1.66	1.264	.912	2.56	1.113	.962	6.60	1.017	.994
.67	2.41	1.051	1.17	1.52	.867	1.67	1.261	.913	2.58	1.111	.963	6.70	1.017	.994
.68	2.37	1.038	1.18	1.51	.867	1.68	1.258	.914	2.60	1.110	.963	6.80	1.017	.995
.69	2.34	1.030	1.19	1.50	.866	1.69	1.255	.915	2.62	1.108	.964	6.90	1.016	.995
.70	2.31	1.023	1.20	1.49	.864	1.70	1.252	.916	2.64	1.106	.965	7.00	1.015	.995
.71	2.28	1.015	1.21	1.48	.863	1.71	1.249	.917	2.66	1.105	.965	7.10	1.015	.995
.72	2.25	1.007	1.22	1.48	.864	1.72	1.247	.918	2.68	1.103	.966	7.20	1.014	.995
.73	2.22	.999	1.23	1.47	.866	1.73	1.243	.919	2.70	1.102	.966	7.30	1.014	.995
.74	2.19	.991	1.24	1.46	.866	1.74	1.241	.920	2.72	1.100	.967	7.40	1.014	.995
.75	2.16	.982	1.25	1.46	.867	1.75	1.238	.921	2.74	1.099	.967	7.50	1.013	.996

"K" Values for Pipe Bends

Table No. 2

Nominal Pipe Size Inches	Wall Thickness Inches	Radius of Bend, Inches															
		12″	14″	15″	20″	25″	30″	35″	40″	45″	50″	60″	70″	80″	90″	100″	110″
3	.216	1.75	1.56	1.49	1.29	1.18	1.13	1.10	1.07	1.06	1.05	1.03					
	.300	1.37	1.27	1.24	1.13	1.09	1.06	1.05	1.03	1.02	1.02	1.01					
	.437	1.15	1.11	1.09	1.05	1.03	1.02	1.02	1.01	1.00	1.00	1.00					
3½	.226		1.86	1.76	1.44	1.29	1.20	1.15	1.12	1.09	1.07	1.05	1.04				
	.318		1.41	1.36	1.21	1.14	1.10	1.07	1.05	1.04	1.03	1.02	1.02				
4	.237			2.08	1.64	1.42	1.30	1.22	1.17	1.13	1.11	1.07	1.05	1.04			
	.337			1.52	1.30	1.19	1.14	1.10	1.08	1.06	1.05	1.04	1.03	1.02			
	.437			1.28	1.17	1.11	1.08	1.05	1.04	1.03	1.02	1.02	1.01	1.00			
	.531			1.18	1.10	1.07	1.04	1.03	1.02	1.02	1.01	1.01	1.00	1.00			
5	.258				2.21	1.81	1.58	1.44	1.34	1.27	1.22	1.15	1.11	1.09	1.07		
	.375				1.55	1.37	1.26	1.19	1.14	1.11	1.09	1.06	1.05	1.04	1.03		
	.500				1.29	1.19	1.13	1.10	1.08	1.06	1.05	1.03	1.02	1.02	1.01		
	.625				1.18	1.11	1.08	1.06	1.04	1.03	1.02	1.02	1.01	1.00	1.00		
6	.280					2.32	1.96	1.72	1.57	1.46	1.37	1.26	1.19	1.15	1.12	1.10	
	.432					1.55	1.39	1.29	1.23	1.18	1.14	1.09	1.07	1.06	1.04	1.03	
	.562					1.31	1.22	1.16	1.12	1.10	1.08	1.06	1.04	1.03	1.02	1.02	
	.718					1.18	1.12	1.09	1.07	1.05	1.04	1.03	1.02	1.02	1.01	1.00	
8	.277						3.39	2.89	2.52	2.25	2.04	1.75	1.57	1.44	1.35	1.29	1.24
	.322						2.89	2.48	2.16	1.95	1.78	1.56	1.42	1.33	1.26	1.21	1.17
	.500						1.82	1.62	1.48	1.39	1.32	1.22	1.16	1.13	1.10	1.08	1.07
	.593						1.58	1.43	1.33	1.27	1.22	1.15	1.11	1.09	1.07	1.06	1.05
	.906						1.22	1.16	1.13	1.10	1.08	1.06	1.04	1.03	1.03	1.02	1.01

Nominal Pipe Size Inches	Wall Thickness Inches	Radius of Bend, Inches												
		40″	45″	50″	60″	70″	80″	90″	100″	110″	120″	130″	140″	150″	160″
10	.307	3.62	3.18	2.89	2.37	2.06	1.84	1.68	1.55	1.46	1.39	1.34			
	.365	3.00	2.65	2.37	2.01	1.76	1.60	1.48	1.39	1.33	1.27	1.24			
	.500	2.13	1.91	1.76	1.54	1.40	1.31	1.25	1.20	1.17	1.14	1.12			
	.593	1.81	1.66	1.53	1.38	1.28	1.22	1.17	1.14	1.12	1.10	1.08			
	.718	1.54	1.44	1.36	1.25	1.18	1.14	1.11	1.09	1.08	1.06	1.05			
	1.125	1.20	1.16	1.13	1.09	1.06	1.05	1.04	1.03	1.03	1.02	1.02			
12	.330		4.19	3.80	3.18	2.69	2.37	2.11	1.91	1.78	1.66	1.57	1.49		
	.375		3.71	3.32	2.75	2.35	2.08	1.87	1.72	1.60	1.51	1.44	1.38		
	.406		3.39	3.06	2.52	2.16	1.93	1.75	1.61	1.52	1.44	1.37	1.33		
	.500		2.69	2.42	2.04	1.79	1.61	1.49	1.40	1.34	1.28	1.24	1.21		
	.687		1.93	1.78	1.55	1.41	1.32	1.25	1.21	1.17	1.14	1.12	1.11		
	.843		1.61	1.50	1.35	1.26	1.20	1.16	1.13	1.11	1.09	1.08	1.07		
	1.312		1.23	1.18	1.13	1.09	1.07	1.06	1.05	1.04	1.03	1.03	1.02		
14	.312			4.90	4.08	3.47	3.06	2.69	2.41	2.22	2.04	1.89	1.79	1.69	
	.375			4.08	3.39	2.84	2.48	2.22	2.01	1.86	1.73	1.63	1.55	1.48	
	.437			3.47	2.84	2.45	2.13	1.93	1.76	1.64	1.54	1.47	1.41	1.36	
	.750			1.91	1.66	1.49	1.38	1.31	1.25	1.21	1.18	1.15	1.13	1.11	
	.937			1.58	1.41	1.31	1.24	1.19	1.15	1.13	1.11	1.09	1.08	1.07	
	1.406			1.23	1.16	1.12	1.09	1.07	1.06	1.05	1.04	1.03	1.03	1.03	
16	.312				5.33	4.64	3.98	3.54	3.18	2.89	2.65	2.45	2.28	2.13	2.01
	.375				4.41	3.80	3.32	2.94	2.65	2.41	2.19	2.04	1.91	1.81	1.72
	.500				3.25	2.79	2.41	2.16	1.97	1.81	1.69	1.60	1.52	1.46	1.41
	.843				1.87	1.66	1.52	1.41	1.33	1.28	1.24	1.20	1.18	1.15	1.13
	1.031				1.58	1.43	1.33	1.26	1.22	1.18	1.15	1.13	1.11	1.10	1.09
	1.437				1.27	1.20	1.16	1.12	1.10	1.08	1.07	1.06	1.05	1.05	1.04

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Safe Deflection and Corresponding Force Values For Pipe Bends

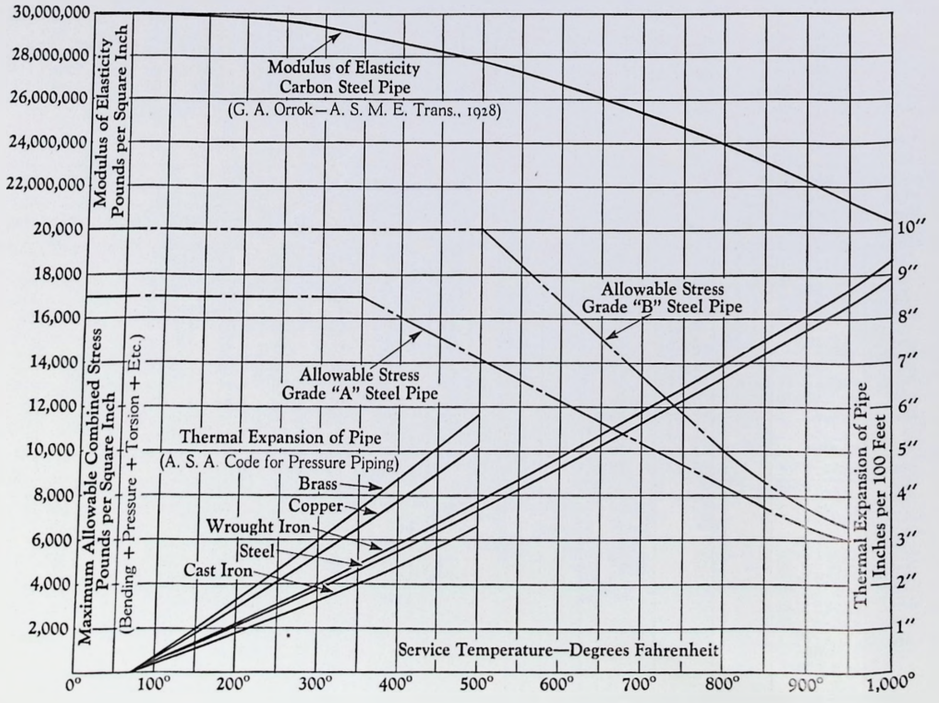
Tables No. 3 to 12, pages 705 to 721 inclusive, give the safe deflection values for double-offset expansion "U" Bends installed under the conditions as illustrated. Tables No. 3A to 12A, inclusive, give the force values required to produce the corresponding safe deflection values as given in the preceding tables. The data covers bends subjected to steam temperatures from room temperature to 850° F. and with radii from approximately 4 pipe diameters to 20 in the smaller and 10 in the larger sizes of pipe.

The figures given in the tables have been calculated on the basis of the assumption that the double-offset expansion "U" Bend is installed under conditions which will not prevent, to any great extent, rotation of the ends of the bend. This condition is approximately obtained. for all practical purposes, when the unanchored length of pipe in which the bend is installed, is equal to approximately 24 times the radius of the bend. This assumption applies to all symmetrical bends of a similar type.

The following stresses and modulus of elasticity values were used in the calculation of the tabulated data. The stress listed for each temperature condition was determined by subtracting the approximate maximum longitudinal stress caused by internal pressure, from the allowable combined stress value given in Figure No. 3. The modulus of elasticity values were also taken from Figure No. 3.

Temperature	Allowable Bending Stress, Grade "A" Pipe Pounds per square inch	Modulus of Elasticity
350° F.	14,700	28,900,000
450	12,700	28,200,000
550	10,600	27,200,000
650	9,050	26,000,000
750	7,100	24,600,000
800	6,700	23,800,000
850	6,000	23,000,000

Figure No. 3



Deflection and Force Factors for Pipe Bends

The formulas for determining the deflection and force values for symmetrical bends have been developed from a basic formula which therefore makes it possible to express the deflection or force for any type of bend made in any material in terms of constants which when multiplied by the deflection and force values for the double-offset expansion "U" Bend give the corresponding values for the specific bend to which the factors apply.

The factors for bends made from Grade "B" pipe per A.S.T.M. Specification A-106 are as follows:

Temperature	Grade "B" Pipe Factor
350° F.	1.14
450	1.32
550	1.42
650	1.31
750	1.18
800	1.12
850	1.09

Figures No. 4, 5, and 6 give deflection and force factors for three types of bends as shown.

Double-Offset Expansion "U" Bend

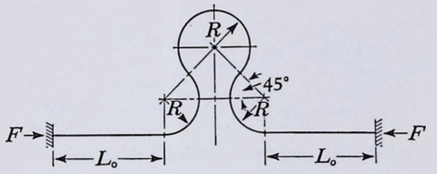


Figure No. 4

L_o	C	N	Q	Deflection Factor N_d	Force Factor N_f
12R	39.88	3.41*	11.68*	1.00	1.0
9R	35.70	3.19*	11.20*	.96	1.1
6R	29.30	2.82*	10.40*	.89	1.2
3R	21.90	2.41*	9.10*	.78	1.4
0	12.30	1.70	7.23	.62	2.0

*Approximate values based on free end assumption.

Expansion "U" Bend

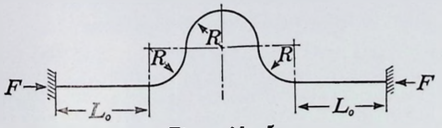


Figure No. 5

L_o	C	N	Q	Deflection Factor N_d	Force Factor N_f
12R	9.42	2.00*	4.71*	.40	1.7
9R	7.77	1.70*	4.57*	.39	2.0
6R	6.58	1.50*	4.39*	.38	2.3
3R	5.00	1.25*	4.00*	.34	2.7
0	3.14	1.00	3.14	.27	3.5

*Approximate values based on free end assumption

"U" Bend with Tangents

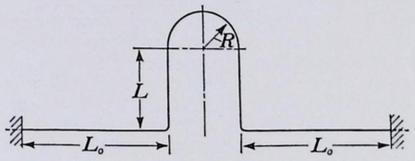
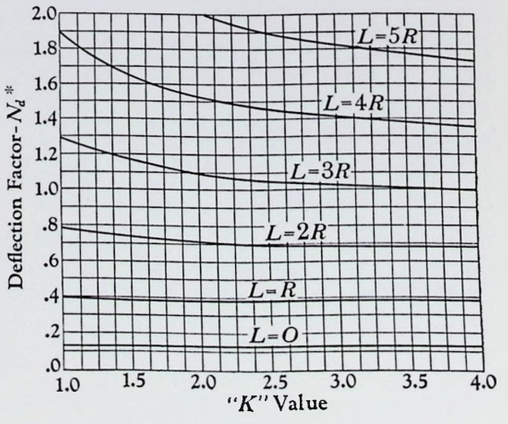


Figure No. 6
L_o Equal to 12R or More

Force Factor N_f*

L	N_f
O	3.4
R	1.7
$2R$	1.13
$3R$	.83
$4R$	.68
$5R$	.57

*Approximate values based on free end assumption.



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Cold Springing of Pipe Bends

When a piping system is erected, it is usually the general practice to "cold spring" the piping into place. The pipe is cut short approximately one-half of the calculated total expansion and pulled into position by means of the bolts in the flange joints or by some other method. This procedure reduces the forces and stresses in the pipe line under the operating conditions, provided advantage is not taken of the "cold spring" when designing the bend.

Designers of piping installations have generally followed the practice of subtracting the amount of "cold spring" from the total expansion of the line, thereby reducing the size of bend necessary to absorb the expansion. If, however, the total amount of "cold spring" is subtracted from the total expansion, any slippage of piping through anchorages or loss in "cold spring" by rotation of flange joints when the piping is not in one plane, increases the forces and stresses under the operating conditions. Therefore, when design expansion values are reduced by "cold spring", consideration must be given to the fact that some of the calculated "cold spring" may be lost in erection. This has been anticipated in the American Standard Code for Pressure Piping (issued as a tentative standard in June, 1935) which reads as follows:

> "As an additional expansion precaution and to facilitate assembly, the pipe may be cut short by an amount approximately one-half the calculated expansion and sprung into place. No reduction in the expansion to be cared for shall be made because of such cold springing except where a section of the line between anchors lies in one plane, in which case the effective expansion between anchors may be taken as not less than two-thirds of that determined for the temperature condition."

Crane Co. has designed and furnished pipe bends for many years and has recommended in practically every case that the piping be "cold sprung" approximately one-half of the expansion to be cared for. In fact, in one of our recent publications "Pipe & Pipe Bends", it was recommended that pipe bends could be "cold sprung" until the stress was equal to that permitted at room temperature. This procedure resulted in a "cold spring" percentage greater than 50 in some cases, especially where the allowable stress under the operating temperature was low. Where a pipe bend is installed in a line located in one plane and care is taken to eliminate any "cold spring" loss and where it is not necessary to comply with the Code for Pressure Piping, the "cold spring" value may be assumed as being equal to the deflection given in the Deflection Tables for 350° F.

As it is impossible to supervise all installations of pipe bends to prevent any "cold spring" loss, Crane Co. will, unless otherwise specified, use the design procedure for cold springing pipe bends as given in the Code for Pressure Piping.

To illustrate the application of "cold spring" to a practical problem, the following example is assumed:

EXAMPLE

A 10″ double-offset expansion "U" bend made from Grade "A" pipe .365" thick is to be installed in a one plane pipe line 200 feet long anchored at its extremities and operating at a temperature of 750° F.

Given:

Size of pipe = 10″ nominal diameter
Thickness of pipe = .365″
Length of line = 200 Feet
Operating temperature = 750° F.
Expansion from 70° to 750° F. = 12.30″

Bend Installed with No "Cold Spring"

Bend should be designed for 12.30″ at 750° F.

Referring to Table 9, page 714, the radius is given as approximately 115″.

Bend Installed in Accordance with the Code for Pressure Piping

Bend should be "cold sprung" $\frac{12.30''}{2} = 6.15''$ and designed for $\frac{2}{3} \times 12.30'' = 8.20''$ at 750° F.

Referring to Table 9, page 714, the radius is given as approximately 85″.

Bend Installed with Maximum "Cold Spring" Value

The "Cold Spring" added to the allowable deflection under the operating conditions should be equal to the total expansion of the line.

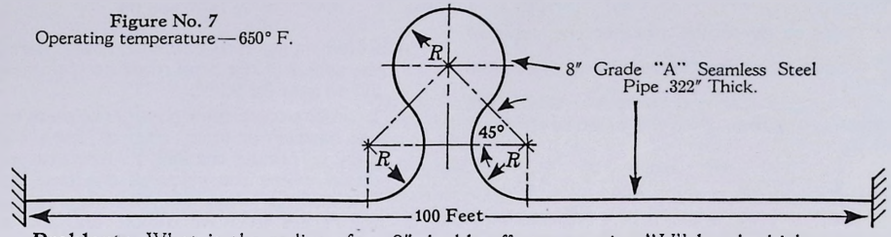
Referring to Table 9, page 714, it is noted that the result of the addition of the deflection values given under the 60″ radius for 350° F. and 750° F. is 8.8″ + 5.0″ = 13.8″, which is greater than the total expansion of the line.

A 60″ radius double-offset expansion "U" bend may therefore be used if the bend is "cold sprung" 8.8″ during erection and care is taken to prevent any loss in the "cold spring" value.

Determining Pipe Bend Dimensions

Example No. 1

Figure No. 7
Operating temperature—650° F.



Problem: What is the radius of an 8″ double-offset expansion "U" bend which must absorb the expansion of 100 feet of 8″—.322″ wall thickness Grade "A" seamless steel pipe which is subjected to a total steam temperature of 650° F.? The bend is to be made from the same material and weight of pipe and the piping will be anchored at its extremities.

Procedure: Note: The location of the bend in the line with reference to the fixed ends will not alter the maximum stress value.

1. Figure No. 3, page 700, shows that the expansion of 100 feet of steel pipe from 70° to 650° F. is approximately 5.10″.
2. Referring to page 702 it is noted that according to the Code for Pressure Piping the bend may be cold sprung 50 per cent of the total expansion, i.e., 2.55″, under which condition it must be designed for ⅔ of 5.10″ or 3.40″.
3. Referring to Table No. 8, page 712, for 8″ pipe under a temperature of 650° F. and a wall thickness of .322″, it is ascertained that a radius of 40″ is required to care for 3.40″.
4. In order to determine whether the value of $\frac{L_o}{R}$ is equal to or greater than 12 (the assumed value for the free end condition) divide the length of the line minus the width of the bend by 2R,

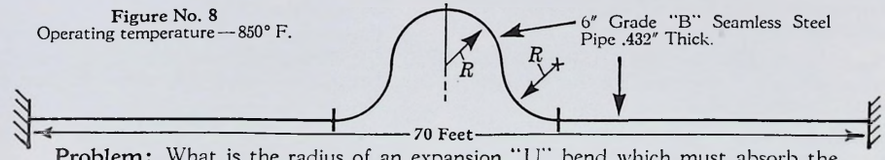
$$\frac{L_o}{R} = \frac{1200 - 2.83R}{2R} = \frac{1200 - 113.2}{80} = 13.6$$

Note: If $\frac{L_o}{R}$ is less than 12 the proper N_d and N_f factors as given in Figure No. 4, page 701, should be used as shown in Example No. 2.

5. To determine the approximate anchorage reaction or force refer to Table No. 8A, page 713. Under the 40″ radius column opposite the wall thickness of .322″ for a temperature of 650° F. the force value is given as 1170 pounds.

Example No. 2

Figure No. 8
Operating temperature—850° F.



Problem: What is the radius of an expansion "U" bend which must absorb the expansion of 70 feet of 6″—.432″ wall thickness Grade "B" seamless steel pipe which is subjected to a total steam temperature of 850° F.? The bend is to be made from the same material and weight of pipe and the piping is to be anchored at its extremities.

Procedure: Note: The location of the bend in the line with reference to the fixed ends will not alter the maximum stress value.

1. Figure No. 3, page 700, shows that the expansion of 70 feet of steel pipe from 70° to 850° F. is approximately $\frac{70}{100} \times 7.2 = 5.04''$.
2. Referring to page 702 it is noted that according to the Code for Pressure Piping, the bend may be cold sprung 50 per cent of the total expansion, i.e., 2.52″, under which condition it must be designed for ⅔ of 5.04″ or 3.36″.
3. As the bend is to be made of Grade "B" pipe, the design expansion value should be divided by the constant for this material for 850° F. on page 701. Therefore $\frac{3.36}{1.09} = 3.08''$.
4. Divide this figure, 3.08″, by the deflection factor, N_d, given in Figure No. 5, page 701, for the expansion "U" bend with $L_o = 12R$ to obtain the corresponding deflection value for this type of bend. Thus, $\frac{3.08}{.40} = 7.7''$.
5. Referring to Table No. 7, page 710, for 6″ pipe under a temperature of 850° F. and a wall

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(Procedure — Example No. 2 — Continued)

thickness of .432″, it is ascertained that a radius of approximately 85″ is required to care for 7.7″.

6. In order to determine whether the value of $\frac{L_o}{R}$ is equal to or greater than 12 (the assumed value for the free end condition) divide the length of the line minus the width of the bend by $2R$.

$$\frac{L_o}{R} = \frac{840 - 4R}{2R} = \frac{840 - 340}{170} = 2.94$$

7. As the value of $\frac{L_o}{R}$ is less than 12, it is necessary to refer to Figure No. 5 where it is noted that the deflection factor, N_d, for the expansion "U" bend installed in a line having an L_o of $3R$, is approximately .34.

8. Referring to step No. 4, the value of the divisor should be changed from .40 to .34, which results in

$$\frac{3.08}{.34} = 9.06″$$

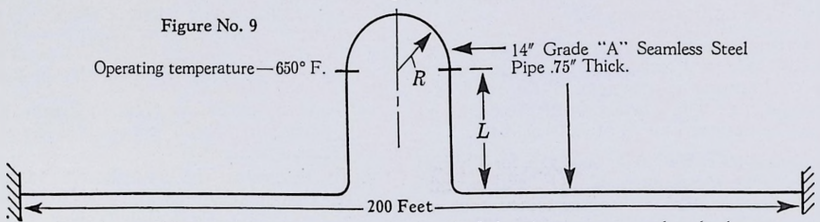
9. Referring again to Table No. 7 it is noted that the radius of the bend must be approximately 93″ to care for 9.06″.

10. In order to determine the approximate anchorage reaction or force, refer to Table No. 7A, page 711, under the 850° F. temperature condition where the value of the force for the free end condition can be interpolated from the figures given for the 90″ and 100″ radius as being approximately 250 pounds. This value must then be multiplied by the force factor, N_f, for $L_o = 3R$ as given in Figure No. 5 and also by the Grade "B" pipe factor of 1.09 (as given in step No. 3), to obtain the actual force. Therefore,

$$F = 250 \times 2.7 \times 1.09 = 736 \text{ pounds}$$

Example No. 3

Figure No. 9



Problem: What are the dimensions of a bend of the above type to absorb the expansion of 200 feet of 14″—.75″ wall thickness Grade "A" seamless steel pipe which is subjected to a total steam temperature of 650° F.? The bend is to be made from the same material and weight of pipe and the piping is to be anchored at its extremities.

Procedure: Note: The location of the bend in the line with reference to the fixed ends will not alter the maximum stress value.

1. Figure No. 3, page 700, shows that the expansion of 200 feet of steel pipe from 70° to 650° F. is approximately 10.2″.

2. Referring to page 702 it is noted that according to the Code for Pressure Piping, the bend may be cold sprung 50 per cent of the total expansion, i.e., 5.10″, under which condition it must be designed for ⅔ of 10.2″ or 6.8″.

3. It is recommended that in designing a bend of this type the radius of the upper portion be made to equal at least five times the nominal diameter of the pipe, which in this case will be 70″.

4. Referring to the tabulation of "K" values for 14″ pipe, Table 2, page 699 under the 70″ radius opposite the thickness of .75″, the "K" value for this particular bend is found to be equal to 1.49.

5. Referring to Table No. 11, page 718, it is noted that a 70″ radius double offset expansion "U" bend operating under a temperature of 650° with a wall thickness of .75″ will care for an expansion of 5.2″.

6. Divide the required expansion value (6.8″) by the deflection value determined from Table No. 11 (5.2″) to obtain the deflection factor N_d.

$$N_d = \frac{6.8}{5.2} = 1.31$$

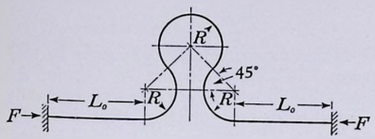
7. Referring to Figure 6, page 701, it is noted that the intersection of lines drawn through the "K" value, 1.49, and the deflection factor, N_d, 1.31, is at the value of L = approximately $3.3R$, which indicates that the length $L = 3.3 \times 70 = 231″$.

8. In order to determine the approximate anchorage reaction or force, refer to Table No. 11A, page 719, which gives a force value of 4480 pounds for a 70″ radius double offset expansion "U" bend operating at a temperature of 650°, and then to the small table below Figure No. 6 where the force factor, N_f, for a value of $L = 3.3R$ is given as approximately .78. Multiply 4480 pounds by the force factor .78 to determine the anchorage reaction or force for the above bend.

$$F = 4480 \times .78 = 3494 \text{ pounds}$$

3″ Double Offset Expansion "U" Bends

Grade "A" Pipe—3.500″ O.D.



The values given in the tables shown below apply only to 3″ Double Offset Expansion "U" Bends made of Grade "A" Pipe (3.500″ O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than $12R$.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 3 – Safe Deflection Values, Inches

Temperature	Wall Thickness	Radius of Bend, Inches 12″	14″	15″	20″	25″	30″	35″	40″	45″	50″	60″
350° F.	.216″	1.0″	1.3″	1.4″	2.1″	2.9″	3.9″	5.1″	6.5″	7.9″	9.6″	13.4″
	.300	.8	1.1	1.2	1.8	2.6	3.7	4.8	6.2	7.7	9.4	13.4
	.437	.7	.9	1.0	1.7	2.5	3.6	4.8	6.2	7.9	9.8	14.1
450° F.	.216	.9	1.1	1.2	1.9	2.6	3.5	4.5	5.7	7.0	8.5	11.9
	.300	.7	.9	1.0	1.6	2.3	3.3	4.3	5.5	6.8	8.3	11.9
	.437	.6	.8	.9	1.5	2.2	3.2	4.2	5.5	7.0	8.6	12.5
550° F.	.216	.8	1.0	1.1	1.6	2.3	3.0	3.9	4.9	6.1	7.4	10.3
	.300	.6	.8	.9	1.4	2.0	2.8	3.7	4.8	5.9	7.2	10.3
	.437	.5	.7	.8	1.3	1.9	2.8	3.7	4.8	6.1	7.5	10.8
650° F.	.216	.7	.9	1.0	1.5	2.0	2.7	3.5	4.4	5.4	6.6	9.2
	.300	.6	.7	.8	1.2	1.8	2.5	3.3	4.2	5.3	6.4	9.2
	.437	.5	.6	.7	1.2	1.7	2.5	3.3	4.3	5.4	6.7	9.6
750° F.	.216	.6	.7	.8	1.2	1.7	2.2	2.9	3.7	4.5	5.5	7.6
	.300	.5	.6	.7	1.0	1.5	2.1	2.7	3.5	4.4	5.3	7.6
	.437	.4	.5	.6	1.0	1.4	2.0	2.7	3.5	4.5	5.5	8.0
800° F.	.216	.6	.7	.8	1.2	1.6	2.2	2.8	3.6	4.4	5.3	7.4
	.300	.5	.6	.6	1.0	1.5	2.0	2.7	3.4	4.3	5.2	7.4
	.437	.4	.5	.6	.9	1.4	2.0	2.6	3.5	4.4	5.4	7.8
850° F.	.216	.5	.7	.7	1.1	1.5	2.0	2.6	3.3	4.1	5.0	7.0
	.300	.4	.5	.6	.9	1.4	1.9	2.5	3.2	4.0	4.9	7.0
	.437	.4	.5	.5	.9	1.3	1.9	2.5	3.2	4.1	5.1	7.3

Table No. 3 A – Force in Pounds to Produce Deflection Given in Table No. 3

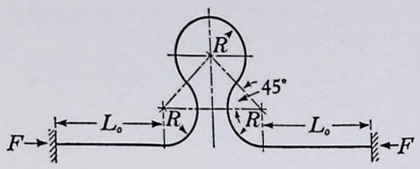
Temperature	Wall Thickness	Radius of Bend, Inches 12″	14″	15″	20″	25″	30″	35″	40″	45″	50″	60″
350° F.	.216″	730#	640#	600#	450#	350#	280#	230#	200#	180#	160#	130#
	.300	1000	840	780	560	430	360	300	260	230	210	175
	.437	1250	1050	980	730	570	470	400	350	310	280	240
450° F.	.216	630	560	520	390	300	240	200	175	155	140	115
	.300	860	730	670	480	370	310	260	230	200	180	150
	.437	1090	920	850	625	490	410	350	300	270	240	200
550° F.	.216	530	470	430	320	250	200	170	145	130	115	95
	.300	730	610	560	410	310	260	220	190	170	150	125
	.437	920	770	710	530	410	340	290	260	230	200	170
650° F.	.216	450	400	370	280	210	175	145	125	110	100	80
	.300	620	520	480	350	270	220	185	160	140	130	105
	.437	780	650	600	450	350	290	250	220	195	175	145
750° F.	.216	350	310	290	210	165	135	115	100	85	75	65
	.300	480	410	370	270	210	170	145	125	110	100	85
	.437	610	510	470	350	270	230	190	170	150	135	115
800° F.	.216	330	290	270	200	155	125	110	95	80	75	60
	.300	450	380	350	260	195	165	135	120	105	95	80
	.437	570	480	440	330	260	210	180	160	140	130	105
850° F.	.216	300	260	240	180	140	115	95	85	75	65	55
	.300	410	340	320	230	175	145	120	105	95	85	70
	.437	510	430	400	300	230	190	165	145	130	115	95

Values given in Table No. 3 do not include cold spring; see page 702.

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3½" Double Offset Expansion "U" Bends

Grade "A" Pipe—4.000" O.D.



The values given in the tables shown below apply only to 3½" Double Offset Expansion "U" Bends made of Grade "A" Pipe (4.000" O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than 12R.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 4 – Safe Deflection Values, Inches

Temperature	Wall Thickness	Radius of Bend, Inches										
		14"	15"	20"	25"	30"	35"	40"	45"	50"	60"	70"
350° F.	.226"	1.3"	1.4"	2.1"	2.9"	3.8"	4.8"	6.0"	7.3"	8.6"	12.0"	15.9"
	.318	1.0	1.1	1.8	2.5	3.3	4.3	5.5	6.8	8.4	11.7	15.8
450° F.	.226	1.1	1.2	1.9	2.6	3.4	4.3	5.3	6.5	7.6	10.6	14.1
	.318	.9	1.0	1.6	2.2	2.9	3.8	4.9	6.0	7.4	10.3	14.0
550° F.	.226	1.0	1.1	1.6	2.2	2.9	3.7	4.6	5.6	6.6	9.2	12.2
	.318	.8	.9	1.3	1.9	2.6	3.3	4.2	5.2	6.4	9.0	12.1
650° F.	.226	.9	1.0	1.4	2.0	2.6	3.3	4.1	5.0	5.9	8.2	10.9
	.318	.7	.8	1.2	1.7	2.3	3.0	3.7	4.6	5.7	8.0	10.8
750° F.	.226	.7	.8	1.2	1.6	2.1	2.8	3.4	4.1	4.9	6.8	9.0
	.318	.6	.6	1.0	1.4	1.9	2.5	3.1	3.9	4.8	6.6	9.0
800° F.	.226	.7	.8	1.2	1.6	2.1	2.7	3.3	4.0	4.8	6.7	8.8
	.318	.6	.6	1.0	1.4	1.8	2.4	3.0	3.8	4.6	6.5	8.8
850° F.	.226	.7	.7	1.1	1.5	2.0	2.5	3.1	3.8	4.5	6.2	8.2
	.318	.5	.6	.9	1.3	1.7	2.2	2.8	3.5	4.3	6.1	8.2

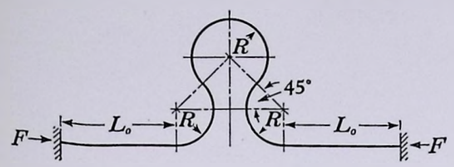
Table No. 4 A – Force in Pounds to Produce Deflection Given in Table No. 4

Temperature	Wall Thickness	Radius of Bend, Inches										
		14"	15"	20"	25"	30"	35"	40"	45"	50"	60"	70"
350° F.	.226"	870#	810#	630#	490#	400#	340#	290#	250#	220#	180#	155#
	.318	1180	1110	820	630	510	430	370	320	300	240	210
450° F.	.226	750	700	540	430	350	290	250	220	190	160	135
	.318	1020	960	710	550	440	370	320	280	260	210	180
550° F.	.226	630	590	460	360	290	250	210	185	160	130	115
	.318	860	810	600	460	370	310	270	240	210	175	150
650° F.	.226	530	500	390	300	250	210	175	155	135	110	95
	.318	730	680	500	390	310	260	230	200	180	150	130
750° F.	.226	420	390	300	240	195	160	135	120	105	85	75
	.318	570	530	390	300	240	200	175	155	140	115	100
800° F.	.226	390	370	280	220	180	155	130	115	100	85	70
	.318	540	500	370	290	230	195	170	145	135	110	95
850° F.	.226	350	330	260	200	165	140	115	105	90	75	65
	.318	480	450	330	260	210	175	150	130	120	100	85

Values given in Table No. 4 do not include cold spring; see page 702.

4" Double Offset Expansion "U" Bends

Grade "A" Pipe—4.500" O.D.



The values given in the tables shown below apply only to 4" Double Offset Expansion "U" Bends made of Grade "A" Pipe (4.500" O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than 12R.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 5 – Safe Deflection Values, Inches

Temperature	Wall Thickness	Radius of Bend, Inches										
		15"	20"	25"	30"	35"	40"	45"	50"	60"	70"	80"
350° F.	.237"	1.4"	2.1"	2.9"	3.7"	4.7"	5.7"	6.8"	8.2"	11.3"	14.8"	18.8"
	.337	1.1	1.7	2.4	3.2	4.0	5.1	6.3	7.6	10.7	14.4	18.7
	.437	1.0	1.5	2.1	3.0	3.9	4.9	6.1	7.5	10.6	14.4	18.8
	.531	.9	1.4	2.1	2.9	3.8	4.9	6.1	7.5	10.8	14.7	19.2
450° F.	.237	1.2	1.9	2.5	3.3	4.1	5.1	6.1	7.3	10.0	13.1	16.6
	.337	1.0	1.5	2.1	2.8	3.6	4.5	5.6	6.8	9.5	12.8	16.5
	.437	.9	1.3	1.9	2.6	3.4	4.4	5.4	6.6	9.4	12.8	16.6
	.531	.8	1.2	1.8	2.5	3.4	4.4	5.4	6.7	9.6	13.3	17.0
550° F.	.237	1.0	1.6	2.2	2.9	3.6	4.4	5.3	6.3	8.7	11.3	14.4
	.337	.9	1.3	1.8	2.4	3.1	3.9	4.8	5.9	8.2	11.1	14.3
	.437	.7	1.1	1.6	2.3	3.0	3.8	4.7	5.7	8.1	11.0	14.4
	.531	.7	1.1	1.6	2.2	2.9	3.8	4.7	5.8	8.3	11.3	14.7
650° F.	.237	.9	1.4	2.0	2.5	3.2	3.9	4.7	5.6	7.7	10.1	12.8
	.337	.8	1.2	1.6	2.2	2.8	3.5	4.3	5.2	7.3	9.9	12.8
	.437	.7	1.0	1.5	2.0	2.7	3.4	4.2	5.1	7.2	9.8	12.8
	.531	.6	.9	1.4	2.0	2.6	3.4	4.2	5.1	7.4	10.1	13.1
750° F.	.237	.8	1.2	1.6	2.1	2.6	3.2	3.9	4.6	6.4	8.4	10.7
	.337	.6	1.0	1.3	1.8	2.3	2.9	3.6	4.3	6.1	8.2	10.6
	.437	.5	.8	1.2	1.7	2.2	2.8	3.5	4.2	6.0	8.2	10.6
	.531	.5	.8	1.2	1.6	2.2	2.8	3.5	4.3	6.1	8.4	10.9
800° F.	.237	.7	1.2	1.6	2.1	2.6	3.2	3.8	4.5	6.2	8.2	10.4
	.337	.6	.9	1.3	1.8	2.2	2.8	3.5	4.2	5.9	8.0	10.3
	.437	.5	.8	1.2	1.7	2.1	2.7	3.4	4.1	5.9	8.0	10.4
	.531	.5	.8	1.1	1.6	2.1	2.7	3.4	4.2	6.0	8.2	10.6
850° F.	.237	.7	1.1	1.5	1.9	2.4	3.0	3.6	4.2	5.8	7.7	9.7
	.337	.6	.9	1.2	1.6	2.1	2.7	3.3	4.0	5.6	7.5	9.7
	.437	.5	.8	1.1	1.5	2.0	2.6	3.2	3.9	5.5	7.4	9.7
	.531	.5	.7	1.1	1.5	2.0	2.6	3.2	3.9	5.6	7.6	10.0

Table No. 5 A – Force in Pounds to Produce Deflection Given in Table No. 5

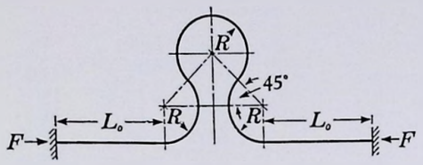
Temperature	Wall Thickness	Radius of Bend, Inches										
		15"	20"	25"	30"	35"	40"	45"	50"	60"	70"	80"
350° F.	.237"	1000#	830#	670#	550#	460#	400#	350#	310#	250#	210#	185#
	.337	1520	1120	880	710	590	510	450	400	330	280	250
	.437	1860	1340	1030	860	720	620	550	490	410	350	310
	.531	2090	1490	1180	980	820	720	630	570	480	410	360
450° F.	.237	860	710	580	480	400	340	300	270	220	185	160
	.337	1310	970	760	610	510	440	390	350	280	240	210
	.437	1600	1150	890	740	620	530	470	430	360	300	270
	.531	1800	1280	1020	850	710	620	550	500	410	350	310
550° F.	.237	730	600	490	400	340	290	250	220	185	155	135
	.337	1100	810	640	520	430	370	330	290	240	210	180
	.437	1350	970	750	620	520	450	400	360	300	250	220
	.531	1520	1080	860	710	600	520	460	420	350	300	260
650° F.	.237	620	510	410	340	290	250	210	190	155	130	115
	.337	940	690	540	440	360	320	280	250	200	175	155
	.437	1150	820	630	530	440	380	340	300	250	210	190
	.531	1290	920	730	600	510	440	390	350	290	250	220
750° F.	.237	480	400	320	260	220	190	165	150	120	100	90
	.337	730	540	420	340	280	250	220	195	160	135	120
	.437	890	640	490	410	350	300	260	240	200	165	145
	.531	1000	710	570	470	400	340	300	280	230	195	170
800° F.	.237	450	380	310	250	210	180	155	140	115	95	85
	.337	690	510	400	320	270	230	210	185	150	130	115
	.437	850	610	470	390	330	280	250	220	185	160	140
	.531	950	680	540	450	370	330	290	260	220	185	165
850° F.	.237	410	340	270	220	190	160	140	125	105	85	75
	.337	620	460	360	290	240	210	185	165	135	115	100
	.437	760	540	420	350	290	250	220	200	170	140	125
	.531	850	610	480	400	340	290	260	230	200	165	145

Values given in Table No. 5 do not include cold spring; see page 702.

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5″ Double Offset Expansion "U" Bends

Grade "A" Pipe—5.563″ O.D.



