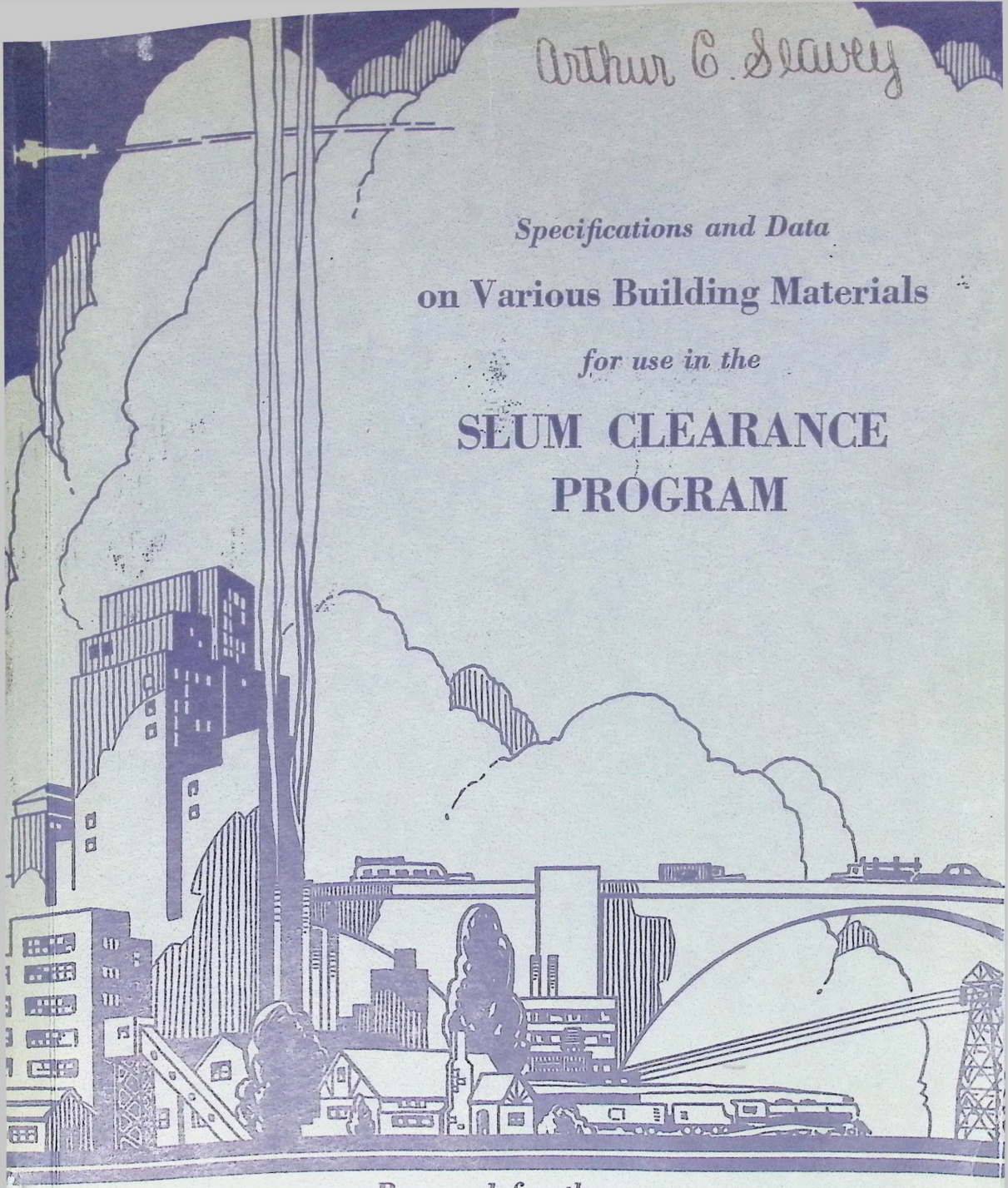
Arthur C. Seavey

Specifications and Data

on Various Building Materials

for use in the

SLUM CLEARANCE PROGRAM



Prepared for the

UNITED STATES HOUSING AUTHORITY

by the Johns-Manville Sales Corporation

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Johns-Manville

826 Woodward Building
15th & H. Streets, N.W.
Washington, D.C.

MEMORANDUM TO ARCHITECTS

As a convenience to architects engaged on public works projects, condensed data is presented in this book regarding various building materials suitable for such service. All of the information relates to standard-type materials of proved merit which are also competitive in bidding.

In the program for slum clearance and low-cost housing, the costs are so restricted that careful survey is necessary in the selection of materials. With this in mind, products are here included which have architectural merit, durability, low maintenance and yet are moderate in cost.

It has been the privilege of Johns-Manville in the past to cooperate extensively on slum clearance and resettlement work. The experience thus gained has been utilized in choosing the types of materials that will not only comply with the definite requirements of the current program but will meet with the approval of the United States Housing Authority.

Descriptive matter and name specifications appear in the various sections, together with competitive specifications and Federal Specifications where available. Different colors distinguish the various classes of information.

The architect is requested to acknowledge receipt of this book and avail himself of the further services of Johns-Manville whenever desired.

Respectfully submitted,

JOHNS-MANVILLE SALES CORPORATION

C. E. Roxbrough

C. E. Roxbrough, Engr.
Government Department
Washington, D. C.

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Cork Expansion Joints

Standard-type competitive materials of proved merit

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Cork Expansion Joints

The standard expansion joint materials available until recent years were the felt-sided asphalt joints, poured asphalt joints and others of similar manufacture. These types partially met the requirements but they lacked proper resiliency, non-extrusion and durability.

A superior expansion joint is now available, manufactured from cork particles and an insoluble, synthetic resin. These raw materials, combined, form a composite sheet which is made in the usual dimensions of expansion joint fillers.

The cork joint, now preferred by many architects and engineers, is a standard specification on highways and streets for a large number of states and municipalities. It has also been specified and used extensively by the various government bureaus.

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J-M Cork Expansion Joints

In concrete highway construction it is essential that provision be made for the changes in volume of the concrete resulting from temperature and moisture variations. To provide for such variable conditions, an expansion joint material must possess three major characteristics: Resilience, non-extrusion and durability. In ornamental structures, there are other properties which become important, such as attractive appearance, pleasing color and texture. J-M Cork Expansion Joint embodies all these requisite characteristics to a high degree, as proved in the laboratory and in the field.

The ability of this type of expansion joint material to fulfill the basic requirements of resilient joint construction can be readily understood from its composition. J-M Cork Expansion Joint is manufactured from natural cork particles and an insoluble synthetic resin, combined to form a composite sheet which is made available in the usual dimensions of expansion joint material.

The quality of natural cork bark varies widely but the best product is light, porous, easily compressed and very elastic. Commercial separation of the bark is made into many different grades but only the granules of high quality are used in producing J-M Cork Expansion Joint. In manufacture, heat in excess of 300 deg. F. is not used. This permits the cork at all times to keep its natural oils and resins which are so essential to the maintenance of its desirable qualities. By this method of processing, the inherent characteristics of the cork are retained in the finished cork expansion joint material.

Johns-Manville furnishes two types of resilient cork joints: Standard Cork Expansion Joint and SE (Self-Expanding) Cork Expansion Joint. The two types are similar except the SE Cork Expansion Joint has the additional advantage of increasing its thickness after installation when exposed to moisture.

Sizes furnished:

Standard Cork Expansion Joint is available in any length up to 10 ft., in standard widths up to 40" and in standard thicknesses of ¼", ⅜", ½", ¾" and 1". Greater dimensions and thicknesses may be obtained on special order. The net weight is about 1.5 lb. per board foot. The joint material is shipped in light skeleton crates.



The cars on this concrete highway, near Poynette, Wis., do not bump from spaced joint extrusions. J-M Cork Expansion Joints provide a smooth, unmarred highway free from joint maintenance

SE Cork Expansion Joint is available in lengths of 10 ft., widths up to 36" and for slot openings of ½", ⅝", ¾" and 1". The weight of SC Cork Expansion Joint per board foot when fully expanded is approximately the same as that for the standard cork joint. Shipment is always made in water-resisting packages, packed in crates.

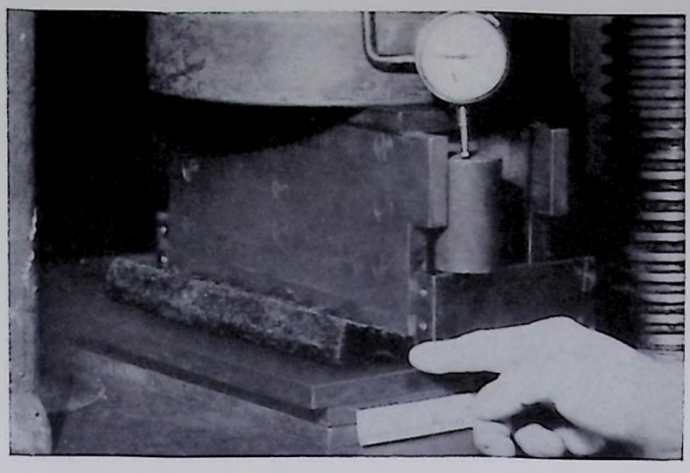
Characteristics of J-M Cork Joint

Non-Extrusion: There is no one quality of J-M Cork Expansion Joint which possesses such a wide appeal as that of non-extrusion. It means to the highway department the positive elimination of costly and continual maintenance. To the motorist, it assures a smooth-riding highway free from the monotonous bumping or "corduroy road" effect common to even the highest type of concrete paving where the ordinary asphaltic joint filler is used. No other type of resilient joint shows a smaller extrusion under compression than the J-M type of joint where the maximum extrusion, in thicknesses commonly used, including one inch, is not more than ⅛".

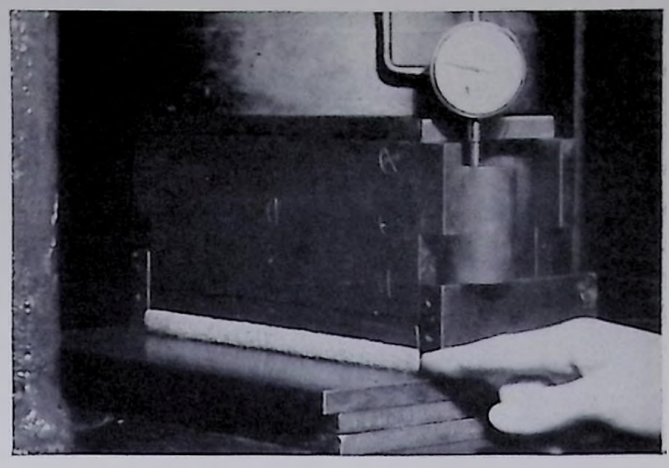
The significance of non-extrusion is well illustrated by the performance of the asphalt joint. As the con-

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Asphalt Expansion Joint, 1" x 4" x 10", compressed to one-half original thickness while restrained on three edges, extruded 2" from 4" dimension. This type of joint cannot absorb compression, nor can it recover from extrusion



J-M Cork Expansion Joint, 1" x 4" x 10", compressed to one-half original thickness while restrained on three edges, shows an extrusion of not more than ⅛" of an inch. This extrusion is easily and immediately recovered

crete expands, a proportional amount of asphalt is forced out of the joint, forming objectionable bumps. It is battered down by traffic, spread over the surface of the road and never returns to its place between the slabs of concrete. As the paving contracts, the resulting open-joint space immediately begins to collect dirt and other foreign material and, unless a repair job is done at once, the effectiveness of the joint is seriously impaired. Furthermore, water is admitted which, with some subgrades, causes considerable trouble by making the soil unstable and subject to heaving from frost action. Routine maintenance, consisting of pouring asphalt into the openings left in the slots, is generally necessary in order to mitigate these difficulties.