The values given in the table shown below apply only to 5″ Double Offset Expansion "U" Bends made of Grade "A" Pipe (5.563″ O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than 12R.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 6 – Safe Deflection Values, Inches

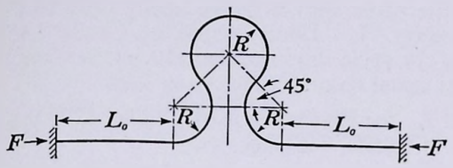
Temperature	Wall Thickness	Radius of Bend, Inches										
		20″	25″	30″	35″	40″	45″	50″	60″	70″	80″	90″
350° F.	.258″	2.0″	2.8″	3.7″	4.6″	5.4″	6.3″	7.4″	9.8″	12.7″	16.1″	19.8″
	.375	1.7	2.3	2.9	3.6	4.5	5.5	6.5	9.0	12.0	15.4	19.3
	.500	1.4	1.9	2.5	3.3	4.2	5.2	6.3	8.9	11.9	15.5	19.5
	.625	1.2	1.8	2.4	3.2	4.1	5.1	6.3	9.0	12.1	15.4	19.5
450° F.	.258	1.8	2.5	3.3	4.1	4.8	5.6	6.5	8.7	11.3	14.3	17.6
	.375	1.5	2.0	2.6	3.2	4.0	4.9	5.8	8.0	10.7	13.7	17.1
	.500	1.2	1.7	2.2	3.0	3.8	4.6	5.6	7.9	10.6	13.8	17.3
	.625	1.1	1.6	2.2	2.9	3.6	4.5	5.6	8.0	10.7	13.7	17.3
550° F.	.258	1.6	2.2	2.9	3.5	4.2	4.9	5.7	7.6	9.8	12.4	15.2
	.375	1.3	1.8	2.3	2.7	3.4	4.2	5.0	6.9	9.2	11.8	14.8
	.500	1.1	1.4	1.9	2.6	3.2	4.0	4.9	6.8	9.2	11.9	15.0
	.625	.9	1.4	1.9	2.5	3.1	3.9	4.9	6.9	9.3	11.8	15.0
650° F.	.258	1.4	1.9	2.6	3.1	3.7	4.3	5.1	6.7	8.7	11.0	13.6
	.375	1.3	1.6	2.0	2.5	3.1	3.8	4.5	6.2	8.2	10.6	13.2
	.500	1.0	1.3	1.7	2.3	2.9	3.5	4.3	6.1	8.2	10.6	13.3
	.625	.8	1.2	1.7	2.2	2.8	3.5	4.3	6.2	8.3	10.5	13.3
750° F.	.258	1.2	1.6	2.1	2.6	3.1	3.6	4.2	5.6	7.2	9.2	11.3
	.375	1.0	1.3	1.7	2.1	2.6	3.1	3.7	5.1	6.8	8.8	11.0
	.500	.8	1.1	1.4	1.9	2.4	3.0	3.6	5.1	6.8	8.8	11.1
	.625	.7	1.0	1.4	1.8	2.3	2.9	3.6	5.1	6.9	8.8	11.1
800° F.	.258	1.1	1.6	2.1	2.5	3.0	3.5	4.1	5.5	7.1	9.0	11.0
	.375	.9	1.3	1.6	2.0	2.5	3.0	3.6	5.0	6.7	8.6	10.7
	.500	.8	1.1	1.4	1.9	2.3	2.9	3.5	4.9	6.6	8.6	10.8
	.625	.7	1.0	1.4	1.8	2.3	2.9	3.5	5.0	6.7	8.6	10.8
850° F.	.258	1.1	1.5	1.9	2.4	2.8	3.3	3.8	5.1	6.6	8.4	10.3
	.375	.9	1.2	1.5	1.9	2.3	2.8	3.4	4.7	6.2	8.0	10.0
	.500	.7	1.0	1.3	1.7	2.2	2.7	3.3	4.6	6.2	8.1	10.1
	.625	.6	.9	1.3	1.7	2.1	2.7	3.3	4.7	6.3	8.0	10.1

Values given in the table do not include cold spring; see page 702.

For force values for 5″ Double Offset Expansion "U" Bends, see the following page.

5″ Double Offset Expansion "U" Bends

Grade "A" Pipe—5.563″ O.D.



The values given in the table shown below apply only to 5″ Double Offset Expansion "U" Bends made of Grade "A" Pipe (5.563″ O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than 12R.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 6 A – Force in Pounds to Produce Deflection Given in Table No. 6

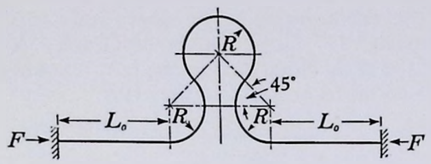
Temperature	Wall Thickness	Radius of Bend, Inches										
		20″	25″	30″	35″	40″	45″	50″	60″	70″	80″	90″
350° F.	.258″	1230#	1080#	950#	800#	690#	600#	530#	410#	370#	320#	280#
	.375	1960	1570	1270	1040	900	800	710	580	500	430	390
	.500	2400	1840	1520	1300	1120	990	890	740	630	550	490
	.625	2750	2180	1750	1520	1310	1170	1050	880	760	650	580
450° F.	.258	1060	940	820	690	600	520	460	350	320	270	240
	.375	1690	1350	1100	900	780	690	610	500	430	370	330
	.500	2070	1590	1310	1120	970	860	770	640	550	480	420
	.625	2370	1880	1510	1310	1130	1010	910	760	650	560	500
550° F.	.258	900	790	690	580	500	430	380	300	270	230	200
	.375	1430	1140	930	750	660	580	510	420	370	310	280
	.500	1740	1340	1100	940	810	720	650	540	460	400	360
	.625	2000	1580	1270	1100	950	850	770	640	550	470	420
650° F.	.258	760	670	590	490	430	370	330	250	230	200	170
	.375	1210	970	790	640	560	490	440	360	310	270	240
	.500	1480	1130	940	800	690	610	550	460	390	340	300
	.625	1690	1340	1080	940	810	720	650	540	470	400	360
750° F.	.258	590	520	460	390	330	290	250	200	175	150	130
	.375	940	750	610	500	430	390	340	280	240	210	185
	.500	1150	890	730	630	540	480	430	360	300	270	240
	.625	1320	1050	840	730	630	560	510	420	360	310	280
800° F.	.258	560	490	430	370	320	270	240	185	165	145	125
	.375	890	710	580	470	410	370	320	270	230	195	175
	.500	1090	840	690	590	510	450	410	340	290	250	220
	.625	1250	990	780	690	600	530	480	400	340	300	270
850° F.	.258	500	440	390	330	280	240	220	165	150	130	110
	.375	800	640	520	420	370	330	290	240	210	175	155
	.500	980	750	620	530	460	410	360	300	260	230	200
	.625	1120	890	710	620	540	480	430	360	310	270	240

For safe deflection values for 5″ Double Offset Expansion "U" Bends, see the preceding page.

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6" Double Offset Expansion "U" Bends

Grade "A" Pipe—6.625" O.D.



The values given in the table shown below apply only to 6" Double Offset Expansion "U" Bends made of Grade "A" Pipe (6.625" O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than $12R$.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 7 – Safe Deflection Values, Inches

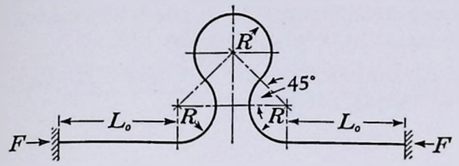
Temperature	Wall Thickness	Radius of Bend, Inches										
		25"	30"	35"	40"	45"	50"	60"	70"	80"	90"	100"
350° F.	.280"	2.6"	3.5"	4.5"	5.4"	6.3"	7.4"	9.3"	11.7"	14.5"	18.7"	21.3"
	.432	2.2	2.8	3.4	4.1	4.9	5.8	7.9	10.4	13.2	16.5	20.2
	.562	1.8	2.3	3.0	3.7	4.5	5.5	7.6	10.1	13.1	16.4	20.2
	.718	1.6	2.1	2.8	3.6	4.4	5.3	7.6	10.2	13.2	16.6	20.4
450° F.	.280	2.3	3.1	4.0	4.8	5.6	6.5	8.3	10.4	12.9	16.6	18.9
	.432	1.9	2.4	3.0	3.6	4.3	5.2	7.0	9.2	11.7	14.6	17.9
	.562	1.6	2.1	2.6	3.3	4.0	4.9	6.8	9.0	11.6	14.6	17.9
	.718	1.4	1.9	2.5	3.2	3.9	4.7	6.7	9.0	11.7	14.7	18.1
550° F.	.280	2.0	2.7	3.4	4.1	4.9	5.6	7.2	9.0	11.2	14.3	16.3
	.432	1.7	2.1	2.6	3.1	3.7	4.5	6.0	8.0	10.1	12.7	15.5
	.562	1.4	1.8	2.3	2.8	3.5	4.2	5.9	7.8	10.0	12.6	15.5
	.718	1.2	1.6	2.1	2.7	3.4	4.1	5.8	7.8	10.1	12.7	15.7
650° F.	.280	1.8	2.4	3.1	3.7	4.3	5.0	6.4	8.0	9.9	12.8	14.5
	.432	1.5	1.9	2.3	2.8	3.3	4.0	5.4	7.1	9.0	11.3	13.8
	.562	1.2	1.6	2.0	2.5	3.1	3.7	5.2	6.9	8.9	11.2	13.8
	.718	1.1	1.5	1.9	2.4	3.0	3.6	5.2	7.0	9.0	11.4	14.0
750° F.	.280	1.5	2.0	2.5	3.0	3.6	4.2	5.3	6.7	8.3	10.6	12.1
	.432	1.2	1.6	1.9	2.3	2.8	3.3	4.5	5.9	7.5	9.4	11.4
	.562	1.0	1.3	1.7	2.1	2.6	3.1	4.3	5.7	7.4	9.3	11.4
	.718	.9	1.2	1.6	2.0	2.5	3.0	4.3	5.8	7.5	9.4	11.6
800° F.	.280	1.4	2.0	2.5	3.0	3.5	4.1	5.2	6.5	8.0	10.3	11.8
	.432	1.2	1.5	1.9	2.3	2.7	3.2	4.4	5.7	7.3	9.2	11.2
	.562	1.0	1.3	1.6	2.0	2.5	3.0	4.2	5.6	7.2	9.1	11.2
	.718	.9	1.2	1.6	2.0	2.5	3.0	4.2	5.6	7.3	9.2	11.3
850° F.	.280	1.4	1.8	2.3	2.8	3.3	3.8	4.8	6.1	7.5	9.7	11.0
	.432	1.1	1.4	1.7	2.1	2.5	3.0	4.1	5.4	6.8	8.6	10.5
	.562	.9	1.2	1.5	1.9	2.3	2.8	4.0	5.2	6.8	8.5	10.5
	.718	.8	1.1	1.4	1.8	2.3	2.8	3.9	5.3	6.8	8.6	10.6

Values given in the table do not include cold spring; see page 702.

For force values for 6" Double Offset Expansion "U" Bends, see the following page.

6" Double Offset Expansion "U" Bends

Grade "A" Pipe—6.625" O.D.



The values given in the table shown below apply only to 6" Double Offset Expansion "U" Bends made of Grade "A" Pipe (6.625" O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than $12R$.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 7 A – Force in Pounds to Produce Deflection Given in Table No. 7

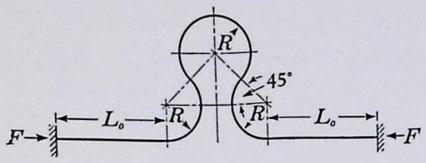
Temperature	Wall Thickness	Radius of Bend, Inches										
		25"	30"	35"	40"	45"	50"	60"	70"	80"	90"	100"
350° F.	.280"	1450#	1350#	1230#	1080#	970#	870#	690#	580#	500#	470#	400#
	.432	2590	2130	1770	1520	1330	1190	970	820	710	630	560
	.562	3130	2510	2110	1830	1610	1440	1190	1010	890	790	710
	.718	3630	3010	2540	2200	1940	1740	1440	1250	1080	960	860
450° F.	.280	1250	1170	1060	930	830	750	600	500	430	400	340
	.432	2240	1840	1530	1310	1150	1030	840	710	610	540	490
	.562	2700	2170	1820	1580	1390	1240	1030	870	760	680	610
	.718	3130	2600	2190	1900	1670	1500	1240	1080	930	820	740
550° F.	.280	1050	980	890	790	700	630	500	420	360	340	290
	.432	1880	1550	1290	1100	970	860	710	600	510	450	410
	.562	2270	1820	1530	1330	1170	1050	870	730	640	570	510
	.718	2640	2180	1840	1600	1410	1260	1040	910	780	690	620
650° F.	.280	890	830	760	670	590	540	430	360	310	290	240
	.432	1590	1310	1090	930	820	730	540	510	440	390	350
	.562	1920	1550	1300	1130	990	890	730	620	550	490	440
	.718	2240	1850	1560	1360	1190	1070	890	770	660	590	530
750° F.	.280	700	650	590	520	460	420	330	280	240	220	190
	.432	1240	1020	850	730	640	570	470	400	340	300	270
	.562	1500	1210	1010	880	770	690	570	490	430	380	340
	.718	1740	1450	1220	1060	930	840	690	600	520	460	410
800° F.	.280	660	610	560	490	440	390	320	260	230	210	180
	.432	1180	970	800	690	610	540	440	370	320	280	260
	.562	1420	1140	960	830	730	650	540	460	400	360	320
	.718	1650	1370	1150	1000	880	790	650	570	490	430	390
850° F.	.280	590	550	500	440	390	350	280	240	200	190	160
	.432	1050	870	720	620	540	480	400	330	290	260	230
	.562	1270	1020	860	740	650	590	480	410	360	320	290
	.718	1480	1230	1030	900	790	710	590	510	440	390	350

For safe deflection values for 6" Double Offset Expansion "U" Bends, see the preceding page.

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8″ Double Offset Expansion "U" Bends

Grade "A" Pipe—8.625″ O.D.



The values given in the table shown below apply only to 8″ Double Offset Expansion "U" Bends made of Grade "A" Pipe (8.625″ O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than $12R$.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 8 – Safe Deflection Values, Inches

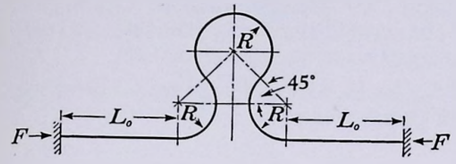
Temperature	Wall Thickness	Radius of Bend, Inches										
		30″	35″	40″	45″	50″	60″	70″	80″	90″	100″	110″
350° F.	.277″	3.2″	4.2″	5.3″	6.5″	7.6″	10.0″	12.6″	15.1″	17.7″	20.3″	23.2″
	.322	3.1	4.1	5.0	6.0	7.1	9.2	11.4	13.7	15.9	18.6	21.5
	.500	2.6	3.3	4.0	4.7	5.4	6.9	8.8	11.0	13.6	16.2	19.3
	.593	2.4	3.0	3.6	4.2	4.9	6.5	8.4	10.6	13.2	16.0	19.0
	.906	1.8	2.3	2.9	3.6	4.3	6.0	7.9	10.3	12.9	15.9	19.1
450° F.	.277	2.9	3.8	4.7	5.7	6.7	8.9	11.1	13.4	15.7	18.0	20.5
	.322	2.8	3.6	4.4	5.4	6.3	8.2	10.1	12.2	14.1	16.5	19.1
	.500	2.3	2.9	3.6	4.2	4.8	6.1	7.8	9.8	12.1	14.4	17.1
	.593	2.1	2.6	3.2	3.7	4.3	5.7	7.4	9.4	11.7	14.2	16.9
	.906	1.6	2.1	2.6	3.2	3.8	5.3	7.0	9.1	11.4	14.1	16.9
550° F.	.277	2.5	3.3	4.1	5.0	5.8	7.7	9.7	11.6	13.6	15.6	17.8
	.322	2.4	3.1	3.8	4.6	5.5	7.1	8.8	10.5	12.2	14.3	16.5
	.500	2.0	2.6	3.1	3.6	4.1	5.3	6.8	8.5	10.5	12.5	14.8
	.593	1.9	2.3	2.8	3.2	3.7	5.0	6.4	8.1	10.2	12.3	14.6
	.906	1.4	1.8	2.2	2.8	3.3	4.6	6.1	7.9	9.9	12.2	14.6
650° F.	.277	2.2	2.9	3.6	4.4	5.2	6.8	8.6	10.4	12.1	13.9	15.8
	.322	2.1	2.8	3.4	4.1	4.9	6.3	7.8	9.4	10.9	12.7	14.7
	.500	1.8	2.3	2.7	3.3	3.7	4.7	6.0	7.6	9.3	11.1	13.2
	.593	1.7	2.0	2.5	2.9	3.3	4.4	5.7	7.3	9.0	11.0	13.0
	.906	1.3	1.6	2.0	2.5	3.0	4.1	5.4	7.0	8.8	10.9	13.0
750° F.	.277	1.8	2.4	3.0	3.7	4.3	5.7	7.1	8.6	10.0	11.5	13.1
	.322	1.8	2.3	2.8	3.4	4.0	5.2	6.5	7.8	9.0	10.6	12.2
	.500	1.5	1.9	2.3	2.7	3.1	3.9	5.0	6.3	7.7	9.2	10.9
	.593	1.4	1.7	2.1	2.4	2.8	3.7	4.8	6.0	7.5	9.1	10.8
	.906	1.1	1.3	1.7	2.0	2.5	3.4	4.5	5.9	7.3	9.0	10.8
800° F.	.277	1.8	2.4	2.9	3.6	4.2	5.5	7.0	8.4	9.8	11.2	12.8
	.322	1.7	2.3	2.8	3.4	3.9	5.1	6.3	7.6	8.8	10.3	11.9
	.500	1.5	1.8	2.2	2.6	3.0	3.8	4.9	6.1	7.6	9.0	10.7
	.593	1.3	1.6	2.0	2.3	2.7	3.6	4.6	5.9	7.3	8.9	10.5
	.906	1.0	1.3	1.6	2.0	2.4	3.3	4.4	5.7	7.2	8.8	10.6
850° F.	.277	1.7	2.2	2.7	3.3	3.9	5.2	6.5	7.8	9.2	10.5	12.0
	.322	1.6	2.1	2.6	3.1	3.7	4.8	5.9	7.1	8.3	9.6	11.1
	.500	1.4	1.7	2.1	2.5	2.8	3.6	4.6	5.7	7.1	8.4	10.0
	.593	1.3	1.5	1.9	2.2	2.5	3.4	4.3	5.5	6.8	8.3	9.9
	.906	1.0	1.2	1.5	1.9	2.2	3.1	4.1	5.3	6.7	8.2	9.9

Values given in the table do not include cold spring; see page 702.

For force values for 8″ Double Offset Expansion "U" Bends, see the following page.

8″ Double Offset Expansion "U" Bends

Grade "A" Pipe—8.625″ O.D.



The values given in the table shown below apply only to 8″ Double Offset Expansion "U" Bends made of Grade "A" Pipe (8.625″ O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than $12R$.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 8 A – Force in Pounds to Produce Deflection Given in Table No. 8

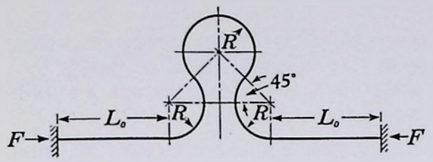
Temperature	Wall Thickness	Radius of Bend, Inches										
		30″	35″	40″	45″	50″	60″	70″	80″	90″	100″	110″
350° F.	.277″	1610#	1550#	1500#	1440#	1360#	1210#	1050#	940#	840#	740#	640#
	.322	2090	2000	1890	1780	1670	1440	1220	1050	910	810	720
	.500	4080	3650	3210	2850	2490	2000	1680	1450	1290	1150	1050
	.593	4940	4210	3680	3150	2780	2270	1920	1680	1480	1340	1200
	.906	6650	5580	4820	4280	3830	3130	2650	2330	2060	1850	1670
450° F.	.277	1390	1340	1300	1240	1180	1040	910	810	730	640	550
	.322	1800	1720	1630	1530	1440	1240	1050	910	780	690	620
	.500	3520	3150	2770	2460	2150	1730	1490	1250	1120	990	910
	.593	4270	3640	3180	2720	2400	1960	1650	1450	1280	1150	1040
	.906	5740	4820	4160	3700	3310	2700	2290	2010	1780	1600	1440
550° F.	.277	1160	1130	1090	1040	990	890	760	680	610	530	460
	.322	1520	1450	1370	1290	1210	1040	890	760	660	580	520
	.500	2960	2650	2330	2070	1910	1450	1250	1050	940	840	760
	.593	3580	3050	2670	2280	2020	1650	1390	1220	1080	970	870
	.906	4820	4050	3500	3110	2780	2270	1930	1690	1500	1350	1210
650° F.	.277	990	950	920	880	840	760	650	580	510	450	410
	.322	1290	1230	1170	1090	1030	880	750	650	560	510	460
	.500	2510	2250	1980	1760	1530	1230	1040	910	790	710	650
	.593	3040	2590	2270	1940	1710	1400	1200	1030	910	820	740
	.906	4100	3440	2970	2630	2360	1930	1630	1440	1270	1140	1030
750° F.	.277	770	740	720	690	650	590	500	450	400	350	320
	.322	990	960	910	860	800	690	590	500	450	400	360
	.500	1960	1750	1540	1370	1190	960	810	710	620	550	500
	.593	2370	2030	1770	1510	1330	1090	930	810	710	640	580
	.906	3190	2680	2310	2050	1840	1500	1270	1120	990	890	800
800° F.	.277	730	700	680	650	620	560	480	430	380	330	300
	.322	950	910	860	810	760	650	550	480	430	380	340
	.500	1850	1660	1460	1300	1130	910	760	670	590	520	480
	.593	2240	1930	1680	1430	1260	1030	880	760	670	610	550
	.906	3020	2530	2190	1950	1740	1430	1210	1050	940	840	760
850° F.	.277	650	630	610	580	550	500	430	380	340	300	270
	.322	850	810	770	730	680	580	500	430	380	340	300
	.500	1660	1490	1310	1160	1020	820	700	600	530	470	430
	.593	2010	1730	1500	1280	1130	930	790	680	600	540	490
	.906	2710	2270	1960	1740	1560	1280	1080	950	840	750	680

For safe deflection values for 8″ Double Offset Expansion "U" Bends, see the preceding page.

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10″ Double Offset Expansion "U" Bends

Grade "A" Pipe—10.75″ O.D.



The values given in the table shown below apply only to 10″ Double Offset Expansion "U" Bends made of Grade "A" Pipe (10.75″ O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than $12R$.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 9 – Safe Deflection Values, Inches

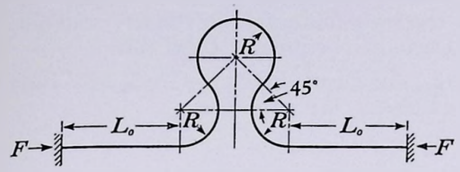
Temperature	Wall Thickness	Radius of Bend, Inches										
		40″	45″	50″	60″	70″	80″	90″	100″	110″	120″	130″
350° F.	.307″	4.6″	5.7″	6.9″	9.4″	12.0″	14.7″	17.6″	20.3″	23.2″	26.2″	29.1″
	.365	4.5	5.5	6.5	8.8	11.0	13.5	15.9	18.2	20.7	23.1	25.9
	.500	4.0	4.9	5.7	7.4	9.2	10.8	12.8	15.0	17.4	20.0	22.9
	.593	3.7	4.5	5.2	6.7	8.1	9.9	11.8	14.0	16.4	19.2	22.1
	.718	3.3	4.0	4.6	5.8	7.4	9.0	11.1	13.3	15.8	18.6	21.6
	1.125	2.5	3.1	3.6	5.0	6.6	8.4	10.5	12.9	15.5	18.3	21.4
450° F.	.307	4.1	5.1	6.1	8.3	10.7	13.0	15.6	18.0	20.6	23.2	25.8
	.365	4.0	4.9	5.8	7.8	9.8	11.9	14.1	16.2	18.3	20.5	23.0
	.500	3.6	4.3	5.0	6.6	8.1	9.6	11.4	13.3	15.4	17.8	20.3
	.593	3.3	4.0	4.6	5.9	7.2	8.7	10.4	12.4	14.6	17.0	19.6
	.718	3.0	3.5	4.0	5.2	6.5	8.0	9.8	11.8	14.0	16.5	19.2
	1.125	2.2	2.7	3.2	4.4	5.9	7.5	9.3	11.4	13.7	16.3	19.0
550° F.	.307	3.6	4.4	5.3	7.2	9.2	11.3	13.5	15.6	17.8	20.1	22.3
	.365	3.4	4.2	5.0	6.7	8.5	10.3	12.1	14.1	15.9	17.7	19.9
	.500	3.1	3.7	4.4	5.7	7.0	8.3	9.8	11.5	13.3	15.4	17.6
	.593	2.9	3.4	4.0	5.1	6.2	7.6	9.0	10.8	12.6	14.7	17.0
	.718	2.6	3.1	3.5	4.5	5.6	6.9	8.5	10.2	12.1	14.2	16.6
	1.125	1.9	2.4	2.8	3.8	5.1	6.5	8.1	8.9	11.9	14.1	16.4
650° F.	.307	3.2	3.9	4.7	6.4	8.2	10.0	12.0	13.9	15.9	17.9	19.9
	.365	3.1	3.7	4.5	6.0	7.5	9.2	10.9	12.5	14.1	15.8	17.7
	.500	2.8	3.3	3.9	5.1	6.3	7.4	8.8	10.3	11.9	13.7	15.6
	.593	2.6	3.0	3.5	4.6	5.5	6.7	8.1	9.6	11.2	13.1	15.1
	.718	2.3	2.7	3.1	4.0	5.0	6.2	7.6	9.1	10.8	12.7	14.8
	1.125	1.7	2.1	2.5	3.4	4.5	5.8	7.2	8.8	10.6	12.5	14.7
750° F.	.307	2.6	3.2	3.9	5.3	6.8	8.4	10.0	11.5	13.2	14.9	16.5
	.365	2.5	3.1	3.7	5.0	6.3	7.6	9.0	10.4	11.8	13.1	14.7
	.500	2.3	2.8	3.2	4.2	5.2	6.1	7.3	8.5	9.8	11.4	13.0
	.593	2.1	2.5	2.9	3.8	4.6	5.6	6.7	8.0	9.3	11.0	12.6
	.718	1.9	2.2	2.6	3.3	4.2	5.1	6.3	7.6	9.0	10.5	12.3
	1.125	1.4	1.7	2.1	2.8	3.7	4.8	6.0	7.3	8.8	10.4	12.2
800° F.	.307	2.6	3.2	3.8	5.2	6.6	8.1	9.7	11.2	12.9	14.5	16.1
	.365	2.5	3.0	3.6	4.9	6.1	7.5	8.7	10.2	11.4	12.8	14.3
	.500	2.2	2.7	3.2	4.1	5.1	6.0	7.1	8.3	9.6	11.1	12.7
	.593	2.1	2.5	2.9	3.7	4.5	5.5	6.5	7.8	9.1	10.6	12.2
	.718	1.9	2.2	2.5	3.2	4.1	5.0	6.1	7.4	8.8	10.3	12.0
	1.125	1.4	1.7	2.0	2.8	3.7	4.7	5.8	7.1	8.6	10.2	11.9
850° F.	.307	2.4	3.0	3.6	4.9	6.2	7.6	9.1	10.5	12.0	13.6	15.1
	.365	2.3	2.8	3.4	4.5	5.7	6.9	8.2	9.4	10.7	12.0	13.4
	.500	2.1	2.5	3.0	3.8	4.7	5.6	6.6	7.8	9.0	10.4	10.9
	.593	1.9	2.3	2.7	3.5	4.2	5.1	6.1	7.3	8.5	9.9	11.5
	.718	1.7	2.0	2.4	3.0	3.8	4.7	5.7	6.9	8.2	9.7	11.2
	1.125	1.3	1.6	1.9	2.6	3.4	4.4	5.4	6.7	8.0	9.5	11.1

Values given in the table do not include cold spring; see page 702.

For force values for 10″ Double Offset Expansion "U" Bends, see the following page.

10″ Double Offset Expansion "U" Bends

Grade "A" Pipe—10.75″ O.D.



The values given in the table shown below apply only to 10″ Double Offset Expansion "U" Bends made of Grade "A" Pipe (10.75″ O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than $12R$.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 9 A – Force in Pounds to Produce Deflection Given in Table No. 9

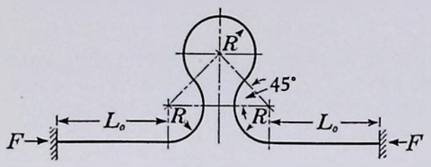
Temperature	Wall Thickness	Radius of Bend, Inches										
		40″	45″	50″	60″	70″	80″	90″	100″	110″	120″	130″
350° F.	.307″	1980#	1950#	1890#	1810#	1670#	1540#	1430#	1290#	1190#	1080#	990#
	.365	2700	2630	2550	2330	2110	1900	1690	1520	1370	1220	1110
	.500	4510	4270	3940	3390	2910	2460	2150	1900	1700	1550	1420
	.593	5700	5210	4740	3950	3240	2790	2430	2160	1950	1780	1630
	.718	6980	6250	5550	4440	3740	3170	2810	2510	2270	2080	1930
	1.125	9520	8360	7450	6100	5200	4510	3990	3580	3260	2980	2750
450° F.	.307	1710	1680	1630	1560	1440	1330	1230	1110	1030	930	850
	.365	2330	2270	2200	2010	1820	1620	1460	1310	1180	1050	960
	.500	3890	3680	3400	2920	2510	2120	1850	1640	1470	1330	1220
	.593	4920	4500	4090	3410	2790	2410	2100	1860	1680	1540	1410
	.718	6020	5400	4780	3830	3230	2740	2430	2170	1960	1800	1670
	1.125	8210	7210	6420	5260	4490	3890	3440	3090	2810	2570	2370
550° F.	.307	1440	1420	1370	1310	1210	1120	1040	950	860	780	720
	.365	1960	1910	1850	1690	1530	1360	1230	1100	1000	900	830
	.500	3270	3100	2870	2460	2110	1790	1560	1380	1240	1120	1030
	.593	4130	3780	3440	2870	2350	2020	1760	1570	1410	1290	1180
	.718	5060	4530	4020	3220	2710	2300	2040	1820	1650	1510	1400
	1.125	6900	6060	5400	4420	3770	3270	2900	2600	2370	2160	1990
650° F.	.307	1220	1200	1160	1110	1030	950	880	800	730	660	610
	.365	1660	1620	1570	1440	1300	1160	1040	940	840	760	680
	.500	2780	2610	2440	2090	1790	1520	1320	1170	1050	950	870
	.593	3510	3210	2920	2430	1990	1720	1500	1330	1200	1100	1020
	.718	4300	3850	3420	2740	2300	1950	1730	1550	1420	1280	1190
	1.125	5860	5150	4580	3750	3200	2770	2460	2200	2010	1840	1690
750° F.	.307	950	940	910	870	800	740	680	630	570	520	480
	.365	1300	1260	1220	1120	1010	900	810	730	660	600	550
	.500	2170	2040	1900	1630	1400	1180	1030	910	820	740	680
	.593	2730	2500	2270	1900	1570	1340	1170	1040	950	870	800
	.718	3340	3000	2660	2130	1790	1520	1350	1220	1100	1000	930
	1.125	4570	4020	3580	2930	2490	2160	1910	1720	1560	1430	1320
800° F.	.307	900	890	840	820	760	700	650	600	540	490	450
	.365	1220	1190	1160	1060	960	850	770	690	620	560	520
	.500	2050	1930	1800	1540	1320	1150	980	860	770	700	660
	.593	2590	2370	2150	1800	1470	1270	1110	980	880	820	750
	.718	3170	2840	2520	2020	1700	1440	1280	1150	1050	950	880
	1.125	4320	3800	3380	2770	2360	2050	1810	1630	1480	1350	1250
850° F.	.307	810	790	770	740	680	630	580	530	480	440	400
	.365	1100	1070	1040	950	860	760	690	620	560	510	460
	.500	1840	1730	1610	1380	1190	1020	880	780	690	650	590
	.593	2320	2120	1930	1610	1320	1140	990	880	810	740	670
	.718	2840	2540	2260	1810	1520	1290	1140	1040	940	850	790
	1.125	3870	3400	3030	2480	2080	1840	1620	1460	1330	1210	1120

For safe deflection values for 10″ Double Offset Expansion "U" Bends, see the preceding page.

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12" Double Offset Expansion "U" Bends

Grade "A" Pipe—12.75" O.D.



The values given in the table shown below apply only to 12" Double Offset Expansion "U" Bends made of Grade "A" Pipe (12.75" O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than $12R$.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 10 – Safe Deflection Values, Inches

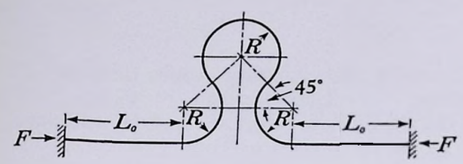
Temperature	Wall Thickness	Radius of Bend, Inches										
		45"	50"	60"	70"	80"	90"	100"	110"	120"	130"	140"
350° F.	.330"	5.1"	6.2"	8.6"	11.2"	14.0"	16.9"	19.8"	22.9"	26.1"	29.2"	32.4"
	.375	5.0	6.0	8.3	10.7	13.3	15.9	18.7	21.9	24.9	27.2	29.8
	.406	4.9	5.9	8.1	10.4	12.8	15.3	17.8	20.5	22.8	25.5	28.1
	.500	4.7	5.7	7.6	9.7	11.9	13.9	16.0	18.2	20.8	23.2	25.9
	.687	4.2	4.9	6.3	7.8	9.3	10.9	12.8	14.8	17.1	19.5	22.1
	.843	3.7	4.3	5.6	6.8	8.3	9.9	11.8	13.9	16.2	18.7	21.4
	1.312	2.8	3.3	4.4	5.8	7.3	9.1	11.1	13.2	15.7	18.2	21.0
450° F.	.330	4.5	5.5	7.6	9.9	12.4	15.0	17.6	20.3	23.2	25.9	28.6
	.375	4.4	5.4	7.3	9.5	11.8	14.1	16.6	19.0	21.6	24.1	26.6
	.406	4.4	5.3	7.2	9.2	11.3	13.6	15.8	18.0	20.2	22.6	24.9
	.500	4.2	5.0	6.7	8.6	10.5	12.3	14.2	16.1	18.4	20.6	23.0
	.687	3.7	4.3	5.6	6.9	8.2	9.7	11.3	13.1	15.2	17.3	19.6
	.843	3.3	3.8	5.0	6.0	7.3	8.8	10.4	12.3	14.3	16.6	18.9
	1.312	2.5	2.9	3.9	5.1	6.5	8.0	9.8	11.7	13.9	16.1	18.6
550° F.	.330	3.9	4.7	6.6	8.6	10.7	13.0	15.2	17.6	19.9	22.4	24.8
	.375	3.8	4.6	6.4	8.2	10.2	12.2	14.3	16.4	18.7	20.9	22.9
	.406	3.8	4.5	6.2	7.9	9.8	11.8	13.7	15.6	17.5	19.6	21.6
	.500	3.6	4.3	5.8	7.4	9.1	10.7	12.3	14.0	16.0	17.8	19.9
	.687	3.2	3.7	4.9	6.0	7.1	8.4	9.8	11.3	13.1	15.0	17.0
	.843	2.9	3.3	4.3	5.2	6.3	7.6	9.0	10.7	12.4	14.4	16.4
	1.312	2.1	2.5	3.4	4.4	5.6	7.0	8.5	10.2	12.0	14.0	16.1
650° F.	.330	3.5	4.2	5.8	7.6	9.6	11.6	13.5	15.8	17.7	20.0	22.1
	.375	3.4	4.1	5.6	7.3	9.1	10.9	12.8	14.6	16.7	18.6	20.4
	.406	3.4	4.1	5.5	7.1	8.7	10.5	12.2	13.9	15.6	17.5	19.2
	.500	3.2	3.9	5.2	6.6	8.1	9.5	10.9	12.4	14.2	15.8	17.7
	.687	2.9	3.3	4.3	5.4	6.3	7.5	8.7	10.1	11.7	13.4	15.1
	.843	2.5	2.9	3.8	4.6	5.6	6.8	8.1	9.5	10.9	12.7	14.5
	1.312	1.9	2.2	3.0	3.9	5.0	6.2	7.6	9.0	10.7	12.5	14.4
750° F.	.330	2.9	3.5	4.9	6.3	7.9	9.6	11.3	13.1	14.7	16.6	18.4
	.375	2.8	3.4	4.7	6.1	7.5	9.0	10.6	12.1	13.8	15.4	16.9
	.406	2.8	3.4	4.5	5.8	7.3	8.7	10.1	11.5	13.0	14.5	16.0
	.500	2.6	3.2	4.3	5.5	6.7	7.9	9.1	10.3	11.8	13.2	14.7
	.687	2.4	2.8	3.6	4.5	5.3	6.2	7.3	8.4	9.7	11.1	12.6
	.843	2.1	2.4	3.2	3.8	4.7	5.6	6.7	7.9	9.2	10.6	12.2
	1.312	1.6	1.9	2.5	3.3	4.2	5.1	6.3	7.5	8.9	10.4	11.9
800° F.	.330	2.8	3.4	4.7	6.2	7.7	9.4	11.0	12.8	14.4	16.2	17.9
	.375	2.7	3.3	4.6	5.9	7.4	8.8	10.3	11.8	13.5	15.0	16.5
	.406	2.7	3.3	4.5	5.7	7.1	8.5	9.9	11.3	12.7	14.1	15.5
	.500	2.6	3.1	4.2	5.3	6.6	7.7	8.8	10.0	11.5	12.8	14.3
	.687	2.3	2.7	3.5	4.3	5.1	6.0	7.1	8.2	9.5	10.8	12.2
	.843	2.1	2.4	3.1	3.8	4.6	5.5	6.5	7.7	9.0	10.4	11.9
	1.312	1.6	1.8	2.4	3.2	4.1	5.0	6.1	7.3	8.7	10.1	11.6
850° F.	.330	2.6	3.2	4.4	5.8	7.2	8.8	10.3	12.0	13.4	15.1	16.8
	.375	2.5	3.1	4.3	5.5	6.9	8.2	9.7	11.1	12.6	14.1	15.4
	.406	2.5	3.1	4.2	5.3	6.6	7.9	9.3	10.5	11.8	13.2	14.5
	.500	2.4	2.9	3.9	5.0	6.1	7.1	8.2	9.4	10.7	12.0	13.4
	.687	2.2	2.5	3.3	4.1	4.8	5.6	6.6	7.6	8.9	10.1	11.5
	.843	1.9	2.2	2.9	3.5	4.3	5.1	6.1	7.2	8.4	9.7	11.2
	1.312	1.5	1.7	2.3	3.0	3.8	4.7	5.7	6.8	8.1	9.4	10.9

Values given in the table do not include cold spring; see page 702.

For force values for 12" Double Offset Expansion "U" Bends, see the following page.

12" Double Offset Expansion "U" Bends

Grade "A" Pipe—12.75" O.D.



The values given in the table shown below apply only to 12" Double Offset Expansion "U" Bends made of Grade "A" Pipe (12.75" O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than $12R$.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 10 A – Force in Pounds to Produce Deflection Given in Table No. 10

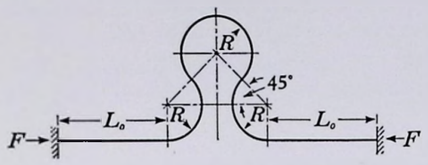
Temperature	Wall Thickness	Radius of Bend, Inches										
		45"	50"	60"	70"	80"	90"	100"	110"	120"	130"	140"
350° F.	.330"	2380#	2310#	2230#	2160#	2060#	1970#	1840#	1730#	1630#	1510#	1400#
	.375	3000	2910	2790	2650	2500	2330	2210	2000	1860	1720	1560
	.406	3430	3340	3200	3040	2790	2590	2350	2230	1960	1810	1660
	.500	5020	4700	4400	4020	3580	3220	2870	2580	2350	2130	1960
	.687	8120	7480	6450	5550	4710	4080	3610	3240	2950	2700	2490
	.843	10230	9240	7710	6320	5410	4740	4200	3820	3480	3220	2960
	1.312	14050	12450	10150	8650	7500	6630	5940	5380	4930	4530	4200
450° F.	.330	2050	1990	1920	1860	1780	1700	1590	1490	1410	1300	1210
	.375	2590	2510	2410	2290	2160	2010	1910	1730	1610	1480	1350
	.406	2960	2880	2760	2630	2400	2240	2030	1920	1690	1560	1430
	.500	4330	4060	3800	3470	3090	2780	2480	2230	2030	1840	1690
	.687	7000	6450	5570	4800	4060	3520	3110	2800	2540	2330	2140
	.843	8830	7960	6650	5450	4670	4080	3620	3300	3000	2780	2560
	1.312	12100	10750	8750	7460	6470	5720	5120	4640	4250	3910	3620
550° F.	.330	1730	1680	1610	1570	1490	1430	1330	1270	1180	1100	1020
	.375	2180	2110	2020	1920	1810	1690	1610	1450	1350	1250	1130
	.406	2490	2420	2320	2210	2020	1880	1700	1620	1420	1310	1200
	.500	3640	3410	3190	2920	2600	2340	2080	1870	1710	1550	1420
	.687	5900	5430	4680	4030	3420	2960	2620	2350	2140	2030	1810
	.843	7430	6700	5620	4580	3930	3440	3050	2770	2530	2340	2150
	1.312	10200	9050	7370	6280	5440	4810	4310	3900	3580	3290	3050
650° F.	.330	1470	1420	1370	1330	1250	1210	1130	1080	1000	930	860
	.375	1850	1790	1920	1630	1540	1430	1360	1230	1150	1060	960
	.406	2110	2050	1970	1870	1720	1600	1450	1370	1210	1120	1030
	.500	3090	2890	2710	2470	2200	1980	1770	1590	1450	1320	1210
	.687	5000	4600	3970	3420	2900	2510	2220	2000	1820	1660	1530
	.843	6300	5680	4770	3890	3330	2920	2580	2350	2140	1980	1820
	1.312	8660	7670	6250	5320	4610	4070	3650	3310	3030	2780	2580
750° F.	.330	1140	1110	1070	1040	980	940	880	840	780	730	670
	.375	1440	1400	1340	1270	1200	1120	1060	960	890	820	750
	.406	1650	1600	1540	1460	1360	1240	1130	1070	940	870	800
	.500	2410	2260	2110	1930	1720	1540	1380	1240	1130	1020	940
	.687	3900	3580	3100	2670	2260	1960	1730	1550	1420	1290	1190
	.843	4920	4420	3720	3030	2600	2270	2010	1840	1670	1550	1420
	1.312	6750	5980	4880	4150	3600	3180	2850	2580	2370	2170	2010
800° F.	.330	1080	1050	1010	980	920	890	840	800	740	690	640
	.375	1360	1320	1260	1200	1130	1060	1000	910	840	780	710
	.406	1560	1520	1450	1380	1290	1180	1070	1010	890	820	760
	.500	2280	2130	2000	1820	1630	1460	1300	1170	1070	970	890
	.687	3680	3390	2930	2520	2140	1850	1640	1470	1360	1230	1130
	.843	4650	4220	3520	2870	2450	2150	1910	1740	1580	1460	1350
	1.312	6390	5660	4610	3930	3400	3010	2700	2440	2240	2060	1910
850° F.	.330	970	940	910	880	830	800	750	710	660	610	570
	.375	1220	1180	1130	1080	1020	950	900	810	760	700	630
	.406	1400	1360	1300	1240	1150	1050	960	910	800	740	680
	.500	2040	1910	1790	1630	1460	1320	1160	1050	960	870	800
	.687	3300	3040	2620	2260	1920	1670	1470	1320	1220	1120	1030
	.843	4190	3780	3150	2570	2210	1930	1710	1560	1420	1310	1210
	1.312	5720	5070	4130	3520	3050	2700	2420	2190	2010	1850	1710

For safe deflection values for 12" Double Offset Expansion "U" Bends, see the preceding page.

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14" Double Offset Expansion "U" Bends

Grade "A" Pipe—14.00" O.D.



The values given in the table shown below apply only to 14" Double Offset Expansion "U" Bends made of Grade "A" Pipe (14.00" O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than $12R$.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 11 – Safe Deflection Values, Inches

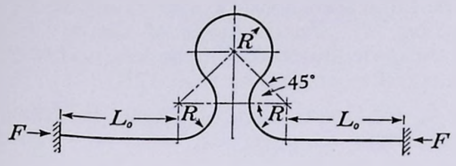
Temperature	Wall Thickness	Radius of Bend, Inches										
		50"	60"	70"	80"	90"	100"	110"	120"	130"	140"	150"
350° F.	.312"	5.8"	8.1"	10.8"	13.7"	16.7"	19.9"	23.3"	26.8"	30.3"	34.0"	37.5"
	.375	5.6	7.9	10.3	12.9	15.7	18.5	21.5	24.6	27.6	30.6	33.7
	.437	5.5	7.6	9.9	12.2	14.7	17.3	20.0	22.4	25.2	27.8	30.4
	.750	4.7	6.1	7.6	9.1	10.7	12.3	14.2	16.2	18.4	20.8	23.3
	.937	4.1	5.4	6.6	7.8	9.4	11.0	13.0	15.1	17.3	19.8	22.5
	1.406	3.2	4.2	5.4	6.8	8.4	10.2	12.2	14.4	16.7	19.3	22.1
450° F.	.312	5.2	7.2	9.5	12.2	14.8	17.7	20.7	23.8	26.8	30.1	33.2
	.375	5.0	7.0	9.1	11.5	13.9	16.4	19.2	21.8	24.4	27.2	29.9
	.437	4.9	6.7	8.8	10.8	13.0	15.3	17.7	19.9	22.2	24.5	26.9
	.750	4.1	5.4	6.7	8.1	9.5	10.9	12.6	14.4	16.3	18.5	20.7
	.937	3.6	4.8	5.9	7.0	8.3	9.9	11.5	13.4	15.4	17.6	20.0
	1.406	2.8	3.7	4.8	6.0	7.4	9.1	10.8	12.7	14.8	17.1	19.6
550° F.	.312	4.5	6.2	8.3	10.5	12.8	15.3	17.9	20.6	23.2	26.1	28.8
	.375	4.3	6.1	7.9	9.9	11.9	14.2	16.5	18.9	21.0	23.4	25.8
	.437	4.3	5.8	7.6	9.3	11.3	13.3	15.2	17.2	19.2	21.2	23.3
	.750	3.6	4.7	5.8	7.0	8.2	9.4	10.9	12.4	14.1	16.0	17.1
	.937	3.2	4.1	5.1	6.0	7.2	8.5	10.0	11.6	13.3	15.2	17.3
	1.406	2.4	3.2	4.1	5.2	6.4	7.8	9.4	11.0	12.8	14.8	17.0
650° F.	.312	4.0	5.5	7.4	9.4	11.4	13.6	15.9	18.2	20.7	23.3	25.5
	.375	3.8	5.4	7.1	8.8	10.6	12.7	14.7	16.8	18.7	20.8	22.9
	.437	3.8	5.2	6.8	8.3	10.0	11.9	13.5	15.3	17.1	18.9	20.9
	.750	3.2	4.2	5.2	6.2	7.3	8.4	9.7	11.1	12.6	14.2	16.2
	.937	2.8	3.7	4.5	5.4	6.4	7.5	8.9	10.3	11.8	13.5	15.4
	1.406	2.2	2.8	3.7	4.6	5.7	7.0	8.4	9.8	11.4	13.2	15.1
750° F.	.312	3.3	4.6	6.0	7.8	9.5	11.3	13.2	15.1	17.2	19.4	21.3
	.375	3.2	4.5	5.9	7.3	8.8	10.5	12.3	14.0	15.6	17.3	19.0
	.437	3.1	4.3	5.6	6.9	8.4	9.8	11.3	12.6	14.2	15.7	17.4
	.750	2.7	3.5	4.3	5.2	6.1	7.0	8.1	9.2	10.4	11.8	13.2
	.937	2.3	3.0	3.8	4.5	5.3	6.3	7.4	8.6	9.8	11.3	12.8
	1.406	1.8	2.4	3.1	3.9	4.8	5.8	6.9	8.2	9.5	10.9	12.6
800° F.	.312	3.2	4.5	6.0	7.6	9.3	11.1	12.9	14.8	16.8	18.9	20.8
	.375	3.1	4.4	5.7	7.2	8.7	10.3	12.0	13.6	15.2	16.9	18.6
	.437	3.1	4.2	5.5	6.7	8.2	9.6	11.0	12.4	13.9	15.3	16.8
	.750	2.6	3.4	4.2	5.1	5.9	6.8	7.8	9.0	10.2	11.5	12.9
	.937	2.3	3.0	3.7	4.3	5.2	6.1	7.2	8.4	9.6	11.0	12.5
	1.406	1.8	2.3	3.0	3.8	4.6	5.7	6.8	8.0	9.2	10.7	12.3
850° F.	.312	3.0	4.2	5.5	7.1	8.7	10.3	12.1	13.8	15.8	17.6	19.3
	.375	2.9	4.1	5.3	6.7	8.1	9.6	11.1	12.8	14.2	15.8	17.4
	.437	2.9	3.9	5.1	6.3	7.6	9.0	10.3	11.5	13.0	14.3	15.9
	.750	2.4	3.2	3.9	4.7	5.6	6.4	7.3	8.4	9.5	10.8	12.1
	.937	2.1	2.8	3.4	4.1	4.9	5.7	6.7	7.8	9.0	10.3	11.7
	1.406	1.6	2.2	2.8	3.5	4.3	5.3	6.3	7.4	8.6	10.0	11.5

Values given in the table do not include cold spring; see page 702.

For force values for 14" Double Offset Expansion "U" Bends, see the following page.

14" Double Offset Expansion "U" Bends

Grade "A" Pipe—14.00" O.D.



The values given in the table shown below apply only to 14" Double Offset Expansion "U" Bends made of Grade "A" Pipe (14.00" O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than $12R$.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 11 A – Force in Pounds to Produce Deflection Given in Table No. 11

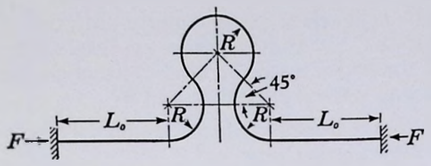
Temperature	Wall Thickness	Radius of Bend, Inches										
		50"	60"	70"	80"	90"	100"	110"	120"	130"	140"	150"
350° F.	.312"	2150#	2080#	2050#	1980#	1930#	1870#	1800#	1740#	1650#	1570#	1470#
	.375	2960	2880	2840	2720	2580	2470	2330	2200	2050	1930	1810
	.437	3940	3820	3620	3470	3240	3040	2820	2600	2400	2220	2070
	.750	9640	8430	7320	6370	5580	4850	4360	3920	3580	3310	3080
	.937	12350	10450	8770	7350	6400	5670	5150	4680	4280	3990	3680
	1.406	16450	13350	11300	9750	8600	7730	7030	6400	5890	5470	5130
450° F.	.312	1860	1800	1770	1710	1670	1610	1550	1500	1420	1380	1270
	.375	2550	2480	2450	2340	2230	2130	2010	1900	1770	1670	1530
	.437	3400	3300	3120	3000	2790	2620	2440	2250	2070	1920	1790
	.750	8320	7280	6310	5500	4820	4180	3760	3380	3090	2860	2660
	.937	10650	9020	7570	6340	5520	4890	4440	4030	3690	3450	3180
	1.406	14200	11500	9760	8410	7410	6660	6060	5520	5080	4720	4420
550° F.	.312	1560	1510	1490	1440	1400	1360	1300	1260	1200	1160	1070
	.375	2150	2090	2060	1970	1870	1790	1690	1600	1490	1400	1290
	.437	2860	2770	2630	2520	2380	2230	2050	1890	1740	1610	1500
	.750	7000	6120	5280	4620	4050	3520	3160	2840	2600	2400	2230
	.937	8960	7580	6370	5330	4640	4120	3770	3420	3100	2900	2670
	1.406	11900	9690	8200	7080	6230	5610	5100	4640	4270	3970	3730
650° F.	.312	1330	1300	1260	1220	1190	1150	1100	1070	1020	990	910
	.375	1820	1780	1750	1670	1590	1520	1440	1360	1260	1190	1090
	.437	2430	2350	2230	2140	2020	1900	1740	1600	1480	1370	1280
	.750	5930	5190	4480	3920	3440	2980	2680	2410	2210	2040	1900
	.937	7600	6430	5400	4530	3940	3490	3200	2910	2660	2460	2270
	1.406	10100	8220	6960	6000	5290	4760	4320	3940	3630	3360	3160
750° F.	.312	1030	1020	990	950	930	900	860	840	820	770	710
	.375	1420	1380	1360	1310	1240	1190	1150	1060	990	930	870
	.437	1890	1830	1740	1670	1580	1480	1360	1250	1150	1070	990
	.750	4620	4050	3490	3060	2680	2320	2090	1880	1720	1590	1480
	.937	5930	5020	4210	3530	3070	2720	2500	2270	2070	1920	1770
	1.406	7900	6410	5420	4680	4120	3710	3370	3070	2820	2620	2460
800° F.	.312	980	960	930	900	880	850	820	790	770	730	670
	.375	1340	1310	1290	1230	1170	1120	1090	1000	930	880	810
	.437	1790	1730	1650	1580	1490	1400	1280	1180	1090	1010	940
	.750	4380	3830	3300	2890	2540	2200	1980	1780	1630	1530	1400
	.937	5610	4750	3980	3340	2900	2570	2360	2140	1960	1810	1670
	1.406	7470	6070	5130	4420	3900	3510	3190	2900	2670	2480	2330
850° F.	.312	880	860	840	810	790	740	730	710	690	650	600
	.375	1210	1170	1160	1110	1050	1030	970	900	830	790	720
	.437	1600	1560	1480	1410	1340	1250	1150	1060	980	900	840
	.750	3920	3430	2960	2590	2270	1970	1770	1600	1460	1370	1250
	.937	5030	4250	3570	2990	2600	2310	2090	1920	1760	1620	1500
	1.406	6700	5430	4600	3970	3500	3150	2860	2610	2400	2230	2090

For safe deflection values for 14" Double Offset Expansion "U" Bends, see the preceding page.

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16" Double Offset Expansion "U" Bends

Grade "A" Pipe—16.00" O.D.



The values given in the table shown below apply only to 16" Double Offset Expansion "U" Bends made of Grade "A" Pipe (16.00" O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than 12R.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 12 – Safe Deflection Values, Inches

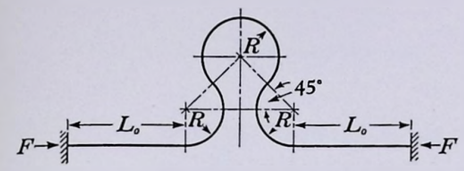
Temperature	Wall Thickness	Radius of Bend, Inches										
		60"	70"	80"	90"	100"	110"	120"	130"	140"	150"	160"
350° F.	.312"	7.4"	9.8"	12.6"	15.7"	19.0"	22.1"	25.8"	29.6"	33.4"	37.3"	41.3"
	.375	7.2	9.4	12.2	15.1	18.1	21.1	24.2	27.6	30.9	34.3	37.8
	.500	6.9	9.1	11.3	13.7	16.2	18.6	21.2	23.8	26.4	29.1	31.8
	.843	5.8	7.3	8.9	10.4	11.8	13.4	15.2	17.1	19.2	21.4	23.9
	1.031	5.2	6.4	7.6	8.9	10.4	12.1	13.9	15.9	18.0	20.3	22.7
	1.562	3.9	5.0	6.2	7.6	9.2	10.9	12.4	14.9	17.2	19.4	21.9
450° F.	.312	6.6	8.7	11.2	13.9	16.8	19.6	22.9	26.3	29.6	33.1	36.6
	.375	6.4	8.5	10.8	13.4	16.0	18.7	21.5	24.5	27.4	30.4	33.5
	.500	6.1	8.0	10.0	12.1	14.3	16.5	18.8	21.1	23.4	25.8	28.2
	.843	5.1	6.5	7.9	9.2	10.4	11.9	13.4	15.1	17.0	19.0	21.1
	1.031	4.7	5.7	6.8	7.9	9.2	10.7	12.3	14.1	16.0	18.0	20.1
	1.562	3.5	4.4	5.5	6.8	8.2	9.6	11.0	13.2	15.2	17.2	19.4
550° F.	.312	5.7	7.6	9.7	12.0	14.6	16.9	19.8	22.7	25.6	28.6	31.7
	.375	5.6	7.3	9.4	11.6	13.9	16.2	18.6	21.2	23.7	26.3	29.0
	.500	5.3	7.0	8.6	10.5	12.4	14.3	16.3	18.3	20.3	22.3	24.4
	.843	4.4	5.6	6.8	8.0	9.0	10.3	11.6	13.1	14.7	16.4	18.3
	1.031	4.0	4.9	5.9	6.8	8.0	9.3	10.7	12.2	13.8	15.6	17.4
	1.562	3.0	3.8	4.8	5.9	7.1	8.3	9.5	11.5	13.2	14.9	16.8
650° F.	.312	5.1	6.7	8.6	10.7	13.0	15.1	17.6	20.2	22.8	25.5	28.2
	.375	5.0	6.5	8.4	10.3	12.4	14.4	16.5	18.9	21.1	23.4	25.8
	.500	4.7	6.2	7.7	9.4	11.1	12.7	14.6	16.4	18.2	19.9	21.8
	.843	4.0	5.0	6.1	7.1	8.0	9.2	10.4	11.7	13.1	14.6	16.3
	1.031	3.6	4.4	5.2	6.1	7.1	8.3	9.5	10.9	12.3	13.9	15.5
	1.562	2.7	3.4	4.2	5.2	6.3	7.4	8.5	10.2	11.8	13.3	15.0
750° F.	.312	4.2	5.6	7.2	8.9	10.8	12.5	14.7	16.8	19.0	21.2	23.4
	.375	4.1	5.4	6.9	8.6	10.3	12.0	13.7	15.7	17.5	19.5	21.5
	.500	3.9	5.2	6.4	7.8	9.2	10.6	12.1	13.6	15.1	16.5	18.1
	.843	3.3	4.2	5.0	5.9	6.7	7.6	8.6	9.7	10.9	12.2	13.6
	1.031	3.0	3.7	4.3	5.1	5.9	6.8	7.9	9.0	10.2	11.5	12.9
	1.562	2.2	2.8	3.5	4.3	5.2	6.2	7.0	8.5	9.8	11.0	12.5
800° F.	.312	4.1	5.5	7.0	8.7	10.5	12.2	14.3	16.4	18.5	20.7	22.8
	.375	4.0	5.3	6.8	8.4	10.0	11.8	13.4	15.3	17.1	19.0	20.9
	.500	3.8	5.0	6.2	7.6	9.1	10.3	11.9	13.3	14.8	16.1	17.7
	.843	3.2	4.1	4.9	5.7	6.5	7.4	8.4	9.5	10.6	11.9	13.2
	1.031	2.9	3.6	4.2	4.9	5.8	6.7	7.7	8.8	10.0	11.2	12.6
	1.562	2.2	2.8	3.4	4.2	5.1	6.0	6.9	8.3	9.5	10.8	12.1
850° F.	.312	3.8	5.1	6.5	8.1	9.8	11.4	13.4	15.3	17.3	19.3	21.4
	.375	3.8	5.0	6.3	7.8	9.4	10.9	12.5	14.3	16.0	17.8	19.6
	.500	3.6	4.7	5.8	7.1	8.4	9.6	11.0	12.3	13.7	15.1	16.5
	.843	3.0	3.8	4.6	5.4	6.1	6.9	7.9	8.9	10.0	11.1	12.4
	1.031	2.7	3.3	4.0	4.6	5.4	6.2	7.2	8.2	9.3	10.5	11.8
	1.562	2.0	2.6	3.2	3.9	4.8	5.6	6.4	7.7	8.9	10.0	11.4

Values given in the table do not include cold spring; see page 702.

For force values for 16" Double Offset Expansion "U" Bends, see the following page.

16" Double Offset Expansion "U" Bends

Grade "A" Pipe—16.00" O.D.



The values given in the table shown below apply only to 16" Double Offset Expansion "U" Bends made of Grade "A" Pipe (16.00" O.D.), of the style illustrated at the left, and only where dimension L_o is equal to or greater than 12R.

For shorter lengths of L_o, for Bends made of Grade "B" Pipe, and for other shapes of Bends, see page 701.

Table No. 12 A – Force in Pounds to Produce Deflection Given in Table No. 12

Temperature	Wall Thickness	Radius of Bend, Inches										
		60"	70"	80"	90"	100"	110"	120"	130"	140"	150"	160"
350° F.	.312"	2190#	2150#	2110#	2070#	2020#	1990#	1910#	1890#	1830#	1800#	1720#
	.375	3080	2970	2920	2850	2760	2660	2590	2460	2380	2270	2170
	.500	5180	5000	4810	4580	4320	4070	3830	3570	3330	3130	2920
	.843	11880	10730	9460	8420	7330	6550	5910	5380	4950	4580	4280
	1.031	15050	12850	11000	9490	8400	7530	6810	6270	5790	5380	5020
	1.562	19900	16730	14450	12750	11400	10250	9080	8680	8080	7440	6950
450° F.	.312	1890	1850	1820	1790	1740	1710	1650	1630	1580	1550	1490
	.375	2660	2560	2520	2460	2380	2290	2260	2120	2050	1960	1870
	.500	4470	4320	4150	3950	3730	3510	3300	3080	2870	2700	2520
	.843	10230	9250	8160	7270	6320	5640	5100	4630	4270	3950	3690
	1.031	13000	11100	9500	8180	7240	6500	5870	5400	5000	4640	4330
	1.562	17150	14400	12450	11000	9840	8850	7820	7500	6980	6410	5990
550° F.	.312	1590	1530	1500	1470	1460	1440	1390	1370	1330	1310	1250
	.375	2240	2160	2120	2100	2000	1960	1900	1790	1730	1660	1580
	.500	3760	3620	3490	3320	3130	2950	2780	2590	2410	2270	2120
	.843	8620	7780	6870	6100	5310	4750	4290	3900	3600	3320	3100
	1.031	10900	9330	7980	6880	6090	5460	4940	4550	4200	3900	3640
	1.562	14450	12150	10500	9250	8280	7440	6580	6300	5860	5400	5040
650° F.	.312	1350	1330	1300	1250	1240	1220	1170	1160	1130	1110	1060
	.375	1900	1830	1800	1780	1700	1660	1620	1520	1470	1400	1370
	.500	3180	3080	2960	2820	2660	2500	2390	2190	2080	1930	1800
	.843	7320	6600	5820	5180	4520	4030	3640	3310	3050	2820	2630
	1.031	9280	7920	6770	5840	5170	4630	4200	3860	3560	3310	3090
	1.562	12250	10300	8900	7850	7030	6320	5590	5340	4970	4580	4280
750° F.	.312	1050	1040	1020	980	970	950	920	910	880	860	830
	.375	1480	1430	1400	1390	1360	1300	1260	1180	1170	1090	1070
	.500	2480	2400	2310	2200	2070	1950	1860	1740	1620	1500	1400
	.843	5700	5180	4540	4040	3520	3140	2840	2580	2380	2200	2050
	1.031	7230	6170	5280	4560	4030	3610	3270	3010	2780	2580	2410
	1.562	9550	8050	6940	6120	5470	4920	4360	4170	3880	3600	3340
800° F.	.312	990	960	940	930	920	900	870	860	830	820	780
	.375	1400	1350	1330	1310	1280	1230	1190	1120	1100	1030	1010
	.500	2350	2270	2180	2080	1960	1850	1760	1650	1540	1420	1330
	.843	5390	4900	4290	3820	3330	2970	2680	2440	2250	2080	1940
	1.031	6840	5840	5000	4300	3820	3420	3100	2850	2630	2440	2280
	1.562	9040	7600	6560	5790	5180	4650	4120	3940	3670	3380	3160
850° F.	.312	880	860	840	830	820	810	780	770	740	730	700
	.375	1260	1240	1190	1180	1150	1100	1070	1000	990	930	900
	.500	2110	2030	1990	1870	1760	1660	1580	1470	1370	1270	1190
	.843	4830	4400	3850	3420	2980	2670	2410	2190	2010	1860	1740
	1.031	6130	5230	4470	3860	3420	3060	2770	2550	2390	2190	2070
	1.562	8100	6810	5880	5190	4640	4170	3690	3530	3280	3050	2830

For safe deflection values for 16" Double Offset Expansion "U" Bends, see the preceding page.

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Formulas for Special Types of Bends

The following formulas may be used for determining stress and reactions in a turbine expansion "U" bend as illustrated in Figure No. 10.

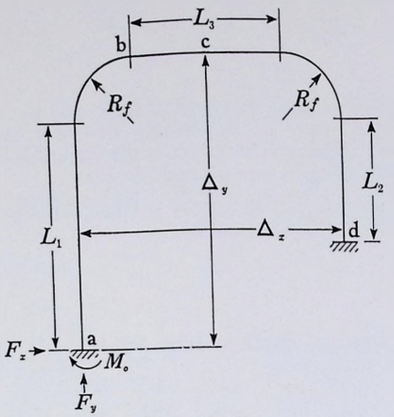


Figure No. 10
Turbine Expansion "U" Bend

$\Delta_y = (L_1 - L_2) \times$ Expansion per foot

$\Delta_x = (2R_f + L_3) \times$ Expansion per foot

Note: L_1, L_2, L_3 and R_f should be expressed in feet.

Bending Moment Formulas

① $M_o = \dfrac{BF_x - CF_y}{A}$ ② $M_o = \dfrac{DF_x - GF_y + EI\Delta_y/1728}{C}$ ③ $M_o = \dfrac{HF_x - DF_y - EI\Delta_x/1728}{B}$

$A = L_1 + L_2 + L_3 + \pi KR_f$

$B = \dfrac{L_1^2}{2} - \dfrac{L_2^2}{2} + L_1L_2 + L_1L_3 + R_fL_3 + 2KR_f^2 + \pi KR_fL_1$

$C = \pi KR_f^2 + \dfrac{\pi KR_fL_3}{2} + R_fL_3 + 2R_fL_2 + L_2L_3 + \dfrac{L_3^2}{2}$

$D = 2KR_f^3 + \pi KR_f^2L_1 + KR_f^2L_3 + R_f^2L_3 + 2R_fL_1L_2 - R_fL_2^2 + \dfrac{R_fL_3^2}{2} + \dfrac{\pi KR_fL_1L_3}{2} + R_fL_1L_3 + \dfrac{L_1L_3^2}{2} - \dfrac{L_3L_2^2}{2} + L_1L_2L_3$

$G = \dfrac{3\pi KR_f^3}{2} + R_f^2L_3 + \pi KR_f^2L_3 + 2KR_f^2L_3 + R_fL_3^2 + \dfrac{\pi KR_fL_3^2}{2} + 4R_f^2L_2 + 4R_fL_2L_3 + L_3^2L_2 + \dfrac{L_3^3}{3}$

$H = \dfrac{L_1^3}{3} + \pi KR_fL_1^2 + 4KR_f^2L_1 + \dfrac{\pi KR_f^3}{2} + R_f^2L_3 - L_1L_2^2 + L_1^2L_2 + L_1^2L_3 + 2R_fL_1L_3 + \dfrac{L_2^3}{3}$

Stress Formulas

④ a—at foot of tangent L_1

$$S = \frac{12M_o r_o}{I}$$

⑤ b—at top of curved portion of bend

$$S = \frac{12\beta\left[M_o - F_x(L_1 + R_f) + F_yR_f\right]r}{I}$$

⑥ c—at center of tangent L_3

$$S = \frac{12\left[M_o - F_x(L_1 + R_f) + F_y(R_f + \frac{L_3}{2})\right]r_o}{I}$$

⑦ d—at foot of tangent L_2

$$S = \frac{12\left[M_o - F_x(L_1 - L_2) + F_y(2R_f + L_3)\right]r_o}{I}$$

Formulas for other types of bends will be furnished on request.

Example (Formulas for Special Types of Bends — Cont.)

What are the anchorage reactions and stresses due to expansion of pipe in a turbine expansion "U" bend as shown in Figure No. 10, having the dimensions as given below:

Service temperature = 750° F.
Outside diameter of pipe = 8.625″
Pipe material = Grade "A" Seamless
Wall thickness = .500
R_f = 5 feet
K = 1.22 (Table 2, page 699)
β = .926 (Table 1, page 698)
L_1 = 15 feet
L_2 = 5 feet
L_3 = 10 feet
E at 750° F. = 24,600,000 (Figure No. 3, page 700)
I = 105.7

Procedure:

1. Figure No. 3 shows that the expansion of 100 feet of steel pipe from 70 to 750° F. is approximately 6.2″.
   Therefore—
   $\Delta_y = (L_1 - L_2) \times \dfrac{6.2}{100} = 10 \times .062 = .62''$
   $\Delta_x = (2R_f + L_3) \times \dfrac{6.2}{100} = 20 \times .062 = 1.24''$
2. Substitute the values given above in formulas ①, ②, and ⑧ which will give the following results:
   ① $M_o = \dfrac{723.45F_x - 391.6F_y}{49.16} = 14.72F_x - 7.97F_y$
   ② $M_o = \dfrac{6734.56F_x - 6328.3F_y + 932950}{391.6} = 17.2F_x - 16.16F_y + 2382.4$
   ③ $M_o = \dfrac{12298F_x - 6734.56F_y - 1865900}{723.45} = 17F_x - 9.31F_y - 2579.17$
3. Subtract formula ① from ②
   ② $M_o = 17.20F_x - 16.16F_y + 2382.4$
   ① $M_o = 14.72F_x - 7.97F_y$
   $0 = 2.48F_x - 8.19F_y + 2382.4$
   ⑧ $F_x = 3.3F_y - 960.6$
4. Subtract formula ① from ③
   ③ $M_o = 17.00F_x - 9.31F_y - 2579.17$
   ① $M_o = 14.72F_x - 7.97F_y$
   $0 = 2.28F_x - 1.34F_y - 2579.17$
   ⑨ $F_x = .59F_y + 1131.2$
5. Subtract formula ⑧ from ⑨
   ⑨ $F_x = .59F_y + 1131.2$
   ⑧ $F_x = 3.30F_y - 960.6$
   $0 = -2.71F_y + 2091.8$
   $F_y = 771.9$ pounds
6. Solve for F_x in formula ⑧
   $F_x = 3.3 \times 771.9 - 960.6 = 1586.6$ pounds
7. Solve for M_o in formula ①
   $M_o = 14.72 \times 1586.6 - 7.97 \times 771.9 = 17202.7$ foot pounds

Stress value at

a. Formula ④
$$S = \frac{12 \times 17202.7 \times 4.3125}{105.7} = 8422 \text{ pounds per square inch}$$

b. Formula ⑤
$$S = \frac{12 \times .926\,[17202.7 - 1586.6(20) + 771.9(5)]\,4.0625}{105.7} = 4557 \text{ pounds per square inch}$$

c. Formula ⑥
$$S = \frac{12\,[17202.7 - 1586.6(20) + 771.9(10)]\,4.3125}{105.7} = 3334 \text{ pounds per square inch}$$

d. Formula ⑦
$$S = \frac{12\,[17202.7 - 1586.6(10) + 771.9(20)]\,4.3125}{105.7} = 8213 \text{ pounds per square inch}$$

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Crane Bolting

Definitions:

1. **Bolt** — A bolt is threaded on one end only, the other end being upset into the form of a head.
2. **Stud** — A stud is threaded on both ends, one end being oversize in diameter to fit tightly (wrench fit) in a tapped hole, the other being to the standard diameter for a nut assembly.
3. **Bolt-Stud** — A bolt-stud is threaded either on both ends, or full length to the standard diameter for nut assembly on each end.

Materials: Crane Co. furnishes the above in the following materials:

Bolts and Studs for use at temperatures up to 500° F. are made from Open Hearth Free-machining Steel complying with A.S.T.M. Specification A107, Open Hearth Screw-Steel grade having the following physical properties:

	Minimum
Tensile Strength, lbs. per sq. in.	60,000
Yield Point, lbs. per sq. in.	35,000
Elongation in 2", per cent	25
Reduction of Area, per cent	50

Nuts regularly furnished are hot pressed, made to the American Standard heavy hexagon dimensions.

Bolts are furnished with square heads which comply with the Standard dimensions of the American Standard unless otherwise specified. Bolts with heads made to the American Standard heavy dimensions are furnished on request at a slightly higher price.

All bolts and studs are threaded in accordance with the American Standard Screw Threads, Coarse-Thread Series (B 1.1).

Studs and Bolt-Studs for use at temperatures up to 500° F. primarily for high pressure hydraulic service are made from cold rolled steel complying with A.S.T.M. Specification A108, Open Hearth Screw-Steel Grade having the following physical properties:

	Minimum
Tensile Strength, lbs. per sq. in.	70,000
Yield Point, lbs. per sq. in.	60,000
Elongation in 2", per cent	18
Reduction of Area, per cent	45

Nuts regularly furnished are cold punched, semi-finished, made to the American Standard heavy hexagonal dimensions.

All studs and bolt-studs are threaded in accordance with the American Standard Screw Threads, Coarse-Thread Series (B 1.1).

Studs and Bolt-Studs for use on high temperature service are made from Crane Triplex Steel which complies with the requirements of A.S.T.M. Specification A96 for Class C Bolting and the American Steel Flange Standards B16e-1932. Crane Triplex Steel has the following physical properties:

	Minimum
Tensile Strength, lbs. per sq. in.	130,000
Yield Point, lbs. per sq. in.	110,000
Elongation in 2", per cent	18
Reduction of Area, per cent	55

All Crane Triplex Steel Bolt-Studs are furnished threaded full length.

Nuts which are regularly furnished with Crane Triplex Steel Studs and Bolt-Studs are medium carbon, oil quenched, semi-finished, made to the American Standard Heavy Hexagon Nut Dimensions, and meet the requirements of A.S.T.M. Specification A96 for Class I.

All studs and bolt-studs from ½" up to and including 1" diameter are threaded in accordance with the American Standard Screw Threads, Coarse-Thread Series (B 1.1). Studs and bolt-studs having diameters 1⅛" and larger are threaded with the American Standard Screw Threads, 8-Pitch-Thread Series.

Working Stresses for Crane Bolting: The bolting used in flanged connections must be designed to withstand internal pressure, maintain a gasket compression sufficient to prevent leakage and resist any additional strains which may be caused by expansion of piping, etc.

As the magnitude of some of these factors is indeterminate, that is, the values may be large or small depending upon installation conditions and type of joint used, the working stresses which are permitted for bolting must be low enough to prohibit the stress which may be set up under operating conditions from exceeding or even approaching the yield point of the material. The following table gives working stresses for Crane bolting:

Material	A.S.T.M. Spec.	Working Stress	Max. Service Temp.
Open Hearth Steel	A107	7,000 – 10,000	500°
Cold Rolled Steel	A108	15,000 – 20,000	500°
Crane Triplex Steel	A96	30,000 – 45,000	*750°

*When using Triplex Steel for temperatures over 750° F., the working stress should be reduced.

NOTE: Care must be used in pulling up the bolts, studs or bolt-studs so that applied stress is less than the yield point.

Torque Required to Produce Bolt Stress:

The torque or turning effort required to produce a certain stress in bolting is dependent upon a number of conditions, some of which are:

1. Diameter of bolt.
2. Type and number of threads on bolt.
3. Material of bolt.
4. Condition of nut bearing surfaces.
5. Lubrication of bolt threads and nut bearing surfaces.

Crane Co. has conducted many tests to determine the relation between torque and bolt stress from which the tables given below were prepared. The values given in these tables are based upon steel bolting well lubricated with a heavy graphite and oil mixture. It was found that a non-lubricated bolt has an efficiency of about 50 per cent of a well lubricated one and also that different lubricants produce results varying between the limits of 50 and 100 per cent of the tabulated stress figures.

Crane High Temperature Thread Lubricant

The graphite and oil mixture will give satisfactory results, however, for high temperature service Crane High Temperature Thread Lubricant should be used, as bolt studs can be more readily followed up or disassembled after being subject to heat when using the latter lubricant. See page 366 for description of Crane High Temperature Thread Lubricant.

Data for Use with Triplex Steel Bolt Studs

Load in Pounds on Bolt Studs when Torque Loads Are Applied

Nominal Diameter of Stud	No. of Threads per Inch	Diameter at Root of Thread	Area at Root of Thread	Stress: 30,000 Lbs. per Sq. In.		45,000 Lbs. per Sq. In.		60,000 Lbs. per Sq. In.	
				Torque Ft. Lbs.	Compression, Lbs.	Torque Ft. Lbs.	Compression, Lbs.	Torque Ft. Lbs.	Compression, Lbs.
¼"	20	.185	.027	4	810	6	1215	8	1620
5/16	18	.240	.045	8	1350	12	2025	16	2700
⅜	16	.294	.068	12	2040	18	3060	24	4080
7/16	14	.345	.093	20	2790	30	4185	40	5580
½	13	.400	.126	30	3780	45	5670	60	7560
9/16	12	.454	.162	45	4860	68	7290	90	9720
⅝	11	.507	.202	60	6060	90	9090	120	12120
¾	10	.620	.302	100	9060	150	13590	200	18120
⅞	9	.731	.419	160	12570	240	18855	320	25140
1	8	.838	.551	245	16530	368	24795	490	33060
1⅛	8	.963	.728	355	21840	533	32760	710	43680
1¼	8	1.088	.929	500	27870	750	41805	1000	55740
1⅜	8	1.213	1.155	680	34650	1020	51975	1360	69300
1½	8	1.338	1.405	800	42150	1200	63225	1600	84300
1⅝	8	1.463	1.680	1100	50400	1650	75600	2200	100800
1¾	8	1.588	1.980	1500	59400	2250	89100	3000	118800
1⅞	8	1.713	2.304	2000	69120	3000	103680	4000	138240
2	8	1.838	2.652	2200	79560	3300	119340	4400	159120
2¼	8	2.088	3.423	3180	102690	4770	154035	6360	205380
2½	8	2.338	4.292	4400	128760	6600	193140	8800	257520
2¾	8	2.638	5.259	5920	157770	8880	236655	11840	315540
3	8	2.838	6.324	7720	189720	11580	284580	15440	379440

Data for Use with Common Bolts

Load in Pounds on Bolts when Torque Loads Are Applied

Nominal Diameter of Bolt	No. of Threads per Inch	Diameter at Root of Thread	Area at Root of Thread	Stress: 7,500 Lbs. per Sq. In.		15,000 Lbs. per Sq. In.		30,000 Lbs. per Sq. In.	
				Torque Ft. Lbs.	Compression, Lbs.	Torque Ft. Lbs.	Compression, Lbs.	Torque Ft. Lbs.	Compression, Lbs.
¼"	20	.185	.027	1	203	2	405	4	810
5/16	18	.240	.045	2	388	4	675	8	1350
⅜	16	.294	.068	3	510	6	1020	12	2040
7/16	14	.345	.093	5	698	10	1395	20	2790
½	13	.400	.126	8	945	15	1890	30	3780
9/16	12	.454	.162	12	1215	23	2430	45	4860
⅝	11	.507	.202	15	1515	30	3030	60	6060
¾	10	.620	.302	25	2265	50	4530	100	9060
⅞	9	.731	.419	40	3143	80	6285	160	12570
1	8	.838	.551	62	4133	123	8265	245	16530
1⅛	7	.939	.693	98	5190	195	10380	390	20760
1¼	7	1.064	.890	137	6675	273	13350	545	26700
1⅜	6	1.158	1.054	183	7905	365	15810	730	31620
1½	6	1.283	1.294	219	9705	437	19410	875	38820
1⅝	5½	1.389	1.515	300	11363	600	22725	1200	45450
1¾	5	1.490	1.744	390	13080	775	26160	1550	52320
1⅞	5	1.615	2.049	525	15368	1050	30735	2100	61470
2	4½	1.711	2.300	563	17250	1125	34500	2250	69000

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Thermal Properties of Water[1]

Temperature Degree F.	Sat. Pressure Pounds per Sq. Inch	Volume Cubic Feet per Pound	Weight Pounds per Cubic Foot	Specific Heat
32	0.0887	0.01602	62.42	1.0093
40	0.1217	0.01602	62.42	1.0048
50	0.1780	0.01602	62.42	1.0015
60	0.2561	0.01603	62.38	0.9995
70	0.3628	0.01605	62.31	0.9982
80	0.5067	0.01607	62.23	0.9975
90	0.6980	0.01610	62.11	0.9971
100	0.9487	0.01613	62.00	0.9970
110	1.274	0.01616	61.88	0.9971
120	1.692	0.01620	61.73	0.9974
130	2.221	0.01625	61.54	0.9978
140	2.887	0.01629	61.39	0.9984
150	3.716	0.01634	61.20	0.9990
160	4.739	0.01639	61.01	0.9998
170	5.990	0.01645	60.79	1.0007
180	7.510	0.01650	60.61	1.0017
190	9.336	0.01656	60.39	1.0028
200	11.525	0.01663	60.13	1.0039
210	14.123	0.01669	59.92	1.0052
212	14.696	0.01670	59.88	1.0055
220	17.188	0.01676	59.66	1.0068
240	24.97	0.01690	59.17	1.0104
260	35.43	0.01706	58.62	1.0148
280	49.20	0.01723	58.04	1.020
300	67.01	0.01742	57.41	1.026
350	134.62	0.01797	55.65	1.044
400	247.25	0.01865	53.62	1.067
450	422.61	0.0195	51.3	1.095
500	681.09	0.0205	48.8	1.130
550	1045.4	0.0219	45.7	1.200
600	1544.6	0.0241	41.5	1.362
700	3096.4	0.0394	25.4	.....