The asphalt joint is illustrative of the limitations of a joint material which extrudes in direct proportion to the extent of compression. It is thus clearly evident that an expansion joint which does not possess the characteristic of non-extrusion is not only unsightly but also entirely inefficient and costly.

To illustrate the high development of non-extrusion in J-M Cork Expansion Joint, J-M specifications include a test requiring that specimens confined on three sides and compressed to 50 percent of their original thickness shall show an extension on the free side of not more than ⅛". This means, of course, that when the concrete expands the consequent compression of the joint material must be absorbed within the cork.

Resilience (Recovery after Compression): The complement of non-extrusion is recovery of thickness after compression. This resilient property is customarily expressed as the percentage of the original thickness the expansion joint recovers after compression to 50 percent of its original thickness. J-M specifications include a test in which specimens must recover to at least 90 percent of their original thickness.

Supplementary to extended laboratory tests, actual performance of installations over a long period of time demonstrate conclusively that J-M Cork Expansion Joint is permanently resilient. Consequently, there is no loss of material due to extrusion and maintenance expense is thereby eliminated.

Durability: Numerous installations of J-M Cork Expansion Joint after years of exposure under the extremes of climatic conditions have consistently proved their durability. The material has also shown marked resistance to cement or lime water, which is a characteristic of particular interest in conjunction with actual conditions in practice.

Accelerated tests of an extreme nature are included in the J-M specifications. For instance, the chemical resistance test is a significant indication of the stability of the binder which, naturally, is of great importance in the durability of the joint material. The chemical test specifies that there shall be no disintegration of the specimens when boiled in concentrated hydrochloric acid for 30 minutes; when immersed in commercial gasoline for 48 hours; and when immersed in lubricating oil (SAE 30) for 48 hours. Discoloration or a slight swelling of the joint specimens shall not be considered as failure.

An accelerated weather test provides that specimens subjected for seven days to a constant temperature of 165 deg. F., twenty-four hours immersion in water,

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and 10 freezing and thawing cycles, shall show no evidence of disintegration.

Appearance: Since J-M Cork Expansion Joint retains the pleasing, natural color of the cork, the joint material can be used freely in structures of an ornamental nature where the appearance of the expansion joints is of great importance. The color blends nicely with that of concrete so that it is not particularly noticeable and in no way objectionable. Non-extrusion, of course, prevents the unsightly accumulation of material surrounding the joints.

SE Cork Expansion Joint

Johns-Manville SE (Self-Expanding) Cork Expansion Joint was developed to provide an expansion joint which would possess the ability of expanding beyond its original thickness. This development, fulfilling the final requirement of a completely satisfactory joint material, serves the important purpose of filling voids at joints caused by the contraction and shrinkage of the concrete.

SE Cork Expansion Joint is Standard Cork Joint compressed at the factory under controlled conditions in such a way that recovery does not take place until after the material is installed in the concrete. Although the method requires strict processing, the result is simple: Moisture is removed in the factory and reabsorbed in the field. In the many installations thus far made the performance has entirely substantiated the laboratory work.

Immediately after compression, the factory wraps SE Cork in a special water-resisting package to retard recovery. This packaging is not removed until immediately before the installation of the joint material between the concrete units. The necessary moisture for recovery in service is absorbed by the exposed cork from the air, from the concrete or by being immersed in water.



A close-up section of paving around the U. S. Department of Justice Building, Washington, D. C., illustrating the neat appearance of J-M Cork Expansion Joint



No unsightly streaks of extruded plastic material mar the sidewalks surrounding the George Rogers Clark Memorial, Vincennes, Ind. J-M Cork Expansion Joints were used throughout

SE Cork Joint is not stocked locally but is shipped direct from the factory. Prior to installation SE Cork should be carefully stored to protect the packaging from mechanical damage and exposure to water or damp conditions. These precautions are similar to those required in connection with the storage of portland cement.

The recovery of SE Cork depends upon moisture conditions and the amount of moisture absorbed. Recoveries, and the minimum limits beyond which the cork should not be compressed, are given in the table.

Recovery and minimum compression table

For joint opening inches *	Ultimate thickness inches—approx.	Minimum compression limits, inches—approx.
½	⅝	⅜
⅝	¾	½
¾	1⅛	⅝
1	1⅜	¾

* SE Cork Expansion Joint is actually somewhat less in thickness than the joint opening.

The recoveries shown in the table are strictly indicative of the characteristics of the material and do not

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signify that similar recoveries will occur in actual practice. This is because, under service conditions, the amount of moisture encountered is a variable quantity. If essential, the rate of recovery can be hastened by soaking SE Cork in water. Substantial recovery does not take place until after the material has been immersed for approximately five hours. After full recovery, SE Cork conforms with specifications for J-M Standard Cork Expansion Joint.

As an illustration of the working range of SE Cork, let it be assumed that a 1″ joint is required. This would require a cork joint manufactured from 1½″ of standard cork material, dehydrated and compressed to 1″. Installed in concrete paving, this 1″ joint may be compressed without extrusion to ¾″. Should the concrete contract, however, so that the joint opening increases to as much as 1⅜″, the cork joint, in the presence of moisture will expand to accommodate this increased dimension. In other words, the working range is from ¾″ to 1⅜″, thus providing for a movement of ⅝″ per joint.

The cork expands due to moisture absorption from the green concrete and curing water. Since absorption cannot take place immediately there is sufficient time for the concrete to set before any stress is developed in the joint.

A desirable characteristic of the SE Cork permits the rate of recovery to be controlled. At temperatures under 100 deg. F., there is an elapsed time of several days before the cork material absorbs sufficient moisture from new concrete to start recovery. If essential, full recovery may be obtained in a few minutes by exposing the cork joint to boiling water.



Replacing asphalt joint filler, in existing joints, with SE Cork Expansion Joint

Installation Methods

J-M Cork Expansion Joint may be installed in accordance with conventional methods for the installation of expansion joint. In general, expansion joint materials require a supporting device such as a bulkhead or, in some instances, a metal channel cap which functions not only as a bulkhead but also forms a protection for the joint material where it is exposed at the surface of the paving.

Depending upon dowel construction, there are various special devices for installing expansion joint and holding the dowels. Bulkheads and installation devices are removed after the concrete has been placed and before it has attained its initial set. The exposed edges of the concrete along the joint material are then finished to prevent spalling and to add to the appearance of the completed joint.

Preliminary treatment of SE Cork Joint, except for existing slots, is not necessary. In placing SE Cork in existing slots, rapid recovery may be desirable because of the loose fit of the joint in the slot, in which case the rate of recovery may be hastened by immersion in water up to five hours or in boiling water for a few minutes. In those instances where SE Cork fits snugly into the slot preliminary soaking in water may not be necessary.

Of particular importance to the road builder are the facts that J-M Cork Expansion Joint does not become brittle at low temperatures or soft at high temperatures. When frozen, the joint retains its resiliency and may be repeatedly frozen and thawed without injury. Also, in addition to possessing toughness and strength in excess of that necessary for shipping, handling and installation, J-M Cork Expansion Joint is light in weight, easy to handle, readily cut to special shapes, and simply installed by the ordinary methods common with other preformed joints.

J-M Felt-Sided Expansion Joint

Johns-Manville also furnishes the ordinary felt-sided type of expansion joint composed of a bituminous core, principally asphalt, confined between two sheets of felt. It is supplied in slab form or cut to size, and in thicknesses of ¼″, ⅜″, ½″, ¾″ and 1″. Other thicknesses can be shipped on special order. The maximum dimensions are 10 ft. in length and 40″ in width.

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J-M STANDARD CORK EXPANSION JOINT SPECIFICATION

The following specifications are based upon laboratory tests of J-M Standard Cork Expansion Joint to be used in concrete highways and in other types of construction where expansion joints are required.

Section 1 - Material:

Cork Expansion Joint shall be available in standard thicknesses (plus or minus 1/32") of 1/4", 3/8", 1/2", 3/4" and 1", in any length up to 10 ft., and in standard widths up to 40".

Greater dimensions and thicknesses may be obtained upon application.

Section 2 - Composition:

Cork Expansion Joint shall be formed from clean cork particles relatively free from hard particles and dust. The granulated cork shall be thoroughly bonded by a synthetic resin of an insoluble nature and shall not be exposed in the process of manufacture to a temperature in excess of 300 deg. F.

Section 3 - Properties:

Cork Expansion Joint shall have the following specified properties:

(a) Accelerated Weathering Tests: There shall be no evidence of disintegration after subjection for 7 days to a constant temperature of 165 deg. F., 24 hours immersion in water, and 10 freezing and thawing cycles.

(b) Compressibility: The pressure required to compress to 50 percent of the original thickness shall not be more than 600 nor less than 125 lb. per sq. in.

(c) Resilience: Recovery shall not be less than 90 percent of original thickness one hour after the third compression.

(d) Extrusion: Extrusion shall not be more than 0.125" when compressed to 50 percent of the original thickness.

(e) Chemical Resistance: There shall be no disintegration (1) when boiled in concentrated hydrochloric acid for 30 minutes, (2) when immersed in commercial gasoline for 48 hours and (3) when immersed in lubricating oil (SAE 30) for 48 hours. Discoloration or a slight swelling shall not be considered as failure.

Section 4 - Test Methods:

Tests to determine the properties of Cork Expansion Joint shall be made in accordance with the procedures outlined below:

(a) Accelerated Weathering Tests: At least five specimens of Cork Expansion Joint 4" x 4" in size shall be exposed to a temperature of 165 deg. F. for a period of 7 days. Upon completion of this accelerated aging test, the specimens shall be immersed in water at room temperature for 24 hours.

The specimens shall then be placed on edge in a suitable container and water poured into the container to a depth of 2" (one-half the height of the specimens). It will be necessary to put a weight or simple frame across the exposed edges of the specimens during this test in order that the positions of the specimens

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in the water will be maintained. The pan containing the specimens partially immersed in water shall be placed in a freezing chamber for a period long enough to freeze the water into solid ice. The temperature of the freezing chamber shall be maintained between plus 14 and minus 4 deg. F. Upon completion of the freezing cycle, the pan containing the specimens shall be removed from the freezing chamber and partially immersed in water at a temperature maintained between 65 and 100 deg. F. When the ice surrounding the specimens has melted entirely, the first cycle of the test is finished. This cycle shall be repeated ten times.