[1] (American Society of Heating and Ventilating Engineers Guide, 1935)

Flow of Water Through Standard Wrought Iron or Steel Pipe

Based on Saph and Schoder Formula

Note: For old or rough pipes add 25% to the pressure drop given in the table.
Velocities given in light face type.
Pressure drops given in bold face type.

$$P = \frac{3.68V^{1.86}}{d^{1.25}}$$

P = Pressure drop, lbs. per sq. in. per 1000 ft. of pipe
V = Velocity, feet per second
d = Inside diameter of pipe, inches

PRESSURE DROP, POUNDS PER SQ. IN. PER 1000 FT. OF PIPE
(1.0 Lb. per Sq. In. = 2.30 Ft. of Water)

Discharge Gals. per Min.	1″ Vel. Ft. per Sec.	1″ Pressure Drop	1¼″ Vel. Ft. per Sec.	1¼″ Pressure Drop	1½″ Vel. Ft. per Sec.	1½″ Pressure Drop	2″ Vel. Ft. per Sec.	2″ Pressure Drop	2½″ Vel. Ft. per Sec.	2½″ Pressure Drop	3″ Vel. Ft. per Sec.	3″ Pressure Drop	3½″ Vel. Ft. per Sec.	3½″ Pressure Drop	4″ Vel. Ft. per Sec.	4″ Pressure Drop	5″ Vel. Ft. per Sec.	5″ Pressure Drop
1	.37	.55																
2	.74	2.0	0.43	.50														
3	1.12	4.25	0.64	1.08	0.47	.50												
4	1.49	7.3	0.86	1.85	0.63	.86												
5	1.86	11.1	1.07	2.81	0.79	1.31												
6	2.24	15.4	1.28	3.94	0.95	1.82	.57	.52										
8	2.98	25.3	1.72	6.70	1.26	3.11	.76	.88										
10	3.72	40.0	2.14	10.2	1.57	4.70	.96	1.34	.67	.55								
15	5.60	85.0	3.21	21.8	2.36	10.1	1.43	2.85	1.00	1.18								
20	7.44	145	4.29	36.8	3.15	17.1	1.91	4.85	1.34	2.00	.87	.68						
25			5.36	56.0	3.94	26.0	2.39	7.32	1.68	3.04	1.08	1.02	.81	.49				
30			6.43	78.5	4.72	36.4	2.87	10.4	2.01	4.26	1.30	1.44	.97	.69				
35			7.51	100	5.51	48.3	3.35	13.7	2.35	5.14	1.52	1.92	1.14	.93	.88	.49		
40					6.30	62.5	3.82	17.6	2.68	7.29	1.74	2.45	1.30	1.18	1.01	.63		
45					7.08	78.0	4.30	22.1	3.00	9.12	1.95	3.08	1.46	1.49	1.13	.79		
50					7.87	94.0	4.78	26.7	3.35	11.0	2.17	3.72	1.62	1.80	1.26	.96		
60							5.74	37.5	4.02	15.5	2.60	5.20	1.95	2.54	1.51	1.24		
70							6.69	51.8	4.69	21.4	3.04	7.25	2.27	3.48	1.76	1.86	1.12	.57
80							7.65	63.8	5.37	26.4	3.48	8.90	2.59	4.33	2.01	2.30	1.28	.70
90							8.60	79.1	6.04	32.8	3.91	11.1	2.92	5.31	2.26	2.86	1.44	.87
100	1.11	.45					9.56	96.8	6.71	40.0	4.34	13.5	3.24	7.78	2.52	3.47	1.60	1.06
125	1.39	.68							8.38	60.6	5.42	20.5	4.05	9.90	3.15	5.28	2.00	1.62
150	1.67	.95							10.06	65.2	6.51	28.8	4.86	13.9	3.78	7.40	2.41	2.28
175	1.94	1.26							11.73	86.6	7.59	39.0	5.67	18.4	4.41	9.80	2.81	3.00
200	2.22	1.62									8.68	49.0	6.48	23.6	5.04	12.6	3.21	3.85
225	2.50	2.00	1.44	.51							9.77	60.6	7.29	29.3	5.67	15.6	3.61	4.76
250	2.78	2.45	1.60	.63							10.85	74.1	8.10	35.8	6.30	19.0	4.01	5.85
275	3.06	2.93	1.76	.74							11.94	88.2	8.91	42.6	6.93	22.8	4.41	6.92
300	3.33	3.44	1.92	.87							13.02	104	9.72	50.2	7.56	26.8	4.81	8.20
325	3.61	3.98	2.08	1.02									10.53	58.0	8.18	31.0	5.21	9.55
350	3.89	4.55	2.24	1.12	1.63	.48							11.35	66.8	8.82	35.7	5.61	10.9
375	4.16	5.17	2.40	1.32	1.73	.53							12.17	75.2	9.45	40.3	6.01	12.4
400	4.44	5.85	2.56	1.49									12.97	85.3	10.08	45.5	6.41	14.0
425	4.72	6.53	2.72	1.67									13.78	95.3	10.70	50.7	6.82	15.6
450	5.00	7.28	2.88	1.85	1.83	.59							14.59	108	11.33	56.8	7.22	17.4
475	5.27	8.07	3.04	2.05	1.93	.66							15.40	118	11.96	62.8	7.62	19.2
500	5.55	8.90	3.20	2.28	2.04	.73									12.59	69.3	8.02	21.3
550	6.11	10.6	3.53	2.71	2.24	.87									13.84	82.7	8.82	25.4
600	6.66	12.5	3.85	3.18	2.44	1.02									15.10	97.0	9.62	29.8
650	7.21	14.4	4.17	3.67	2.65	1.18	1.84	.48							16.36	112	10.42	34.5
700	7.77	16.6	4.49	4.23	2.85	1.36	1.99	.55									11.22	39.7
750	8.32	19.0	4.81	4.80	3.05	1.54	2.13	.63									12.02	45.0
800	8.88	21.3	5.13	5.41	3.26	1.73	2.27	.70									12.82	50.8
850	9.44	23.7	5.45	6.05	3.46	1.94	2.41	.79	1.98	.48							13.62	56.7
900	10.00	26.4	5.77	6.72	3.66	2.16	2.55	.87	2.10	.53							14.42	62.8
950	10.55	29.2	6.09	7.45	3.87	2.38	2.69	.96	2.21	.59							15.22	69.6
1,000	11.10	32.3	6.41	8.18	4.07	2.63	2.84	1.06	2.33	.65							16.02	76.8
1,100	12.22	38.6	7.05	9.82	4.48	3.15	3.12	1.27	2.56	.78							17.63	91.8
1,200	13.32	45.1	7.69	11.6	4.88	3.64	3.41	1.50	2.80	.91	2.11	.45					19.24	108
1,300	14.43	52.5	8.33	13.4	5.29	4.30	3.69	1.74	3.03	1.06	2.28	.52						
1,400	15.54	60.0	8.97	15.4	5.70	4.88	3.97	1.99	3.26	1.22	2.46	.60						
1,500	16.65	68.8	9.62	17.5	6.10	5.59	4.26	2.28	3.49	1.39	2.64	.69						
1,600	17.76	77.1	10.26	19.7	6.51	6.29	4.54	2.56	3.73	1.56	2.81	.77						
1,800	19.98	96.1	11.54	24.5	7.32	7.85	5.11	3.19	4.19	1.93	3.16	.96	2.47	.52				
2,000	22.20	117	12.83	29.9	8.13	9.57	5.67	3.86	4.66	2.37	3.51	1.17	2.75	.63				
2,500			16.03	45.1	10.18	14.5	7.09	5.88	5.82	3.58	4.39	1.77	3.43	.96				
3,000			19.24	63.2	12.21	20.4	8.51	8.23	6.98	5.02	5.27	2.49	4.12	1.35	3.30	.55		
3,500			22.43	84.0	14.25	27.2	9.93	10.9	8.16	6.68	6.14	3.31	4.81	1.79	3.85	.78		
4,000			25.65	108	16.28	34.7	11.35	14.1	9.32	8.52	7.02	4.22	5.49	2.29	4.41	1.04	3.02	.51
4,500					18.31	43.2	12.76	17.4	10.48	10.6	7.90	5.22	6.18	2.85	4.96	1.32	3.40	.64
5,000					20.35	52.3	14.18	21.3	11.63	12.9	8.78	6.40	6.86	3.48	5.51	1.64	3.78	.79
6,000					24.42	73.1	17.02	29.8	13.97	18.2	10.52	8.98	8.24	4.85	6.61	2.00	4.54	1.09
7,000					28.50	98.0	19.85	39.6	16.30	23.2	12.28	11.9	9.61	6.47	7.71	3.74	5.29	1.45
8,000					32.57	125	22.70	50.9	18.62	30.9	14.04	15.2	10.98	8.25	8.82	4.76	6.05	1.86
9,000							25.53	62.8	20.95	38.3	15.79	19.0	12.35	10.3	9.92	5.90	6.81	2.20
10,000							28.37	77.0	23.30	46.7	17.57	23.4	13.73	12.2	11.02	7.22	7.56	2.92
12,000							34.00	108	27.95	66.0	21.08	32.7	16.48	17.7	13.22	10.2	9.07	3.96
14,000									32.60	87.5	24.60	43.3	19.22	23.6	15.42	13.5	10.59	4.51
15,000									34.95	99.4	26.35	49.5	20.60	26.7	16.52	15.3	11.34	5.99
16,000									37.25	112	28.10	55.4	21.96	30.2	17.62	17.4	12.10	6.76
18,000											31.60	69.2	24.70	37.6	19.83	21.6	13.60	8.45
20,000											35.10	84.8	27.45	45.6	22.03	26.4	15.12	10.3
22,000											38.64	100	30.20	54.0	24.23	31.2	16.63	12.2
24,000													32.95	63.8	26.43	36.8	18.15	14.3
25,000													34.30	69.0	27.54	39.6	18.90	15.4
30,000													41.20	96.2	33.04	55.5	22.68	21.6
35,000													48.10	129	38.55	74.2	26.45	28.8
40,000															44.10	95.3	30.25	37.0
45,000															49.60	119	34.00	45.9
50,000																	37.80	56.0
55,000																	41.60	66.8
60,000																	45.36	78.2

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Pressure Drop in Elbows and Bends

The general effect of elbows, bends, or obstructions on the flow of fluids in pipes is to lower the critical velocity, so that a fluid flowing streamline in a straight pipe may become turbulent upon traversing a bend, or any existing turbulence may be increased.

In bends or elbows, the degree of turbulence is altered by any change of velocity and also by any change in the ratio of the radius of curvature, R, to the pipe diameter, d. It has also been indicated by tests that the increase in the degree of turbulence depends upon the properties of the fluid itself and is not constant for all fluids.

It is generally assumed that short radius elbows produce a greater pressure drop than long radius bends. This assumption is not borne out by tests, however, which show that if the mean radius of curvature of the elbow is equal to approximately 1½ or 2 pipe diameters, the pressure drop is lower than that caused by a bend having a radius of curvature of 5 pipe diameters. This, however, does not take into consideration the straight length of pipe connected to the short radius elbow, to maintain the overall dimensions of the larger radius bend which, if included, would indicate a greater pressure drop for the short radius elbow construction.

Professor Eustice* has shown, by the use of colored filaments, the motion of water in its flow through curved glass pipes and has prepared an average curve of frictional resistance ratios which is plotted as curve A in Figure No. 1. Curve B shows the resistance due to the actual length of the bend; Curve C shows the total resistance of the pipe bend; Curves D and E show the variations which may occur when using fluids other than water. The curves indicate that the variation due to the properties of the various fluids is small and that for all practical purposes the curves given for water may be used for steam, gas, etc.

Example: What is the pressure drop in terms of equivalent pipe length caused by an expansion "U" bend (see Figure No. 5, page 701) made from 6″ pipe having a radius of curvature of 30″?

Referring to Figure No. 1 for an R/d ratio of 30/6 = 5 and proceeding upward to Curve C, the equivalent pipe length for a quarter bend is equal to 22 × 6 = 132″, or 11 feet of 6″ pipe. As an expansion "U" bend is made up of four quarter bends, the approximate total resistance offered by this type of bend is 11 × 4 = 44 feet of 6″ pipe.

*"Engineering" London — November 13, 1925

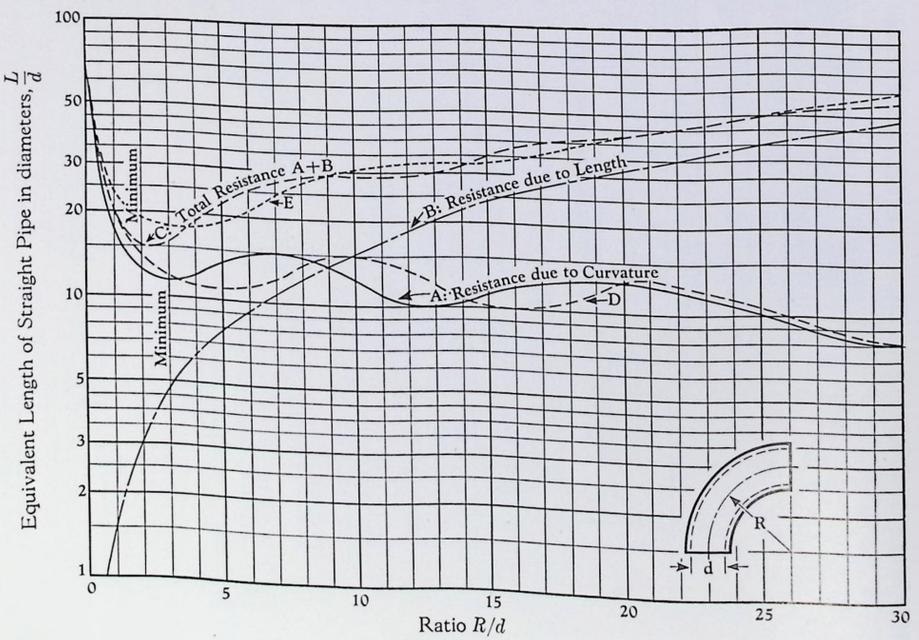


Figure No. 1

Discharge of Water Through Pipes, Orifices, and Valves

Table of Nomenclature

A = Area of opening, square feet.
C = Experimental coefficient.
D = Inside diameter of pipe, feet.
f = Coefficient of friction.
g = 32.2 feet per second²
h_1, h_2, h_3 = Individual head losses, feet of water.
H = Effective head pressure, feet of water.
L = Length of pipe line, feet.
Q = Flow of water, gallons per minute.
V = Velocity of water, feet per second.

Frequently it is necessary to determine the quantity of water which will be discharged through a valve or orifice, or through a certain length of pipe. This problem is one which occurs often in hydraulic work, particularly with reference to the flow of water through long pipe lines from a high level to a lower one.

The quantity of water which is discharged into the atmosphere through a pipe, orifice, or valve is dependent upon several variable factors which include flow pressure, size of pipe, type of valve or orifice, condition of pipe wall surface, length of pipe line, etc. The discharge of water into the atmosphere in terms of head loss follows the general formula:

$$H = C\frac{V^2}{2g} \qquad \textit{Formula No. 1.}$$

Where the value of "C" is usually determined by experiment.

Discharge of Water Through Pipes

In the case of water flowing through pipes, the quantity discharged is dependent upon three major resistance factors:

A. Entrance loss
B. Loss of head due to friction
C. Loss of head due to velocity

The loss of head at entrance depends upon the condition of the pipe end. A well rounded connection will cause the entrance loss to be decreased appreciably, while a square non-projecting pipe will give a "C" value of approximately .5 in Formula No. 1. This latter condition is realized in the majority of installations and therefore, the formula for entrance effect is as follows:

$$h_1 = .5\frac{V^2}{2g} \qquad \textit{Formula No. 2.}$$

The loss of head due to friction is mainly dependent upon the length and condition of the pipe line and may be expressed as

$$h_2 = \frac{f \times L}{D} \times \frac{V^2}{2g} \qquad \textit{Formula No. 3.}$$

In this equation, the friction factor, "f", must be determined from experimental results. For rough approximations, the value of "f" may be assumed as .015 for brass tubes, .02 for steel pipe, and .04 for cast iron pipe.

The third factor, the loss of head due to velocity, may be expressed by the following formula:

$$h_3 = \frac{V^2}{2g} \qquad \textit{Formula No. 4.}$$

The total loss of head is the sum of the individual losses and may be expressed as follows:

$$H = h_1 + h_2 + h_3 = \left(1.5 + \frac{f \times L}{D}\right)\frac{V^2}{2g}$$

As $Q = VA \times 450$

It follows that $Q = 450A\sqrt{\dfrac{2gH}{1.5 + \dfrac{f \times L}{D}}}$ *Formula No. 5.*

Example: How much water will an 8″ steel pipe line (7.981 inside diameter) 3000 feet long discharge per minute at a point which is 300 feet below the inlet?

Given: $D = \dfrac{7.981}{12} = .665$ feet
$A = .3474$ square feet
$H = 300$ feet
$2g = 64.4$ feet per second²
$f = .02$ (assumed)
$L = 3000$ feet

Then: $Q = 450 \times .3474\sqrt{\dfrac{64.4 \times 300}{1.5 + \dfrac{.02 \times 3000}{.665}}}$

$Q = 2268$ gallons per minute

Discharge of Water Through Orifices

The coefficient "C" for orifices is dependent upon the condition of the orifice edges, i.e., an orifice having well rounded edges has a "C" value of approximately .9, while one having sharp edges gives a "C" value of approximately .61.

Discharge of Water Through Globe Valves

The discharge of water through globe valves under a given flow pressure depends primarily upon the type of valve considered. Crane Co. has conducted tests on various types of globe valves in sizes up to and including 2½″ and has determined that the flow through a globe valve is, roughly, one-half of the flow through a short pipe of the same size.

See pages 730 and 731.

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Figure No. 2 gives the discharge of water through pipe sizes from ⅜″ to 10″, in lengths from 1 foot to 200 feet; through orifices in sizes up to 10″; and through valves in sizes up to 2½″ based upon the formulas or tests described previously. For sizes, lengths, or pressures not given on the chart, the respective formulas or ratios may be used.

NOTE: In all cases, the pressure used to determine the flow through pipes, orifices, or valves, should be the effective head pressure under flow conditions, not the static pressure in the line before flow commences. This statement applies particularly to lines supplied by pumps, etc.

Application of Figure No. 2

Example No. 1

What quantity of water will be discharged through 75 feet of 5″ standard pipe under a discharge gauge pressure of 50 pounds per square inch?

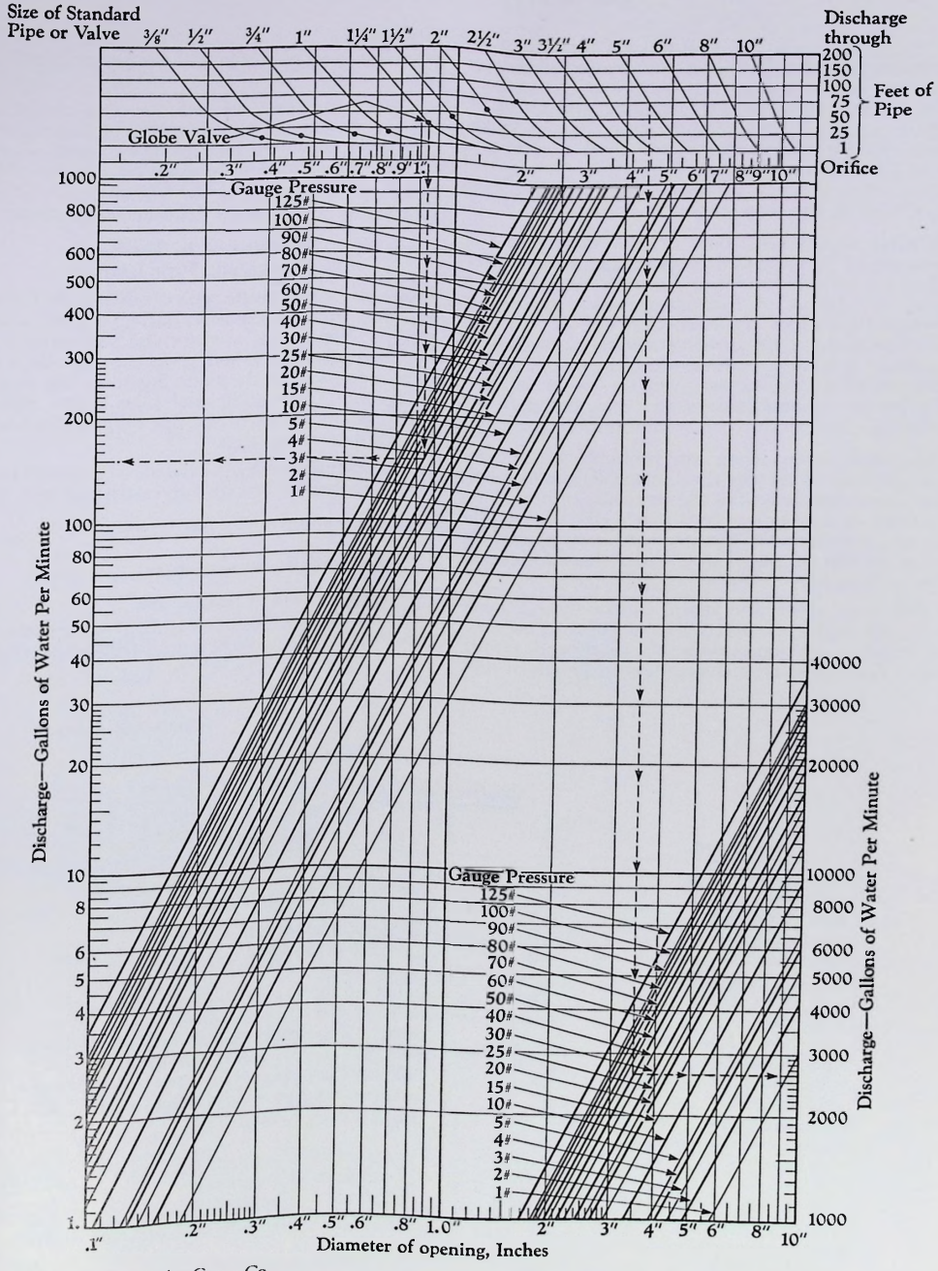
Enter the upper portion of Figure No. 2 at the intersection of the horizontal line for 75 feet of pipe and the line for the 5″ pipe size. Proceed downward to the intersection with the diagonal for 50 pounds gauge pressure and then continue horizontally to the right where the quantity discharged is given as 2600 gallons per minute on the right hand ordinate.

Example No. 2

A 1¼″ globe valve is discharging water into the atmosphere under a discharge gauge pressure of 50 pounds per square inch. What quantity is discharged in gallons per minute?

Enter the upper portion of Figure No. 2 at the black dot on the line for 1¼″ valve size. Proceed downward to the intersection with the diagonal for 50 pounds gauge pressure and then continue horizontally to the left where the quantity discharged is given as 150 gallons per minute on the left hand ordinate.

Discharge of Water Through Smooth Pipes, Orifices, and Valves



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Figure No. 2

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Resistance of Valves and Fittings to Flow of Fluids

When the flow of a fluid in a pipe line is altered by some obstruction such as a valve or fitting, the velocity is changed, turbulence is magnified, and a drop in pressure results. This pressure drop may be insignificant in long lines where it is very small in comparison to the total drop, but when the line is short, the pressure drop through valves and fittings becomes a major item in the total pressure drop value.

The most widely used data on the subject of the resistance of valves and fittings to the flow of water and steam is the information given in Dean Foster's paper on "Effect of Fittings on Flow of Fluids Through Pipe Lines" (published in Vol. 42, 1920, of the *Transactions of the American Society of Mechanical Engineers*). Recently, tests conducted by others have indicated that the values given by Foster are low for globe valves, angle valves, etc., and that data are needed to establish the correct information to use.

It has been the tendency, and probably is the most practical way, to present the friction values in terms of an equivalent length of the same size of pipe; i. e., the pressure drop caused by a 2-inch elbow is equivalent to approximately the pressure drop caused by five or six feet of 2-inch pipe under the same conditions of flow.

In this way, water and steam can be treated comparatively and a relation can be established between the relative friction values of water and steam. Foster has stated that the equivalent length of pipe for steam flow is about .8 of that established for the flow of water.

Realizing the need for definite data covering this subject, Crane Co. has recently conducted pressure drop tests on valves and fittings on both water and steam. These tests were made on 2-inch and 6-inch sizes and conducted under conditions which were thoroughly investigated previous to the tests.

Resistance in Terms of Equivalent Pipe Length

From data given in the tests conducted by Crane Co. and also from information gathered from authentic sources, Figure No. 3, shown on the opposite page, has been prepared, which gives the equivalent length of pipe to produce the same pressure drop as a valve or fitting. This additional pipe length should be added to the length of the line in order to determine the total pressure drop.

It has been shown by previous investigators that the drop in pressure through valves, fittings, etc., is some constant multiplied by the velocity head, $\frac{V^2}{2g}$.

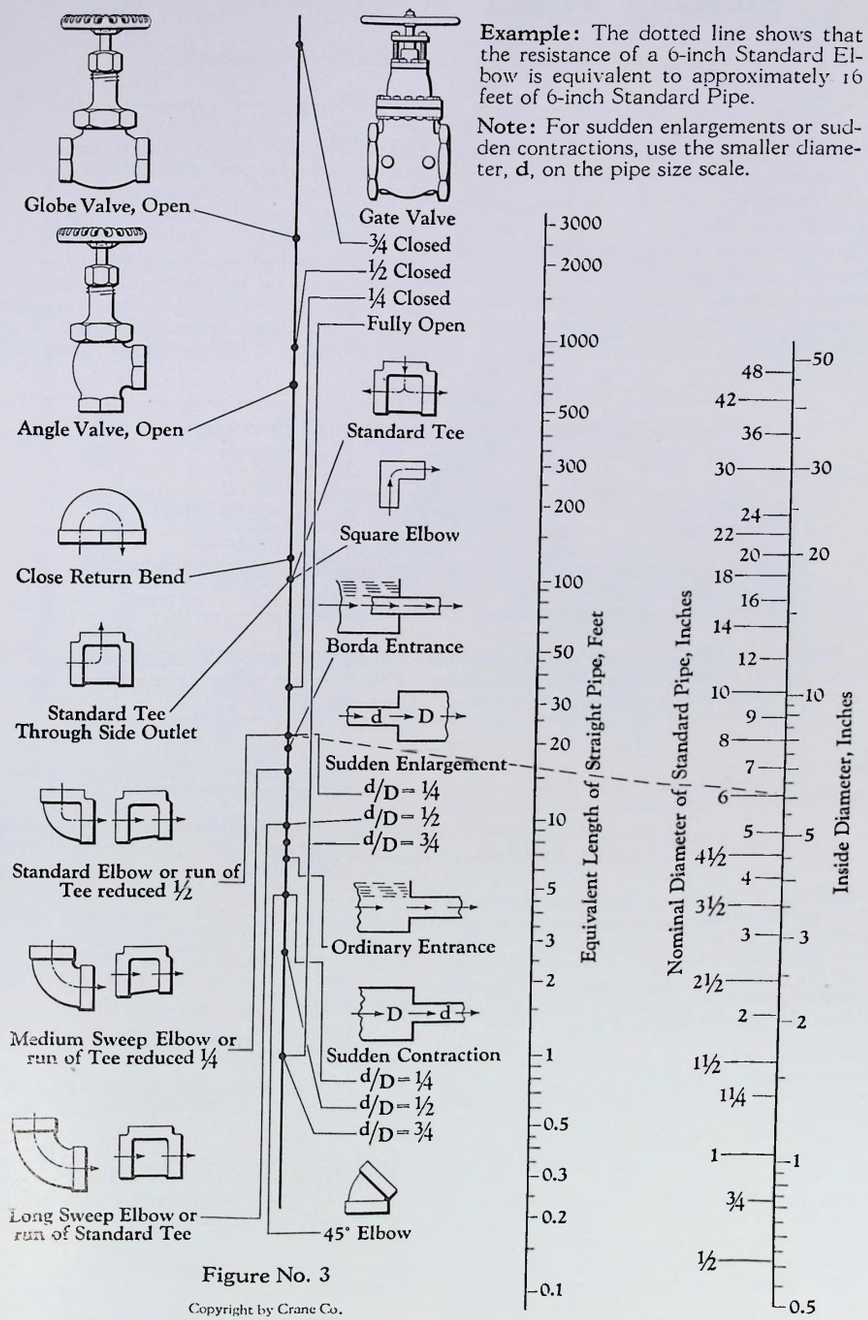
Therefore: $H_1 = k\frac{V^2}{2g}$ where

H_1 = Loss of head in feet
k = Coefficient (Values given in table below)
V = Velocity of water, feet per second
$2g$ = 64.4

Coefficient "k"

Type	"k"	Authority
Globe valve	10.0	Crane tests
Angle valve	5.0	Crane tests
Close return bend	2.2	
Standard tee	1.8	Giesecke & Badgett
Standard elbow	.9	Giesecke & Badgett
Medium sweep elbow	.75	Crane tests
Long sweep elbow	.60	Bulletin No. 2712 — University of Texas
45° elbow	.42	Bulletin No. 2712 — University of Texas
Gate valve (fully open)	.19	Bulletin No. 252 — University of Wisconsin
¼ closed	1.15	Bulletin No. 252 — University of Wisconsin
½ closed	5.6	Bulletin No. 252 — University of Wisconsin
¾ closed	24.0	Bulletin No. 252 — University of Wisconsin
Borda entrance	.83	"Hydraulics" Daugherty
Sudden enlargement:		
d/D = ¼	.92	"Hydraulics" Daugherty
d/D = ½	.56	"Hydraulics" Daugherty
d/D = ¾	.19	"Hydraulics" Daugherty
Ordinary entrance	.5	"Hydraulics" Daugherty
Sudden contraction:		
d/D = ¼	.42	"Hydraulics" Daugherty
d/D = ½	.33	"Hydraulics" Daugherty
d/D = ¾	.19	"Hydraulics" Daugherty

Resistance of Valves and Fittings to Flow of Fluids



Example: The dotted line shows that the resistance of a 6-inch Standard Elbow is equivalent to approximately 16 feet of 6-inch Standard Pipe.

Note: For sudden enlargements or sudden contractions, use the smaller diameter, **d**, on the pipe size scale.

Figure No. 3

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Heating Water With Steam Coils

When steam pipes or coils are submerged in water and the condensation is withdrawn as rapidly as it is formed, the rate of heat transfer may be determined from Fig. No. 4. The values for brass and iron pipe given on this chart are based upon data prepared by the American Radiator Co., which were derived from tests. The figures given on the chart are one-half of the actual test results to allow for corrosion and fouling of the pipe.

CAUTION: It must be realized that when the size of a trap is to be recommended based on the values obtained from this chart, the pounds of steam condensed per square foot per hour, as given by the chart for the operating conditions, should be doubled.

Fig. No. 4 not only gives the B.t.u. loss per square foot per hour from copper, brass, and iron pipes, but also includes the pounds of steam condensed per square foot of pipe surface per hour for pressures ranging from 10 to 385 pounds per square inch gauge.

EXAMPLE:

A well insulated tank contains 10,000 gallons of water.

Given:

Quantity of water = 10,000 gallons = 10,000 × 7.48 = 74,800 pounds
Inlet temperature of water = 70° Fahr.
Final temperature of water = 140° Fahr.
Temperature of steam at 150 pounds per square inch gauge = 366° Fahr.
Size of pipe for coil = 1¼″
Material of pipe for coil = steel

Problem: How many feet of 1¼″ steel pipe will be required for a coil large enough to raise the temperature of the water from 70° Fahr. to 140° Fahr. in one hour if the steam pressure available is 150 pounds per square inch gauge?

Procedure:

1. Determine the mean temperature difference.

$$\frac{(366-70)+(366-140)}{2} = 261° \text{ Fahr.}$$

2. Referring to Fig. No. 4, enter the bottom of the chart at a mean temperature difference of 261° Fahr., proceed upward to the intersection with the line for steel pipe and then horizontally to the left to the ordinate where it is noted that the heat transfer rate is 70,000 B.t.u. per square foot per hour.

3. Determine the B.t.u. necessary to raise the water from 70° to 140° Fahr.

74,800 pounds × (140 — 70) = 5,236,000 B.t.u. per hour.

4. Divide this quantity by the rate of heat transfer to determine the square feet of pipe surface required.

$$\frac{5,236,000}{70,000} = 74.8 \text{ square feet}$$

5. The length of 1¼″ pipe which has one square foot of outer surface is equal to 2.301 feet.

6. Multiply the number of square feet required by the length per square foot to obtain the total length of 1¼″ pipe required.

74.8 × 2.301 = 172.1 feet of 1¼″ pipe

Heating Water with Steam Coils

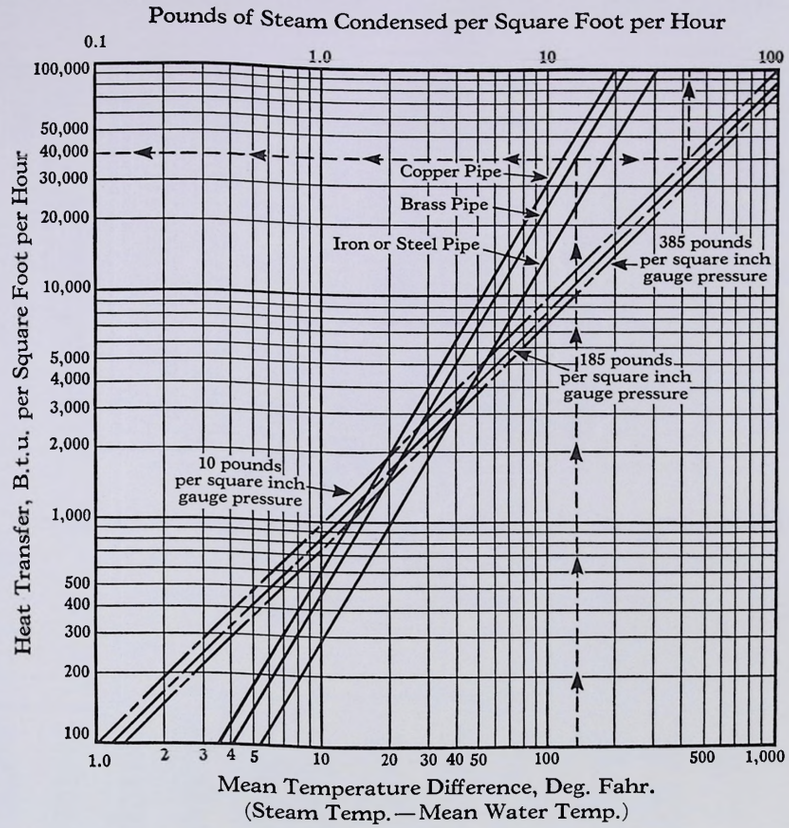


Fig. 4

EXAMPLE:

Steam pressure — 10 pounds per square inch, gauge.
Pipe size — 2″ Standard.
Pipe Material — Brass.
Inlet Water Temperature — 40 deg. Fahr.
Required outlet water temperature — 170 deg. Fahr.

Required:

Total number of B.t.u. transferred per square foot of pipe surface per hour.
Pounds of steam condensed per square foot of pipe surface per hour.

Procedure: The temperature of saturated steam at 10 pounds per square inch gauge pressure is approximately 240 deg. Fahr.

The mean water temperature is 105 deg. Fahr. which gives a mean temperature difference of 240 — 105 = 135 deg. Fahr.

Entering Fig. 4 on the lower scale at a temperature difference of 135 deg. Fahr. and proceeding upward to the intersection with the line for *Brass pipe* and thence left to the ordinate, it is found that the heat transfer is approximately 40,000 B.t.u. per square foot per hour. Proceeding horizontally to the right along the 40,000 B.t.u. line to the intersection with the dash line for 10 pounds per square inch gauge pressure and then upward to the top boundary line, it is determined that 42 pounds of steam are condensed by each square foot of outer pipe surface per hour.

Crane Co.: Valves, Fittings, Pipe and Fabricated Piping, Catalog No. 52 (1936)
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Weight of Air at Various Pressures and Temperatures[1]

Based on an Atmospheric Pressure of 14.7 Pounds Absolute at Sea Level

Temp. of Air Deg. Fahr.	Gauge Pressure, Pounds																					
	0	5	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	175	200	225	250	300
	Weight in Pounds per Cubic Foot																					
−20	.0900	.1205	.1515	.2125	.2744	.3360	.3970	.4580	.5190	.5800	.6410	.702	.7635	.825	.886	.948	1.010	1.165	1.318	1.465	1.625	1.930
−10	.0882	.1184	.1485	.2090	.2685	.3283	.3880	.4478	.5076	.5674	.6272	.687	.747	.807	.868	.928	.989	1.139	1.288	1.438	1.588	1.890
0	.0864	.1160	.1455	.2040	.2630	.3215	.3800	.4385	.4970	.5555	.6140	.672	.731	.790	.849	.908	.968	1.114	1.260	1.406	1.553	1.850
10	.0846	.1136	.1425	.1995	.2568	.3145	.3720	.4292	.4863	.5433	.6006	.658	.716	.774	.832	.889	.947	1.090	1.233	1.376	1.520	1.810
20	.0828	.1112	.1395	.1955	.2516	.3071	.3645	.4205	.4770	.5330	.5890	.645	.701	.757	.813	.869	.927	1.067	1.208	1.348	1.489	1.770
30	.0811	.1088	.1366	.1916	.2465	.3015	.3570	.4121	.4672	.5221	.5771	.632	.687	.742	.797	.852	.908	1.046	1.184	1.322	1.460	1.735
40	.0795	.1067	.1338	.1876	.2415	.2954	.3503	.4038	.4576	.5114	.5652	.619	.673	.727	.781	.835	.890	1.025	1.161	1.296	1.431	1.701
50	.0780	.1045	.1310	.1839	.2367	.2905	.3432	.3960	.4487	.5014	.5541	.607	.660	.713	.766	.819	.873	1.006	1.139	1.271	1.403	1.668
60	.0764	.1025	.1283	.1803	.2323	.2840	.3362	.3882	.4402	.4927	.5447	.596	.649	.700	.752	.804	.856	.988	1.116	1.245	1.376	1.636
70	.0750	.1005	.1260	.1770	.2280	.2791	.3302	.3808	.4316	.4824	.5332	.584	.635	.686	.737	.788	.839	.967	1.095	1.223	1.350	1.604
80	.0736	.0988	.1239	.1738	.2237	.2739	.3242	.3738	.4234	.4729	.5224	.572	.622	.673	.723	.774	.824	.949	1.074	1.199	1.325	1.573
90	.0723	.0970	.1218	.1707	.2195	.2688	.3182	.3670	.4154	.4639	.5122	.561	.611	.660	.709	.759	.809	.932	1.054	1.177	1.300	1.544
100	.0710	.0954	.1197	.1676	.2155	.2638	.3122	.3602	.4079	.4555	.5033	.551	.599	.648	.696	.745	.794	.914	1.035	1.155	1.276	1.517
110	.0698	.0937	.1176	.1645	.2115	.2593	.3070	.3542	.4011	.4481	.4950	.542	.589	.637	.685	.732	.780	.899	1.017	1.135	1.254	1.491
120	.0686	.0921	.1155	.1618	.2080	.2549	.3018	.3481	.3944	.4403	.4866	.533	.579	.626	.673	.720	.767	.884	1.001	1.118	1.234	1.465
130	.0674	.0905	.1135	.1590	.2045	.2505	.2966	.3446	.3924	.4296	.4770	.524	.570	.616	.662	.708	.754	.869	.984	1.099	1.214	1.440
140	.0663	.0889	.1115	.1565	.2015	.2465	.2915	.3364	.3813	.4262	.4711	.516	.561	.606	.651	.696	.742	.855	.968	1.081	1.194	1.416
150	.0652	.0874	.1096	.1541	.1985	.2425	.2865	.3308	.3751	.4198	.4636	.508	.552	.596	.640	.685	.730	.841	.953	1.064	1.175	1.392
175	.0626	.0840	.1054	.1482	.1910	.2335	.2755	.3181	.3607	.4033	.4450	.488	.531	.573	.616	.658	.701	.808	.914	1.021	1.128	1.337
200	.0603	.0809	.1014	.1427	.1840	.2248	.2655	.3054	.3473	.3882	.4291	.470	.511	.552	.592	.633	.674	.776	.879	.982	1.084	1.287
225	.0581	.0779	.0976	.1373	.1770	.2163	.2555	.2949	.3344	.3738	.4129	.452	.491	.531	.570	.609	.649	.747	.846	.944	1.043	1.240
250	.0560	.0751	.0941	.1323	.1705	.2085	.2466	.2845	.3223	.3602	.3981	.436	.474	.513	.551	.589	.627	.722	.817	.912	1.007	1.197
275	.0541	.0726	.0910	.1278	.1645	.2011	.2378	.2745	.3111	.3478	.3844	.421	.458	.494	.531	.568	.605	.697	.789	.881	.972	1.155
300	.0523	.0707	.0881	.1237	.1592	.1945	.2300	.2654	.3008	.3362	.3716	.407	.442	.478	.513	.549	.585	.673	.762	.852	.940	1.118
350	.0491	.0658	.0825	.1160	.1495	.1828	.2160	.2492	.2824	.3156	.3488	.382	.415	.449	.482	.516	.549	.632	.715	.799	.883	1.048
400	.0463	.0621	.0779	.1090	.1405	.1720	.2035	.2348	.2661	.2974	.3287	.360	.391	.423	.454	.486	.517	.596	.674	.753	.831	.987
450	.0437	.0586	.0735	.1033	.1330	.1628	.1925	.2220	.2515	.2810	.3105	.340	.369	.399	.429	.458	.488	.562	.637	.711	.786	.934
500	.0414	.0555	.0696	.0978	.1260	.1540	.1820	.2100	.2380	.2660	.2940	.322	.351	.379	.407	.435	.463	.534	.604	.675	.746	.885
550	.0394	.0528	.0661	.0930	.1198	.1464	.1730	.1996	.2262	.2528	.2794	.306	.333	.359	.386	.413	.440	.507	.573	.641	.709	.841
600	.0375	.0504	.0631	.0885	.1140	.1395	.1650	.1904	.2158	.2412	.2668	.292	.317	.343	.368	.393	.419	.483	.547	.611	.675	.801

[1]Reprinted from "Compressed Air Data" Fourth Edition. Courtesy of Ingersoll-Rand Company.

Discharge of Air Through High Pressure Orifice[1]

In cubic feet of free air per minute at standard atmospheric pressure of 14.7 lbs. per sq. in. absolute and 70° F. temperature.

Gauge Pressure before Orifice in Pounds per sq. in.	DIAMETER OF ORIFICE												
	1/64″	1/32″	1/16″	1/8″	1/4″	3/8″	1/2″	5/8″	3/4″	7/8″	1″	1 1/4″	1 1/2″
	Discharge in cubic feet of free air per minute												
15	.105	.420	1.68	6.72	26.9	60.5	108	168	242	329	430	672	968
20	.123	.491	1.96	7.86	31.4	70.7	126	196	283	385	503	786	1132
25	.140	.562	2.25	8.98	35.9	80.9	144	225	323	440	575	898	1294
30	.158	.633	2.53	10.1	40.5	91.1	162	253	365	496	648	1013	1458
35	.176	.703	2.81	11.3	45.0	101	180	281	405	551	720	1125	1620
40	.194	.774	3.10	12.4	49.6	112	198	310	446	607	793	1239	1784
45	.211	.845	3.38	13.5	54.1	122	216	338	487	662	865	1352	1946
50	.229	.916	3.66	14.7	58.6	132	235	366	528	718	938	1466	2111
60	.264	1.06	4.23	16.9	67.6	152	271	423	609	828	1082	1691	2435
70	.300	1.20	4.79	19.2	76.7	173	307	479	690	939	1227	1917	2761
80	.335	1.34	5.36	21.4	85.7	193	343	536	771	1050	1371	2142	3085
90	.370	1.48	5.92	23.7	94.8	213	379	592	853	1161	1516	2369	3411
100	.406	1.62	6.49	26.0	104	234	415	649	934	1272	1661	2595	3737
110	.441	1.76	7.05	28.2	113	254	452	705	1016	1383	1806	2822	4064
120	.476	1.91	7.62	30.5	122	274	488	762	1097	1494	1951	3048	4390
125	.494	1.98	7.90	31.6	126	284	506	790	1138	1549	2023	3161	4552

Table is based on 100% coefficient of flow. For well rounded entrance multiply values by 0.98. For sharp edged orifices a multiplier of 0.65 may be used for approximate results.

Table calculated by approximate formula proposed by S. A. Moss.

$$W = 76.367\frac{ACP_1}{\sqrt{T_1}}$$

Where:
W = discharge in lbs. per sec.
A = area of orifice in sq. ft.
C = Coefficient of flow
P_1 = Upstream pressure in lbs. per sq. in. absolute
T_1 = Upstream temperature in °F. absolute

Values used in calculating above table were: $C = 1.0$, P_1 = gauge pressure + 14.7 lbs./sq. in. $T_1 = 530°$ F. abs.

Weights (W) were converted to volumes using density factor of 0.07494 lbs./cu. ft. This is correct for dry air at 14.7 lbs. per sq. in. absolute pressure and 70° F.

Formula cannot be used where P_1 is less than two times the barometric pressure.

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Friction of Air in Pipes[1]

Loss of pressure in lbs. per sq. in. in 1000 ft. lengths of pipe.

At 60 lbs. gauge

Cu. Ft. of Free Air per Minute	Equivalent Cu. Ft. of Compressed Air per Minute	Nominal Diameter in Inches														
		½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	8	10	12
10	1.96	10.0	1.53	.43													
20	3.94		5.99	1.71	.39												
30	5.89		13.85	3.86	.88												
40	7.86		24.7	6.85	1.59	.71											
50	9.84			10.7	2.48	1.10											
60	11.81			15.4	3.58	1.57	.43										
70	13.75			21.0	4.87	2.15	.57										
80	15.72			27.4	6.37	2.82	.75										
90	17.65				8.05	3.57	.95										
100	19.60				9.95	4.40	1.18										
125	24.60				15.7	6.90	1.83	.71									
150	29.45				22.4	9.90	2.64	1.02									
175	34.44					13.40	3.64	1.40									
200	39.40					17.60	4.71	1.83	.57								
250	49.20						7.37	2.85	.89								
300	58.90						10.55	4.11	1.30								
350	68.8						14.4	5.60	1.76	.82							
400	78.8						18.6	7.30	2.30	1.06	.53						
450	88.4						23.7	9.20	2.90	1.35	.70						
500	98.4							11.4	3.60	1.67	.85						
600	118.1							16.4	5.17	2.40	1.22	.67					
700	137.5							22.3	7.00	3.27	1.67	.91					
800	157.2								9.06	4.26	2.18	1.20	.65				
900	176.5								11.6	5.40	2.76	1.51	.83				
1000	196.0								14.3	6.15	3.40	1.87	1.02				
1500	294.5									15.0	7.6	4.20	2.32	.87			
2000	394.0										13.6	7.5	4.18	1.53			
2500	492										21.3	11.6	6.4	2.42	.57		
3000	589											16.7	9.2	3.48	.81		
3500	688											22.6	12.8	4.68	1.07		
4000	788												16.5	6.17	1.44	.67	
4500	884												20.8	7.8	1.83	.98	
5000	984													9.7	2.26	1.34	.51
6000	1181													13.9	3.25	1.73	.71
7000	1375													18.7	4.43	2.20	.87
8000	1572													24.7	5.80	2.72	1.06
9000	1765														7.33	3.29	1.28
10000	1960														9.05	3.90	1.51
11000	2165														10.9	4.58	1.77
12000	2362														13.0	5.32	2.07
13000	2560														15.2	6.10	2.36
14000	2750														17.7	6.95	2.70
15000	2945														20.3	8.80	3.42
16000	3144														23.1	10.8	4.22
18000	3530														29.2	13.2	5.12
20000	3940															15.6	5.92
22000	4330															18.3	7.15
24000	4724															21.3	8.3
26000	5120															24.4	9.5
28000	5500																
30000	5890																

For longer or shorter lengths of pipe the friction loss is proportional to the length, i. e., for 500 ft., ½ of the above; for 4000 ft., 4 times the above, etc.

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Loss of pressure in lbs. per sq. in. in 1000 ft. lengths of pipe.

At 80 lbs. gauge

Cu. Ft. of Free Air per Minute	Equivalent Cu. Ft. of Compressed Air per Minute	Nominal Diameter in Inches																
		½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	8	10	12
10	1.55	7.90	1.21	.34													
20	3.10		4.72	1.35	.31												
30	4.65		10.9	3.05	.69												
40	6.20		19.5	5.40	1.25	.56											
50	7.74			8.45	1.96	.87											
60	9.29			12.16	2.82	1.24	.34										
70	10.82			16.6	3.84	1.70	.45										
80	12.40			21.6	5.03	2.22	.59										
90	13.95				6.35	2.82	.75										
100	15.5				7.85	3.47	.93										
125	19.4				12.4	5.45	1.44	.56									
150	23.2				17.7	7.82	2.08	.81									
175	27.2					10.6	2.87	1.10									
200	31.0					13.9	3.72	1.44	.45								
250	38.7						5.82	2.25	.70								
300	46.5						8.35	3.24	1.03								
350	54.2						11.4	4.42	1.39	.65							
400	62.0						14.7	5.76	1.82	.84	.42						
450	69.7						18.7	7.25	2.29	1.06	.55						
500	77.4							9.0	2.84	1.32	.67						
600	92.9							12.9	4.08	1.89	.96	.53					
700	108.2							17.6	5.52	2.58	1.32	.72					
800	124.0								7.15	3.36	1.72	.95	.51				
900	139.5								9.17	4.26	2.18	1.19	.65				
1000	155								11.3	4.85	2.68	1.48	.81				
1500	232									11.8	6.0	3.32	1.83	.69			
2000	310										10.7	5.9	3.30	1.21			
2500	387										16.8	9.2	5.1	1.91	.45		
3000	465											13.2	7.3	2.74	.64		
3500	542											17.8	10.1	3.70	.85		
4000	620												13.0	4.87	1.14		
4500	697												16.4	6.15	1.44		
5000	774													7.65	1.78	.53	
6000	929													11.0	2.57	.77	
7000	1082													14.8	3.50	1.06	.40
8000	1240													19.5	4.57	1.36	.56
9000	1395														5.78	1.74	.69
10000	1550														7.15	2.14	.84
11000	1710														8.61	2.60	1.01
12000	1860														10.3	3.08	1.19
13000	2020														12.0	3.62	1.40
14000	2170														14.0	4.20	1.63
15000	2320														16.0	4.82	1.86
16000	2480														18.2	5.48	2.13
18000	2790														23.0	6.95	2.70
20000	3100															8.55	3.33
22000	3410															10.4	4.04
24000	3720															12.3	4.69
26000	4030															14.4	5.65
28000	4350															16.8	6.5
30000	4650															19.3	7.5

For longer or shorter lengths of pipe the friction loss is proportional to the length, i. e., for 500 ft., ½ of the above; for 4000 ft., 4 times the above, etc.

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Loss of pressure in lbs. per sq. in. in 1000 ft. lengths of pipe.

At 100 lbs. gauge

Cu. Ft. of Free Air per Minute	Equivalent Cu. Ft. of Compressed Air per Minute	Nominal Diameter in Inches															
		½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	8	10	12
10	1.28	6.50	.99	.28													
20	2.56		3.90	1.11	.25												
30	3.84		9.01	2.51	.57												
40	5.12		16.0	4.45	1.03	.46											
50	6.41			6.96	1.61	.71											
60	7.68			10.0	2.32	1.02	.28										
70	8.96			13.7	3.16	1.40	.37										
80	10.24			17.8	4.14	1.83	.49										
90	11.52				5.23	2.32	.62										
100	12.81				6.47	2.86	.77										
125	15.82				10.2	4.49	1.19	.46									
150	19.23				14.6	6.43	1.72	.66									
175	22.40					8.72	2.36	.91									
200	25.62					11.4	3.06	1.19	.37								
250	31.64						4.78	1.85	.58								
300	38.44						6.85	2.67	.84								
350	44.80						9.36	3.64	1.14	.53							
400	51.24						12.1	4.75	1.50	.69	.35						
450	57.65						15.4	5.98	1.89	.88	.46						
500	63.28							7.42	2.34	1.09	.55						
600	76.88							10.7	3.36	1.56	.79	.44					
700	89.60							14.5	4.55	2.13	1.09	.59					
800	102.5								5.89	2.77	1.42	.78	.42				
900	115.3								7.6	3.51	1.80	.99	.54				
1000	126.6								9.3	4.00	2.21	1.22	.66				
1500	192.3									9.8	4.9	2.73	1.51	.57			
2000	256.2										8.8	4.9	2.72	.99			
2500	316.4										13.8	8.3	4.2	1.57	.37		
3000	384.6											10.9	6.0	2.26	.53		
3500	447.8											14.7	8.2	3.04	.70		
4000	512.4												10.7	4.01	.94		
4500	576.5												13.5	5.10	1.19		
5000	632.8													6.3	1.47	.44	
6000	768.8													9.1	2.11	.64	
7000	896.0													12.2	2.88	.87	.33
8000	1025													16.1	3.77	1.12	.46
9000	1153														4.77	1.43	.57
10000	1280														5.88	1.77	.69
11000	1410														7.10	2.14	.83
12000	1540														8.5	2.54	.98
13000	1668														9.8	2.98	1.15
14000	1795														11.5	3.46	1.35
15000	1923														13.2	3.97	1.53
16000	2050														15.0	4.52	1.75
18000	2310														19.0	5.72	2.22
20000	2560															7.0	2.74
22000	2820															8.5	3.33
24000	3080															10.0	3.85
26000	3338															11.9	4.65
28000	3590															13.8	5.40
30000	3850															15.9	6.17

For longer or shorter lengths of pipe the friction loss is proportional to the length, i. e., for 500 ft., ½ of the above; for 4000 ft., 4 times the above, etc.

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Loss of pressure in lbs. per sq. in. in 1000 ft. lengths of pipe.

At 125 lbs. gauge

Cu. Ft. of Free Air per Minute	Equivalent Cu. Ft. of Compressed Air per Minute	Nominal Diameter in Inches															
		½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	8	10	12
10	1.05	5.35	.82	.23													
20	2.11		3.21	.92	.21												
30	3.16		7.42	2.07	.47												
40	4.21		13.2	3.67	.85	.38											
50	5.26			5.72	1.33	.59											
60	6.32			8.25	1.86	.84	.23										
70	7.38			11.2	2.61	1.15	.31										
80	8.42			14.7	3.41	1.51	.40										
90	9.47				4.30	1.91	.51										
100	10.50				5.32	2.36	.63										
125	13.15				8.4	3.70	.98	.38									
150	15.79				12.0	5.30	1.41	.55									
175	18.41					7.2	1.95	.75									
200	21.05					9.4	2.52	.98	.31								
250	26.30						3.94	1.53	.48								
300	31.60						5.62	2.20	.70								
350	36.80						7.7	3.00	.94	.44							
400	42.10						10.0	3.91	1.23	.57	.28						
450	47.30						12.7	4.92	1.55	.72	.37						
500	52.60							6.10	1.93	.89	.46						
600	63.20							8.8	2.76	1.28	.65	.36					
700	73.80							11.9	3.74	1.75	.89	.49					
800	84.20								4.85	2.28	1.17	.64	.35				
900	94.70								6.2	2.89	1.48	.81	.44				
1000	105.1								7.7	3.29	1.85	1.00	.55				
1500	157.9									8.0	4.1	2.25	1.24	.47			
2000	210.5										7.3	4.0	2.24	.82			
2500	263.0										11.4	6.2	3.4	1.30	.31		
3000	316.0											9.0	4.9	1.86	.43		
3500	368.0											12.1	6.9	2.51	.57		
4000	421.0												8.9	3.30	.77		
4500	473.0												11.1	4.2	.98		
5000	526.0													5.2	1.21	.36	
6000	632.0													7.5	1.74	.52	
7000	738.0													10.0	2.37	.72	.27
8000	842.0													13.2	3.10	.93	.38
9000	947.0														3.93	1.18	.47
10000	1051														4.85	1.46	.57
11000	1156														5.8	1.76	.68
12000	1262														7.0	2.09	.81
13000	1368														8.1	2.44	.95
14000	1473														9.7	2.85	1.11
15000	1579														10.9	3.26	1.26
16000	1683														12.4	3.72	1.45
18000	1893														15.6	4.71	1.83
20000	2150															5.8	2.20
22000	2315															7.1	2.74
24000	2525															8.4	3.17
26000	2735															9.8	3.83
28000	2946															11.4	4.4
30000	3158															13.1	5.1

For longer or shorter lengths of pipe the friction loss is proportional to the length, i. e., for 500 ft., ½ of the above; for 4000 ft., 4 times the above, etc.

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Steam

There are three states of matter: solid, liquid and gas. Under normal atmospheric conditions substances exist in any one of these three states and when the outside conditions are varied they change from one state to another.

Water under average conditions exists in the form of a liquid. When a body of water is heated by means of some external medium, the temperature of the water rises and soon small bubbles are noted on the surface which break and form continuously. This phenomenon is described as "boiling".

The amount of heat necessary to cause the temperature of the water to rise is expressed in British Thermal Units (B.t.u.) where one B.t.u. is the quantity of heat required to raise the temperature of 1 lb. of water from 60 to 61° F. or, as is generally stated, 1/180 part of the heat necessary to raise the temperature of 1 lb. of water from 32° F. (freezing point) to 212° F. (boiling point).

After the temperature of 212° F. is reached each pound of water contains 180 B.t.u. (above 32° F.). This quantity of heat is called "*heat of the liquid*" or "*sensible heat*". In order to change the liquid into a vapor at atmospheric pressure (14.7 pounds per sq. in. absolute), 970.2 B.t.u. must be added to each pound of water after the temperature of 212° F. is reached. During this transition period the temperature remains constant. The added quantity of heat is called the "*latent heat of evaporation*". Consequently, the "*total heat*" in the vapor formed when water boils at atmospheric pressure is the sum of the two quantities 180 B.t.u. and 970.2 B.t.u. or 1150.2 B.t.u. per pound.

If water is heated in a closed vessel not completely filled, the pressure will rise after steam or water vapor begins to form accompanied by an increase in temperature.

Steam may exist in two states: saturated or superheated.

Saturated Steam is steam in contact with the liquid water from which it was generated, at a temperature which is the boiling point of the water and the condensing point of the steam. It may be either "DRY" or "WET", depending upon the generating conditions. "DRY" saturated steam is steam free from mechanically mixed water particles. "WET" saturated steam on the other hand contains water particles in suspension. Saturated steam at any pressure has a definite temperature.

Superheated Steam is steam at any given pressure which is heated to a temperature higher than the temperature of saturated steam at that pressure. Water cannot exist in the presence of superheated steam.

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Steam Data

BOILER HORSE POWER

The accepted rule for figuring boiler horse power is as follows:

One Horse Power equals the evaporation of 30 lbs. of water per hour from an initial temperature of 100 deg. Fahr. into steam at 70 lbs. gauge pressure, or its equivalent; 34½ lbs. of water evaporated per hour from a temperature of 212 deg. Fahr. into steam at 212 deg.

HORSE POWER OF AN ENGINE

P = Mean effective pressure per square inch of the steam on the piston.

L = Length of stroke in feet.

A = Area of piston in square inches.

N = Number of strokes per minute.

Then Horse Power $= \frac{PLAN}{33000}$

The approximate mean effective pressure in the cylinder when valve cuts off at:

¼ stroke equals steam pressure × .597
⅓ stroke equals steam pressure × .670
⅜ stroke equals steam pressure × .743
½ stroke equals steam pressure × .847
⅝ stroke equals steam pressure × .919
⅔ stroke equals steam pressure × .937
¾ stroke equals steam pressure × .966
⅞ stroke equals steam pressure × .992

RANGES IN STEAM CONSUMPTION BY PRIME MOVERS

(For Estimating Purposes)

Simple Non-Condensing Engines	29- 45 pounds per hour
Simple Non-Condensing Automatic Engines	26- 40 pounds per hour
Simple Non-Condensing Corliss Engines	26- 35 pounds per hour
Compound Non-Condensing Engines	19- 28 pounds per hour
Compound Condensing Engines	12- 22 pounds per hour
Simple Duplex Steam Pumps	120-200 pounds per hour
Turbines, Non-Condensing	28- 60 pounds per K.W. hour
Turbines, Condensing	12- 42 pounds per K.W. hour

FLOW OF STEAM IN PIPES

To determine the velocity of steam in feet per minute through a pipe, the quantity, pressure and area being known.

V = Velocity in feet per minute.
A = Pounds of steam per hour.
B = Volume in cubic feet per lb. at given pressure. (See steam tables, pages 743 to 752.)
C = Area of pipe in square inches.
1728 = Cubic inches in a cubic foot.
60 = Minutes in an hour.
12 = Inches in a foot.

Then $V = \frac{A \times B \times 1728}{60 \times C \times 12} = \frac{A \times B \times 2.4}{C}$

$$A = \frac{C \times V}{B \times 2.4}$$

$$B = \frac{C \times V}{A \times 2.4}$$

$$C = \frac{A \times B \times 2.4}{V}$$

LOSS OF PRESSURE

The above formula does not consider the probable drop, or loss of pressure which is dependent upon the velocity of flow, length of line, number of turns in fittings or valves, and the covering of the pipe. In every steam line there must be a difference in pressure between the inlet and outlet or there could be no flow, and this difference is increased by friction and radiation.

REASONABLE VELOCITIES FOR FLOW OF STEAM IN PIPES

The table below giving reasonable velocities, based on average practice, can be used to advantage in steam lines. It must be realized that the lower velocities should be used for smaller pipes and higher for pipes larger than 12".

Condition of Steam	Pressure Lbs. per Sq. In.	Use	Reasonable Velocity Ft. per Minute
Saturated	0 Lbs. — 15 Lbs.	Heating (Short Lines)	4,000 to 6,000
Saturated	50 Lbs. and Up	*Miscellaneous	6,000 to 10,000
Superheated	200 Lbs. and Up	*High Pressure Steam Piping	7,000 to 20,000

***Boiler Leads:** The velocity of the steam in the case of boiler leads should be lower than in large turbine leads, because of the stop check valves which are necessarily installed in these lines. A high velocity through the check valve would cause an excessive pressure drop which is detrimental to efficient operation. On the other hand, too low a velocity will cause a chattering of the disc. The velocities most generally used are from 7,000 to 9,000 ft. per min.

Properties of Saturated Steam[1]

Abs. Press. Lb./Sq. In. p	Temp. Deg. F. t	Specific Volume: Sat. Liquid v_f	Specific Volume: Evap. v_{fg}	Specific Volume: Sat. Vapor v_g	Total Heat: Sat. Liquid h_f	Total Heat: Evap. h_{fg}	Total Heat: Sat. Vapor h_g	Entropy: Sat. Liquid s_f	Entropy: Evap. s_{fg}	Entropy: Sat. Vapor s_g
0.20	53.15	0.01602	1526.6	1526.6	21.21	1061.9	1083.1	0.0422	2.0708	2.1131
½" Hg	58.83	0.01603	1256.9	1256.9	26.88	1058.8	1085.7	0.0533	2.0422	2.0955
0.25	59.32	0.01603	1235.9	1235.9	27.37	1058.5	1085.9	0.0542	2.0398	2.0940
0.30	64.49	0.01604	1040.1	1040.1	32.53	1055.7	1088.3	0.0641	2.0143	2.0784
0.35	68.95	0.01605	899.0	899.0	36.98	1053.3	1090.3	0.0726	1.9927	2.0653
¾" Hg	70.44	0.01605	856.5	856.5	38.47	1052.5	1091.0	0.0754	1.9856	2.0609
0.40	72.88	0.01606	792.4	792.4	40.91	1051.2	1092.1	0.0800	1.9740	2.0539
0.45	76.40	0.01606	708.9	708.9	44.42	1049.2	1093.7	0.0865	1.9574	2.0440
1" Hg	79.06	0.01607	652.7	652.7	47.06	1047.8	1094.9	0.0914	1.9451	2.0365
0.50	79.60	0.01607	641.8	641.8	47.60	1047.5	1095.1	0.0925	1.9426	2.0351
0.60	85.21	0.01609	540.3	540.4	53.19	1044.4	1097.6	0.1027	1.9170	2.0197
0.70	90.09	0.01610	467.2	467.2	58.07	1041.8	1099.8	0.1117	1.8951	2.0068
1½" Hg	91.75	0.01610	445.3	445.3	59.72	1040.8	1100.6	0.1147	1.8877	2.0024
0.80	94.40	0.01611	412.0	412.0	62.36	1039.4	1101.8	0.1195	1.8760	1.9955
0.90	98.26	0.01612	368.7	368.7	66.21	1037.3	1103.5	0.1264	1.8593	1.9857
2" Hg	101.17	0.01613	339.5	339.5	69.10	1035.7	1104.8	0.1316	1.8468	1.9784
1.0	101.76	0.01614	333.8	333.9	69.69	1035.3	1105.0	0.1326	1.8442	1.9769
1.2	107.94	0.01616	281.2	281.2	75.85	1031.9	1107.8	0.1436	1.8181	1.9617
2½" Hg	108.73	0.01616	275.2	275.2	76.63	1031.5	1108.1	0.1450	1.8148	1.9598
1.4	113.28	0.01618	243.2	243.2	81.17	1028.9	1110.1	0.1529	1.7959	1.9488
3" Hg	115.08	0.01618	231.8	231.8	82.96	1027.9	1110.8	0.1561	1.7885	1.9446
1.6	118.00	0.01620	214.53	214.55	85.88	1026.2	1112.1	0.1611	1.7766	1.9378
1.8	122.25	0.01621	192.05	192.07	90.13	1023.8	1113.9	0.1684	1.7595	1.9279
2.0	126.10	0.01623	173.94	173.96	93.97	1021.6	1115.6	0.1750	1.7442	1.9192
2.2	129.63	0.01624	159.04	159.06	97.49	1019.6	1117.0	0.1810	1.7302	1.9113
2.4	132.91	0.01626	146.56	146.58	100.76	1017.7	1118.4	0.1866	1.7175	1.9040
2.6	135.94	0.01627	135.93	135.95	103.78	1015.9	1119.7	0.1916	1.7058	1.8974
2.8	138.80	0.01629	126.80	126.81	106.65	1014.2	1120.9	0.1964	1.6948	1.8913
3.0	141.49	0.01630	118.84	118.86	109.33	1012.7	1122.0	0.2009	1.6847	1.8856
3.5	147.59	0.01633	102.83	102.85	115.44	1009.1	1124.5	0.2110	1.6618	1.8728
4.0	152.99	0.01636	90.72	90.74	120.83	1005.9	1126.8	0.2198	1.6420	1.8618
4.5	157.83	0.01638	81.23	81.24	125.67	1003.1	1128.7	0.2276	1.6245	1.8522
5.0	162.25	0.01641	73.59	73.61	130.10	1000.4	1130.6	0.2348	1.6088	1.8435
5.5	166.31	0.01643	67.30	67.32	134.16	998.0	1132.2	0.2413	1.5945	1.8358
6.0	170.07	0.01645	62.03	62.05	137.92	995.8	1133.7	0.2473	1.5814	1.8287
6.5	173.55	0.01647	57.54	57.56	141.43	993.7	1135.1	0.2528	1.5694	1.8222
7.0	176.85	0.01649	53.68	53.70	144.71	991.7	1136.4	0.2580	1.5582	1.8162
7.5	179.94	0.01650	50.33	50.34	147.81	989.9	1137.7	0.2628	1.5477	1.8106
8.0	182.87	0.01652	47.38	47.39	150.75	988.1	1138.9	0.2674	1.5379	1.8053
8.5	185.64	0.01654	44.76	44.77	153.53	986.4	1140.0	0.2717	1.5287	1.8004
9.0	188.28	0.01656	42.42	42.44	156.19	984.8	1141.0	0.2758	1.5200	1.7958
9.5	190.82	0.01657	40.33	40.34	158.73	983.3	1142.0	0.2797	1.5117	1.7915
10.0	193.21	0.01658	38.44	38.45	161.13	981.8	1143.0	0.2834	1.5040	1.7874
11.0	197.75	0.01661	35.15	35.17	165.68	979.1	1144.8	0.2903	1.4894	1.7797
12.0	201.96	0.01664	32.40	32.42	169.91	976.5	1146.4	0.2968	1.4760	1.7727
13.0	205.88	0.01666	30.06	30.08	173.85	974.1	1147.9	0.3027	1.4636	1.7663
14.0	209.56	0.01669	28.05	28.06	177.55	971.8	1149.3	0.3082	1.4521	1.7604
14.696	212.00	0.01670	26.80	26.82	180.00	970.2	1150.2	0.3119	1.4446	1.7564

[1]Reprinted from Steam Tables and Mollier Diagram by Prof. J. H. Keenan, 1930 Edition, by Permission of the Publisher, The American Society of Mechanical Engineers.

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Abs. Press. Lb./Sq. In.	Temp. Deg. F.	Specific Volume			Total Heat			Entropy		
		Sat. Liquid	Evap.	Sat. Vapor	Sat. Liquid	Evap.	Sat. Vapor	Sat. Liquid	Evap.	Sat. Vapor
p	t	v_f	v_{fg}	v_g	h_f	h_{fg}	h_g	s_f	s_{fg}	s_g
15.0	213.03	0.01671	26.29	26.31	181.04	969.6	1150.6	0.3134	1.4414	1.7548
16.0	216.32	0.01673	24.75	24.76	184.35	967.4	1151.8	0.3184	1.4312	1.7496
17.0	219.43	0.01676	23.38	23.40	187.48	965.4	1152.9	0.3230	1.4218	1.7448
18.0	222.40	0.01678	22.16	22.18	190.48	963.5	1154.0	0.3274	1.4127	1.7402
19.0	225.23	0.01680	21.07	21.08	193.34	961.7	1155.0	0.3316	1.4042	1.7358
20.0	227.96	0.01682	20.078	20.095	196.09	959.9	1156.0	0.3356	1.3960	1.7317
21.0	230.56	0.01684	19.180	19.197	198.72	958.2	1156.9	0.3395	1.3883	1.7278
22.0	233.07	0.01685	18.363	18.380	201.25	956.6	1157.8	0.3431	1.3809	1.7240
23.0	235.49	0.01687	17.613	17.630	203.70	955.0	1158.6	0.3466	1.3738	1.7204
24.0	237.82	0.01689	16.924	16.941	206.05	953.4	1159.5	0.3500	1.3670	1.7170
25.0	240.07	0.01690	16.289	16.306	208.33	951.9	1160.2	0.3533	1.3604	1.7137
26.0	242.25	0.01692	15.701	15.718	210.54	950.4	1161.0	0.3564	1.3542	1.7106
27.0	244.36	0.01694	15.155	15.172	212.67	949.0	1161.7	0.3594	1.3481	1.7075
28.0	246.41	0.01695	14.647	14.664	214.75	947.7	1162.4	0.3624	1.3422	1.7046
29.0	248.40	0.01697	14.173	14.190	216.77	946.3	1163.1	0.3652	1.3365	1.7018
30.0	250.34	0.01698	13.728	13.745	218.73	945.0	1163.7	0.3680	1.3310	1.6990
31.0	252.22	0.01700	13.313	13.330	220.64	943.7	1164.4	0.3707	1.3257	1.6964
32.0	254.05	0.01701	12.923	12.940	222.50	942.5	1165.0	0.3732	1.3206	1.6938
33.0	255.84	0.01703	12.556	12.573	224.32	941.2	1165.6	0.3758	1.3156	1.6914
34.0	257.58	0.01704	12.209	12.226	226.09	940.0	1166.1	0.3783	1.3107	1.6890
35.0	259.28	0.01706	11.881	11.898	227.82	938.9	1166.7	0.3807	1.3060	1.6866
36.0	260.94	0.01707	11.570	11.587	229.51	937.7	1167.2	0.3830	1.3014	1.6844
37.0	262.57	0.01708	11.277	11.294	231.17	936.6	1167.8	0.3853	1.2968	1.6822
38.0	264.16	0.01710	10.998	11.015	232.79	935.5	1168.3	0.3876	1.2925	1.6800
39.0	265.72	0.01711	10.733	10.750	234.38	934.4	1168.8	0.3898	1.2882	1.6780
40.0	267.24	0.01712	10.480	10.497	235.93	933.3	1169.2	0.3919	1.2840	1.6759
41.0	268.74	0.01713	10.240	10.257	237.45	932.3	1169.7	0.3940	1.2799	1.6739
42.0	270.21	0.01715	10.010	10.027	238.95	931.2	1170.2	0.3961	1.2759	1.6720
43.0	271.65	0.01716	9.791	9.808	240.42	930.2	1170.6	0.3981	1.2720	1.6701
44.0	273.06	0.01717	9.582	9.599	241.86	929.2	1171.1	0.4000	1.2682	1.6683
45.0	274.45	0.01718	9.382	9.399	243.28	928.2	1171.5	0.4020	1.2645	1.6665
46.0	275.81	0.01719	9.189	9.207	244.67	927.2	1171.9	0.4039	1.2608	1.6647
47.0	277.14	0.01720	9.006	9.023	246.03	926.3	1172.3	0.4057	1.2572	1.6630
48.0	278.45	0.01722	8.829	8.846	247.37	925.4	1172.7	0.4076	1.2537	1.6613
49.0	279.74	0.01723	8.659	8.676	248.68	924.4	1173.1	0.4093	1.2503	1.6596
50.0	281.01	0.01724	8.496	8.514	249.98	923.5	1173.5	0.4111	1.2469	1.6580
51.0	282.26	0.01725	8.340	8.357	251.26	922.6	1173.9	0.4128	1.2436	1.6564
52.0	283.49	0.01726	8.189	8.206	252.52	921.7	1174.3	0.4145	1.2404	1.6549
53.0	284.70	0.01727	8.043	8.060	253.76	920.9	1174.6	0.4162	1.2372	1.6533
54.0	285.90	0.01728	7.902	7.919	254.99	920.0	1175.0	0.4178	1.2340	1.6518
55.0	287.07	0.01729	7.766	7.783	256.19	919.1	1175.3	0.4194	1.2309	1.6504
56.0	288.23	0.01730	7.636	7.653	257.38	918.3	1175.7	0.4210	1.2279	1.6489
57.0	289.37	0.01732	7.509	7.527	258.55	917.5	1176.0	0.4226	1.2249	1.6475
58.0	290.50	0.01732	7.388	7.405	259.71	916.6	1176.4	0.4241	1.2220	1.6461
59.0	291.62	0.01734	7.270	7.287	260.86	915.8	1176.7	0.4256	1.2191	1.6447
60.0	292.71	0.01735	7.155	7.172	261.98	915.0	1177.0	0.4271	1.2162	1.6434
61.0	293.79	0.01736	7.044	7.062	263.09	914.2	1177.3	0.4286	1.2134	1.6420
62.0	294.85	0.01737	6.937	6.955	264.18	913.4	1177.6	0.4300	1.2107	1.6407
63.0	295.91	0.01738	6.833	6.850	265.27	912.7	1177.9	0.4315	1.2080	1.6394
64.0	296.94	0.01739	6.732	6.749	266.33	911.9	1178.2	0.4329	1.2053	1.6382
65.0	297.97	0.01740	6.634	6.652	267.39	911.1	1178.5	0.4343	1.2026	1.6369
66.0	298.98	0.01741	6.539	6.556	268.43	910.4	1178.8	0.4356	1.2001	1.6357
67.0	299.99	0.01742	6.447	6.464	269.47	909.6	1179.1	0.4370	1.1975	1.6345
68.0	300.98	0.01743	6.357	6.375	270.49	908.9	1179.4	0.4384	1.1950	1.6333
69.0	301.96	0.01744	6.271	6.288	271.50	908.2	1179.6	0.4397	1.1924	1.6321

Abs. Press. Lb./Sq. In.	Temp. Deg. F.	Specific Volume			Total Heat			Entropy		
		Sat. Liquid	Evap.	Sat. Vapor	Sat. Liquid	Evap.	Sat. Vapor	Sat. Liquid	Evap.	Sat. Vapor
p	t	v_f	v_{fg}	v_g	h_f	h_{fg}	h_g	s_f	s_{fg}	s_g
70.0	302.92	0.01744	6.186	6.203	272.49	907.4	1179.9	0.4410	1.1900	1.6310
71.0	303.88	0.01746	6.104	6.121	273.48	906.7	1180.2	0.4423	1.1876	1.6298
72.0	304.82	0.01746	6.024	6.041	274.45	906.0	1180.5	0.4435	1.1852	1.6287
73.0	305.76	0.01747	5.946	5.963	275.42	905.3	1180.7	0.4448	1.1828	1.6276
74.0	306.68	0.01748	5.870	5.887	276.37	904.6	1181.0	0.4460	1.1805	1.6265
75.0	307.60	0.01749	5.796	5.813	277.32	903.9	1181.2	0.4473	1.1782	1.6254
76.0	308.50	0.01750	5.723	5.741	278.25	903.2	1181.5	0.4485	1.1759	1.6244
77.0	309.39	0.01751	5.653	5.671	279.17	902.6	1181.7	0.4497	1.1736	1.6233
78.0	310.28	0.01752	5.584	5.602	280.09	901.9	1182.0	0.4509	1.1714	1.6223
79.0	311.16	0.01753	5.517	5.535	281.00	901.2	1182.2	0.4520	1.1692	1.6212
80.0	312.03	0.01754	5.452	5.470	281.90	900.5	1182.4	0.4532	1.1670	1.6202
81.0	312.88	0.01755	5.388	5.406	282.79	899.9	1182.7	0.4544	1.1649	1.6192
82.0	313.74	0.01756	5.325	5.343	283.67	899.2	1182.9	0.4555	1.1627	1.6182
83.0	314.58	0.01756	5.264	5.282	284.55	898.6	1183.1	0.4566	1.1606	1.6173
84.0	315.42	0.01757	5.204	5.222	285.42	897.9	1183.4	0.4578	1.1586	1.6163
85.0	316.25	0.01758	5.146	5.164	286.28	897.3	1183.6	0.4589	1.1565	1.6154
86.0	317.06	0.01759	5.089	5.107	287.13	896.7	1183.8	0.4599	1.1545	1.6144
87.0	317.88	0.01760	5.033	5.051	287.97	896.0	1184.0	0.4610	1.1524	1.6135
88.0	318.68	0.01761	4.979	4.997	288.80	895.4	1184.2	0.4621	1.1505	1.6126
89.0	319.48	0.01762	4.926	4.944	289.63	894.8	1184.4	0.4632	1.1485	1.6116
90.0	320.27	0.01763	4.874	4.892	290.45	894.2	1184.6	0.4642	1.1465	1.6107
91.0	321.05	0.01764	4.823	4.841	291.26	893.6	1184.8	0.4652	1.1446	1.6099
92.0	321.83	0.01764	4.773	4.791	292.07	893.0	1185.0	0.4663	1.1427	1.6090
93.0	322.60	0.01765	4.724	4.742	292.87	892.4	1185.2	0.4673	1.1408	1.6081
94.0	323.37	0.01766	4.676	4.694	293.67	891.8	1185.4	0.4683	1.1389	1.6072
95.0	324.13	0.01767	4.629	4.647	294.47	891.2	1185.6	0.4693	1.1370	1.6064
96.0	324.88	0.01768	4.584	4.602	295.25	890.6	1185.8	0.4703	1.1352	1.6055
97.0	325.62	0.01768	4.539	4.557	296.02	890.0	1186.0	0.4713	1.1334	1.6047
98.0	326.37	0.01769	4.494	4.512	296.80	889.4	1186.2	0.4723	1.1316	1.6038
99.0	327.10	0.01770	4.450	4.468	297.57	888.8	1186.4	0.4732	1.1298	1.6030
100.0	327.83	0.01771	4.408	4.426	298.33	888.2	1186.6	0.4742	1.1280	1.6022
101.0	328.55	0.01772	4.367	4.385	299.08	887.7	1186.8	0.4751	1.1262	1.6014
102.0	329.27	0.01773	4.326	4.344	299.83	887.1	1186.9	0.4761	1.1245	1.6006
103.0	329.98	0.01773	4.287	4.305	300.57	886.6	1187.1	0.4770	1.1228	1.5998
104.0	330.68	0.01774	4.247	4.265	301.30	886.0	1187.3	0.4779	1.1211	1.5990
105.0	331.38	0.01775	4.208	4.226	302.03	885.4	1187.5	0.4789	1.1194	1.5982
106.0	332.08	0.01776	4.171	4.189	302.76	884.9	1187.6	0.4798	1.1177	1.5974
107.0	332.76	0.01777	4.134	4.152	303.48	884.3	1187.8	0.4807	1.1160	1.5967
108.0	333.44	0.01777	4.097	4.115	304.19	883.8	1188.0	0.4816	1.1144	1.5959
109.0	334.12	0.01778	4.061	4.079	304.90	883.2	1188.1	0.4825	1.1127	1.5952
110.0	334.79	0.01779	4.026	4.044	305.61	882.7	1188.3	0.4834	1.1111	1.5944
111.0	335.46	0.01780	3.992	4.010	306.31	882.1	1188.4	0.4842	1.1095	1.5937
112.0	336.12	0.01780	3.958	3.976	307.00	881.6	1188.6	0.4851	1.1079	1.5930
113.0	336.78	0.01781	3.925	3.943	307.68	881.1	1188.8	0.4859	1.1063	1.5922
114.0	337.43	0.01782	3.892	3.910	308.36	880.6	1188.9	0.4868	1.1048	1.5915
115.0	338.08	0.01783	3.860	3.878	309.04	880.0	1189.1	0.4876	1.1032	1.5908
116.0	338.72	0.01783	3.828	3.846	309.71	879.5	1189.2	0.4885	1.1017	1.5901
117.0	339.37	0.01784	3.797	3.815	310.38	879.0	1189.4	0.4893	1.1001	1.5894
118.0	340.01	0.01785	3.766	3.784	311.05	878.5	1189.5	0.4901	1.0986	1.5887
119.0	340.64	0.01786	3.736	3.754	311.71	878.0	1189.7	0.4909	1.0971	1.5880
120.0	341.26	0.01786	3.707	3.725	312.37	877.4	1189.8	0.4918	1.0956	1.5874
121.0	341.88	0.01787	3.679	3.697	313.02	876.9	1190.0	0.4926	1.0941	1.5867
122.0	342.50	0.01788	3.652	3.670	313.67	876.4	1190.1	0.4934	1.0926	1.5860
123.0	343.12	0.01789	3.624	3.642	314.32	875.9	1190.2	0.4942	1.0911	1.5853
124.0	343.73	0.01789	3.597	3.615	314.96	875.4	1190.4	0.4950	1.0897	1.5847

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Abs. Press. Lb./Sq. In.	Temp. Deg. F.	Specific Volume			Total Heat			Entropy		
		Sat. Liquid	Evap.	Sat. Vapor	Sat. Liquid	Evap.	Sat. Vapor	Sat. Liquid	Evap.	Sat. Vapor
p	t	v_f	v_{fg}	v_g	h_f	h_{fg}	h_g	s_f	s_{fg}	s_g
125.0	344.34	0.01790	3.569	3.587	315.60	874.9	1190.5	0.4958	1.0882	1.5840
126.0	344.94	0.01791	3.542	3.560	316.23	874.4	1190.6	0.4965	1.0868	1.5834
127.0	345.54	0.01792	3.514	3.532	316.86	873.9	1190.8	0.4973	1.0854	1.5827
128.0	346.14	0.01792	3.487	3.505	317.49	873.4	1190.9	0.4981	1.0840	1.5821
129.0	346.73	0.01793	3.459	3.477	318.11	872.9	1191.0	0.4989	1.0826	1.5814
130.0	347.31	0.01794	3.433	3.451	318.73	872.4	1191.2	0.4996	1.0812	1.5808
131.0	347.90	0.01794	3.408	3.426	319.34	872.0	1191.3	0.5004	1.0798	1.5802
132.0	348.48	0.01795	3.383	3.401	319.95	871.5	1191.4	0.5011	1.0784	1.5796
133.0	349.06	0.01796	3.359	3.377	320.56	871.0	1191.6	0.5019	1.0770	1.5789
134.0	349.64	0.01796	3.335	3.353	321.17	870.5	1191.7	0.5026	1.0757	1.5783
135.0	350.21	0.01797	3.311	3.329	321.77	870.0	1191.8	0.5034	1.0743	1.5777
136.0	350.78	0.01798	3.288	3.306	322.37	869.6	1191.9	0.5041	1.0730	1.5771
137.0	351.35	0.01799	3.265	3.283	322.97	869.1	1192.0	0.5048	1.0716	1.5765
138.0	351.91	0.01799	3.242	3.260	323.56	868.6	1192.2	0.5056	1.0703	1.5759
139.0	352.47	0.01800	3.220	3.238	324.15	868.1	1192.3	0.5063	1.0690	1.5753
140.0	353.03	0.01801	3.198	3.216	324.74	867.7	1192.4	0.5070	1.0677	1.5747
141.0	353.59	0.01802	3.176	3.194	325.33	867.2	1192.5	0.5077	1.0664	1.5741
142.0	354.14	0.01802	3.155	3.173	325.91	866.7	1192.6	0.5084	1.0651	1.5735
143.0	354.68	0.01803	3.133	3.151	326.49	866.3	1192.8	0.5091	1.0638	1.5729
144.0	355.22	0.01804	3.112	3.130	327.06	865.8	1192.9	0.5098	1.0625	1.5724
145.0	355.77	0.01804	3.092	3.110	327.63	865.3	1193.0	0.5105	1.0612	1.5718
146.0	356.31	0.01805	3.071	3.089	328.20	864.9	1193.1	0.5112	1.0600	1.5712
147.0	356.84	0.01806	3.051	3.069	328.76	864.4	1193.2	0.5119	1.0587	1.5707
148.0	357.37	0.01806	3.031	3.049	329.32	864.0	1193.3	0.5126	1.0575	1.5701
149.0	357.90	0.01807	3.012	3.030	329.88	863.5	1193.4	0.5133	1.0563	1.5695
150.0	358.43	0.01808	2.992	3.010	330.44	863.1	1193.5	0.5140	1.0550	1.5690
151.0	358.95	0.01808	2.973	2.991	330.99	862.6	1193.6	0.5146	1.0538	1.5684
152.0	359.47	0.01809	2.954	2.972	331.54	862.2	1193.7	0.5153	1.0526	1.5679
153.0	359.99	0.01810	2.936	2.954	332.09	861.7	1193.8	0.5160	1.0514	1.5674
154.0	360.51	0.01810	2.917	2.935	332.64	861.3	1193.9	0.5166	1.0502	1.5668
155.0	361.02	0.01811	2.899	2.917	333.18	860.8	1194.0	0.5173	1.0490	1.5663
156.0	361.53	0.01812	2.882	2.900	333.72	860.4	1194.1	0.5180	1.0478	1.5658
157.0	362.04	0.01812	2.864	2.882	334.26	860.0	1194.2	0.5186	1.0466	1.5652
158.0	362.54	0.01813	2.846	2.864	334.80	859.5	1194.3	0.5193	1.0454	1.5647
159.0	363.05	0.01814	2.829	2.847	335.33	859.1	1194.4	0.5199	1.0443	1.5642
160.0	363.55	0.01814	2.812	2.830	335.86	858.7	1194.5	0.5205	1.0431	1.5636
161.0	364.05	0.01815	2.796	2.814	336.39	858.2	1194.6	0.5212	1.0420	1.5631
162.0	364.54	0.01816	2.779	2.797	336.91	857.8	1194.7	0.5218	1.0408	1.5626
163.0	365.03	0.01816	2.763	2.781	337.43	857.4	1194.8	0.5224	1.0397	1.5621
164.0	365.52	0.01817	2.746	2.764	337.95	857.0	1194.9	0.5230	1.0385	1.5616
165.0	366.01	0.01818	2.730	2.748	338.47	856.5	1195.0	0.5237	1.0374	1.5611
166.0	366.50	0.01818	2.715	2.733	338.99	856.1	1195.1	0.5243	1.0363	1.5606
167.0	366.98	0.01819	2.699	2.717	339.50	855.7	1195.2	0.5249	1.0352	1.5601
168.0	367.46	0.01819	2.683	2.701	340.01	855.2	1195.3	0.5255	1.0340	1.5596
169.0	367.94	0.01820	2.668	2.686	340.52	854.8	1195.4	0.5262	1.0329	1.5591
170.0	368.42	0.01821	2.653	2.671	341.03	854.4	1195.4	0.5268	1.0318	1.5586
171.0	368.90	0.01821	2.638	2.656	341.54	854.0	1195.5	0.5274	1.0307	1.5581
172.0	369.37	0.01822	2.623	2.641	342.04	853.6	1195.6	0.5280	1.0296	1.5576
173.0	369.84	0.01823	2.608	2.626	342.54	853.2	1195.7	0.5286	1.0286	1.5571
174.0	370.31	0.01823	2.594	2.612	343.04	852.7	1195.8	0.5292	1.0275	1.5566
175.0	370.78	0.01824	2.580	2.598	343.54	852.3	1195.9	0.5298	1.0264	1.5562
176.0	371.24	0.01825	2.566	2.584	344.03	851.9	1196.0	0.5304	1.0253	1.5557
177.0	371.70	0.01825	2.552	2.570	344.52	851.5	1196.0	0.5310	1.0243	1.5552
178.0	372.16	0.01826	2.538	2.556	345.01	851.1	1196.1	0.5315	1.0232	1.5548
179.0	372.62	0.01826	2.524	2.542	345.50	850.7	1196.2	0.5321	1.0222	1.5543
180.0	373.08	0.01827	2.511	2.529	345.99	850.3	1196.3	0.5327	1.0211	1.5538
181.0	373.54	0.01828	2.497	2.515	346.48	849.9	1196.4	0.5333	1.0200	1.5534
182.0	374.00	0.01828	2.484	2.502	346.97	849.5	1196.4	0.5339	1.0190	1.5529
183.0	374.45	0.01829	2.471	2.489	347.46	849.0	1196.5	0.5345	1.0180	1.5524
184.0	374.90	0.01829	2.458	2.476	347.94	848.6	1196.6	0.5350	1.0169	1.5520