The length of time required for freezing and thawing tests will be governed by the temperature of the freezing chamber and the volume of water around the specimens. Note that Cork Expansion Joint specimens are partially immersed in water throughout the entire test.

After ten freezing and thawing cycles are completed, the specimens shall be removed from the water and allowed to stand in air at room temperature for 48 hours. No cracks or other evidence of disintegration shall be visible on the specimens.

The samples of Cork Expansion Joint which have undergone the treatment described in Section 4, (a), shall be designated as "weathered specimens".

At the discretion of the testing engineer, all accelerated weathering tests may be ommitted and the Cork Expansion Joint as received from the manufacturer shall comply with specifications in Section 3, (b), (c), (d) and (e).

(b) and (c) Compressibility and Resilience: One of the 4" x 4" "weathered specimens" shall be used in this test. Three separate load applications shall be employed in which the cork specimen shall be compressed each time between smooth, flat surfaces to 50 percent of its original thickness. The load shall be applied at a rate of 0.05 inches per minute. Load shall be released immediately upon attaining 50 percent consolidation of the specimen. After the first compression, the specimen shall be allowed to recover for 30 minutes before proceeding with the second compression.

A similar recovery period shall elapse between the second and third compressions. The maximum load required for 50 percent compression and the thickness one hour after the third load release shall be recorded. Percentage recovery shall be construed as:

$$\frac{\text{Thickness one hour after release}}{\text{Original Thickness}} \times 100$$

Pressure and percentage recovery figures shall comply with the requirements of Section 3, (b) and (c).

(d) Extrusion: One of the 4" x 4" "weathered specimens" of Cork Expansion Joint shall be placed in a suitable steel mold so constructed as to restrain the lateral movement of the specimen on three edges. The specimen shall then be covered with a 1/2" steel plate which fits snugly but without binding within the three restraining sides of the steel mold. Load shall be applied to the upper surface of the 1/2" steel plate. The specimen shall be compressed at a rate of 0.05 inches per minute to 50 percent of its original thickness. The amount of extrusion when so compressed shall be measured at the center of the free edge of the specimen by means of a suitably mounted dial indicator or other measuring device reading to 0.001 inch.

(e) Chemical Resistance: Test methods are fully outlined under Section 3, (e). The remaining three "weathered specimens" of Cork Expansion Joint shall be employed in these tests.

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J-M SE (Self-Expanding) CORK EXPANSION JOINT SPECIFICATION

The following specifications are based upon laboratory tests of J-M SE (Self-Expanding) Cork Expansion Joint to be used in concrete highways and in other types of construction where expansion joints are required.

SECTION 1 - MATERIAL:

SE Cork Expansion Joint shall be available in thicknesses for the following standard joint thicknesses: 1/2", 5/8", 3/4" and 1". The thickness tolerances shall be plus 0 to minus 10 percent to allow for easy placing in the expansion opening. The cork shall be available in standard lengths up to 10 ft. and widths up to 3 ft.

SECTION 2 - COMPOSITION:

SE Cork Expansion Joint shall be formed from clean cork particles relatively free from hard particles and dust. The granulated cork shall be thoroughly bonded by a synthetic resin of an insoluble nature and shall not be exposed in the process of manufacture to a temperature in excess of 300 deg. F.

SECTION 3 - PROPERTIES:

SE Cork Expansion Joint shall have the following specified properties:

(a) Expansion: (No evidence of disintegration)

(1) In Boiling Water: Final thickness to be not less than 140 percent of the joint thickness for which it is recommended.

(2) In 100 percent Relative Humidity: Final thickness to be not less than 130 percent of the joint thickness for which it is recommended.

(3) Freezing and Thawing: Final thickness to be not less than 130 percent of the joint thickness for which it is recommended.

(b) Fundamental Properties After Expansion:

(1) Compressibility: Not more than 600 nor less than 125 lb. per sq.in. shall be required to compress to 50 percent of expanded thickness.

(2) Resilience: Shall recover to not less than 90 percent of expanded thickness one hour after third compression.

(3) Extrusion: When compressed to 50 percent of expanded thickness, shall be not more than 0.125".

(4) Chemical Resistance: Shall not disintegrate: First, when boiled in concentrated hydrochloric acid for 30 minutes. Second, when immersed in commercial gasoline for 48 hours. Third, when immersed in lubricating oil (S.A.E. 30) for 48 hours.

Discoloration or a slight swelling shall not be considered as failure.

SECTION 4 - TEST METHODS:

(a) Expansion:-

(1) In Boiling Water: A specimen of SE Cork Expansion Joint, 5" x 10", shall be immersed in boiling water for a period of 1 hour. It shall then be removed and allowed to cool to room temperature for 15 minutes. Thickness shall be measured and the percentage expansion computed on the basis of the joint thickness for which the particular specimen was recommended. Discoloration of the water shall not be considered as an indication of failure.

(2) In 100 percent Relative Humidity: A specimen of SE Cork Expansion Joint, 4" x 4", shall be subjected to 95 to 100 percent relative humidity at temperature of 95 deg. F. for a period of 28 days. Specimen shall be removed from humidity chamber and allowed to remain in air for 24 hours. At the end of this time, thickness shall be measured and the percentage expansion computed on the basis of the joint thickness for which the particular specimen was recommended.

JOHNS-MANVILLE Building Materials

SE Cork Expansion Joint Specification

DATE June, 1938
(Cancelling BMM-215 dated August, 1937)
BMM-417

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(3) Freezing and Thawing: A specimen of SE Cork Expansion Joint 4" x 4" in size shall be immersed in water for 24 hours at room temperature. The specimen shall be removed from the water and placed in a freezing chamber for 5 hours. The temperature of the freezing chamber shall be maintained between plus 14 and minus 4 deg. F. After the freezing period, the specimen shall be placed in water at room temperature for 3 hours. Five hour freezing and 3 hour thawing periods shall follow consecutively until the specimen has completed 12 cycles. The specimens shall then be subjected to 95 to 100 percent relative humidity at a temperature of 95 deg. F. for 96 hours.

Following the treatment outlined, the thickness of the specimen shall be measured and the percentage expansion computed on the basis of the joint thickness for which it was recommended. The specimen shall not show loosened particles or other signs of disintegration.

NOTE: Freezing and thawing times given above are minimum periods. Additional exposure to either condition will not affect test results and will permit continuation of the test throughout the night without attention.

(b) Fundamental Properties After Expansion: At least three specimens of SE Cork Expansion Joint measuring 5" x 10" shall be immersed in boiling water for a period of one hour. These shall then be removed and allowed to stand in room air for 24 hours. Each of these specimens shall then be cut or sawed into two 4" x 4" samples, the thickness of which shall be measured. This thickness is hereafter referred to as the "expanded thickness". An optional method of obtaining samples of "expanded thickness" shall be as follows: At least five specimens of SE Cork Expansion Joint 4" x 4" in size shall be subjected to 100 percent relative humidity at a temperature of 95 deg. F. for 28 days. Specimens shall then be removed from humidity chamber and allowed to remain in air for 24 hours. Thickness of specimens at the completion of this treatment shall be measured. This thickness is hereafter called "expanded thickness".

(1) and (2) Compressibility and Resilience: One of the 4" x 4" expanded specimens shall be used in this test. Three separate load applications shall be employed in which the cork specimen shall be compressed each time between smooth, flat surfaces to 50 percent of its expanded thickness. The load shall be applied at a rate of 0.05 inches per minute. Load shall be released immediately upon attaining 50 percent consolidation of the specimen. After the first compression, the specimen shall be allowed to recover for 30 minutes before proceding with the second compression. A similar recovery period shall elapse between the second and third compressions. The maximum load required for 50 percent compression and the thickness one hour after the third load release shall be recorded. Percentage recovery shall be construed as:

$$\frac{\text{Thickness one hour after release}}{\text{Original thickness}} \times 100$$

Pressure and percentage recovery figures shall comply with the requirements of Section 3, (b), (1) and (2).

(3) Extrusion: One of the 4" x 4" expanded specimens of SE Cork Expansion Joint shall be placed in a suitable steel mould so constructed as to restrain the lateral movement of the specimen on three edges. The specimen shall then be covered with a 1/2" steel plate which fits snugly but without binding within the three restraining sides of the steel mould. Load shall be applied to the upper surface of the 1/2" steel plate. The specimen shall be compressed at a rate of 0.05 inches per minute to 50 percent of its original thickness. The extrusion when so compressed shall be measured by means of a dial indicator horizontally mounted at the center of the free side of the cork specimen. The indicator point shall contact the specimen at a position approximately one-quarter of the expanded thickness above the bottom of the specimen. Readings shall be made to 0.001 inches.

(4) Chemical Resistance: The remaining three expanded samples shall be used in making these tests. One specimen shall be used for each test. Test methods are fully outlined under Section 3, (b), (4).