Abs. Press. Lb./Sq. In.	Temp. Deg. F.	Specific Volume			Total Heat			Entropy		
		Sat. Liquid	Evap.	Sat. Vapor	Sat. Liquid	Evap.	Sat. Vapor	Sat. Liquid	Evap.	Sat. Vapor
p	t	v_f	v_{fg}	v_g	h_f	h_{fg}	h_g	s_f	s_{fg}	s_g
185.0	375.34	0.01830	2.445	2.463	348.42	848.2	1196.7	0.5356	1.0159	1.5515
186.0	375.78	0.01831	2.433	2.451	348.89	847.9	1196.8	0.5362	1.0149	1.5511
187.0	376.23	0.01831	2.420	2.438	349.36	847.5	1196.8	0.5367	1.0139	1.5506
188.0	376.67	0.01832	2.407	2.425	349.83	847.1	1196.9	0.5373	1.0129	1.5502
189.0	377.11	0.01832	2.395	2.413	350.30	846.7	1197.0	0.5378	1.0119	1.5497
190.0	377.55	0.01833	2.383	2.401	350.77	846.3	1197.0	0.5384	1.0109	1.5493
191.0	377.99	0.01834	2.371	2.389	351.24	845.9	1197.1	0.5390	1.0099	1.5488
192.0	378.42	0.01834	2.359	2.377	351.70	845.5	1197.2	0.5395	1.0089	1.5484
193.0	378.85	0.01835	2.347	2.365	352.16	845.1	1197.3	0.5400	1.0079	1.5480
194.0	379.27	0.01835	2.335	2.353	352.61	844.7	1197.3	0.5406	1.0070	1.5475
195.0	379.70	0.01836	2.324	2.342	353.07	844.3	1197.4	0.5411	1.0060	1.5471
196.0	380.13	0.01837	2.312	2.330	353.53	844.0	1197.5	0.5417	1.0050	1.5467
197.0	380.55	0.01837	2.301	2.319	353.98	843.6	1197.6	0.5422	1.0040	1.5462
198.0	380.97	0.01838	2.289	2.307	354.43	843.2	1197.6	0.5427	1.0031	1.5458
199.0	381.40	0.01838	2.278	2.296	354.88	842.8	1197.7	0.5433	1.0021	1.5454
200.0	381.82	0.01839	2.267	2.285	355.33	842.4	1197.8	0.5438	1.0012	1.5450
205.0	383.89	0.01842	2.213	2.231	357.56	840.5	1198.1	0.5465	0.9964	1.5429
210.0	385.93	0.01844	2.162	2.180	359.76	838.6	1198.4	0.5491	0.9918	1.5409
215.0	387.93	0.01847	2.113	2.131	361.91	836.8	1198.7	0.5516	0.9873	1.5389
220.0	389.89	0.01850	2.066	2.084	364.02	835.0	1199.0	0.5540	0.9829	1.5369
225.0	391.81	0.01853	2.0208	2.0393	366.10	833.2	1199.3	0.5565	0.9786	1.5350
230.0	393.70	0.01856	1.9778	1.9964	368.14	831.4	1199.6	0.5588	0.9743	1.5332
235.0	395.56	0.01859	1.9367	1.9553	370.15	829.7	1199.8	0.5612	0.9702	1.5313
240.0	397.40	0.01861	1.8970	1.9156	372.13	827.9	1200.1	0.5635	0.9661	1.5295
245.0	399.20	0.01864	1.8589	1.8775	374.09	826.2	1200.3	0.5658	0.9620	1.5278
250.0	400.97	0.01867	1.8223	1.8410	376.02	824.5	1200.5	0.5680	0.9581	1.5261
255.0	402.71	0.01869	1.7873	1.8060	377.91	822.9	1200.8	0.5701	0.9542	1.5244
260.0	404.43	0.01872	1.7536	1.7723	379.78	821.2	1201.0	0.5723	0.9504	1.5227
265.0	406.12	0.01874	1.7210	1.7397	381.62	819.6	1201.2	0.5744	0.9467	1.5210
270.0	407.79	0.01877	1.6895	1.7083	383.44	818.0	1201.4	0.5765	0.9430	1.5194
275.0	409.44	0.01880	1.6593	1.6781	385.24	816.3	1201.6	0.5785	0.9393	1.5178
280.0	411.06	0.01882	1.6302	1.6490	387.02	814.7	1201.8	0.5805	0.9357	1.5163
285.0	412.66	0.01884	1.6018	1.6206	388.77	813.2	1201.9	0.5825	0.9322	1.5147
290.0	414.24	0.01887	1.5745	1.5934	390.50	811.6	1202.1	0.5845	0.9287	1.5132
295.0	415.80	0.01889	1.5480	1.5669	392.21	810.0	1202.2	0.5864	0.9253	1.5117
300.0	417.33	0.01892	1.5225	1.5414	393.90	808.5	1202.4	0.5883	0.9220	1.5102
310.0	420.35	0.01896	1.4738	1.4928	397.23	805.5	1202.7	0.5920	0.9153	1.5074
320.0	423.29	0.01901	1.4279	1.4469	400.47	802.5	1203.0	0.5957	0.9089	1.5046
330.0	426.16	0.01905	1.3849	1.4039	403.64	799.5	1203.2	0.5992	0.9026	1.5018
340.0	428.96	0.01910	1.3439	1.3630	406.75	796.6	1203.4	0.6027	0.8965	1.4992
350.0	431.71	0.01914	1.3054	1.3245	409.81	793.7	1203.6	0.6061	0.8905	1.4966
360.0	434.39	0.01918	1.2689	1.2881	412.80	790.9	1203.7	0.6094	0.8846	1.4940
370.0	437.01	0.01923	1.2344	1.2536	415.73	788.1	1203.8	0.6126	0.8789	1.4915
380.0	439.59	0.01927	1.2015	1.2208	418.61	785.3	1203.9	0.6157	0.8733	1.4891
390.0	442.11	0.01931	1.1705	1.1898	421.44	782.6	1204.0	0.6188	0.8678	1.4867
400.0	444.58	0.0194	1.1407	1.1601	424.2	779.8	1204.1	0.6218	0.8625	1.4843
410.0	447.00	0.0194	1.1123	1.1317	426.9	777.2	1204.1	0.6248	0.8572	1.4820
420.0	449.38	0.0194	1.0853	1.1047	429.6	774.5	1204.1	0.6277	0.8520	1.4798
430.0	451.72	0.0195	1.0593	1.0788	432.3	771.9	1204.1	0.6306	0.8470	1.4775
440.0	454.01	0.0195	1.0345	1.0540	434.8	769.3	1204.1	0.6334	0.8420	1.4753
450.0	456.27	0.0196	1.0107	1.0303	437.4	766.7	1204.1	0.6361	0.8371	1.4732
460.0	458.48	0.0196	0.9881	1.0077	439.9	764.1	1204.0	0.6388	0.8322	1.4711
470.0	460.66	0.0196	0.9665	0.9861	442.4	761.6	1204.0	0.6415	0.8275	1.4690
480.0	462.80	0.0197	0.9456	0.9653	444.9	759.0	1203.9	0.6441	0.8228	1.4670
490.0	464.91	0.0197	0.9256	0.9453	447.3	756.5	1203.8	0.6467	0.8182	1.4650

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Abs. Press. Lb./Sq. In.	Temp. Deg. F.	Specific Volume			Total Heat			Entropy		
		Sat. Liquid	Evap.	Sat. Vapor	Sat. Liquid	Evap.	Sat. Vapor	Sat. Liquid	Evap.	Sat. Vapor
p	t	v_f	v_{fg}	v_g	h_f	h_{fg}	h_g	s_f	s_{fg}	s_g
500.0	466.99	0.0198	0.9063	0.9261	449.7	754.0	1203.7	0.6493	0.8137	1.4630
520.0	471.05	0.0198	0.8701	0.8899	454.4	749.0	1203.5	0.6543	0.8048	1.4591
540.0	474.99	0.0199	0.8363	0.8562	459.0	744.1	1203.2	0.6592	0.7962	1.4554
560.0	478.82	0.0200	0.8047	0.8247	463.6	739.3	1202.9	0.6639	0.7878	1.4517
580.0	482.55	0.0201	0.7751	0.7952	468.0	734.5	1202.5	0.6686	0.7796	1.4482
600.0	486.17	0.0202	0.7475	0.7677	472.3	729.8	1202.1	0.6731	0.7716	1.4447
620.0	489.71	0.0202	0.7217	0.7419	476.6	725.1	1201.7	0.6775	0.7638	1.4413
640.0	493.16	0.0203	0.6972	0.7175	480.8	720.5	1201.2	0.6818	0.7562	1.4380
660.0	496.53	0.0204	0.6744	0.6948	484.9	715.9	1200.8	0.6861	0.7487	1.4348
680.0	499.82	0.0205	0.6527	0.6732	488.9	711.3	1200.2	0.6902	0.7414	1.4316
700.0	503.04	0.0206	0.6321	0.6527	492.9	706.8	1199.7	0.6943	0.7342	1.4285
720.0	506.19	0.0206	0.6128	0.6334	496.8	702.4	1199.2	0.6983	0.7272	1.4255
740.0	509.28	0.0207	0.5944	0.6151	500.6	697.9	1198.6	0.7022	0.7203	1.4225
760.0	512.30	0.0208	0.5769	0.5977	504.4	693.5	1198.0	0.7060	0.7136	1.4196
780.0	515.27	0.0209	0.5602	0.5811	508.2	689.2	1197.4	0.7098	0.7069	1.4167
800.0	518.18	0.0209	0.5444	0.5653	511.8	684.9	1196.7	0.7135	0.7004	1.4139
820.0	521.03	0.0210	0.5293	0.5503	515.5	680.6	1196.0	0.7171	0.6940	1.4111
840.0	523.83	0.0211	0.5149	0.5360	519.0	676.4	1195.4	0.7207	0.6877	1.4084
860.0	526.58	0.0212	0.5013	0.5225	522.6	672.1	1194.7	0.7242	0.6815	1.4057
880.0	529.29	0.0213	0.4881	0.5094	526.0	667.9	1194.0	0.7277	0.6754	1.4031
900.0	531.95	0.0213	0.4756	0.4969	529.5	663.8	1193.3	0.7311	0.6694	1.4005
920.0	534.56	0.0214	0.4635	0.4849	532.9	659.7	1192.6	0.7344	0.6635	1.3980
940.0	537.13	0.0215	0.4520	0.4735	536.2	655.6	1191.8	0.7377	0.6577	1.3954
960.0	539.66	0.0216	0.4409	0.4625	539.6	651.5	1191.1	0.7410	0.6520	1.3930
980.0	542.14	0.0217	0.4303	0.4520	542.8	647.5	1190.3	0.7442	0.6464	1.3905
1000.0	544.58	0.0217	0.4202	0.4419	546.0	643.5	1189.6	0.7473	0.6408	1.3881
1050.0	550.53	0.0219	0.3960	0.4179	554.0	633.6	1187.6	0.7550	0.6273	1.3822
1100.0	556.28	0.0222	0.3738	0.3960	561.7	623.9	1185.6	0.7624	0.6141	1.3765
1150.0	561.81	0.0224	0.3540	0.3764	569.2	614.3	1183.5	0.7695	0.6014	1.3709
1200.0	567.14	0.0226	0.3356	0.3582	576.5	604.9	1181.4	0.7764	0.5891	1.3656
1250.0	572.30	0.0228	0.3187	0.3415	583.6	595.6	1179.2	0.7831	0.5772	1.3603
1300.0	577.32	0.0230	0.3029	0.3259	590.6	586.3	1177.0	0.7897	0.5654	1.3552
1350.0	582.21	0.0232	0.2884	0.3116	597.5	577.2	1174.7	0.7962	0.5540	1.3501
1400.0	586.96	0.0235	0.2748	0.2983	604.3	568.1	1172.4	0.8024	0.5428	1.3452
1450.0	591.58	0.0237	0.2621	0.2858	611.0	559.1	1170.0	0.8086	0.5318	1.3404
1500.0	596.08	0.0239	0.2502	0.2741	617.5	550.2	1167.6	0.8146	0.5212	1.3357
1600.0	604.74	0.0244	0.2284	0.2528	630.2	532.6	1162.7	0.8262	0.5003	1.3265
1700.0	612.98	0.0249	0.2089	0.2338	642.5	515.0	1157.5	0.8373	0.4801	1.3174
1800.0	620.86	0.0254	0.1913	0.2167	654.7	497.2	1151.8	0.8482	0.4601	1.3083
1900.0	628.39	0.0260	0.1754	0.2014	666.8	478.9	1145.7	0.8589	0.4402	1.2990
2000.0	635.6	0.0265	0.1610	0.1875	679.0	460.0	1139.0	0.8696	0.4200	1.2896
2100.0	642.6	0.0271	0.1473	0.1744	691.3	440.4	1131.7	0.8804	0.3996	1.2800
2200.0	649.2	0.0277	0.1346	0.1623	703.7	420.0	1123.8	0.8912	0.3788	1.2700
2300.0	655.7	0.0284	0.1226	0.1510	716.4	398.7	1115.2	0.9021	0.3575	1.2596
2400.0	661.9	0.0292	0.1112	0.1404	729.4	376.4	1105.8	0.9133	0.3356	1.2488
2500.0	668.0	0.0301	0.1002	0.1303	742.8	352.8	1095.6	0.9247	0.3129	1.2375
2600.0	673.8	0.0310	0.0895	0.1205	756.7	327.8	1084.5	0.9364	0.2892	1.2257
2700.0	679.5	0.0321	0.0790	0.1111	771.2	301.2	1072.4	0.9487	0.2644	1.2131
2800.0	684.9	0.0333	0.0688	0.1021	786.7	272.3	1058.9	0.9618	0.2379	1.1996
2900.0	690.2	0.0348	0.0585	0.0933	803.6	240.0	1043.7	0.9760	0.2088	1.1847
3000.0	695.2	0.0367	0.0477	0.0844	823.1	202.5	1025.6	0.9922	0.1754	1.1676
3100.0	700.2	0.0395	0.0348	0.0743	847.2	155.0	1002.2	1.0126	0.1336	1.1462
3200.0	704.9	0.0459	0.0142	0.0601	887.0	75.9	962.9	1.0461	0.0651	1.1112
3226.0	706.1	0.0522	0	0.0522	925.0	0	925.0	1.0785	0	1.0785

Properties of Superheated Steam[1]

Abs. Press. Lb./Sq.In. (Sat.Temp.)		Sat. Water	Sat. Steam	Temperature—Degrees Fahrenheit									
				300°	360°	400°	460°	500°	600°	700°	800°	900°	1000°
	v	0.02	26.82	30.52	33.00	34.65	37.11	38.75	42.83	46.91	50.97	55.03	59.09
14.696	h	180.0	1150.2	1192.2	1220.3	1239.0	1267.1	1286.0	1333.7	1382.4	1432.1	1482.9	1534.9
(212.00)	s	0.3119	1.7564	1.8154	1.8509	1.8731	1.9048	1.9249	1.9722	2.0161	2.0572	2.0961	2.1330
	v	0.02	20.10	22.36	24.21	25.43	27.24	28.45	31.46	34.46	37.44	40.43	43.42
20	h	196.1	1156.0	1191.1	1219.5	1238.3	1266.6	1285.5	1333.4	1382.1	1432.0	1482.8	1534.8
(227.96)	s	0.3356	1.7317	1.7802	1.8162	1.8386	1.8704	1.8906	1.9380	1.9819	2.0232	2.0620	2.0989
	v	0.017	13.745	14.818	16.069	16.890	18.111	18.923	20.94	22.94	24.94	26.93	28.93
30	h	218.7	1163.7	1188.7	1217.9	1237.0	1265.5	1284.6	1332.7	1381.7	1431.6	1482.6	1534.6
(250.34)	s	0.3680	1.6990	1.7332	1.7700	1.7928	1.8249	1.8452	1.8928	1.9370	1.9783	2.0172	2.0541
	v	0.017	10.497	11.044	11.999	12.623	13.547	14.161	15.682	17.190	18.686	20.18	21.68
40	h	235.9	1169.2	1186.5	1216.2	1235.6	1264.5	1283.7	1332.0	1381.2	1431.3	1482.3	1534.4
(267.24)	s	0.3919	1.6759	1.6990	1.7369	1.7599	1.7924	1.8128	1.8607	1.9050	1.9464	1.9854	2.0224
	v	0.017	8.514	8.777	9.558	10.061	10.809	11.304	12.527	13.737	14.934	16.136	17.337
50	h	250.0	1173.5	1183.9	1214.5	1234.2	1263.4	1282.8	1331.4	1380.7	1431.0	1482.1	1534.1
(281.01)	s	0.4111	1.6580	1.6718	1.7107	1.7341	1.7669	1.7875	1.8357	1.8801	1.9217	1.9608	1.9977
	v	0.017	7.172	7.260	7.929	8.353	8.983	9.398	10.423	11.435	12.436	13.439	14.440
60	h	262.0	1177.0	1181.2	1212.8	1232.8	1262.3	1281.9	1330.7	1380.2	1430.6	1481.8	1533.9
(292.71)	s	0.4271	1.6434	1.6488	1.6890	1.7128	1.7460	1.7667	1.8151	1.8597	1.9014	1.9406	1.9775
	v	0.017	6.203		6.764	7.132	7.677	8.036	8.920	9.791	10.651	11.512	12.370
70	h	272.5	1179.9		1211.0	1231.4	1261.2	1280.9	1330.0	1379.7	1430.3	1481.5	1533.7
(302.92)	s	0.4410	1.6310		1.6703	1.6945	1.7281	1.7490	1.7976	1.8424	1.8843	1.9235	1.9604
	v	0.018	5.470		5.889	6.217	6.698	7.015	7.793	8.558	9.313	10.067	10.817
80	h	281.9	1182.4		1209.2	1229.9	1260.1	1280.0	1329.3	1379.2	1429.9	1481.3	1533.5
(312.03)	s	0.4532	1.6202		1.6538	1.6785	1.7125	1.7336	1.7824	1.8274	1.8694	1.9086	1.9456
	v	0.018	4.892		5.208	5.504	5.938	6.220	6.916	7.599	8.272	8.943	9.610
90	h	290.4	1184.6		1207.2	1228.5	1259.0	1279.0	1328.6	1378.7	1429.6	1481.0	1533.3
(320.27)	s	0.4642	1.6107		1.6390	1.6642	1.6986	1.7198	1.7690	1.8142	1.8563	1.8955	1.9326
	v	0.018	4.426		4.663	4.934	5.328	5.585	6.215	6.831	7.439	8.044	8.644
100	h	298.3	1186.6		1205.3	1226.9	1257.9	1278.0	1327.9	1378.2	1429.2	1480.7	1533.1
(327.83)	s	0.4742	1.6022		1.6254	1.6512	1.6860	1.7075	1.7569	1.8023	1.8445	1.8838	1.9209
	v	0.018	4.044		4.216	4.467	4.830	5.065	5.640	6.203	6.758	7.307	7.854
110	h	305.6	1188.3		1203.3	1225.4	1256.7	1277.1	1327.2	1377.7	1428.9	1480.5	1532.9
(334.79)	s	0.4834	1.5944		1.6129	1.6393	1.6746	1.6963	1.7459	1.7915	1.8338	1.8732	1.9104
	v	0.018	3.725		3.842	4.077	4.414	4.632	5.162	5.680	6.189	6.693	7.196
120	h	312.4	1189.8		1201.2	1223.8	1255.6	1276.1	1326.5	1377.2	1428.5	1480.2	1532.7
(341.26)	s	0.4918	1.5874		1.6013	1.6283	1.6640	1.6859	1.7359	1.7816	1.8240	1.8635	1.9007
	v	0.018	3.451		3.527	3.748	4.062	4.265	4.757	5.237	5.709	6.174	6.638
130	h	318.7	1191.2		1199.0	1222.2	1254.4	1275.1	1325.8	1376.7	1428.2	1479.9	1532.5
(347.31)	s	0.4996	1.5808		1.5904	1.6180	1.6542	1.6763	1.7266	1.7724	1.8150	1.8545	1.8918
	v	0.018	3.216		3.255	3.465	3.761	3.951	4.410	4.857	5.297	5.728	6.161
140	h	324.7	1192.4		1196.8	1220.5	1253.2	1274.1	1325.1	1376.2	1427.8	1479.7	1532.2
(353.03)	s	0.5070	1.5747		1.5801	1.6084	1.6451	1.6674	1.7179	1.7640	1.8066	1.8462	1.8836
	v	0.018	3.010		3.019	3.219	3.500	3.679	4.109	4.528	4.939	5.342	5.747
150	h	330.4	1193.5		1194.5	1218.8	1252.0	1273.1	1324.4	1375.7	1427.4	1479.4	1532.0
(358.43)	s	0.5140	1.5690		1.5703	1.5993	1.6365	1.6589	1.7098	1.7561	1.7988	1.8385	1.8758
	v	0.018	2.830			3.005	3.270	3.440	3.846	4.240	4.627	5.006	5.385
160	h	335.9	1194.5			1217.1	1250.8	1272.1	1323.7	1375.2	1427.1	1479.1	1531.8
(363.55)	s	0.5205	1.5636			1.5906	1.6284	1.6510	1.7022	1.7487	1.7915	1.8313	1.8687
	v	0.018	2.671			2.815	3.068	3.229	3.614	3.986	4.351	4.708	5.066
170	h	341.0	1195.4			1215.3	1249.5	1271.0	1323.0	1374.7	1426.7	1478.8	1531.6
(368.42)	s	0.5268	1.5586			1.5822	1.6207	1.6435	1.6951	1.7417	1.7847	1.8245	1.8619
	v	0.018	2.529			2.646	2.888	3.041	3.407	3.760	4.105	4.444	4.782
180	h	346.0	1196.3			1213.5	1248.3	1270.0	1322.2	1374.2	1426.3	1478.5	1531.4
(373.08)	s	0.5327	1.5538			1.5742	1.6134	1.6364	1.6882	1.7351	1.7782	1.8180	1.8555

[1] Abstracted from Steam Tables and Mollier Diagram by Prof. J. H. Keenan, 1930 Edition, by Permission of the Publisher, The American Society of Mechanical Engineers.

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Abs. Press. Lb./Sq.In. (Sat.Temp.)		Sat. Water	Sat. Steam	Temperature—Degrees Fahrenheit									
				400°	450°	500°	560°	600°	660°	700°	800°	900°	1000°
	v	0.018	2.401	2.495	2.690	2.873	3.085	3.222	3.425	3.558	3.886	4.208	4.527
190	h	350.8	1197.0	1211.7	1241.4	1268.9	1300.7	1321.5	1352.7	1373.7	1426.0	1478.3	1531.2
(377.55)	s	0.5384	1.5493	1.5666	1.6002	1.6296	1.6617	1.6818	1.7104	1.7288	1.7721	1.8120	1.8495
	v	0.018	2.285	2.358	2.547	2.722	2.925	3.056	3.249	3.376	3.688	3.995	4.299
200	h	355.3	1197.8	1209.8	1240.0	1267.9	1299.8	1320.8	1352.2	1373.1	1425.6	1478.0	1531.0
(381.82)	s	0.5438	1.5450	1.5592	1.5934	1.6231	1.6554	1.6756	1.7044	1.7228	1.7662	1.8062	1.8438
	v	0.019	2.084	2.122	2.299	2.462	2.648	2.769	2.946	3.062	3.347	3.628	3.903
220	h	364.0	1199.0	1205.9	1237.3	1265.7	1298.2	1319.3	1350.9	1372.1	1424.8	1477.4	1530.6
(389.89)	s	0.5540	1.5369	1.5450	1.5805	1.6109	1.6437	1.6641	1.6931	1.7117	1.7553	1.7954	1.8331
	v	0.0186	1.9156	1.9250	2.092	2.244	2.418	2.529	2.693	2.800	3.063	3.321	3.574
240	h	372.1	1200.1	1201.9	1234.4	1263.5	1296.5	1317.8	1349.7	1371.0	1424.1	1476.8	1530.2
(397.40)	s	0.5635	1.5295	1.5317	1.5684	1.5996	1.6328	1.6534	1.6827	1.7014	1.7453	1.7856	1.8234
	v	0.0187	1.7723		1.9165	2.060	2.222	2.327	2.479	2.579	2.823	3.062	3.295
260	h	379.8	1201.0		1231.5	1261.3	1294.7	1316.3	1348.5	1370.0	1423.3	1476.3	1529.7
(404.43)	s	0.5723	1.5227		1.5571	1.5890	1.6228	1.6435	1.6731	1.6919	1.7360	1.7765	1.8144
	v	0.0188	1.6490		1.7655	1.9019	2.055	2.153	2.296	2.389	2.617	2.839	3.056
280	h	387.0	1201.8		1228.4	1259.0	1293.0	1314.8	1347.3	1368.9	1422.5	1475.7	1529.3
(411.06)	s	0.5805	1.5163		1.5462	1.5790	1.6133	1.6343	1.6641	1.6830	1.7274	1.7680	1.8060
	v	0.0189	1.5414		1.6347	1.7648	1.9098	2.002	2.137	2.224	2.438	2.646	2.849
300	h	393.9	1202.4		1225.3	1256.7	1291.2	1313.3	1346.0	1367.8	1421.7	1475.1	1528.9
(417.33)	s	0.5883	1.5102		1.5359	1.5695	1.6044	1.6256	1.6557	1.6747	1.7193	1.7601	1.7983
	v	0.0190	1.4469		1.5195	1.6445	1.7825	1.8700	1.9974	2.080	2.281	2.477	2.668
320	h	400.5	1203.0		1222.1	1254.4	1289.4	1311.8	1344.8	1366.7	1420.9	1474.5	1528.5
(423.29)	s	0.5957	1.5046		1.5260	1.5605	1.5960	1.6174	1.6477	1.6670	1.7118	1.7528	1.7911
	v	0.0191	1.3630		1.4177	1.5384	1.6703	1.7535	1.8745	1.9526	2.143	2.328	2.508
340	h	406.8	1203.4		1218.8	1251.9	1287.6	1310.2	1343.5	1365.6	1420.2	1473.9	1528.1
(428.96)	s	0.6027	1.4992		1.5164	1.5518	1.5879	1.6096	1.6402	1.6596	1.7047	1.7458	1.7842
	v	0.0192	1.2881		1.3272	1.4439	1.5704	1.6500	1.7652	1.8396	2.020	2.196	2.366
360	h	412.8	1203.7		1215.4	1249.5	1285.8	1308.7	1342.3	1364.5	1419.4	1473.3	1527.7
(443.39)	s	0.6094	1.4940		1.5070	1.5435	1.5802	1.6022	1.6331	1.6526	1.6979	1.7392	1.7777
	v	0.0193	1.2208		1.2460	1.3591	1.4811	1.5573	1.6673	1.7384	1.9108	2.077	2.239
380	h	418.6	1203.9		1211.9	1246.9	1283.9	1307.1	1341.0	1363.4	1418.5	1472.7	1527.3
(439.59)	s	0.6157	1.4891		1.4980	1.5355	1.5729	1.5951	1.6262	1.6460	1.6915	1.7329	1.7716
	v	0.0194	1.1601		1.1726	1.2828	1.4007	1.4740	1.5792	1.6472	1.8119	1.9704	2.125
400	h	424.2	1204.1		1208.3	1244.3	1282.1	1305.5	1339.7	1362.3	1417.7	1472.1	1526.8
(444.58)	s	0.6218	1.4843		1.4892	1.5276	1.5658	1.5884	1.6197	1.6396	1.6854	1.7270	1.7658
	v	0.0194	1.1047		1.1062	1.2132	1.3276	1.3982	1.4995	1.5648	1.7223	1.8740	2.021
420	h	429.6	1204.1		1204.6	1241.7	1280.2	1303.9	1338.4	1361.2	1416.9	1471.5	1526.4
(449.38)	s	0.6277	1.4798		1.4804	1.5201	1.5590	1.5818	1.6135	1.6335	1.6796	1.7213	1.7603
	v	0.0195	1.0540			1.1499	1.2612	1.3294	1.4270	1.4898	1.6411	1.7864	1.9273
440	h	434.8	1204.1			1239.0	1278.2	1302.3	1337.1	1360.0	1416.1	1470.9	1526.0
(454.01)	s	0.6334	1.4753			1.5127	1.5524	1.5756	1.6075	1.6276	1.6741	1.7159	1.7550
	v	0.0196	1.0077			1.0922	1.2005	1.2665	1.3608	1.4213	1.5670	1.7063	1.8414
460	h	439.9	1204.0			1236.2	1276.3	1300.6	1335.8	1358.9	1415.3	1470.3	1525.6
(458.48)	s	0.6388	1.4711			1.5055	1.5460	1.5695	1.6017	1.6220	1.6687	1.7107	1.7499
	v	0.0197	0.9653			1.0393	1.1448	1.2089	1.3002	1.3586	1.4990	1.6330	1.7627
480	h	444.9	1203.9			1233.4	1274.3	1299.0	1334.5	1357.7	1414.4	1469.7	1525.2
(462.80)	s	0.6441	1.4670			1.4984	1.5399	1.5636	1.5961	1.6166	1.6635	1.7057	1.7451
	v	0.0198	0.9261			0.9905	1.0937	1.1558	1.2444	1.3009	1.4365	1.5655	1.6903
500	h	449.7	1203.7			1230.5	1272.3	1297.3	1333.2	1356.6	1413.6	1469.1	1524.8
(466.99)	s	0.6493	1.4630			1.4915	1.5338	1.5579	1.5908	1.6113	1.6586	1.7009	1.7404
	v	0.0198	0.8899			0.9448	1.0461	1.1067	1.1927	1.2475	1.3786	1.5031	1.6233
520	h	454.4	1203.5			1227.5	1270.3	1295.6	1331.8	1355.4	1412.7	1468.5	1524.4
(471.05)	s	0.6543	1.4591			1.4847	1.5280	1.5524	1.5856	1.6063	1.6538	1.6964	1.7360
	v	0.0199	0.8562			0.9024	1.0021	1.0613	1.1449	1.1980	1.3249	1.4454	1.5614
540	h	459.0	1203.2			1224.4	1268.2	1293.9	1330.5	1354.2	1411.9	1467.9	1524.0
(474.99)	s	0.6592	1.4554			1.4780	1.5222	1.5470	1.5805	1.6014	1.6491	1.6919	1.7316
	v	0.0200	0.8247			0.8630	0.9612	1.0191	1.1005	1.1521	1.2751	1.3917	1.5038
560	h	463.6	1202.9			1221.2	1266.1	1292.2	1329.1	1353.0	1411.0	1467.3	1523.6
(478.82)	s	0.6639	1.4517			1.4714	1.5166	1.5417	1.5757	1.5966	1.6446	1.6877	1.7275

Abs. Press. Lb./Sq.In. (Sat.Temp.)		Sat. Water	Sat. Steam	Temperature—Degrees Fahrenheit									
				500°	550°	600°	650°	700°	740°	780°	800°	900°	1000°
	v	0.0201	0.7952	0.8264	0.9081	0.9798	1.0459	1.1093	1.1581	1.2053	1.2288	1.3419	1.4503
580	h	468.0	1202.5	1218.0	1256.9	1290.5	1321.7	1351.8	1375.5	1398.7	1410.2	1466.7	1523.2
(482.55)	s	0.6686	1.4482	1.4648	1.5041	1.5366	1.5653	1.5919	1.6120	1.6311	1.6403	1.6834	1.7234
	v	0.0202	0.7677	0.7922	0.8728	0.9431	1.0080	1.0694	1.1169	1.1628	1.1855	1.2953	1.4003
600	h	472.3	1202.1	1214.7	1254.6	1288.7	1320.2	1350.6	1374.4	1397.8	1409.3	1466.1	1522.8
(486.17)	s	0.6731	1.4447	1.4582	1.4986	1.5316	1.5607	1.5874	1.6076	1.6268	1.6360	1.6794	1.7196
	v	0.0202	0.7419	0.7594	0.8395	0.9086	0.9721	1.0320	1.0782	1.1229	1.1450	1.2518	1.3534
620	h	476.6	1201.7	1211.5	1252.2	1287.0	1318.8	1349.4	1373.4	1396.9	1408.5	1465.5	1522.4
(489.71)	s	0.6775	1.4413	1.4516	1.4932	1.5267	1.5561	1.5830	1.6034	1.6226	1.6319	1.6754	1.7158
	v	0.0203	0.7175	0.7287	0.8082	0.8763	0.9384	0.9970	1.0420	1.0856	1.1071	1.2111	1.3096
640	h	480.8	1201.2	1208.0	1249.8	1285.2	1317.3	1348.2	1372.3	1395.9	1407.6	1464.9	1522.0
(493.16)	s	0.6818	1.4380	1.4451	1.4878	1.5219	1.5516	1.5787	1.6016	1.6186	1.6279	1.6716	1.7121
	v	0.0204	0.6948	0.6998	0.7788	0.8460	0.9068	0.9640	1.0079	1.0505	1.0715	1.1728	1.2683
660	h	484.9	1200.8	1204.3	1247.4	1283.4	1315.9	1347.0	1371.2	1395.0	1406.7	1464.2	1521.6
(496.53)	s	0.6861	1.4348	1.4385	1.4825	1.5172	1.5472	1.5745	1.5951	1.6146	1.6240	1.6679	1.7086
	v	0.0205	0.6732	0.6727	0.7511	0.8174	0.8770	0.9331	0.9759	1.0175	1.0379	1.1368	1.2295
680	h	488.9	1200.2	1200.4	1244.9	1281.5	1314.4	1345.8	1370.2	1394.0	1405.8	1463.6	1521.2
(499.82)	s	0.6902	1.4316	1.4318	1.4772	1.5126	1.5429	1.5704	1.5912	1.6108	1.6202	1.6643	1.7051
	v	0.0206	0.6527		0.7251	0.7905	0.8490	0.9038	0.9457	0.9864	1.0063	1.1029	1.1929
700	h	492.9	1199.7		1242.4	1279.7	1312.9	1344.5	1369.1	1393.1	1404.9	1463.0	1520.8
(503.04)	s	0.6943	1.4285		1.4720	1.5080	1.5387	1.5665	1.5873	1.6070	1.6165	1.6608	1.7018
	v	0.0208	0.6063		0.6652	0.7289	0.7852	0.8373	0.8772	0.9158	0.9348	1.0254	1.1100
750	h	502.6	1198.3		1235.8	1275.0	1309.2	1341.4	1366.3	1390.7	1402.7	1461.5	1519.8
(510.80)	s	0.7041	1.4211		1.4591	1.4970	1.5285	1.5569	1.5780	1.5980	1.6076	1.6524	1.6938
	v	0.0209	0.5653		0.6128	0.6750	0.7293	0.7791	0.8172	0.8541	0.8723	0.9577	1.0374
800	h	511.8	1196.7		1228.8	1270.1	1305.4	1338.2	1363.5	1388.2	1400.4	1459.9	1518.8
(518.18)	s	0.7135	1.4139		1.4462	1.4862	1.5187	1.5477	1.5692	1.5894	1.5992	1.6446	1.6864
	v	0.0211	0.5292		0.5655	0.6271	0.6797	0.7278	0.7642	0.7996	0.8168	0.8981	0.9735
850	h	520.8	1195.0		1221.4	1265.0	1301.4	1335.0	1360.7	1385.7	1398.1	1458.3	1517.8
(525.21)	s	0.7224	1.4071		1.4335	1.4758	1.5093	1.5389	1.5607	1.5812	1.5911	1.6372	1.6794
	v	0.0213	0.4969		0.5234	0.5844	0.6356	0.6821	0.7171	0.7511	0.7675	0.8451	0.9166
900	h	529.5	1193.3		1213.6	1259.8	1297.4	1331.7	1357.8	1383.2	1395.8	1456.8	1516.8
(531.95)	s	0.7311	1.4005		1.4208	1.4656	1.5003	1.5304	1.5526	1.5734	1.5835	1.6301	1.6727
	v	0.0215	0.4679		0.4845	0.5458	0.5959	0.6410	0.6749	0.7076	0.7234	0.7975	0.8657
950	h	537.9	1191.5		1205.3	1254.3	1293.4	1328.3	1354.8	1380.7	1393.4	1455.2	1515.8
(538.40)	s	0.7394	1.3942		1.4079	1.4555	1.4914	1.5223	1.5448	1.5660	1.5761	1.6234	1.6663
	v	0.0217	0.4419		0.4495	0.5111	0.5602	0.6040	0.6369	0.6684	0.6837	0.7547	0.8199
1000	h	546.0	1189.6		1196.5	1248.7	1289.2	1324.9	1351.9	1378.1	1391.0	1453.6	1514.8
(544.58)	s	0.7473	1.3881		1.3949	1.4455	1.4829	1.5144	1.5373	1.5588	1.5691	1.6169	1.6603
	v	0.0222	0.3960			0.4500	0.4983	0.5401	0.5712	0.6009	0.6152	0.6810	0.7408
1100	h	561.7	1185.6			1236.6	1280.5	1317.9	1345.8	1372.8	1386.1	1450.4	1512.8
(556.28)	s	0.7624	1.3765			1.4257	1.4662	1.4993	1.5229	1.5450	1.5557	1.6048	1.6491
	v	0.0226	0.3582			0.3985	0.4462	0.4865	0.5162	0.5444	0.5578	0.6195	0.6750
1200	h	576.5	1181.4			1223.4	1271.3	1310.6	1339.5	1367.4	1381.1	1447.2	1510.8
(567.14)	s	0.7765	1.3656			1.4058	1.4501	1.4848	1.5092	1.5321	1.5431	1.5937	1.6388
	v	0.0230	0.3259			0.3537	0.4018	0.4412	0.4699	0.4966	0.5095	0.5675	0.6190
1300	h	590.6	1177.0			1208.7	1261.6	1303.0	1333.0	1361.8	1376.0	1444.0	1508.8
(577.32)	s	0.7897	1.3552			1.3855	1.4343	1.4709	1.4962	1.5199	1.5312	1.5832	1.6292
	v	0.0235	0.2983			0.3144	0.3634	0.4021	0.4299	0.4556	0.4678	0.5229	0.5712
1400	h	604.3	1172.4			1192.4	1251.2	1295.2	1326.3	1356.1	1370.8	1440.8	1506.9
(586.96)	s	0.8024	1.3452			1.3643	1.4187	1.4574	1.4837	1.5082	1.5199	1.5736	1.6204
	v	0.0239	0.2741			0.2789	0.3298	0.3682	0.3951	0.4200	0.4318	0.4840	0.5298
1500	h	617.5	1167.6			1174.3	1240.2	1287.1	1319.4	1350.2	1365.4	1437.6	1504.9
(596.08)	s	0.8146	1.3357			1.3420	1.4029	1.4442	1.4716	1.4969	1.5091	1.5642	1.6120
	v	0.0244	0.2528				0.2999	0.3384	0.3646	0.3888	0.4002	0.4503	0.4935
1600	h	630.2	1162.7				1228.3	1278.6	1312.3	1344.2	1360.0	1434.3	1502.9
(604.74)	s	0.8262	1.3265				1.3870	1.4313	1.4599	1.4860	1.4986	1.5555	1.6042
	v	0.0249	0.2338				0.2730	0.3119	0.3376	0.3612	0.3721	0.4204	0.4616
1700	h	642.5	1157.5				1215.5	1269.8	1305.1	1338.0	1354.4	1431.1	1500.8
(612.98)	s	0.8373	1.3174				1.3706	1.4185	1.4484	1.4755	1.4885	1.5472	1.5968

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Abs. Press. Lb./Sq.In. (Sat.Temp.)		Sat. Water	Sat. Steam	Temperature—Degrees Fahrenheit 650°	700°	750°	800°	820°	840°	860°	880°	900°	1000°
	v	0.0254	0.2167	0.2483	0.2880	0.3195	0.3472	0.3573	0.3669	0.3762	0.3851	0.3938	0.4330
1800	h	654.7	1151.8	1201.5	1260.6	1306.2	1348.7	1365.2	1381.5	1397.3	1412.7	1427.8	1498.8
(620.86)	s	0.8482	1.3083	1.3537	1.4058	1.4444	1.4787	1.4917	1.5044	1.5164	1.5280	1.5392	1.5897
	v	0.0260	0.2014	0.2257	0.2665	0.2977	0.3248	0.3347	0.3441	0.3531	0.3618	0.3700	0.4076
1900	h	666.8	1145.7	1186.0	1250.9	1298.9	1342.9	1360.0	1376.8	1393.1	1409.0	1424.5	1496.7
(628.39)	s	0.8589	1.2990	1.3358	1.3931	1.4336	1.4692	1.4826	1.4957	1.5081	1.5201	1.5316	1.5830
	v	0.0265	0.1875	0.2044	0.2468	0.2781	0.3047	0.3143	0.3235	0.3322	0.3406	0.3486	0.3847
2000	h	679.0	1139.0	1168.9	1240.7	1291.4	1337.0	1354.6	1372.0	1388.8	1405.2	1421.1	1494.7
(635.61)	s	0.8696	1.2896	1.3168	1.3802	1.4230	1.4599	1.4738	1.4873	1.5001	1.5124	1.5242	1.5765
	v	0.0271	0.1744	0.1840	0.2287	0.2603	0.2862	0.2957	0.3047	0.3132	0.3214	0.3292	0.3639
2100	h	691.3	1131.7	1149.4	1229.9	1283.7	1331.0	1349.2	1367.1	1384.5	1401.3	1417.7	1492.5
(642.56)	s	0.8804	1.2800	1.2960	1.3671	1.4125	1.4508	1.4652	1.4791	1.4923	1.5049	1.5171	1.5703
	v	0.0277	0.1623	0.1634	0.2120	0.2438	0.2696	0.2788	0.2877	0.2960	0.3040	0.3115	0.3451
2200	h	703.7	1123.8	1125.8	1218.4	1275.7	1324.8	1343.7	1362.2	1380.1	1397.4	1414.2	1490.4
(649.25)	s	0.8912	1.2700	1.2719	1.3536	1.4021	1.4418	1.4567	1.4711	1.4847	1.4977	1.5102	1.5644
	v	0.0284	0.1510		0.1963	0.2287	0.2543	0.2634	0.2720	0.2802	0.2880	0.2954	0.3279
2300	h	716.4	1115.2		1206.1	1267.6	1318.6	1338.1	1357.2	1375.6	1393.4	1410.7	1488.2
(655.70)	s	0.9021	1.2596		0.3397	1.3917	1.4331	1.4484	1.4632	1.4773	1.4906	1.5035	1.5586
	v	0.0292	0.1404		0.1816	0.2148	0.2401	0.2492	0.2576	0.2658	0.2734	0.2805	0.3121
2400	h	729.4	1105.8		1192.8	1259.1	1312.3	1332.4	1352.1	1371.1	1389.4	1407.1	1486.1
(661.94)	s	0.9133	1.2488		1.3253	1.3813	1.4244	1.4403	1.4555	1.4700	1.4838	1.4969	1.5531
	v	0.0301	0.1303		0.1676	0.2019	0.2272	0.2361	0.2444	0.2524	0.2598	0.2668	0.2976
2500	h	742.8	1095.6		1178.4	1250.2	1305.8	1326.6	1347.0	1366.5	1385.3	1403.5	1483.9
(667.98)	s	0.9247	1.2375		1.3101	1.3708	1.4158	1.4322	1.4480	1.4629	1.4770	1.4905	1.5477
	v	0.0310	0.1205		0.1540	0.1896	0.2151	0.2239	0.2322	0.2400	0.2473	0.2542	0.2842
2600	h	756.7	1084.5		1162.5	1241.0	1299.2	1320.8	1341.7	1361.8	1381.1	1399.8	1481.7
(673.82)	s	0.9364	1.2257		1.2938	1.3602	1.4074	1.4243	1.4406	1.4559	1.4704	1.4842	1.5426
	v	0.0321	0.1111		0.1408	0.1783	0.2039	0.2126	0.2208	0.2285	0.2357	0.2425	0.2719
2700	h	771.2	1072.4		1144.6	1231.4	1292.5	1314.8	1336.3	1357.0	1376.9	1396.0	1479.5
(679.46)	s	0.9487	1.2131		1.2760	1.3494	1.3989	1.4165	1.4332	1.4490	1.4639	1.4781	1.5375
	v	0.0333	0.1021		0.1275	0.1674	0.1934	0.2021	0.2102	0.2178	0.2249	0.2315	0.2603
2800	h	786.7	1058.9		1123.8	1221.3	1285.5	1308.6	1330.9	1352.2	1372.5	1392.1	1477.3
(684.91)	s	0.9618	1.1996		1.2559	1.3384	1.3905	1.4087	1.4260	1.4422	1.4575	1.4720	1.5326
	v	0.0348	0.0933		0.1141	0.1573	0.1834	0.1921	0.2002	0.2078	0.2148	0.2213	0.2495
2900	h	803.6	1043.7		1098.7	1210.6	1278.4	1302.4	1325.3	1347.2	1368.1	1388.2	1475.1
(690.17)	s	0.9760	1.1847		1.2323	1.3271	1.3821	1.4010	1.4188	1.4355	1.4512	1.4661	1.5279
	v	0.0367	0.0844		0.0983	0.1476	0.1742	0.1829	0.1909	0.1984	0.2053	0.2118	0.2396
3000	h	823.1	1025.6		1066.3	1199.3	1271.1	1296.0	1319.7	1342.2	1363.7	1384.3	1472.9
(695.25)	s	0.9922	1.1676		1.2028	1.3155	1.3737	1.3932	1.4116	1.4288	1.4450	1.4602	1.5233
	v	0.0395	0.0743			0.1383	0.1655	0.1743	0.1823	0.1896	0.1964	0.2029	0.2303
3100	h	847.2	1002.2			1187.3	1263.6	1289.5	1313.9	1337.1	1359.1	1380.2	1470.7
(700.17)	s	1.0126	1.1462			1.3034	1.3652	1.3856	1.4046	1.4222	1.4388	1.4544	1.5188
	v	0.0459	0.0601			0.1293	0.1572	0.1660	0.1740	0.1814	0.1881	0.1945	0.2214
3200	h	887.0	962.9			1174.5	1255.9	1282.8	1308.1	1331.9	1354.5	1376.1	1468.4
(704.91)	s	1.0461	1.1112			1.2907	1.3567	1.3779	1.3975	1.4157	1.4327	1.4487	1.5144
	v	0.0522	0.0522			0.1271	0.1552	0.1640	0.1720	0.1793	0.1860	0.1924	0.2192
3226	h	925.0	925.0			1171.2	1253.8	1281.0	1306.5	1330.6	1353.3	1375.0	1467.8
(706.10)	s	1.0785	1.0785			1.2874	1.3545	1.3759	1.3957	1.4140	1.4311	1.4472	1.5133
	v					0.1207	0.1495	0.1583	0.1663	0.1735	0.1803	0.1865	0.2132
3300	h					1160.8	1247.9	1275.9	1302.1	1326.6	1349.8	1371.9	1466.2
	s					1.2775	1.3481	1.3702	1.3905	1.4092	1.4266	1.4430	1.5101
	v					0.1123	0.1420	0.1510	0.1589	0.1661	0.1728	0.1791	0.2055
3400	h					1146.0	1239.7	1268.9	1296.0	1321.3	1345.0	1367.6	1463.9
	s					1.2634	1.3395	1.3624	1.3835	1.4028	1.4206	1.4374	1.5059
	v					0.1042	0.1349	0.1439	0.1518	0.1591	0.1658	0.1720	0.1981
3500	h					1129.7	1231.2	1261.7	1289.8	1315.8	1340.2	1363.3	1461.6
	s					1.2484	1.3307	1.3547	1.3765	1.3964	1.4146	1.4318	1.5017

Properties of Saturated Ammonia[1]

Temp.	Pressure		Volume		Density		Heat Content Above −40°			Entropy From −40°	
°F. t	Abs. lb./in.² p	Gauge lb./in.² p_d	Liquid ft.³/lb. v_f	Vapor ft.³/lb. v_g	Liquid lb./ft.³ $1/v_f$	Vapor lb./ft.³ $1/v_g$	Liquid Btu./lb. h_f	Latent Btu./lb. h	Vapor Btu./lb. h_g	Liquid Btu./lb.°F. s_f	Vapor Btu./lb.°F. s_g
−60	5.55	18.6*	0.02278	44.73	43.91	0.02235	−21.2	610.8	589.6	−0.0517	1.4769
−59	5.74	18.2*	.02280	43.37	43.87	.02306	−20.1	610.1	590.0	− .0490	1.4741
−58	5.93	17.8*	.02282	42.05	43.83	.02378	−19.1	609.5	590.4	− .0464	1.4713
−57	6.13	17.4*	.02284	40.79	43.78	.02452	−18.0	608.8	590.8	− .0438	1.4686
−56	6.33	17.0*	.02286	39.56	43.74	.02528	−17.0	608.2	591.2	− .0412	1.4658
−55	6.54	10.6*	0.02288	38.38	43.70	0.02605	−15.9	607.5	591.6	−0.0386	1.4631
−54	6.75	16.2*	.02291	37.24	43.66	.02685	−14.8	606.9	592.1	− .0360	1.4604
−53	6.97	15.7*	.02293	36.15	43.62	.02766	−13.8	606.2	592.4	− .0334	1.4577
−52	7.20	15.3*	.02295	35.09	43.58	.02850	−12.7	605.6	592.9	− .0307	1.4551
−51	7.43	14.8*	.02297	34.06	43.54	.02936	−11.7	604.9	593.2	− .0281	1.4524
−50	7.67	14.3*	0.02299	33.08	43.49	0.03023	−10.6	604.3	593.7	−0.0256	1.4497
−49	7.91	13.8*	.02301	32.12	43.45	.03113	−9.6	603.6	594.0	− .0230	1.4471
−48	8.16	13.3*	.02304	31.20	43.41	.03205	−8.5	602.9	594.4	− .0204	1.4445
−47	8.42	12.8*	.02306	30.31	43.37	.03299	−7.4	602.3	594.9	− .0179	1.4419
−46	8.68	12.2*	.02308	29.45	43.33	.03395	−6.4	601.6	595.2	− .0153	1.4393
−45	8.95	11.7*	0.02310	28.62	43.28	0.03494	−5.3	600.9	595.6	−0.0127	1.4368
−44	9.23	11.1*	.02313	27.82	43.24	.03595	−4.3	600.3	596.0	− .0102	1.4342
−43	9.51	10.6*	.02315	27.04	43.20	.03698	−3.2	599.6	596.4	− .0076	1.4317
−42	9.81	10.0*	.02317	26.29	43.16	.03804	−2.1	598.9	596.8	− .0051	1.4292
−41	10.10	9.3*	.02319	25.56	43.12	.03912	−1.1	598.3	597.2	− .0025	1.4267
−40	10.41	8.7*	0.02322	24.86	43.08	0.04022	0.0	597.6	597.6	0.0000	1.4242
−39	10.72	8.1*	.02324	24.18	43.03	.04135	1.1	596.9	598.0	.0025	1.4217
−38	11.04	7.4*	.02326	23.53	42.99	.04251	2.1	596.2	598.3	.0051	1.4193
−37	11.37	6.8*	.02328	22.89	42.95	.04369	3.2	595.5	598.7	.0076	1.4169
−36	11.71	6.1*	.02331	22.27	42.91	.04489	4.3	594.8	599.1	.0101	1.4144
−35	12.05	5.4*	0.02333	21.68	42.86	0.04613	5.3	594.2	599.5	0.0126	1.4120
−34	12.41	4.7*	.02335	21.10	42.82	.04739	6.4	593.5	599.9	.0151	1.4096
−33	12.77	3.9*	.02338	20.54	42.78	.04868	7.4	592.8	600.2	.0176	1.4072
−32	13.14	3.2*	.02340	20.00	42.74	.04999	8.5	592.1	600.6	.0201	1.4048
−31	13.52	2.4*	.02342	19.48	42.69	.05134	9.6	591.4	601.0	.0226	1.4025
−30	13.90	1.6*	0.02345	18.97	42.65	0.05271	10.7	590.7	601.4	0.0250	1.4001
−29	14.30	0.8*	.02347	18.48	42.61	.05411	11.7	590.0	601.7	.0275	1.3978
−28	14.71	0.0	.02349	18.00	42.57	.05555	12.8	589.3	602.1	.0300	1.3955
−27	15.12	0.4	.02352	17.54	42.52	.05701	13.9	588.6	602.5	.0325	1.3932
−26	15.55	0.8	.02354	17.09	42.48	.05850	14.9	587.9	602.8	.0350	1.3909
−25	15.98	1.3	0.02357	16.66	42.44	0.06003	16.0	587.2	603.2	0.0374	1.3886
−24	16.42	1.7	.02359	16.24	42.39	.06158	17.1	586.5	603.6	.0399	1.3863
−23	16.88	2.2	.02361	15.83	42.35	.06317	18.1	585.8	603.9	.0423	1.3840
−22	17.34	2.6	.02364	15.43	42.31	.06479	19.2	585.1	604.3	.0448	1.3818
−21	17.81	3.1	.02366	15.05	42.26	.06644	20.3	584.3	604.6	.0472	1.3796
−20	18.30	3.6	0.02369	14.68	42.22	0.06813	21.4	583.6	605.0	0.0497	1.3774
−19	18.79	4.1	.02371	14.32	42.18	.06985	22.4	582.9	605.3	.0521	1.3752
−18	19.30	4.6	.02374	13.97	42.13	.07161	23.5	582.2	605.7	.0545	1.3729
−17	19.81	5.1	.02376	13.62	42.09	.07340	24.6	581.5	606.1	.0570	1.3708
−16	20.34	5.6	.02378	13.29	42.05	.07522	25.6	580.8	606.4	.0594	1.3686
−15	20.88	6.2	0.02381	12.97	42.00	0.07709	26.7	580.0	606.7	0.0618	1.3664
−14	21.43	6.7	.02383	12.66	41.96	.07898	27.8	579.3	607.1	.0642	1.3643
−13	21.99	7.3	.02386	12.36	41.91	.08092	28.9	578.6	607.5	.0666	1.3621
−12	22.56	7.9	.02388	12.06	41.87	.08289	30.0	577.8	607.8	.0690	1.3600
−11	23.15	8.5	.02391	11.78	41.83	.08490	31.0	577.1	608.1	.0714	1.3579
−10	23.74	9.0	0.02393	11.50	41.78	0.08695	32.1	576.4	608.5	0.0738	1.3558
−9	24.35	9.7	.02396	11.23	41.74	.08904	33.2	575.6	608.8	.0762	1.3537
−8	24.97	10.3	.02399	10.97	41.70	.09117	34.3	574.9	609.2	.0786	1.3516
−7	25.61	10.9	.02401	10.71	41.65	.09334	35.4	574.1	609.5	.0809	1.3495
−6	26.26	11.6	.02404	10.47	41.61	.09555	36.4	573.4	609.8	.0833	1.3474
−5	26.92	12.2	0.02406	10.23	41.56	0.09780	37.5	572.6	610.1	0.0857	1.3454
−4	27.59	12.9	.02409	9.991	41.52	.1001	38.6	571.9	610.5	.0880	1.3433
−3	28.28	13.6	.02411	9.763	41.47	.1024	39.7	571.1	610.8	.0904	1.3413
−2	28.98	14.3	.02414	9.541	41.43	.1048	40.7	570.4	611.1	.0928	1.3393
−1	29.69	15.0	.02417	9.326	41.38	.1072	41.8	569.6	611.4	.0951	1.3372

*Inches of mercury below one standard atmosphere (29.92 in. = 14.696 lbs. abs.).

[1]Reprinted from Refrigerating Data Book — American Society of Refrigerating Engineers Data from Bureau of Standards Circular No. 142.

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Temp.	Pressure		Volume		Density		Heat Content Above −40°			Entropy From −40°	
°F. t	Abs. lb./in.² p	Gauge lb./in.² p_d	Liquid ft.³/lb. v_f	Vapor ft.³/lb. v_g	Liquid lb./ft.³ $1/v_f$	Vapor lb./ft.³ $1/v_g$	Liquid Btu./lb. h_f	Latent Btu./lb. h	Vapor Btu./lb. h_g	Liquid Btu./lb.°F. s_f	Vapor Btu./lb.°F. s_g
0	30.42	15.7	0.02419	9.116	41.34	0.1097	42.9	568.9	611.8	0.0975	1.3352
1	31.16	16.5	.02422	8.912	41.29	.1122	44.0	568.1	612.1	.0998	1.3332
2	31.92	17.2	.02424	8.714	41.25	.1148	45.1	567.3	612.4	.1022	1.3312
3	32.69	18.0	.02427	8.521	41.20	.1174	46.2	566.5	612.7	.1045	1.3292
4	33.47	18.8	.02430	8.333	41.16	.1200	47.2	565.8	613.0	.1069	1.3273
5*	34.27	19.6	0.02432	8.150	41.11	0.1227	48.3	565.0	613.3	0.1092	1.3253
6	35.09	20.4	.02435	7.971	41.07	.1254	49.4	564.2	613.6	.1115	1.3234
7	35.92	21.2	.02438	7.798	41.02	.1282	50.5	563.4	613.9	.1138	1.3214
8	36.77	22.1	.02440	7.629	40.98	.1311	51.6	562.7	614.3	.1162	1.3195
9	37.63	22.9	.02443	7.464	40.93	.1340	52.7	561.9	614.6	.1185	1.3176
10	38.51	23.8	0.02446	7.304	40.89	0.1369	53.8	561.1	614.9	0.1208	1.3157
11	39.40	24.7	.02449	7.148	40.84	.1399	54.9	560.3	615.2	.1231	1.3137
12	40.31	25.6	.02451	6.996	40.79	.1429	56.0	559.5	615.5	.1254	1.3118
13	41.24	26.5	.02454	6.847	40.75	.1460	57.1	558.7	615.8	.1277	1.3099
14	42.18	27.5	.02457	6.703	40.70	.1492	58.2	557.9	616.1	.1300	1.3081
15	43.14	28.4	0.02460	6.562	40.66	0.1524	59.2	557.1	616.3	0.1323	1.3062
16	44.12	29.4	.02462	6.425	40.61	.1556	60.3	556.3	616.6	.1346	1.3043
17	45.12	30.4	.02465	6.291	40.56	.1590	61.4	555.5	616.9	.1369	1.3025
18	46.13	31.4	.02468	6.161	40.52	.1623	62.5	554.7	617.2	.1392	1.3006
19	47.16	32.5	.02471	6.034	40.47	.1657	63.6	553.9	617.5	.1415	1.2988
20	48.21	33.5	0.02474	5.910	40.43	0.1692	64.7	553.1	617.8	0.1437	1.2969
21	49.28	34.6	.02476	5.789	40.38	.1728	65.8	552.2	618.0	.1460	1.2951
22	50.36	35.7	.02479	5.671	40.34	.1763	66.9	551.4	618.3	.1483	1.2933
23	51.47	36.8	.02482	5.556	40.29	.1800	68.0	550.6	618.6	.1505	1.2915
24	52.59	37.9	.02485	5.443	40.24	.1837	69.1	549.8	618.9	.1528	1.2897
25	53.73	39.0	0.02488	5.334	40.20	0.1875	70.2	548.9	619.1	0.1551	1.2879
26	54.90	40.2	.02491	5.227	40.15	.1913	71.3	548.1	619.4	.1573	1.2861
27	56.08	41.4	.02494	5.123	40.10	.1952	72.4	547.3	619.7	.1596	1.2843
28	57.28	42.6	.02497	5.021	40.05	.1992	73.5	546.4	619.9	.1618	1.2825
29	58.50	43.8	.02500	4.922	40.01	.2032	74.6	545.6	620.2	.1641	1.2808
30	59.74	45.0	0.02503	4.825	39.96	0.2073	75.7	544.8	620.5	0.1663	1.2790
31	61.00	46.3	.02505	4.730	39.91	.2114	76.8	543.9	620.7	.1686	1.2773
32	62.29	47.6	.02508	4.637	39.87	.2156	77.9	543.1	621.0	.1708	1.2755
33	63.59	48.9	.02511	4.547	39.82	.2199	79.0	542.2	621.2	.1730	1.2738
34	64.91	50.2	.02514	4.459	39.77	.2243	80.1	541.4	621.5	.1753	1.2721
35	66.26	51.6	0.02518	4.373	39.72	0.2287	81.2	540.5	621.7	0.1775	1.2704
36	67.63	52.9	.02521	4.289	39.68	.2332	82.3	539.7	622.0	.1797	1.2686
37	69.02	54.3	.02524	4.207	39.63	.2377	83.4	538.8	622.2	.1819	1.2669
38	70.43	55.7	.02527	4.126	39.58	.2423	84.6	537.9	622.5	.1841	1.2652
39	71.87	57.2	.02530	4.048	39.53	.2470	85.7	537.0	622.7	.1863	1.2635
40	73.32	58.6	0.02533	3.971	39.49	0.2518	86.8	536.2	623.0	0.1885	1.2618
41	74.80	60.1	.02536	3.897	39.44	.2566	87.9	535.3	623.2	.1908	1.2602
42	76.31	61.6	.02539	3.823	39.39	.2616	89.0	534.4	623.4	.1930	1.2585
43	77.83	63.1	.02542	3.752	39.34	.2665	90.1	533.6	623.7	.1952	1.2568
44	79.38	64.7	.02545	3.682	39.29	.2716	91.2	532.7	623.9	.1974	1.2552
45	80.96	66.3	0.02548	3.614	39.24	0.2767	92.3	531.8	624.1	0.1996	1.2535
46	82.55	67.9	.02551	3.547	39.19	.2819	93.5	530.9	624.4	.2018	1.2519
47	84.18	69.5	.02555	3.481	39.15	.2872	94.6	530.0	624.6	.2040	1.2502
48	85.82	71.1	.02558	3.418	39.10	.2926	95.7	529.1	624.8	.2062	1.2486
49	87.49	72.8	.02561	3.355	39.05	.2981	96.8	528.2	625.0	.2083	1.2469
50	89.19	74.5	0.02564	3.294	39.00	0.3036	97.9	527.3	625.2	0.2105	1.2453
51	90.91	76.2	.02568	3.234	38.95	.3092	99.1	526.4	625.5	.2127	1.2437
52	92.66	78.0	.02571	3.176	38.90	.3149	100.2	525.5	625.7	.2149	1.2421
53	94.43	79.7	.02574	3.119	38.85	.3207	101.3	524.6	625.9	.2171	1.2405
54	96.23	81.5	.02577	3.063	38.80	.3265	102.4	523.7	626.1	.2192	1.2389
55	98.06	83.4	0.02581	3.008	38.75	0.3325	103.5	522.8	626.3	0.2214	1.2373
56	99.91	85.2	.02584	2.954	38.70	.3385	104.7	521.8	626.5	.2236	1.2357
57	101.8	87.1	.02587	2.902	38.65	.3446	105.8	520.9	626.7	.2257	1.2341
58	103.7	89.0	.02590	2.851	38.60	.3508	106.9	520.0	626.9	.2279	1.2325
59	105.6	90.9	.02594	2.800	38.55	.3571	108.1	519.0	627.1	.2301	1.2310
60	107.6	92.9	0.02597	2.751	38.50	0.3635	109.2	518.1	627.3	0.2322	1.2294
61	109.6	94.9	.02601	2.703	38.45	.3700	110.3	517.2	627.5	.2344	1.2278
62	111.6	96.9	.02604	2.656	38.40	.3765	111.5	516.2	627.7	.2365	1.2262
63	113.6	98.9	.02608	2.610	38.35	.3832	112.6	515.3	627.9	.2387	1.2247
64	115.7	101.0	.02611	2.565	38.30	.3899	113.7	514.3	628.0	.2408	1.2231

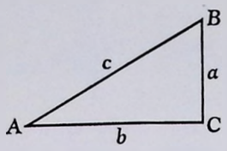
*Standard ton temperatures.

Temp.	Pressure		Volume		Density		Heat Content Above −40°			Entropy From −40°	
°F. t	Abs. lb./in.² p	Gauge lb./in.² p_d	Liquid ft.³/lb. v_f	Vapor ft.³/lb. v_g	Liquid lb./ft.³ $1/v_f$	Vapor lb./ft.³ $1/v_g$	Liquid Btu./lb. h_f	Latent Btu./lb. h	Vapor Btu./lb. h_g	Liquid Btu./lb.°F s_f	Vapor Btu./lb.°F s_g
65	117.8	103.1	0.02614	2.520	38.25	0.3968	114.8	513.4	628.2	0.2430	1.2216
66	120.0	105.3	.02618	2.477	38.20	.4037	116.0	512.4	628.4	.2451	1.2201
67	122.1	107.4	.02621	2.435	38.15	.4108	117.1	511.5	628.6	.2473	1.2186
68	124.3	109.6	.02625	2.393	38.10	.4179	118.3	510.5	628.8	.2494	1.2170
69	126.5	111.8	.02628	2.352	38.05	.4251	119.4	509.5	628.9	.2515	1.2155
70	128.8	114.1	0.02632	2.312	38.00	0.4325	120.5	508.6	629.1	0.2537	1.2140
71	131.1	116.4	.02635	2.273	37.95	.4399	121.7	507.6	629.3	.2558	1.2125
72	133.4	118.7	.02639	2.235	37.90	.4474	122.8	506.6	629.4	.2579	1.2110
73	135.7	121.0	.02643	2.197	37.84	.4551	124.0	505.6	629.6	.2601	1.2095
74	138.1	123.4	.02646	2.161	37.79	.4628	125.1	504.7	629.8	.2622	1.2080
75	140.5	125.8	0.02650	2.125	37.74	0.4707	126.2	503.7	629.9	0.2643	1.2065
76	143.0	128.3	.02653	2.089	37.67	.4786	127.4	502.7	630.1	.2664	1.2050
77	145.4	130.7	.02657	2.055	37.64	.4867	128.5	501.7	630.2	.2685	1.2035
78	147.9	133.2	.02661	2.021	37.59	.4949	129.7	500.7	630.4	.2706	1.2020
79	150.5	135.8	.02664	1.988	37.53	.5031	130.8	499.7	630.5	.2728	1.2006
80	153.0	138.3	0.02668	1.955	37.48	0.5115	132.0	498.7	630.7	0.2749	1.1991
81	155.6	140.9	.02672	1.923	37.43	.5200	133.1	497.7	630.8	.2769	1.1976
82	158.3	143.6	.02675	1.892	37.37	.5287	134.3	496.7	631.0	.2791	1.1962
83	161.0	146.3	.02679	1.861	37.33	.5374	135.4	495.7	631.1	.2812	1.1947
84	163.7	149.0	.02684	1.831	37.27	.5462	136.6	494.7	631.3	.2833	1.1933
85	166.4	151.7	0.02687	1.801	37.21	0.5552	137.8	493.6	631.4	0.2854	1.1918
86	169.2	154.5	.02691	1.772	37.16	.5643	138.9	492.6	631.5	.2875	1.1904
87	172.0	157.3	.02695	1.744	37.11	.5735	140.1	491.6	631.7	.2895	1.1889
88	174.8	160.1	.02699	1.716	37.05	.5828	141.2	490.6	631.8	.2917	1.1875
89	177.7	163.0	.02703	1.688	37.00	.5923	142.4	489.5	631.9	.2937	1.1860
90	180.6	165.9	0.02707	1.661	36.95	0.6019	143.5	488.5	632.0	0.2958	1.1846
91	183.6	168.9	.02711	1.635	36.90	.6116	144.7	487.4	632.1	.2979	1.1832
92	186.6	171.9	.02715	1.609	36.85	.6214	145.8	486.4	632.2	.3000	1.1818
93	189.6	174.9	.02719	1.584	36.80	.6314	147.0	485.3	632.3	.3021	1.1804
94	192.7	178.0	.02723	1.559	36.74	.6415	148.2	484.3	632.5	.3041	1.1789
95	195.8	181.1	0.02727	1.534	36.67	0.6517	149.4	483.2	632.6	0.3062	1.1775
96	198.9	184.2	.02731	1.510	36.62	.6620	150.5	482.1	632.6	.3083	1.1761
97	202.1	187.4	.02735	1.487	36.56	.6725	151.7	481.1	632.8	.3104	1.1747
98	205.3	190.6	.02739	1.464	36.51	.6832	152.9	480.0	632.9	.3125	1.1733
99	208.6	193.9	.02743	1.441	36.45	.6939	154.0	478.9	632.9	.3145	1.1719
100	211.9	197.2	0.02747	1.419	36.40	0.7048	155.2	477.8	633.0	0.3166	1.1705
101	215.2	200.5	.02752	1.397	36.34	.7159	156.4	476.7	633.1	.3187	1.1691
102	218.6	203.9	.02756	1.375	36.29	.7270	157.6	475.6	633.2	.3207	1.1677
103	222.0	207.3	.02760	1.354	36.23	.7384	158.7	474.6	633.3	.3228	1.1663
104	225.4	210.7	.02764	1.334	36.18	.7498	159.9	473.5	633.4	.3248	1.1649
105	228.9	214.2	0.02769	1.313	36.12	0.7615	161.1	472.3	633.4	0.3269	1.1635
106	232.5	217.8	.02773	1.293	36.07	.7732	162.3	471.2	633.5	.3289	1.1621
107	236.0	221.3	.02777	1.274	36.01	.7852	163.5	470.1	633.6	.3310	1.1607
108	239.7	225.0	.02782	1.254	35.95	.7972	164.6	469.0	633.6	.3330	1.1593
109	243.3	228.6	.02786	1.235	35.89	.8095	165.8	467.9	633.7	.3351	1.1580
110	247.0	232.2	0.02790	1.217	35.84	0.8219	167.0	466.7	633.7	0.3372	1.1566
111	250.8	236.1	.02795	1.198	35.78	.8344	168.2	465.6	633.8	.3392	1.1552
112	254.5	239.8	.02799	1.180	35.72	.8471	169.4	464.4	633.8	.3413	1.1538
113	258.4	243.7	.02804	1.163	35.67	.8600	170.6	463.3	633.9	.3433	1.1524
114	262.2	247.5	.02808	1.145	35.51	.8730	171.8	462.1	633.9	.3453	1.1510
115	266.2	251.5	0.02813	1.128	35.55	0.8862	173.0	460.9	633.9	0.3474	1.1497
116	270.1	255.4	.02817	1.112	35.49	.8996	174.2	459.8	634.0	.3495	1.1483
117	274.1	259.4	.02822	1.095	35.43	.9132	175.4	458.6	634.0	.3515	1.1469
118	278.2	263.5	.02827	1.079	35.37	.9269	176.6	457.4	634.0	.3535	1.1455
119	282.3	267.6	.02832	1.063	35.32	.9408	177.8	456.2	634.0	.3556	1.1441
120	286.4	271.7	0.02836	1.047	35.26	0.9549	179.0	455.0	634.0	0.3576	1.1427
121	290.6	275.9	.02841	1.032	35.20	.9692	180.2	453.8	634.0	.3597	1.1414
122	294.8	280.1	.02846	1.017	35.14	.9837	181.4	452.6	634.0	.3618	1.1400
123	299.1	284.4	.02851	1.002	35.08	.9983	182.6	451.4	634.0	.3638	1.1386
124	303.4	288.7	.02855	0.987	35.02	1.0132	183.9	450.1	634.0	.3659	1.1372
125	307.8	293.1	0.02860	0.973	34.96	1.028	185.1	448.9	634.0	0.3679	1.1358
126	312.2	297.5	.02865	.958	34.90	1.043	186.3	447.6	633.9	.3700	1.1344
127	316.7	302.0	.02870	.944	34.84	1.059	187.5	446.4	633.9	.3720	1.1330
128	321.2	306.5	.02875	.931	34.78	1.075	188.8	445.1	633.9	.3741	1.1316
129	325.7	311.0	.02880	.917	34.72	1.091	190.1	443.8	633.9	.3762	1.1302

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Mensuration of Plane Figures

Right Triangle

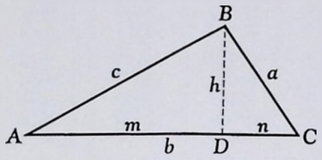


Angles $A + B = 90°$

$\sin A = \frac{a}{c}$ $\quad \cos A = \frac{b}{c}$ $\quad \tan A = \frac{a}{b}$

$a^2 + b^2 = c^2$ $\quad$ Area $= \frac{1}{2}ab$

Oblique Triangle



$\overline{AB} = c$ $\quad \overline{BC} = a$

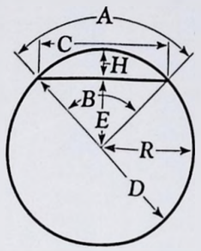
$\overline{AC} = b$ $\quad \overline{BD} = h$

$\overline{AD} = m$ $\quad \overline{DC} = n$

A, B and C are angles

Given	Required	Formulas
A,B,a	C,b,c	$C = 180° - A - B$; $b = \frac{a \sin B}{\sin A}$; $c = \frac{a \sin C}{\sin A}$
b,c,A	B,C,a	$\cos B = \frac{c^2 + a^2 - b^2}{2ac}$; $\cos C = \frac{a^2 + b^2 - c^2}{2ab}$ $a^2 = b^2 + c^2 - 2bc \cos A$; $h = c \sin A$ $m = c \cos A$; $n = b - m$; $a^2 = h^2 + n^2$
a,c,A	B,C,b	$\sin C = \sin A \times \frac{c}{a}$; $B = 180° - A - C$ $b = a \frac{\sin B}{\sin A}$ Note: In some cases two values for B, C and b are possible
a,b,c	A	$\sin \frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{b \times c}}$ $\cos \frac{A}{2} = \sqrt{\frac{s(s-a)}{b \times c}}$ $\quad s = \frac{1}{2}(a+b+c)$ $\tan \frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{s\,s-a)}}$
a,b,c	m,n	$m = \frac{c^2 + b^2 - a^2}{2b}$; $n = \frac{a^2 + b^2 - c^2}{2b}$

Circle

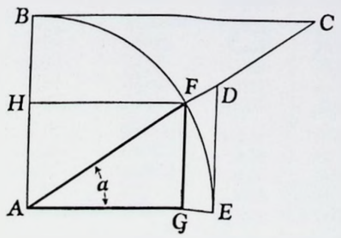


B = Angle in Degrees
A = Length of Arc

Circumference $= \pi D = 2\pi R$
Area $= \pi R^2$
$A = \frac{\pi RB}{180}$
$C = 2\sqrt{2HR - H^2} = 2R \sin \frac{B}{2}$

$H = R - \frac{1}{2}\sqrt{4R^2 - C^2} = 2R \sin^2 \frac{B}{4}$
$E = R - H$
Area of Sector $= \frac{1}{2}RA$
Area of Segment $= \frac{1}{2}RA - \frac{1}{2}EC$

Trigonometric Formulae



Radius $AE = 1$

$FG = \sin a$ $\quad BC = \cot a$
$AG = \cos a$ $\quad AD = \sec a$
$DE = \tan a$ $\quad AC = \csc a$

$\sin^2 a + \cos^2 a = 1$
$\tan a = \frac{\sin a}{\cos a}$
$\sec^2 a - \tan^2 a = 1$

$\sin a$		$\sqrt{1 - \cos^2 a}$	$\frac{\tan a}{\sqrt{1 + \tan^2 a}}$	$\frac{1}{\sqrt{1 + \cot^2 a}}$
$\cos a$	$\sqrt{1 - \sin^2 a}$		$\frac{1}{\sqrt{1 + \tan^2 a}}$	$\frac{\cot a}{\sqrt{1 + \cot^2 a}}$
$\tan a$	$\frac{\sin a}{\sqrt{1 - \sin^2 a}}$	$\frac{\sqrt{1 - \cos^2 a}}{\cos a}$		$\frac{1}{\cot a}$
$\cot a$	$\frac{\sqrt{1 - \sin^2 a}}{\sin a}$	$\frac{\cos a}{\sqrt{1 - \cos^2 a}}$	$\frac{1}{\tan a}$	

Circumferences and Areas of Circles

Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area
1/64	.04909	.00019	2	6.2832	3.1416	6	18.850	28.274	14	43.982	153.94	22	69.115	380.13
1/32	.09818	.00077	1/16	6.4795	3.3410	1/8	19.242	29.465	1/8	44.375	156.70	1/8	69.508	384.46
3/64	.14726	.00173	1/8	6.6759	3.5466	1/4	19.635	30.680	1/4	44.768	159.48	1/4	69.900	388.82
1/16	.19635	.00307	3/16	6.8722	3.7583	3/8	20.028	31.919	3/8	45.160	162.30	3/8	70.293	393.20
3/32	.29452	.00690	1/4	7.0686	3.9761	1/2	20.420	33.183	1/2	45.553	165.13	1/2	70.686	397.61
			5/16	7.2649	4.2000	5/8	20.813	34.472	5/8	45.946	167.99	5/8	71.079	402.04
1/8	.39270	.01227	3/8	7.4613	4.4301	3/4	21.206	35.785	3/4	46.338	170.87	3/4	71.471	406.49
5/32	.49087	.01917	7/16	7.6576	4.6664	7/8	21.598	37.122	7/8	46.731	173.78	7/8	71.864	410.97
3/16	.58905	.02761	1/2	7.8540	4.9087									
7/32	.68722	.03758	9/16	8.0503	5.1572	7	21.991	38.485	15	47.124	176.71	23	72.257	415.48
			5/8	8.2467	5.4119	1/8	22.384	39.871	1/8	47.517	179.67	1/8	72.649	420.00
1/4	.78540	.04909	11/16	8.4430	5.6727	1/4	22.776	41.282	1/4	47.909	182.65	1/4	73.042	424.56
9/32	.88357	.06213	3/4	8.6394	5.9396	3/8	23.169	42.718	3/8	48.302	185.66	3/8	73.435	429.13
5/16	.98175	.07670	13/16	8.8357	6.2126	1/2	23.562	44.179	1/2	48.695	188.69	1/2	73.827	433.74
11/32	1.0799	.09281	7/8	9.0321	6.4918	5/8	23.955	45.664	5/8	49.087	191.75	5/8	74.220	438.36
			15/16	9.2284	6.7771	3/4	24.347	47.173	3/4	49.480	194.83	3/4	74.613	443.01
3/8	1.1781	.11045				7/8	24.740	48.707	7/8	49.873	197.93	7/8	75.006	447.69
13/32	1.2763	.12962	3	9.4248	7.0686									
7/16	1.3744	.15033	1/16	9.6211	7.3662	8	25.133	50.265	16	50.265	201.06	24	75.398	452.39
15/32	1.4726	.17257	1/8	9.8175	7.6699	1/8	25.525	51.849	1/8	50.658	204.22	1/8	75.791	457.11
			3/16	10.014	7.9798	1/4	25.918	53.456	1/4	51.051	207.39	1/4	76.184	461.86
1/2	1.5708	.19635	1/4	10.210	8.2958	3/8	26.311	55.088	3/8	51.444	210.60	3/8	76.576	466.64
17/32	1.6690	.22166	5/16	10.407	8.6179	1/2	26.704	56.745	1/2	51.836	213.82	1/2	76.969	471.44
9/16	1.7671	.24850	3/8	10.603	8.9462	5/8	27.096	58.426	5/8	52.229	217.08	5/8	77.362	476.26
19/32	1.8653	.27688	7/16	10.799	9.2806	3/4	27.489	60.132	3/4	52.622	220.35	3/4	77.754	481.11
			1/2	10.996	9.6211	7/8	27.882	61.862	7/8	53.014	223.65	7/8	78.147	485.98
5/8	1.9635	.30680	9/16	11.192	9.9678									
21/32	2.0617	.33824	5/8	11.388	10.321	9	28.274	63.617	17	53.407	226.98	25	78.540	490.87
11/16	2.1598	.37122	11/16	11.585	10.680	1/8	28.667	65.397	1/8	53.800	230.33	1/8	78.933	495.79
23/32	2.2580	.40574	3/4	11.781	11.045	1/4	29.060	67.201	1/4	54.192	233.71	1/4	79.325	500.74
			13/16	11.977	11.416	3/8	29.452	69.029	3/8	54.585	237.10	3/8	79.718	505.71
3/4	2.3562	.44179	7/8	12.174	11.793	1/2	29.845	70.882	1/2	54.978	240.53	1/2	80.111	510.71
25/32	2.4544	.47937	15/16	12.370	12.177	5/8	30.238	72.760	5/8	55.371	243.98	5/8	80.503	515.72
13/16	2.5525	.51849				3/4	30.631	74.662	3/4	55.763	247.45	3/4	80.896	520.77
27/32	2.6507	.55914	4	12.566	12.566	7/8	31.023	76.589	7/8	56.156	250.95	7/8	81.289	525.84
			1/16	12.763	12.962									
7/8	2.7489	.60132	1/8	12.959	13.364	10	31.416	78.540	18	56.549	254.47	26	81.681	530.93
29/32	2.8471	.64504	3/16	13.155	13.772	1/8	31.809	80.516	1/8	56.941	258.02	1/8	82.074	536.05
15/16	2.9452	.69029	1/4	13.352	14.186	1/4	32.201	82.516	1/4	57.334	261.59	1/4	82.467	541.19
31/32	3.0434	.73708	5/16	13.548	14.607	3/8	32.594	84.541	3/8	57.727	265.18	3/8	82.860	546.35
			3/8	13.744	15.033	1/2	32.987	86.590	1/2	58.119	268.80	1/2	83.252	551.55
1	3.1416	.7854	7/16	13.941	15.466	5/8	33.379	88.664	5/8	58.512	272.45	5/8	83.645	556.76
1/16	3.3379	.8866	1/2	14.137	15.904	3/4	33.772	90.763	3/4	58.905	276.12	3/4	84.038	562.00
1/8	3.5343	.9940	9/16	14.334	16.349	7/8	34.165	92.886	7/8	59.298	279.81	7/8	84.430	567.27
3/16	3.7306	1.1075	5/8	14.530	16.800									
			11/16	14.726	17.257	11	34.558	95.033	19	59.690	283.53	27	84.823	572.56
1/4	3.9270	1.2272	3/4	14.923	17.721	1/8	34.950	97.205	1/8	60.083	287.27	1/8	85.216	577.87
5/16	4.1233	1.3530	13/16	15.119	18.190	1/4	35.343	99.402	1/4	60.476	291.04	1/4	85.608	583.21
3/8	4.3197	1.4849	7/8	15.315	18.665	3/8	35.736	101.62	3/8	60.868	294.83	3/8	86.001	588.57
7/16	4.5160	1.6230	15/16	15.512	19.147	1/2	36.128	103.87	1/2	61.261	298.65	1/2	86.394	593.96
				15.708	19.635	5/8	36.521	106.14	5/8	61.654	302.49	5/8	86.786	599.37
1/2	4.7124	1.7671	5	15.904	20.129	3/4	36.914	108.43	3/4	62.046	306.35	3/4	87.179	604.81
9/16	4.9087	1.9175	1/16	16.101	20.629	7/8	37.306	110.75	7/8	62.439	310.24	7/8	87.572	610.27
5/8	5.1051	2.0739	1/8	16.297	21.135									
11/16	5.3014	2.2365	3/16	16.493	21.648	12	37.699	113.10	20	62.832	314.16	28	87.965	615.75
			1/4	16.690	22.166	1/8	38.092	115.47	1/8	63.225	318.10	1/8	88.357	621.26
3/4	5.4978	2.4053	5/16	16.886	22.691	1/4	38.485	117.86	1/4	63.617	322.06	1/4	88.750	626.80
13/16	5.6941	2.5802	3/8	17.082	23.221	3/8	38.877	120.28	3/8	64.010	326.05	3/8	89.143	632.36
7/8	5.8905	2.7612	7/16	17.279	23.758	1/2	39.270	122.72	1/2	64.403	330.06	1/2	89.535	637.94
15/16	6.0868	2.9483	1/2	17.475	24.301	5/8	39.663	125.19	5/8	64.795	334.10	5/8	89.928	643.55
			9/16	17.671	24.850	3/4	40.055	127.68	3/4	65.188	338.16	3/4	90.321	649.18
			5/8	17.868	25.406	7/8	40.448	130.19	7/8	65.581	342.25	7/8	90.713	654.84
			11/16	18.064	25.967									
			3/4	18.261	26.535	13	40.841	132.73	21	65.973	346.36	29	91.106	660.52
			13/16	18.457	27.109	1/8	41.233	135.30	1/8	66.366	350.50	1/8	91.499	666.23
			7/8	18.653	27.688	1/4	41.626	137.89	1/4	66.759	354.66	1/4	91.892	671.96
			15/16			3/8	42.019	140.50	3/8	67.152	358.84	3/8	92.284	677.71
						1/2	42.412	143.14	1/2	67.544	363.05	1/2	92.677	683.49
						5/8	42.804	145.80	5/8	67.937	367.28	5/8	93.070	689.30
						3/4	43.197	148.49	3/4	68.330	371.54	3/4	93.462	695.13
						7/8	43.590	151.20	7/8	68.722	375.83	7/8	93.855	700.98