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Asphalt Tile Flooring

Standard-type competitive materials of proved merit

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Asphalt Tile Flooring

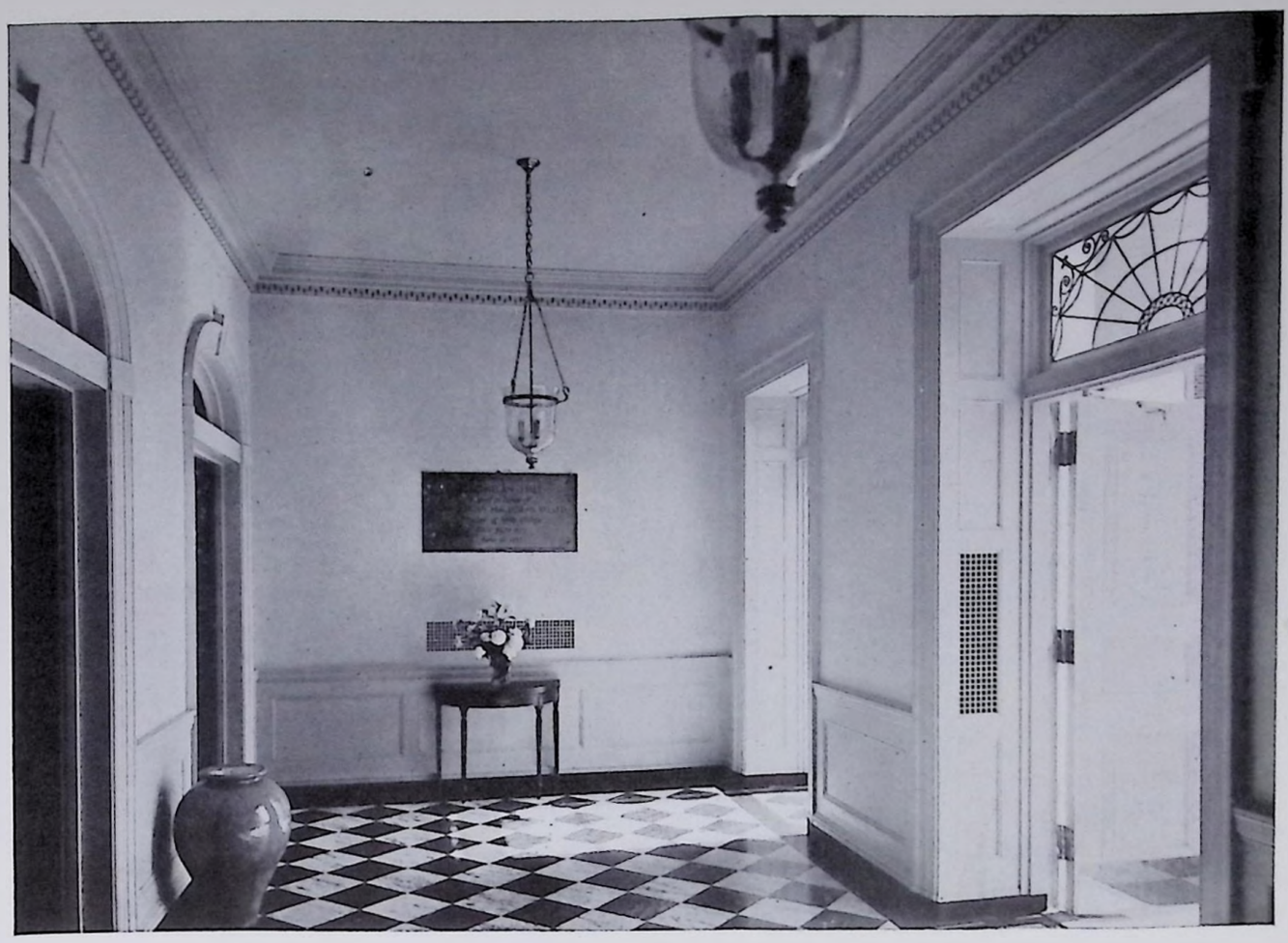
Requirements for flooring vary according to the design and use of the proposed building. Most important in their selection, however, are the characteristics of attractiveness, durability, and low-maintenance cost.

The acceptance of Asphalt Tile Flooring in the above classifications is indicated by the fact that thousands of square feet have been specified and installed in slum clearance and resettlement projects.

In this section are included complete details for preparation of base, installation and maintenance, as well as Federal Specification SS-T-306, to which reference is made for all government projects.

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J-M Asphalt Tile Flooring



This installation of J-M Asphalt Tile Flooring in MacMillan Hall at Wells College, Aurora, N. Y., assures an attractive, permanent and resilient floor. Dwight James Baum, architect

Whether the need is for a richly decorative floor or one that is strictly utilitarian, J-M Asphalt Tile Flooring meets all of the seven important requirements of a desirable floor covering:

1. Fine appearance
2. Low cost
3. Marked durability
4. Resistance to moisture and fire
5. Comfort, sanitation and safety under foot
6. Minimum maintenance expense
7. Ease of repair or extension

Appearance:

With the great variety of colors and patterns available, any desired effect is easily obtained—bright and cheerful, dark and rich, gay or unobtrusive. The harmony of the extensive line of colors permits them to be used together with the utmost freedom in any pattern or combination selected, with the assurance that the resulting effect will be pleasing to the eye and perfectly suitable whatever the scheme of interior decoration or location.

Low Cost:

The first cost of a Johns-Manville Asphalt Tile floor compares favorably with other resilient floor coverings of the same thickness, while its extraordinary service over years with minimum upkeep demonstrates its outstanding economy.

Durability:

The toughness, resistance to abrasion and maintained durability of J-M Asphalt Tile Flooring under the hardest usage in busy locations has been proved in hundreds of installations. Its surface does not become dull with use and years of foot traffic only bring out its lustre.

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Resistance to Moisture and Fire:

By the very nature of its composition, J-M Asphalt Tile is more resistant to moisture than other resilient floor coverings. The method and materials used insure a permanently effective bond between the flooring and the sub-floor when application is made in accordance with manufacturer's directions. After installation, the asphalt tile is fire-retardant and has been officially approved for use in fire-proof buildings in many large cities throughout the country, notably New York where the fire laws are very stringent.

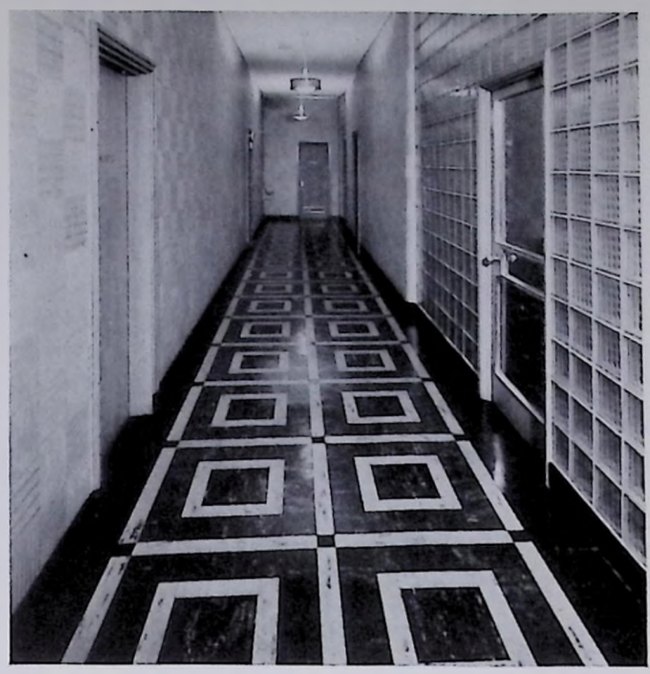
Comfort, Safety and Sanitation:

The resiliency of J-M Asphalt Tile Flooring is immediately perceptible. It cushions hard heels and makes for quiet foot traffic. It is also a safe floor, because the asphalt tile does not wear slippery with use. It is odorless, non-absorbent and will not originate dust. This, with its ease of cleaning, makes it particularly adapted to locations where high sanitary standards must be maintained, such as hospitals, schools and sanitariums. Building managers especially recommend J-M Asphalt Tile Flooring for all types of institutional structures.

Minimum Upkeep:

J-M Asphalt Tile, due to its toughness, resistance to abrasion, and its natural sheen, does not require expensive treatment and constant attention to preserve the appearance and life of the floor.

The floors of offices, hospitals and other buildings exposed to normal foot traffic, can be maintained clean and attractive by the usual daily brushing and an occasional cleaning with an approved neutral soap. For the floors of street-level shops, restaurants, etc., an occasional waxing with an approved emulsion wax will make the Asphalt Tile easier to clean when exposed to dirt and grit. Where highly polished floors are desired, the natural sheen of J-M Asphalt Tile permits a high lustre to be obtained, easily and economically, by the use of an approved water wax.



One of the many striking designs of J-M Asphalt Tile used in the Toronto Globe and Mail building, Toronto, Ontario

Ease of Repair or Extension:

When excessive abuse or severe accident makes a repair necessary, new units can be easily inserted to replace the old. The same is true where partition removals or office changes require an extension of the asphalt tile flooring in the same pattern.

Types of J-M Asphalt Tile Flooring

J-M Asphalt Tile Flooring comprises two types of units to cover all flooring conditions: Type A Asphalt Tile, in three thicknesses, 1/8", 3/16" and 1/4"; and Heavy Duty Asphalt Tile, 1/4" thick.

Type A Asphalt Tile

Type A Asphalt Tile, available in a large variety of plain and marbleized colors for use under all normal foot traffic, is furnished in 1/8", 3/16" and 1/4" thicknesses. Standard sizes are available to meet every decorative need and a wide variety of service or installation requirements.

The Type A Asphalt Tile Flooring must be installed over suitable sub-floors in accordance with manufacturer's instructions. Complete application and maintenance directions appear on other data sheets.

The units are available in the plain colors below:

No. 1 Black	No. 11 Tan	No. 22 Rose Taupe
No. 2 Mahogany	No. 12 Terra Cotta	No. 23 Emerald
No. 3 Red	No. 13 Ivy Green	No. 24 Pearl Gray
No. 4 Brown	No. 14 French Gray	No. 31 Dark Blue
No. 5 Olive Green	No. 21 Buff	No. 32 Light Blue

The approximate weights per sq. ft. of asphalt tile are 1.2 lb., 1.8 lb. and 2.3 lb. for 1/8", 3/16" and 1/4" thicknesses, respectively.

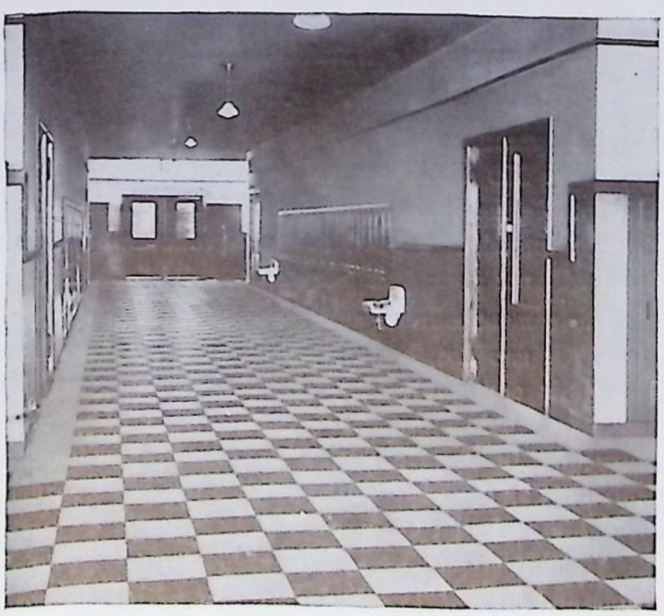
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They are also furnished in marbleized colors, the base or field color being blended with as many as three other colors, to produce an unusual and attractive effect. Since the mottling of no two asphalt tile in the same color combination can be exactly alike, a floor laid with J-M Marbleized Asphalt Tile shows a freedom from repetition ordinarily lacking in marbleized designs. The marbleized colors are:

Designation	*Splash Color*		*Base or Field Color*
No. 101	White	on	Ivy Green
No. 102	White	on	Black
No. 103	White and Yellow	on	Rose
No. 104	Terra Cotta and Yellow	on	Mahogany
No. 106	Black, White and Green	on	Gray
No. 107	White	on	Green
No. 108	Buff	on	Mahogany
No. 111	Black and White	on	Gray
No. 112	White and Green	on	Black
No. 115	Ivy Green and White	on	Green
No. 116	Dark Brown and Orange Gold	on	Cream
No. 118	Red and Gold	on	Black
No. 119	White and Gold	on	Red
No. 120	White and Green	on	Olive Green
No. 121	White and Gold	on	Terra Cotta
No. 122	White	on	Brown
No. 123	Brown and White	on	Beige
No. 124	White and Blue	on	Dark Blue
No. 125	White and Blue	on	Light Blue

Type A Asphalt Tile are manufactured in the following sizes, all colors, 1/8" and 3/16" thick (1/4" thickness, 9" x 9", 9" x 18", 12" x 12" and 12" x 24" only):

3" x 3"	6" x 6"	9" x 9"	12" x 12"	18" x 24"
3" x 6"	6" x 12"	9" x 18"	12" x 24"	—



J-M Asphalt Tile are now the standard flooring for corridors and many other places in schools



This attractive floor, in marbleized colors, is serving effectively in one of New York City's well-known restaurants

Heavy Duty Asphalt Tile

J-M Heavy Duty Asphalt Tile is an exclusive product scientifically designed for exceptionally heavy foot traffic or light trucking conditions too severe for any other kind of decorative resilient flooring.