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Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area
30	94.248	706.86	37	116.239	1075.2	44	138.230	1520.5	51	160.221	2042.8	58	182.212	2642.1
1/8	94.640	712.76	1/8	116.632	1082.5	1/8	138.623	1529.2	1/8	160.614	2052.8	1/8	182.605	2653.5
1/4	95.033	718.69	1/4	117.024	1089.8	1/4	139.015	1537.9	1/4	161.007	2062.9	1/4	182.998	2664.9
3/8	95.426	724.64	3/8	117.417	1097.1	3/8	139.408	1546.6	3/8	161.399	2073.0	3/8	183.390	2676.4
1/2	95.819	730.62	1/2	117.810	1104.5	1/2	139.801	1555.3	1/2	161.792	2083.1	1/2	183.783	2687.8
5/8	96.211	736.62	5/8	118.202	1111.8	5/8	140.194	1564.0	5/8	162.185	2093.2	5/8	184.176	2699.3
3/4	96.604	742.64	3/4	118.596	1119.2	3/4	140.586	1572.8	3/4	162.577	2103.3	3/4	184.569	2710.9
7/8	96.997	748.69	7/8	118.988	1126.7	7/8	140.979	1581.6	7/8	162.970	2113.5	7/8	184.961	2722.4
31	97.389	754.77	38	119.381	1134.1	45	141.372	1590.4	52	163.363	2123.7	59	185.354	2734.0
1/8	97.782	760.87	1/8	119.773	1141.6	1/8	141.764	1599.3	1/8	163.756	2133.9	1/8	185.747	2745.6
1/4	98.175	766.99	1/4	120.166	1149.1	1/4	142.157	1608.2	1/4	164.148	2144.2	1/4	186.139	2757.2
3/8	98.567	773.14	3/8	120.559	1156.6	3/8	142.550	1617.0	3/8	164.541	2154.5	3/8	186.532	2768.8
1/2	98.960	779.31	1/2	120.951	1164.2	1/2	142.942	1626.0	1/2	164.934	2164.8	1/2	186.925	2780.5
5/8	99.353	785.51	5/8	121.344	1171.7	5/8	143.335	1634.9	5/8	165.326	2175.1	5/8	187.317	2792.2
3/4	99.746	791.73	3/4	121.737	1179.3	3/4	143.728	1643.9	3/4	165.719	2185.4	3/4	187.710	2803.9
7/8	100.138	797.98	7/8	122.129	1186.9	7/8	144.121	1652.9	7/8	166.112	2195.8	7/8	188.103	2815.7
32	100.531	804.25	39	122.522	1194.6	46	144.513	1661.9	53	166.504	2206.2	60	188.496	2827.4
1/8	100.924	810.54	1/8	122.915	1202.3	1/8	144.906	1670.9	1/8	166.897	2216.6	1/8	188.888	2839.2
1/4	101.316	816.86	1/4	123.308	1210.0	1/4	145.299	1680.0	1/4	167.290	2227.0	1/4	189.281	2851.0
3/8	101.709	823.21	3/8	123.700	1217.7	3/8	145.691	1689.1	3/8	167.683	2237.5	3/8	189.674	2862.9
1/2	102.102	829.58	1/2	124.093	1225.4	1/2	146.084	1698.2	1/2	168.075	2248.0	1/2	190.066	2874.8
5/8	102.494	835.97	5/8	124.486	1233.2	5/8	146.477	1707.4	5/8	168.468	2258.5	5/8	190.459	2886.6
3/4	102.887	842.39	3/4	124.878	1241.0	3/4	146.869	1716.5	3/4	168.861	2269.1	3/4	190.852	2898.6
7/8	103.280	848.83	7/8	125.271	1248.8	7/8	147.262	1725.7	7/8	169.253	2279.6	7/8	191.244	2910.5
33	103.673	855.30	40	125.664	1256.6	47	147.655	1734.9	54	169.646	2290.2	61	191.637	2922.5
1/8	104.065	861.79	1/8	126.056	1264.5	1/8	148.048	1744.2	1/8	170.039	2300.8	1/8	192.030	2934.5
1/4	104.458	868.31	1/4	126.449	1272.4	1/4	148.440	1753.5	1/4	170.431	2311.5	1/4	192.423	2946.5
3/8	104.851	874.85	3/8	126.842	1280.3	3/8	148.833	1762.7	3/8	170.824	2322.1	3/8	192.815	2958.5
1/2	105.243	881.41	1/2	127.235	1288.2	1/2	149.226	1772.1	1/2	171.217	2332.8	1/2	193.208	2970.6
5/8	105.636	888.00	5/8	127.627	1296.2	5/8	149.618	1781.4	5/8	171.609	2343.5	5/8	193.601	2982.7
3/4	106.029	894.62	3/4	128.020	1304.2	3/4	150.011	1790.8	3/4	172.002	2354.3	3/4	193.993	2994.8
7/8	106.421	901.26	7/8	128.413	1312.2	7/8	150.404	1800.1	7/8	172.395	2365.0	7/8	194.386	3006.9
34	106.814	907.92	41	128.805	1320.3	48	150.796	1809.6	55	172.788	2375.8	62	194.779	3019.1
1/8	107.207	914.61	1/8	129.198	1328.3	1/8	151.189	1819.0	1/8	173.180	2386.6	1/8	195.171	3031.3
1/4	107.600	921.32	1/4	129.591	1336.4	1/4	151.582	1828.5	1/4	173.573	2397.5	1/4	195.564	3043.5
3/8	107.992	928.06	3/8	129.983	1344.5	3/8	151.975	1837.9	3/8	173.966	2408.3	3/8	195.957	3055.7
1/2	108.385	934.82	1/2	130.376	1352.7	1/2	152.367	1847.5	1/2	174.358	2419.2	1/2	196.350	3068.0
5/8	108.778	941.61	5/8	130.769	1360.8	5/8	152.760	1857.0	5/8	174.751	2430.1	5/8	196.742	3080.3
3/4	109.170	948.42	3/4	131.161	1369.0	3/4	153.153	1866.5	3/4	175.144	2441.1	3/4	197.135	3092.6
7/8	109.563	955.25	7/8	131.554	1377.2	7/8	153.545	1876.1	7/8	175.536	2452.0	7/8	197.528	3104.9
35	109.956	962.11	42	131.947	1385.4	49	153.938	1885.7	56	175.929	2463.0	63	197.920	3117.2
1/8	110.348	969.00	1/8	132.340	1393.7	1/8	154.331	1895.4	1/8	176.322	2474.0	1/8	198.313	3129.6
1/4	110.741	975.91	1/4	132.732	1402.0	1/4	154.723	1905.0	1/4	176.715	2485.0	1/4	198.706	3142.0
3/8	111.134	982.84	3/8	133.125	1410.3	3/8	155.116	1914.7	3/8	177.107	2496.1	3/8	199.098	3154.5
1/2	111.527	989.80	1/2	133.518	1418.6	1/2	155.509	1924.4	1/2	177.500	2507.2	1/2	199.491	3166.9
5/8	111.919	996.78	5/8	133.910	1427.0	5/8	155.902	1934.2	5/8	177.893	2518.3	5/8	199.884	3179.4
3/4	112.312	1003.8	3/4	134.303	1435.4	3/4	156.294	1943.9	3/4	178.285	2529.4	3/4	200.277	3191.9
7/8	112.705	1010.8	7/8	134.696	1443.8	7/8	156.687	1953.7	7/8	178.678	2540.6	7/8	200.669	3204.4
36	113.097	1017.9	43	135.088	1452.2	50	157.080	1963.5	57	179.071	2551.8	64	201.062	3217.0
1/8	113.490	1025.0	1/8	135.481	1460.7	1/8	157.472	1973.3	1/8	179.463	2563.0	1/8	201.455	3229.6
1/4	113.883	1032.1	1/4	135.874	1469.1	1/4	157.865	1983.2	1/4	179.856	2574.2	1/4	201.847	3242.2
3/8	114.275	1039.2	3/8	136.267	1477.6	3/8	158.258	1993.1	3/8	180.249	2585.4	3/8	202.240	3254.8
1/2	114.668	1046.3	1/2	136.659	1486.2	1/2	158.650	2003.0	1/2	180.642	2596.7	1/2	202.633	3267.5
5/8	115.061	1053.5	5/8	137.052	1494.7	5/8	159.043	2012.9	5/8	181.034	2608.0	5/8	203.025	3280.1
3/4	115.454	1060.7	3/4	137.445	1503.3	3/4	159.436	2022.8	3/4	181.427	2619.4	3/4	203.418	3292.8
7/8	115.846	1068.0	7/8	137.837	1511.9	7/8	159.829	2032.8	7/8	181.820	2630.7	7/8	203.811	3305.6

Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area
65	204.204	3318.3	72	226.195	4071.5	79	248.186	4901.7	86	270.177	5808.8	93	292.168	6792.9
1/8	204.596	3331.1	1/8	226.587	4085.7	1/8	248.579	4917.2	1/8	270.570	5825.7	1/8	292.561	6811.2
1/4	204.989	3343.9	1/4	226.980	4099.8	1/4	248.971	4932.7	1/4	270.962	5842.6	1/4	292.954	6829.5
3/8	205.382	3356.7	3/8	227.373	4114.0	3/8	249.364	4948.3	3/8	271.355	5859.6	3/8	293.346	6847.8
1/2	205.774	3369.6	1/2	227.765	4128.2	1/2	249.757	4963.9	1/2	271.748	5876.5	1/2	293.739	6866.1
5/8	206.167	3382.4	5/8	228.158	4142.5	5/8	250.149	4979.5	5/8	272.140	5893.5	5/8	294.132	6884.5
3/4	206.560	3395.3	3/4	228.551	4156.8	3/4	250.542	4995.2	3/4	272.533	5910.6	3/4	294.524	6902.9
7/8	206.952	3408.2	7/8	228.944	4171.1	7/8	250.935	5010.9	7/8	272.926	5927.6	7/8	294.917	6921.3
66	207.345	3421.2	73	229.336	4185.4	80	251.327	5026.5	87	273.319	5944.7	94	295.310	6939.8
1/8	207.738	3434.2	1/8	229.729	4199.7	1/8	251.720	5042.3	1/8	273.711	5961.8	1/8	295.702	6958.2
1/4	208.131	3447.2	1/4	230.122	4214.1	1/4	252.113	5058.0	1/4	274.104	5978.9	1/4	296.095	6976.7
3/8	208.523	3460.2	3/8	230.514	4228.5	3/8	252.506	5073.8	3/8	274.497	5996.0	3/8	296.488	6995.3
1/2	208.916	3473.2	1/2	230.907	4242.9	1/2	252.898	5089.6	1/2	274.889	6013.2	1/2	296.881	7013.8
5/8	209.309	3486.3	5/8	231.300	4257.4	5/8	253.291	5105.4	5/8	275.282	6030.4	5/8	297.273	7032.4
3/4	209.701	3499.4	3/4	231.692	4271.8	3/4	253.684	5121.2	3/4	275.675	6047.6	3/4	297.666	7051.0
7/8	210.094	3512.5	7/8	232.085	4286.3	7/8	254.076	5137.1	7/8	276.067	6064.9	7/8	298.059	7069.6
67	210.487	3525.7	74	232.478	4300.8	81	254.469	5153.0	88	276.460	6082.1	95	298.451	7088.2
1/8	210.879	3538.8	1/8	232.871	4315.4	1/8	254.862	5168.9	1/8	276.853	6099.4	1/8	298.844	7106.9
1/4	211.272	3552.0	1/4	233.263	4329.9	1/4	255.254	5184.9	1/4	277.246	6116.7	1/4	299.237	7125.6
3/8	211.665	3565.2	3/8	233.656	4344.5	3/8	255.647	5200.8	3/8	277.638	6134.1	3/8	299.629	7144.3
1/2	212.058	3578.5	1/2	234.049	4359.2	1/2	256.040	5216.8	1/2	278.031	6151.4	1/2	300.022	7163.0
5/8	212.450	3591.7	5/8	234.441	4373.8	5/8	256.433	5232.8	5/8	278.424	6168.8	5/8	300.415	7181.8
3/4	212.843	3605.0	3/4	234.834	4388.5	3/4	256.825	5248.9	3/4	278.816	6186.2	3/4	300.807	7200.6
7/8	213.236	3618.3	7/8	235.227	4403.1	7/8	257.218	5264.9	7/8	279.209	6203.7	7/8	301.200	7219.4
68	213.628	3631.7	75	235.619	4417.9	82	257.611	5281.0	89	279.602	6221.1	96	301.593	7238.2
1/8	214.021	3645.0	1/8	236.012	4432.6	1/8	258.003	5297.1	1/8	279.994	6238.6	1/8	301.986	7257.1
1/4	214.414	3658.4	1/4	236.405	4447.4	1/4	258.396	5313.3	1/4	280.387	6256.1	1/4	302.378	7276.0
3/8	214.806	3671.8	3/8	236.798	4462.2	3/8	258.789	5329.4	3/8	280.780	6273.7	3/8	302.771	7294.9
1/2	215.199	3685.3	1/2	237.190	4477.0	1/2	259.181	5345.6	1/2	281.173	6291.2	1/2	303.164	7313.8
5/8	215.592	3698.7	5/8	237.583	4491.8	5/8	259.574	5361.8	5/8	281.565	6308.8	5/8	303.556	7332.8
3/4	215.984	3712.2	3/4	237.976	4506.7	3/4	259.967	5378.1	3/4	281.958	6326.4	3/4	303.949	7351.8
7/8	216.377	3725.7	7/8	238.368	4521.5	7/8	260.359	5394.3	7/8	282.351	6344.1	7/8	304.342	7370.8
69	216.770	3739.3	76	238.761	4536.5	83	260.752	5410.6	90	282.743	6361.7	97	304.734	7389.8
1/8	217.163	3752.8	1/8	239.154	4551.4	1/8	261.145	5426.9	1/8	283.136	6379.4	1/8	305.127	7408.9
1/4	217.555	3766.4	1/4	239.546	4566.4	1/4	261.538	5443.3	1/4	283.529	6397.1	1/4	305.520	7428.0
3/8	217.948	3780.0	3/8	239.939	4581.3	3/8	261.930	5459.6	3/8	283.921	6414.9	3/8	305.913	7447.1
1/2	218.341	3793.7	1/2	240.332	4596.3	1/2	262.323	5476.0	1/2	284.314	6432.6	1/2	306.305	7466.2
5/8	218.733	3807.3	5/8	240.725	4611.4	5/8	262.716	5492.4	5/8	284.707	6450.4	5/8	306.698	7485.3
3/4	219.126	3821.0	3/4	241.117	4626.4	3/4	263.108	5508.8	3/4	285.100	6468.2	3/4	307.091	7504.5
7/8	219.519	3834.7	7/8	241.510	4641.5	7/8	263.501	5525.3	7/8	285.492	6486.0	7/8	307.483	7523.7
70	219.911	3848.5	77	241.903	4656.6	84	263.894	5541.8	91	285.885	6503.9	98	307.876	7543.0
1/8	220.304	3862.2	1/8	242.295	4671.8	1/8	264.286	5558.3	1/8	286.278	6521.8	1/8	308.269	7562.2
1/4	220.697	3876.0	1/4	242.688	4686.9	1/4	264.679	5574.8	1/4	286.670	6539.7	1/4	308.661	7581.5
3/8	221.090	3889.8	3/8	243.081	4702.1	3/8	265.072	5591.4	3/8	287.063	6557.6	3/8	309.054	7600.8
1/2	221.482	3903.6	1/2	243.473	4717.3	1/2	265.465	5607.9	1/2	287.456	6575.5	1/2	309.447	7620.1
5/8	221.875	3917.5	5/8	243.866	4732.5	5/8	265.857	5624.5	5/8	287.848	6593.5	5/8	309.840	7639.5
3/4	222.268	3931.4	3/4	244.259	4747.8	3/4	266.250	5641.2	3/4	288.241	6611.5	3/4	310.232	7658.9
7/8	222.660	3945.3	7/8	244.652	4763.1	7/8	266.643	5657.8	7/8	288.634	6629.6	7/8	310.625	7678.3
71	223.053	3959.2	78	245.044	4778.4	85	267.035	5674.5	92	289.027	6647.6	99	311.018	7697.7
1/8	223.446	3973.1	1/8	245.437	4793.7	1/8	267.428	5691.2	1/8	289.419	6665.7	1/8	311.410	7717.1
1/4	223.838	3987.1	1/4	245.830	4809.0	1/4	267.821	5707.9	1/4	289.812	6683.8	1/4	311.803	7736.6
3/8	224.231	4001.1	3/8	246.222	4824.4	3/8	268.213	5724.7	3/8	290.205	6701.9	3/8	312.196	7756.1
1/2	224.624	4015.2	1/2	246.615	4839.8	1/2	268.606	5741.5	1/2	290.597	6720.1	1/2	312.588	7775.6
5/8	225.017	4029.2	5/8	247.008	4855.2	5/8	268.999	5758.3	5/8	290.990	6738.2	5/8	312.981	7795.2
3/4	225.409	4043.3	3/4	247.400	4870.7	3/4	269.392	5775.1	3/4	291.383	6756.4	3/4	313.374	7814.8
7/8	225.802	4057.4	7/8	247.793	4886.2	7/8	269.784	5791.9	7/8	291.775	6774.7	7/8	313.767	7834.4
												100	314.159	7854.0

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Conversion Table

Measure:

1 in. = 25.4 mm.
1 mm. = .0394 in.
1 ft. = 304.8 mm. = 30.48 cm.
1 mm. = .00328 ft.
1 sq. in. = 6.4516 sq. cm.
1 sq. cm. = 0.155 sq. in.
1 sq. ft. = 929.03 sq. cm.
1 sq. cm. = .00108 sq. ft.
1 cu. ft. = 1728 cu. in.
1 cu. ft. = 28,316.83 cu. cm.
1 cu. in. = 16.39 cu. cm.
1 cu. ft. = 7.4805 gal.
1 gal. = 0.1337 cu. ft.

Weight:

1 cu. ft. of water = 62.4 lbs. (15° C).
1 cu. in. of water = .0361 lbs. (15° C).
1 gal. water = 8.33 lbs. (15° C).
1 cu. in. of mercury = 13.6 cu. in. water.
1 cu. in. of water = .0735 cu. in. mercury.
1 cu. in. of mercury = .491 lbs.

Velocity:

1 ft. per sec. = .3048 m. per sec.
1 m. per sec. = 3.2808 ft. per sec.

Heat Transfer:

1 B.t.u. per sq. ft. = .2712 gram. calorie per sq. cm.
1 gram. cal. per sq. cm. = 3.687 B.t.u. per sq. ft.
1 B.t.u. per hr. per sq. ft. per F° = 4.88 kg. cal. per hr. per sq. m. per C°.
1 kg. cal. per hr. per sq. m. per C° = .205 B.t.u. per hr. per sq. ft. per F°.
1 B.t.u. per hr. per sq. ft. per F° = .0001355 gram. cal. per sec. per sq. cm. per C°.
1 gram. cal. per sec. per sq. cm. per C° = 7380 B.t.u. per hr. per sq. ft. per F°.

Thermal Conductivity:

1 B.t.u. per sq. ft. per in. = .6892 gram. calories per sq. cm. per cm.
1 gram. cal. per sq. cm. per cm. = 1.451 B.t.u. per sq. ft. per in.
1 B.t.u. per hr. per sq. ft. per F° per in. = .0003445 gram. cal. per sec. per sq. cm. per C° per cm.
1 gram. cal. per sec. per sq. cm. per C° per cm. = 2903 B.t.u. per hr. per sq. ft. per F° per in.
1 B.t.u. per hr. per sq. ft. per F° per ft. = .00413 gram. cal. per sec. per sq. cm. per C° per cm.
1 gram. cal. per sec. per sq. cm. per C° per cm. = 242.13 B.t.u. per hr. per sq. ft. per F° per ft.

Viscosity:

Absolute:

1 Dyne sec. per sq. cm. = .0672 lbs. per (sec.) (ft.).

Kinematic:

1 sq. cm. per sec. = .001076 sq. ft. per sec.

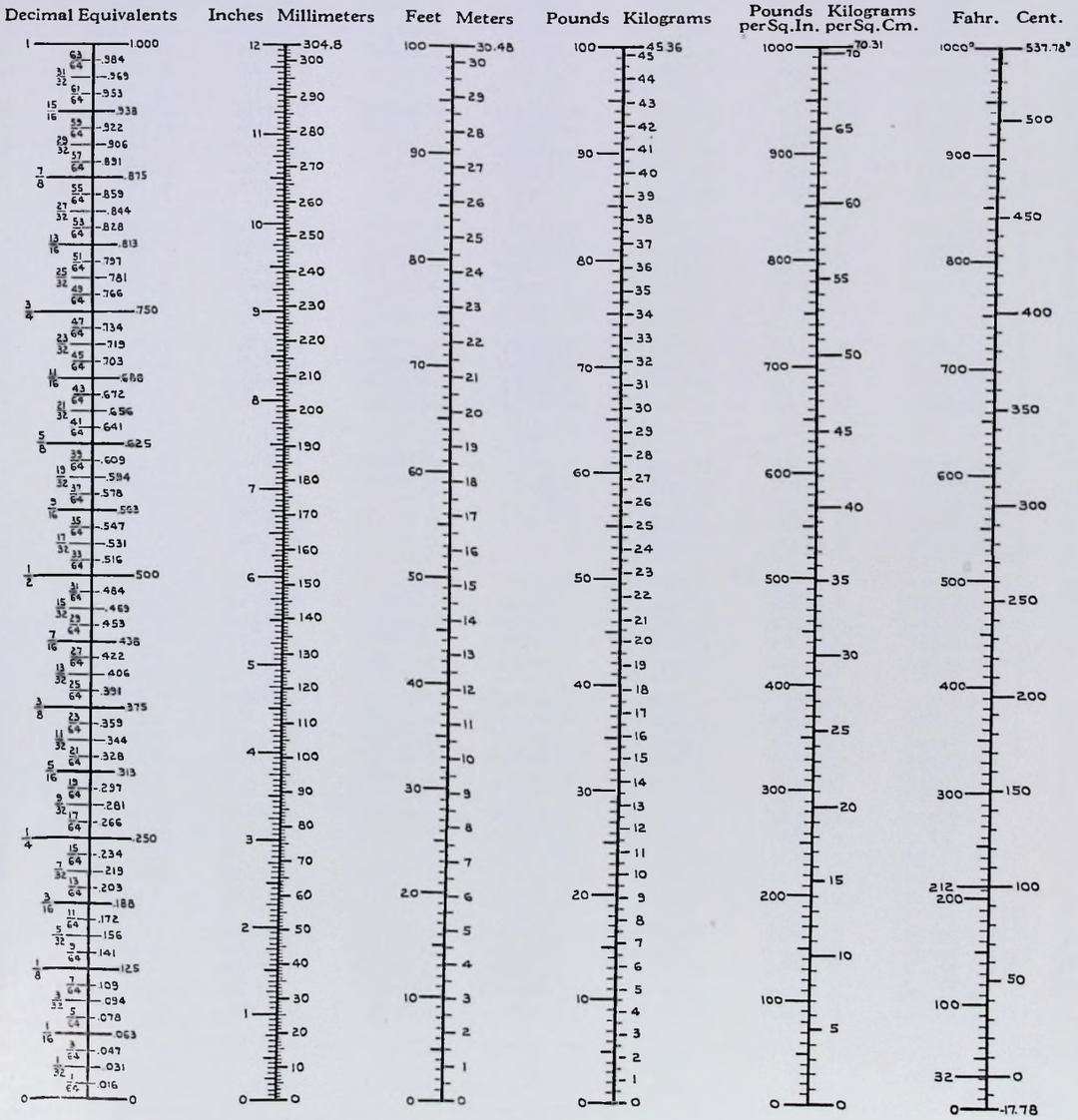
Density:

1 lb. per cu. in. = 27.68 gram. per cu. cm.
1 gr. per cu. cm. = .03613 lbs. per cu. in.
1 lb. per cu. ft. = 16.0184 kg. per cu. m.
1 kg. per cu. m. = .06243 lbs. per cu. ft.

Pressure:

1 in. of water = .0361 lbs. per sq. in.
1 ft. of water = .4332 lbs. per sq. in.
1 in. of water = .0735 in. of mercury.
1 in. of mercury = 13.6 in. of water.
1 in. of mercury = 1.333 ft. of water.
1 ft. of water = .8824 in. of mercury.
1 in. of mercury = .4912 lbs. per sq. in.
1 cm. of mercury = .1934 lbs. per sq. in.
1 atmosphere = 14.696 lbs. per sq. in.
1 lb. per sq. in. = .06804 atmosphere.
1 lb. per sq. in. = 2.312 ft. of water = 27.71 in. water.
1 lb. per sq. in. = 2.04 in. mercury.
1 atmosphere = 34 ft. of water = 760 mm. of mercury.
1 lb. per sq. in. = .0703 kg. per cm².
1 kg. per cm². = 14.223 lbs. per sq. in.

Conversion Chart



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Natural Trigonometric Functions

Degrees	Sines 0′	10′	20′	30′	40′	50′	60′	Cosines
0	0.00000	0.00291	0.00582	0.00873	0.01164	0.01454	0.01745	89
1	0.01745	0.02036	0.02327	0.02618	0.02908	0.03199	0.03490	88
2	0.03490	0.03781	0.04071	0.04362	0.04653	0.04943	0.05234	87
3	0.05234	0.05524	0.05814	0.06105	0.06395	0.06685	0.06976	86
4	0.06976	0.07266	0.07556	0.07846	0.08136	0.08426	0.08716	85
5	0.08716	0.09005	0.09295	0.09585	0.09874	0.10164	0.10453	84
6	0.10453	0.10742	0.11031	0.11320	0.11609	0.11898	0.12187	83
7	0.12187	0.12476	0.12764	0.13053	0.13341	0.13629	0.13917	82
8	0.13917	0.14205	0.14493	0.14781	0.15069	0.15356	0.15643	81
9	0.15643	0.15931	0.16218	0.16505	0.16792	0.17078	0.17365	80
10	0.17365	0.17651	0.17937	0.18224	0.18509	0.18795	0.19081	79
11	0.19081	0.19366	0.19652	0.19937	0.20222	0.20507	0.20791	78
12	0.20791	0.21076	0.21360	0.21644	0.21928	0.22212	0.22495	77
13	0.22495	0.22778	0.23062	0.23345	0.23627	0.23910	0.24192	76
14	0.24192	0.24474	0.24756	0.25038	0.25320	0.25601	0.25882	75
15	0.25882	0.26163	0.26443	0.26724	0.27004	0.27284	0.27564	74
16	0.27564	0.27843	0.28123	0.28402	0.28680	0.28959	0.29237	73
17	0.29237	0.29515	0.29793	0.30071	0.30348	0.30625	0.30902	72
18	0.30902	0.31178	0.31454	0.31730	0.32006	0.32282	0.32557	71
19	0.32557	0.32832	0.33106	0.33381	0.33655	0.33929	0.34202	70
20	0.34202	0.34475	0.34748	0.35021	0.35293	0.35565	0.35837	69
21	0.35837	0.36108	0.36379	0.36650	0.36921	0.37191	0.37461	68
22	0.37461	0.37730	0.37999	0.38268	0.38537	0.38805	0.39073	67
23	0.39073	0.39341	0.39608	0.39875	0.40141	0.40408	0.40674	66
24	0.40674	0.40939	0.41204	0.41469	0.41734	0.41998	0.42262	65
25	0.42262	0.42525	0.42788	0.43051	0.43313	0.43575	0.43837	64
26	0.43837	0.44098	0.44359	0.44620	0.44880	0.45140	0.45399	63
27	0.45399	0.45658	0.45917	0.46175	0.46433	0.46690	0.46947	62
28	0.46947	0.47204	0.47460	0.47716	0.47971	0.48226	0.48481	61
29	0.48481	0.48735	0.48989	0.49242	0.49495	0.49748	0.50000	60
30	0.50000	0.50252	0.50503	0.50754	0.51004	0.51254	0.51504	59
31	0.51504	0.51753	0.52002	0.52250	0.52498	0.52745	0.52992	58
32	0.52992	0.53238	0.53484	0.53730	0.53975	0.54220	0.54464	57
33	0.54464	0.54708	0.54951	0.55194	0.55436	0.55678	0.55919	56
34	0.55919	0.56160	0.56401	0.56641	0.56880	0.57119	0.57358	55
35	0.57358	0.57596	0.57833	0.58070	0.58307	0.58543	0.58779	54
36	0.58779	0.59014	0.59248	0.59482	0.59716	0.59949	0.60182	53
37	0.60182	0.60414	0.60645	0.60876	0.61107	0.61337	0.61566	52
38	0.61566	0.61795	0.62024	0.62251	0.62479	0.62706	0.62932	51
39	0.62932	0.63158	0.63383	0.63608	0.63832	0.64056	0.64279	50
40	0.64279	0.64501	0.64723	0.64945	0.65166	0.65386	0.65606	49
41	0.65606	0.65825	0.66044	0.66262	0.66480	0.66697	0.66913	48
42	0.66913	0.67129	0.67344	0.67559	0.67773	0.67987	0.68200	47
43	0.68200	0.68412	0.68624	0.68835	0.69046	0.69256	0.69466	46
44	0.69466	0.69675	0.69883	0.70091	0.70298	0.70505	0.70711	45

Sines	60′	50′	40′	30′	20′	10′	0′	Degrees
	Cosines							

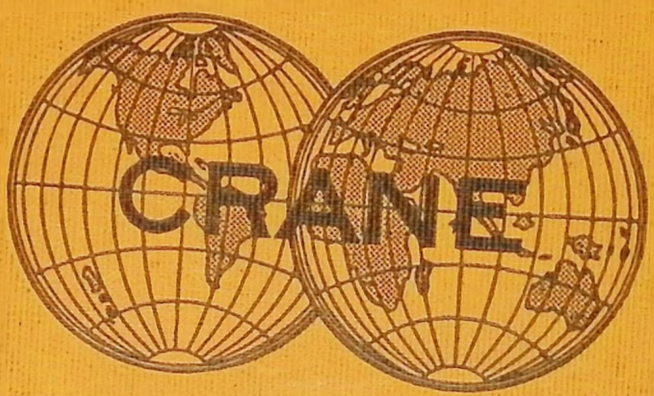
Degrees	Cosines 0′	10′	20′	30′	40′	50′	60′	Sines
0	1.00000	1.00000	0.99998	0.99996	0.99993	0.99989	0.99985	89
1	0.99985	0.99979	0.99973	0.99966	0.99958	0.99949	0.99939	88
2	0.99939	0.99929	0.99917	0.99905	0.99892	0.99878	0.99863	87
3	0.99863	0.99847	0.99831	0.99813	0.99795	0.99776	0.99756	86
4	0.99756	0.99736	0.99714	0.99692	0.99668	0.99644	0.99619	85
5	0.99619	0.99594	0.99567	0.99540	0.99511	0.99482	0.99452	84
6	0.99452	0.99421	0.99390	0.99357	0.99324	0.99290	0.99255	83
7	0.99255	0.99219	0.99182	0.99144	0.99106	0.99067	0.99027	82
8	0.99027	0.98986	0.98944	0.98902	0.98858	0.98814	0.98769	81
9	0.98769	0.98723	0.98676	0.98629	0.98580	0.98531	0.98481	80
10	0.98481	0.98430	0.98378	0.98325	0.98272	0.98218	0.98163	79
11	0.98163	0.98107	0.98050	0.97992	0.97934	0.97875	0.97815	78
12	0.97815	0.97754	0.97692	0.97630	0.97566	0.97502	0.97437	77
13	0.97437	0.97371	0.97304	0.97237	0.97169	0.97100	0.97030	76
14	0.97030	0.96959	0.96887	0.96815	0.96742	0.96667	0.96593	75
15	0.96593	0.96517	0.96440	0.96363	0.96285	0.96206	0.96126	74
16	0.96126	0.96046	0.95964	0.95882	0.95799	0.95715	0.95630	73
17	0.95630	0.95545	0.95459	0.95372	0.95284	0.95195	0.95106	72
18	0.95106	0.95015	0.94924	0.94832	0.94740	0.94646	0.94552	71
19	0.94552	0.94457	0.94361	0.94264	0.94167	0.94068	0.93969	70
20	0.93969	0.93869	0.93769	0.93667	0.93565	0.93462	0.93358	69
21	0.93358	0.93253	0.93148	0.93042	0.92935	0.92827	0.92718	68
22	0.92718	0.92609	0.92499	0.92388	0.92276	0.92164	0.92050	67
23	0.92050	0.91936	0.91822	0.91706	0.91590	0.91472	0.91355	66
24	0.91355	0.91236	0.91116	0.90996	0.90875	0.90753	0.90631	65
25	0.90631	0.90507	0.90383	0.90259	0.90133	0.90007	0.89879	64
26	0.89879	0.89752	0.89623	0.89493	0.89363	0.89232	0.89101	63
27	0.89101	0.88968	0.88835	0.88701	0.88566	0.88431	0.88295	62
28	0.88295	0.88158	0.88020	0.87882	0.87743	0.87603	0.87462	61
29	0.87462	0.87321	0.87178	0.87036	0.86892	0.86748	0.86603	60
30	0.86603	0.86457	0.86310	0.86163	0.86015	0.85866	0.85717	59
31	0.85717	0.85567	0.85416	0.85264	0.85112	0.84959	0.84805	58
32	0.84805	0.84650	0.84495	0.84339	0.84182	0.84025	0.83867	57
33	0.83867	0.83708	0.83549	0.83389	0.83228	0.83066	0.82904	56
34	0.82904	0.82741	0.82577	0.82413	0.82248	0.82082	0.81915	55
35	0.81915	0.81748	0.81580	0.81412	0.81242	0.81072	0.80902	54
36	0.80902	0.80730	0.80558	0.80386	0.80212	0.80038	0.79864	53
37	0.79864	0.79688	0.79512	0.79335	0.79158	0.78980	0.78801	52
38	0.78801	0.78622	0.78442	0.78261	0.78079	0.77897	0.77715	51
39	0.77715	0.77531	0.77347	0.77162	0.76977	0.76791	0.76604	50
40	0.76604	0.76417	0.76229	0.76041	0.75851	0.75661	0.75471	49
41	0.75471	0.75280	0.75088	0.74896	0.74703	0.74509	0.74314	48
42	0.74314	0.74120	0.73924	0.73728	0.73531	0.73333	0.73135	47
43	0.73135	0.72937	0.72737	0.72537	0.72337	0.72136	0.71934	46
44	0.71934	0.71732	0.71529	0.71325	0.71121	0.70916	0.70711	45

Cosines	60′	50′	40′	30′	20′	10′	0′	Degrees
	Sines							

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Degrees	Tangents 0′	10′	20′	30′	40′	50′	60′	Cotangents
0	0.00000	0.00291	0.00582	0.00873	0.01164	0.01455	0.01746	89
1	0.01746	0.02036	0.02328	0.02619	0.02910	0.03201	0.03492	88
2	0.03492	0.03783	0.04075	0.04366	0.04658	0.04949	0.05241	87
3	0.05241	0.05533	0.05824	0.06116	0.06408	0.06700	0.06993	86
4	0.06993	0.07285	0.07578	0.07870	0.08163	0.08456	0.08749	85
5	0.08749	0.09042	0.09335	0.09629	0.09923	0.10216	0.10510	84
6	0.10510	0.10805	0.11099	0.11394	0.11688	0.11983	0.12278	83
7	0.12278	0.12574	0.12869	0.13165	0.13461	0.13758	0.14054	82
8	0.14054	0.14351	0.14648	0.14945	0.15243	0.15540	0.15838	81
9	0.15838	0.16137	0.16435	0.16734	0.17033	0.17333	0.17633	80
10	0.17633	0.17933	0.18233	0.18534	0.18835	0.19136	0.19438	79
11	0.19438	0.19740	0.20042	0.20345	0.20648	0.20952	0.21256	78
12	0.21256	0.21560	0.21864	0.22169	0.22475	0.22781	0.23087	77
13	0.23087	0.23393	0.23700	0.24008	0.24316	0.24624	0.24933	76
14	0.24933	0.25242	0.25552	0.25862	0.26172	0.26483	0.26795	75
15	0.26795	0.27107	0.27419	0.27732	0.28046	0.28360	0.28675	74
16	0.28675	0.28990	0.29305	0.29621	0.29938	0.30255	0.30573	73
17	0.30573	0.30891	0.31210	0.31530	0.31850	0.32171	0.32492	72
18	0.32492	0.32814	0.33136	0.33460	0.33783	0.34108	0.34433	71
19	0.34433	0.34758	0.35085	0.35412	0.35740	0.36068	0.36397	70
20	0.36397	0.36727	0.37057	0.37388	0.37720	0.38053	0.38386	69
21	0.38386	0.38721	0.39055	0.39391	0.39727	0.40065	0.40403	68
22	0.40403	0.40741	0.41081	0.41421	0.41763	0.42105	0.42447	67
23	0.42447	0.42791	0.43136	0.43481	0.43828	0.44175	0.44523	66
24	0.44523	0.44872	0.45222	0.45573	0.45924	0.46277	0.46631	65
25	0.46631	0.46985	0.47341	0.47698	0.48055	0.48414	0.48773	64
26	0.48773	0.49134	0.49495	0.49858	0.50222	0.50587	0.50953	63
27	0.50953	0.51319	0.51688	0.52057	0.52427	0.52798	0.53171	62
28	0.53171	0.53545	0.53920	0.54296	0.54673	0.55051	0.55431	61
29	0.55431	0.55812	0.56194	0.56577	0.56962	0.57348	0.57735	60
30	0.57735	0.58124	0.58513	0.58905	0.59297	0.59691	0.60086	59
31	0.60086	0.60483	0.60881	0.61280	0.61681	0.62083	0.62487	58
32	0.62487	0.62892	0.63299	0.63707	0.64117	0.64528	0.64941	57
33	0.64941	0.65355	0.65771	0.66189	0.66608	0.67028	0.67451	56
34	0.67451	0.67875	0.68301	0.68728	0.69157	0.69588	0.70021	55
35	0.70021	0.70455	0.70891	0.71329	0.71769	0.72211	0.72654	54
36	0.72654	0.73100	0.73547	0.73996	0.74447	0.74900	0.75355	53
37	0.75355	0.75812	0.76272	0.76733	0.77196	0.77661	0.78129	52
38	0.78129	0.78598	0.79070	0.79544	0.80020	0.80498	0.80978	51
39	0.80978	0.81461	0.81946	0.82434	0.82923	0.83415	0.83910	50
40	0.83910	0.84407	0.84906	0.85408	0.85912	0.86419	0.86929	49
41	0.86929	0.87441	0.87955	0.88473	0.88992	0.89515	0.90040	48
42	0.90040	0.90569	0.91099	0.91633	0.92170	0.92709	0.93252	47
43	0.93252	0.93797	0.94345	0.94896	0.95451	0.96008	0.96569	46
44	0.96569	0.97133	0.97700	0.98270	0.98843	0.99420	1.00000	45
	60′	50′	40′	30′	20′	10′	0′	
Tangents	Cotangents							Degrees

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