As with Type A Asphalt Tile Flooring, installation must be in accordance with manufacturer's instructions which are set forth on other data sheets, entitled "Directions for Application and Maintenance of J-M Asphalt Tile Flooring."

Heavy Duty Asphalt Tile are furnished in 1/4" thickness only, in the following colors:

Plain Colors	*Marbleized Colors*
Black	No. 203 Gray on Black
Red	No. 204 Green on Black
Mahogany	

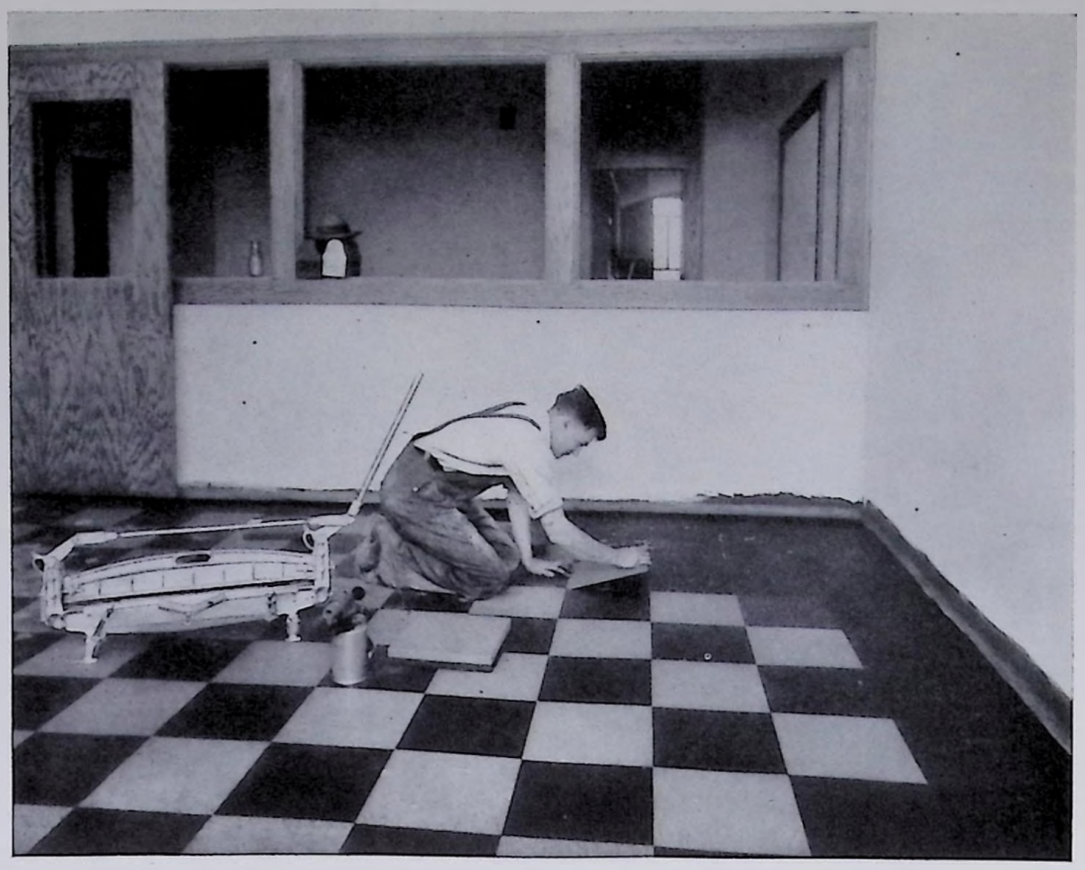
Standard sizes are 9" x 9", 9" x 18", 12" x 12" and 12" x 24". The weight per sq. ft. is approximately 2.3 lb.

Feature Strips for Asphalt Tile

Feature strips are available 1/8" and 3/16" thick, in all the colors of Type A Asphalt Tile, cut in widths of 1" to 3" (in multiples of 1/2") and 24" long. These are generally used with contrasting colored units to produce attractive panel patterns.

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The installation of a J-M Asphalt Tile Floor is easily and rapidly accomplished

Flexible Composition Base and Corners

J-M Flexible Composition Base is recommended wherever a cove base is desired for use with J-M Type A or Heavy Duty Asphalt Tile. This type of base will readily conform to the irregularities usually found in wall construction. The base, applied with rubber cement and using brads where necessary, will permanently follow the contour of the wall. J-M Asphalt Tile Cement should not be used with the flexible base, nor is the base recommended for on grade or below grade work where moisture or dampness may be encountered.

The base is furnished only in black, brown and mahogany, in 3-ft. strips, 6″ high and ⅛″ in thickness. The floor lip is available in ⅛″, 3/16″ and ¼″ thicknesses, for use with asphalt tile. Shipped in case lots only, containing 300 lin. ft., of which not more than 10 percent may be lengths shorter than 3 ft.

External moulded corners ⅛″ thick can be supplied in pairs, each pair containing a right and a left corner spaced 6″ apart. Right or left internal corners are available as an integral part of the base, moulded to one end. External and internal corners are supplied with a floor lip ⅛″, 3/16″ or ¼″ thick, as desired.

Cements and Emulsions

J-M Asphalt Tile Cement:

J-M Asphalt Tile Cement is an emulsified asphalt compounded to a special formula and possessing greater adhesive qualities than the ordinary cements generally employed for such purposes. It works most satisfactorily at about 70 deg. F.

The spreading capacity of the asphalt tile cement averages 150 sq. ft. per gallon over smooth surfaces acceptable for laying J-M Asphalt Tile Flooring. It is not intended to level rough or uneven sub-floors and will not serve that purpose.

The cement can be easily spread over a dry surface. It can not, however, be used over a sub-floor which is continually wet, such as is sometimes encountered below grade or where a head of water is present. In these cases an approved waterproofing job must be done before the application of the cement and the asphalt tile flooring.

Asphalt Tile Cement is furnished in 1 and 5-gal. cans and 30 and 55-gal. drums, and weighs approximately 10 lb. per gallon. One-gallon cans are packed 6 per case and are shipped in case lots only.

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J-M Fibrated Flooring Asphalt:

J-M Fibrated Flooring Asphalt is an asphaltic compound used with portland cement, sand and water to make a leveling fill, from a feather edge to ¾″ thick, where recommended for floors requiring such preparation. When a greater fill is necessary, a mineral aggregate may be added. The correct proportions of Fibrated Flooring Asphalt and the other ingredients of the leveling fill are given in the data sheets comprised in the "Application and Maintenance of J-M Asphalt Tile Flooring," DS Series 145.

The quantity of Fibrated Flooring Asphalt which should be used to a fill mixture per 110 sq. ft., ½″ thick, or 90 sq. ft., ¾″ thick, is 7½ gallons.

Fibrated Flooring Asphalt is furnished in 5-gal. cans and 30 and 55-gal. drums, and weighs approximately 10 lb. per gal.

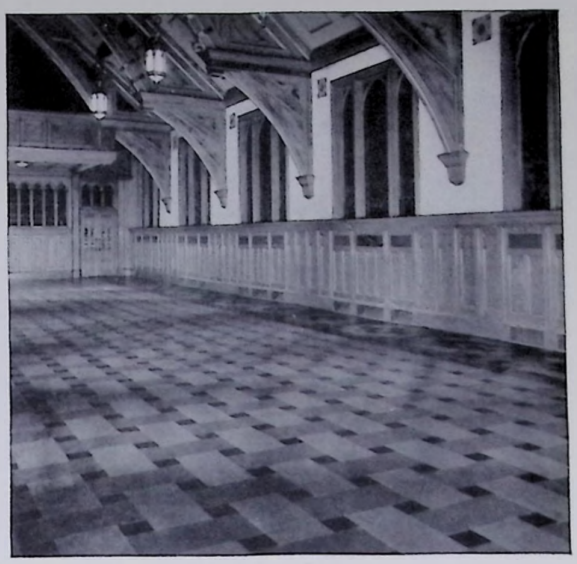
J-M Emulsion Primer:

J-M Emulsion Primer is an emulsified asphalt used in connection with underlayment for priming concrete and other sub-floors.

Emulsion Primer is always required under a leveling course or underlayment, and must be allowed to dry before the underlayment is applied. On or below grade, it is necessary first to apply J-M Cut-Back Primer to the sub-floor. After the Cut-Back Primer is dry, the Emulsion Primer is applied. On above-grade installations, only Emulsion Primer is required.



For the office reception room, J-M Asphalt Tile Flooring combines modern feeling with practical utility



Beautiful effects, such as shown in this church, are readily achieved with J-M Asphalt Tile Flooring

J-M Emulsion Primer should be allowed to dry completely. Drying overnight is preferable, although this may not always be practicable. However, even under most urgent conditions, Emulsion Primer should be allowed to dry at least three hours.

The average coverage of Emulsion Primer is 75 to 100 sq. ft. per gallon. The primer is furnished in containers of 5, 30 and 55-gal. capacities and weighs about 10 lb. per gal.

J-M Cut-Back Primer:

J-M Cut-Back Primer is a thin liquid asphalt for priming concrete sub-floors. It should be applied with a flooring brush, not a mop. This material is inflammable and very volatile. It must not be used near any fire and, because of fumes, rooms must be well ventilated during its application.

All concrete sub-floors, either on grade or below grade should be primed with Cut-Back Primer. The priming coat must be allowed to become thoroughly dry, which will take from 12 to 24 hours, before applying the Asphalt Tile Cement.

The coverage of J-M Cut-Back Primer is 200 sq. ft. per gallon if the floor is reasonably smooth. It weighs approximately 10 lb. per gal. and is furnished in 1, 5, 25 and 50-gal. containers.

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Protection and Maintenance of J-M Asphalt Tile

Resiliency and comfort are advantages in J-M Asphalt Tile Flooring which are lacking in hard floors. Since J-M Asphalt Tile Flooring is resilient, it should receive proper care to protect its appearance and prolong its wear. Sharp point loads of furniture or equipment or heavy static loads require protection to avoid indentations in the asphalt tile. Office swivel chairs, beds and the like, should be equipped with ball-bearing casters with wide soft-rubber treads. Heavy stationary furniture should have rubber cups beneath the legs. Portable furniture should be equipped with glides or rubber sleeves. Metal domes are not suitable as they tend to point the load.

The customary maintenance given to linoleum and similar soft floor coverings is all that is necessary to keep J-M Asphalt Tile Flooring in good condition. Warm suds of an approved neutral soap can be used to clean the asphalt tile without injury to the material. Soap powders which contain fillers not readily soluble, should not be used, as they may leave a white sediment in the joints between the asphalt tile. Many soap powders are so strong and harsh they destroy the lustre on the surface of the asphalt tile, rather than improve its appearance.

If a highly polished floor is desired, this may readily be accomplished by the use of an approved emulsion wax. Waxes containing solvents such as benzine, turpentine, or other solvents of this type, should not be used for the reason that the solvents will soften the asphalt tile and "run the colors" of one asphalt tile into the other. A list of approved emulsion waxes will be furnished on request.



J-M Asphalt Tile Flooring, as typified by this installation in the new Acacia Mutual Life Insurance Co. Building, Washington, D. C., fulfills all the exacting requirements demanded in present-day construction. Shreve, Lamb & Harmon, architects

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SPECIFICATIONS FOR J-M ASPHALT TILE FLOORING

(Short Form for use by Architects)

(Note: Manufacturer's application directions referred to in the following specifications are covered on data sheets entitled, "J-M Asphalt Tile Flooring, Directions for Application and Maintenance" - DS Series 145).

WORK INCLUDED:

The work contemplated under this specification shall include all material, labor, equipment and services necessary for the installation of Johns-Manville Asphalt Tile Flooring as shown on the drawings or herein specified (State in detail work to be done including colors, patterns, sizes and thickness of asphalt tile to be used in individual rooms. Since there is a wide difference in cost between colors of asphalt tile, it is important that definite colors be specified in order that estimates may be correctly submitted.)

If a cove base is shown on plans or called for in the schedule, it shall be Johns-Manville 6" high Flexible Composition Base having a wall thickness of 1/8" and a floor lip the thickness of the asphalt tile specified.

WORK NOT INCLUDED:

The following work will be furnished and installed as specified under other divisions of the specifications which this contractor shall read to ascertain what is called for therein.

A. (Include if sub-floor is to be new concrete)

The concrete sub-floor shall be firm and solid and shall have a top finish of at least 3/4" to 1" thick. This finish shall be composed of one part portland cement and two parts clean screened sand. This topping shall be brought to a smooth, steel-troweled, monolithic finish free from waves and irregularities and finished to a point below the required floor level equal to the thickness of the asphalt tile flooring specified.

B. (Include if sub-floor is to be old concrete)

The concrete sub-floor shall be prepared by the flooring contractor in accordance with manufacturer's application directions.

C. (Include if sub-floor is to be new wood)

New wood sub-floors shall be of double construction, over joists not to exceed 16" centers and which are of sufficient structural strength to carry intended loads without deflecting. The surface flooring shall be of well-seasoned, kiln dried, T & G flooring, not over 3"-face width, top-nailed and toe-nailed to a tight surface. All wood floors shall be sanded to a uniform smooth surface and shall contain no cupped or springing boards and shall be left in a suitable condition to receive Johns-Manville Asphalt Tile applied in accordance with manufacturer's application directions.

D. (Include if sub-floor is to be old or uneven wood)

Old wood sub-floors shall be of double construction over joists not to exceed 16" centers and which are of sufficient structural strength to carry intended loads without deflecting. These sub-floors shall be prepared by the flooring contractor in the manner described in the manufacturer's application directions.

E. (Continued on reverse side of page)

JOHNS-MANVILLE Building Materials

J-M Asphalt Tile Flooring - Specifications
(Short Form for Use by Architects)

DATE August, 1938
(Cancelling sheet dated April, 1938)

BMF-405

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E. (Include where J-M Flexible Composition Base is to be used)

A smooth backing of cement, wood, plaster or other suitable material shall be provided to the height of the base specified.

CONNECTING WORK:

The J-M Approved Asphalt Tile Flooring Contractor shall examine all surfaces on which his work is to be applied and he shall notify the architect in writing of any defects that he may discover which, in his opinion, he considers detrimental to the installation of his materials.

SCHEDULE:

It is suggested that, particularly on large jobs, the specifications contain a schedule indicating the following:-

a. Room name or number
b. Size and thickness of field asphalt tile
c. Color and arrangement of field asphalt tile
d. Color border asphalt tile
e. Color of flexible composition base, if included.

MATERIALS:

All asphalt tile flooring, asphalt tile cement (and where specified flexible composition base) referred to in these specifications shall be Johns-Manville and shall bear the manufacturer's label. The thickness of the asphalt tile, size, colors, etc., shall be as specified and shall be installed by an approved Johns-Manville Contractor in strict accordance with the manufacturer's application directions.

SAMPLES:

The contractor shall submit for approval with his bid duplicate samples of each color of J-M Asphalt Tile required under his contract. Samples shall be labeled with the manufacturer's name, flooring contractor's name, and the name and color number of the tile.

INSTALLATION:

After the completion of work by the trades such as plasterers, painters and carpenters, J-M Asphalt Tile shall be applied in strict accordance with the manufacturer's application directions. Temperature of the rooms and sub-floors shall be maintained at a minimum of 70 deg. F. for several days before, during and after the application of J-M Asphalt Tile. The completed floor, when protection is necessary, shall be covered with building paper.

CLEANING:

J-M Asphalt Tile Flooring shall be thoroughly cleaned (using a neutral soap or cleaner approved by the manufacturer) when directed by the architect, after completion of the installation and after the asphalt tile has thoroughly bonded to the sub-floor. (If a wax finish is desired, the wax shall be of a type approved by Johns-Manville for use on asphalt tile. The number of coats desired shall be specified.)

PROTECTION:

Information on bearing equipment recommended by Johns-Manville shall be furnished by the contractor upon completion of the installation so that the proper equipment may be provided for the protection of the J-M Asphalt Tile Flooring against sharp pointed loads, etc.

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J-M ASPHALT TILE FLOORING

DIRECTIONS FOR APPLICATION AND MAINTENANCE

THESE DIRECTIONS apply to all Departments and Districts in the United States including the Pacific Coast. They also apply to J-M International and all Canadian Districts.

PURPOSE OF DIRECTIONS:

These directions are intended for the use of J-M Approved Flooring Contractors to serve as specifications for application of J-M Asphalt Tile, and are in no way to be construed as a substitute for skill, experience, and integrity possessed by these contractors.

MATERIALS AND SPECIFICATIONS:

Specifications: All material shall be installed according to these directions.

J-M Materials: Materials other than Johns-Manville shall not be used, except where noted.

Execution of Work: Asphalt Tile shall be applied by J-M Approved Asphalt Tile Flooring Contractors.

Special Cases: Refer all special cases to General Headquarters for instructions.

J-M MATERIALS AND USE:

Type A Asphalt Tile is a decorative floor covering adaptable for foot traffic. It is available in many colors and sizes and in 1/8", 3/16" and 1/4" thickness.

Heavy Duty Asphalt Tile is adaptable to severe conditions including medium and light-weight trucking. It is available in dark colors, 1/4" thick only.

J-M Asphalt Tile Cement is an emulsified asphalt cement used as an adhesive in fastening asphalt tile to sub-floors. Where applied over a smooth dense sub-floor it results in a permanent bond between the asphalt tile and the sub-floor. J-M Asphalt Tile Cement does not harden with age but remains tacky indefinitely and therefore, should be used only as an adhesive and not for the purpose of smoothing up rough concrete or other types of sub-floors. When an attempt is made to fasten asphalt tile over rough sub-floors with the cement, the asphalt tile does not have sufficient contact with the cement and the floor to result in a satisfactory bond and the asphalt tile will eventually become loose. Average coverage is as follows:

Type of Sub-Floor	Coverage in Square Feet per Gallon
Smooth Concrete Floor	125 to 175
Asphalt-Saturated Asbestos Felt	175 to 200
Flexboard Sheeting	110 to 125
Emulsion Type Underlayment	125 to 175

Fibrated Flooring Asphalt is a heavy-bodied emulsified asphalt containing fibre used as a binder in leveling course or underlayment.

JOHNS-MANVILLE Building Materials

J-M Asphalt Tile Flooring
Directions for Application and Maintenance

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Emulsion Primer is a heavy-bodied emulsified asphalt always used for priming all surfaces to receive underlayment. Average coverage 75 to 100 sq. ft. per gallon.

Cut-back Primer is a thin liquid asphalt for priming concrete sub-floors. Coverage is about 300 sq. ft. per gallon.

CAUTION: This material is inflammable and, because of fumes, rooms must be well ventilated during application.

Flexible Composition Base is a flexible rubber cove base used in connection with Type A and Heavy Duty Asphalt Tile Flooring.

Rubber Tile Cement is a good grade rubber tile cement used for cementing Flexible Composition Base on walls. This cement shall not be used for on-grade or below-grade locations.

Linoleum Paste is a good grade linoleum paste used to cement J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt to wood sub-floors where specifications call for this type installation. Linoleum paste is soluble in water and therefore shall not be used in damp locations.

J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt is used in connection with installation of 1/4" Type A and Heavy Duty Asphalt Tile over wood floors.

Reinforcing for Underlayment (1.8 lb. per sq. yd. diamond-mesh stucco lath or J-M Reinforcing, Style AA-1616) is used for reinforcing and bonding underlayment to wood sub-floors. Reinforcing shall be stretched taut to avoid bulging and shall be nailed to the sub-floor using 4d or 6d wire nails on 6" centers in both directions. Lath shall be butted, not lapped.

J-M 15-lb. Standard Asphalt-Saturated Rag Felt is used over wood floors in connection with wire reinforcing and emulsion-type underlayment.

J-M Standard Flexboard, 1/8" thick, is a flexible asbestos and cement board furnished in 4' x 8' sheets and is used in connection with the application of 1/8" and 3/16" Asphalt Tile over wood floors. This material can be readily sawed and can be nailed without drilling.

J-M Lap Cement is a cut-back asphalt cement used only in connection with the application of J-M Flexboard over wood floors.

CAUTION: Lap Cement is not suitable as an adhesive for Asphalt Tile and should never be used for this purpose.

HANDLING ASPHALT TILE AND CEMENT:

Heating Asphalt Tile: Store Asphalt Tile in a heated room. In cold weather place the boxes near radiators for several hours before unpacking.

CAUTION: The temperature of asphalt tile should be at least 70 deg. F., preferably 80 deg. F. Under no circumstances shall asphalt tile which is colder than room temperature be applied, due to condensation forming on the underside of the asphalt tile which tends to break down the adhesive qualities of the cement.

NOTE: Asphalt Tile is a plastic material and will not conform to the surface of a sub-floor at temperatures lower than 70 deg. F.

Uncrating: When removing Asphalt Tile from the boxes, handle carefully and pile in regular stacks upon a flat surface.

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Warped Asphalt Tile: If any of the Asphalt Tile are warped when removed from the boxes, pile them on a perfectly flat surface next to radiators or in a very warm room until they become flat.

Handling During Shipment: Truckmen and mechanics must be definitely instructed to exercise care at all times in handling cases.

Claims for Damage: If boxes or asphalt tile are broken in transit, notify the Transportation Company and file claims immediately.

Stocks: In general, J-M Asphalt Tile should be ordered as needed and not stocked. Cases should be stored proper side up as indicated on each case.

Cement, Emulsion Primer and Fibrated Flooring Asphalt: Store in a heated room. In cold weather, place containers near radiators for several hours before using. The temperature of these materials should be 70 deg. F. at least, preferably 80 deg. F. Keep from freezing. Do not expose to direct fire. Containers shall be kept covered at all times.

NOTE: Type A Asphalt Tile Cement should always be kept from freezing. If, however, accidental freezing does occur, the cement will not be permanently injured. Any frozen cement should be slowly thawed out by placing container in a warm room or near a radiator for several hours before using. Do not stir the cement while thawing. Emulsion Primer and Fibrated Flooring Asphalt may be permanently injured by freezing. If accidental freezing does occur, thaw out by storing the containers in a heated room. Do not stir while thawing. If thawed contents will not mix with water, the material has been injured and should not be used.

PREPARATION OF SUB-FLOORS TO RECEIVE TYPE A AND HEAVY DUTY ASPHALT TILE

NEW CONCRETE SUB-FLOORS ABOVE GRADE:

NOTE: Concrete slabs are considered above grade when such slabs are above the ground and have heated and ventilated spaces underneath them. Concrete slabs located slightly above the ground and consequently not having heat and ventilation underneath them are subject to approximately the same temperature, moisture and condensation conditions as slabs resting directly on the ground and should, therefore, be considered as on-grade.

Concrete shall be firm and solid, and shall have a top finish at least 3/4" to 1" thick. This finish shall be composed of 1 part portland cement and 2 parts clean, screened sand to prevent cracking. This topping shall be brought to a smooth finish by the use of a steel trowel. Lines or joints shall not be scored on the finished concrete surface.

The smoothness of the sub-floor is of vital importance in connection with the satisfactory performance of an Asphalt Tile. Rough sub-floors do not allow a proper contact between the asphalt tile cement and the asphalt tile and may result in the units coming loose from the sub-floor.

The Sub-Floor shall be scraped free of all foreign material such as plaster, paint, etc., and dust should then be removed with a soft-bristle broom or

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brush. Extreme care should be exercised to clean the edges and corners of the sub-floor thoroughly.

CAUTION: The concrete slab shall be thoroughly dry.

Primer (Cut-Back Primer) is not generally required. However, the priming of new concrete slabs is often considered a good assurance against possible concealed moisture.

Over concrete floors meeting the above requirements, apply Asphalt Tile in accordance with our standard application directions discussed under "Standard Application Directions for J-M Type A and Heavy Duty Asphalt Tile", following.

Rough or Uneven Sub-Floors will require an emulsion-type leveling course or underlayment applied in accordance with our standard application directions discussed under "Emulsion Type Leveling Course or Underlayment over Concrete Sub-Floors", following.

NEW CONCRETE SUB-FLOORS GRADE AND BELOW GRADE:

NOTE: "Grade or Below Grade" conditions apply not only when the slab rests directly on the ground, but also when the slab, although suspended above the ground, does not have a heated and ventilated air space below it.

Conditions where not adaptable: The construction proposed is not suitable for floors that are at any time subject to a head of water or to seepage. Such conditions require membrane waterproofing in accordance with accepted waterproofing practice. The term "membrane waterproofing" does not imply simply the application of a single ply of felt to the concrete slab. It means the application of a membrane containing several plys of waterproofing felts mopped down with hot asphalt and covered with two or three inches of concrete topping steel-troweled to a smooth even surface. Where this type waterproofing is required, it should be installed by a waterprocfing contractor thoroughly experienced in handling the work.

CAUTION: Sub-floors on grade or below grade that have been treated with waterglass (silicate of soda), or with other mixtures containing silicate of soda shall not be considered suitable to receive Asphalt Tile.

Precautions: Contractors shall use every precaution to determine the exact water or moisture conditions of each job. This is an absolutely necessary prerequisite for handling correctly every installation so that the floor will meet the high standard expected and, at the same time, preclude the possibilities of any complaints developing which will involve either the contractor or Johns-Manville.

Recommended Colors: In the use of Asphalt Tile on grade or below grade installations, any of the colors can be used with the exception of the following Type A blue and green colors. These colors, No. 23, 31. 32, 107, 115, 124 and 125, are not recommended because the blue and green pigments used in these colors are more or less susceptible to attack by alkalies usually found in concrete slabs on or below grade. Due to their high asphalt content, however, the following darker colors are more desirable for use on grade or below grade: No. 1, 2, 3, 4, 5, 102, 104, 108, 112, 118, 119, 120 and 122.

Concrete: The concrete shall be firm and solid, and shall have a top finish at least 3/4" to 1" thick. This finish shall be composed of 1 part portland cement and 2 parts clean, screened sand to prevent cracking. This topping

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shall be brought to a smooth finish by the use of a steel trowel. Lines or joints shall not be scored on the finished concrete surface.

Sub-Floor: The sub-floor shall be scraped free of all foreign material such as plaster, paint, etc., and dust should then be removed with a soft-bristle broom or brush. Extreme care should be exercised to clean edges and corners thoroughly.

CAUTION: The concrete Slab shall be thoroughly dry.

Primer (Cut Back Primer): The primer shall, without exception, be used on all grade or below grade slabs.

Application: After cleaning all dirt, dust, etc., from the areas, cut-back primer is brushed on over the entire surface using the minimum quantity which will still assure the whole surface being covered.

Coverage: Average covering capacity is approximately 300 sq.ft. per gallon.

Drying Period: The prime coat must be allowed to become thoroughly dry, which will take from 12 to 24 hours depending on atmospheric conditions and ventilation.

CAUTION: The material is inflammable and because of fumes, rooms must be well ventilated during application.

Over concrete floors meeting the above requirements, apply Asphalt Tile in accordance with our standard application directions discussed under "Standard Application Directions for J-M Type A and Heavy Duty Asphalt Tile", following.

Rough or Uneven Sub-Floors will require an emulsion-type leveling course or underlayment applied in accordance with our standard application directions discussed under "Emulsion Type Leveling Course or Underlayment over Concrete Sub-Floors", following.

OLD CONCRETE SUB-FLOORS ABOVE GRADE:

NOTE: Concrete slabs are considered above grade when such slabs are above the ground and have heated and ventilated spaces underneath them. Concrete slabs not meeting the above requirements but existing slightly above the ground level, are subject to approximately the same temperature, moisture and condensation conditions as slabs resting directly on the ground and should, therefore, be considered as on grade.

Old Concrete Sub-Floors shall be free from old floor coverings or other surface treatments. Expansion joints, cracks, score marks and depressions shall be filled in, in a manner hereinafter described, to produce a smooth, even surface. If there are any indications that the concrete floor has been subjected to wax, paint, oil, etc. the floor should be thoroughly cleaned in a manner hereinafter described.

Removing Paint, Grease and Oil, Wax etc.: The cheapest and quickest method of removing paint is to first thoroughly saturate the surface with a caustic-soda solution or with an industrial-lye solution; then go over the floor thoroughly with an electric rotary power machine equipped with a circular wire brush. The friction will loosen the paint, which then may be swept up.

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After all the paint is removed, the floor should be thoroughly washed with clear water to remove all traces of caustic solution. It is important that this washing be thorough, for the reason that, due to alkali content of caustic solutions, such solutions, if allowed to remain on the floor, will prevent proper adhesion of asphalt tile cement and the concrete and also may eventually discolor the asphalt tile. Mop the floor and allow it to dry thoroughly before spreading the asphalt tile cement.

If only a small amount of paint exists on the sub-floor it can usually be removed by softening it with a blow-torch and scraping it off with a putty knife.

Removing Linoleum or Rubber Tile Cement: When J-M Asphalt Tile is to be applied over a sub-floor from which linoleum or rubber tile has been removed, it is necessary to remove all remaining linoleum or rubber tile cement. This can usually be done by thorough washing with hot water. A wire brush, preferably of the rotary power type, will hasten this operation considerably.

Removing Asphalt Tile Cement: When J-M Asphalt Tile is to be applied over a sub-floor from which asphalt tile has been removed, it is necessary to clean off all the residual cement. This is done by saturating the surface with a solvent (carbon tetrachloride or a solution which shall be not less than 75 percent carbon tetrachloride and 25 percent varnish makers' and painters' naphtha or 25 percent gasoline) and allowing it to soak into the cement. Most of the cement can then be removed by the use of a scraping tool. Allow the solvent to evaporate completely and then apply J-M Asphalt Tile Cement and Asphalt Tile as discussed under J-M Standard Application Directions, following.

NOTE: Keep room well ventilated.

Filling Expansion Joints, Cracks and other Minor Depressions: It is necessary that all such depressions be filled because otherwise they will be reflected in the surface of the finished floor. Where the floor is level, smooth and even at the grooves or joints, the depressions may be filled with either of the following mixtures:

Mixture "A" - 1 part J-M Fibrated Flooring Asphalt or J-M Emulsion Primer and 1 part Moulders Plaster or Plaster of Paris, mixed with sufficient amount of water to mortar consistency.

It is important that areas to be patched must first be primed with emulsion primer.

Mixture "B" - "Floorstone" manufactured by Tamms-Silica Co., Chicago, or other similar material applied in accordance with manufacturer's directions.

Both of these mixtures are quick-setting and should be mixed in small quantities as required and steel-troweled to a smooth even finish.

The Sub-Floor shall be swept clean of all debris and loose material and the dust removed with a soft-bristle broom or brush. Extreme care should be exercised to clean edges and corners thoroughly.

CAUTION: The concrete slab shall be thoroughly dry.

Primer (Cut-Back Primer) is not required.

Over concrete floors meeting the above requirements, apply Asphalt Tile in accordance with standard application directions discussed under "Standard Application Directions for J-M Type A and Heavy Duty Asphalt Tile", following.

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Rough or Uneven Sub-Floors will require an emulsion-type leveling course or underlayment applied in accordance with our standard application directions discussed under "Emulsion-Type Leveling Course or Underlayment over Concrete Sub-Floors", following.

OLD CONCRETE SUB-FLOORS GRADE AND BELOW GRADE:

NOTE: "Grade or Below Grade" conditions apply not only when the slab rests directly on the ground, but also when the slab, although suspended above the ground, does not have a heated and ventilated air space below it.

Conditions where not adaptable: The construction proposed is not suitable for floors that are at any time subject to a head of water or to seepage. Such conditions require membrane waterproofing in accordance with accepted waterproofing practice. The term "membrane waterprocfing" does not imply simply the application of a single ply of felt to the concrete slab. It means the application of a membrane containing several plys of waterproofing felts mopped down with hot asphalt and covered with two or three inches of concrete topping steel-troweled to a smooth even surface. Where this type waterproofing is required, it should be installed by a waterproofing contractor thoroughly experienced in handling the work.

CAUTION: Sub-floors on grade or below grade that have been treated with waterglass (silicate of soda) or with other mixtures containing silicate of soda shall not be considered suitable to receive Asphalt Tile.

Precautions: Contractors shall use every precaution to determine the exact water or moisture conditions of each job. This is an absolutely necessary prerequisite for handling correctly every installation so that the floor will meet the high standard expected and, at the same time, preclude the possibilities of any complaints developing which will involve either the contractor or Johns-Manville.

Recommended Colors: In the use of Asphalt Tile on grade or below grade installations, any of the colors can be used with the exception of the following Type A blue and green colors. These colors, No. 23, 31, 32, 107, 115, 124 and 125, are not recommended because the blue and green pigments used in these colors are more or less susceptible to attack by alkalies usually found in concrete slabs on or below grade. Due to their high asphalt content, however, the following darker colors are more desirable for use on grade or below grade: No. 1, 2, 3, 4, 5, 102, 104, 108, 112, 118, 119, 120 and 122.

Old Concrete Sub-Floors shall be free from old floor coverings, etc. Expansion joints, cracks, score marks and depressions shall be filled in, in a manner hereinafter described, to produce a smooth, even surface. If there are any indications that the concrete floor has been subjected to wax, paint, oil or other surface treatments, the floor should be thoroughly cleaned in a manner hereinafter described.

Removing Paint, Grease and Oil, Wax, etc.: The cheapest and quickest method of removing paint is to first thoroughly saturate the surface with a caustic-soda solution or with an industrial-lye solution; then go over the floor thoroughly with an electric rotary power machine equipped with a wire circular brush. The friction will loosen the paint, which then may be swept up. After

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all the paint is removed the floor should be thoroughly washed with clear water to remove all traces of caustic solution. It is important that this washing be thorough, for the reason that, due to alkali content of caustic solutions, such solutions, if allowed to remain on the floor will prevent proper adhesion of asphalt tile cement and the concrete and also may eventually discolor the asphalt tile. Mop the floor and allow it to dry thoroughly before proceeding with the application of cut-back primer.

If only a small amount of paint exists on the sub-floor, it can usually be removed by softening it with a blow torch and scraping it off with a putty knife.

Removing Linoleum or Rubber Tile Cement: When J-M Asphalt Tile is to be applied over a sub-floor from which linoleum or rubber tile has been removed, it is necessary to remove all remaining linoleum or rubber tile cement. This can usually be done by thoroughly washing with hot water. A wire brush, preferably of the rotary power type, will hasten this operation considerably.

Removing Asphalt Tile Cement: When J-M Asphalt Tile is to be applied over a sub-floor from which asphalt tile has been removed, it is necessary to clean off all the residual cement. Saturate the surface with a solvent (carbon tetrachloride or a solution which shall be not less than 75 percent carbon tetrachloride and 25 percent varnish makers' and painters' naphtha or 25 percent gasoline). Allow this to soak into the cement. Most of the cement can then be removed by the use of a scraping tool. Allow the solvent to evaporate completely and then apply J-M Asphalt Tile Cement and Asphalt Tile in accordance with J-M Standard Application Directions, following.

NOTE: Keep room well ventilated.

Filling Expansion Joints, Cracks and Other Minor Depressions: It is necessary that all such depressions be filled because otherwise they will be reflected in the surface of the finished floor. Where the floor is level, smooth and even at the grooves or joints, the depressions may be filled with either of the following mixtures.

Mixture "A" - 1 part of J-M Fibrated Flooring Asphalt or J-M Emulsion Primer and 1 part Moulders Plaster or Plaster of Paris, mixed with a sufficient amount of water to mortar consistency.

It is important that areas to be patched must first be primed with emulsion primer.

Mixture "B" - "Floorstone" manufactured by Tamms-Silica Co., Chicago, or other similar material applied in accordance with manufacturer's directions.

Both of these mixtures are quick-setting and should be mixed in small quantities as required and steel-troweled to a smooth even finish.

The Sub-Floor shall be swept clean of all debris and loose material and the dust removed with a soft bristle broom or brush. Extreme care should be exercised to clean edges and corners thoroughly.

CAUTION: The concrete slab shall be thoroughly dry.

Primer (Cut-Back Primer): The primer shall without exception be used on all grade or below grade slabs.

Application: After cleaning all dirt, dust, etc., from the areas, Cut-back Primer is brushed on over the entire surface using the minimum quantity which will still assure the whole surface being covered.

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Coverage: Average covering capacity is approximately 300 sq. ft. per gallon.

Drying Period: The prime coat must be allowed to become thoroughly dry, which will take from 12 to 24 hours depending on atmospheric conditions and ventilation.

CAUTION: The material is inflammable and because of fumes, rooms must be well ventilated during application.

Over concrete floors meeting the above requirements, apply Asphalt Tile in accordance with standard application directions discussed under "Standard Application Directions for J-M Type A and Heavy Duty Asphalt Tile", following.

Rough or Uneven Sub-Floors will require an emulsion-type leveling course or underlayment applied in accordance with the standard application directions discussed under "Emulsion-Type Leveling Course or Underlayment over Concrete Sub-Floors", following.

EMULSION TYPE LEVELING COURSE OR UNDERLAYMENT OVER CONCRETE SUB-FLOORS:

Preparation of concrete sub-floors above grade:

Primer (Cut-Back Primer) is not required.

Primer (Emulsion Primer) shall, without exception, be used in connection with any emulsion-type leveling course or underlayment.

Application: After cleaning all dirt, dust, etc. from the areas, Emulsion Primer is brushed over the entire surface. Primer shall be diluted with the minimum amount of water for spreading.

Coverage: Average coverage should be approximately 75 to 100 sq. ft. per gallon.

Drying Period: Primer should be allowed to dry completely. Drying overnight is preferable although this is not always practicable. However, even under most urgent conditions, primer should be allowed to dry at least three hours.

Preparation of concrete sub-floors grade or below grade:

Primer (Cut-Back Primer) is always required.

Application: After cleaning all dirt, dust, etc. from the areas, cut-back primer is brushed on over the entire surface using the minimum quantity which will still assure the whole surface being covered.

Coverage: Average coverage should be approximately 300 sq. ft. per gallon.

Drying Period: The prime coat must be allowed to become thoroughly dry, which will take from 12 to 24 hours depending on atmospheric conditions and ventilation.

CAUTION: The material is inflammable and because of fumes, rooms must be well ventilated during application.

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Primer (Emulsion Primer) is always required.

Application: After the previously applied cut-back primer has thoroughly dried, the emulsion primer is brushed over the entire surface. Emulsion primer shall be diluted with the minimum amount of water required for spreading.

Coverage: Average coverage should be approximately 75 to 100 sq. ft. per gallon.

Drying Period: Primer should be allowed to dry completely. Drying overnight is preferable although this is not always practicable. However, even under most urgent conditions, the primer should be allowed to dry at least three hours.

Mixing and Application Directions for J-M Emulsion-Type Underlayment:

Mix No. 1 - Composition for thicknesses from 1/4" to feather edge:
(Batch to cover approximately 220 sq. ft. 1/4" average thickness.)

1 bag	(7-1/2 gal.) Portland Cement
4 cu. ft.	(30 gal.) Silica Sand (Sand which will pass a 24 mesh and is retained on a 40 mesh screen.)
7-1/2 gal.	Fibrated Flooring Asphalt
Water.	As Necessary

Mix No. 2 - Composition for thicknesses from 1/4" to 3/4";
(Batch to cover approximately 110 sq. ft. 1/2" average thickness.)

1 bag	(7-1/2 gal.) Portland Cement
4 cu. ft.	(30 gal.) Clean Sharp Sand
7-1/2 gal.	Fibrated Flooring Asphalt
Water.	As Necessary

Mix No. 3 - Composition for thicknesses 3/4" or greater:
(Batch to cover approximately 90 sq. ft. 3/4" thick.)

1-1/4 bags	(9-1/2 gal.) Portland Cement
2 cu. ft.	(15 gal.) Clean Sharp Sand
7-1/2 gal.	Fibrated Flooring Ashalt
3 cu. ft.	(22-1/2 gal.) Gravel, stone or trap rock chips 1/8" to 3/8" in diameter.
Water.	As Necessary

Sand: Sand suitable for a good grade of concrete finish shall be used in Mix No. 2 and Mix No. 3. It shall be free from quicksand, clay, mica, organic matter, or other impurities. Insofar as possible, the sand selected shall have at least 90 percent of its content retained on a 48-mesh screen.

NOTE: "Concrete sand" is usually suitable for Mix No. 2 and Mix No. 3. "Plasterer's sand" shall not be used because the particles are too fine. Silica Sand, which will pass a 24-mesh screen and is retained on a 40-mesh screen is recommended in Mix No. 1 because it will not roll under the trowel when finishing to a feather edge.

Gravel: Gravel, stone, or trap rock chips, 1/8" to 3/8" in size shall be used.

Water: The water shall be clean tap water and shall be used in sufficient quantity to give the finished mix a heavy mortar consistency.

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Equipment: The mixing of the batch can be done in a concrete mixer or by manual labor in a mixing box. The manipulation in either case is the same as that for any concrete or mortar.

Mixing procedure: The mastic materials shall be combined in the following sequence: Portland cement mixed thoroughly with sand and gravel. Add water and mix thoroughly. Add fibrated flooring asphalt and mix thoroughly. The complete mixture should be or a heavy-mortar consistency, uniform in color and without streaks. It is often necessary to add a small quantity of water to the mixture after the fibrated flooring asphalt is in, but this last addition of water should be kept to the minimum which will still obtain workability in the mix.

Application: Over the previously applied dry primer, spread on the underlayment composition to a thickness governed by screed strips which have been previously set. The mass shall be spread using a darby or a wood float and shall then be straight-edged in a manner similar to that used in placing concrete topping.

NOTE: Screed strips are not required when using Mix No. 1 or Mix No. 2 as a skim or leveling coat.

Finishing: Finishing of the underlayment shall be done in a manner similar to that of finishing concrete topping. It shall be wood-floated at the time of initial set and shall be given a steel-troweling at the time of final set. Excessive troweling shall be avoided as it tends to pull too much of the portland cement to the surface which will weaken the mix.

Curing: Care shall be taken to prevent too rapid drying, particularly in areas subjected to drafts created by elevator shafts, open windows, direct sun, etc. In order to accomplish this curing, the floor shall be covered as soon as possible after finishing with paper or damp sawdust for a period of at least 24 hours. The mix should be practically dry within 48 to 72 hours after finishing. When the mixture has thoroughly dried, apply asphalt tile as discussed under J-M Standard Application Instructions, following. The importance of thorough drying cannot be over-emphasized.

NOTE: The above underlayment, while making a satisfactory fill or leveling course for rough sub-floors, is not designed to become a wearing surface and, therefore, should not be exposed to traffic until the asphalt tile is applied. If exposed to traffic, the surface of the underlayment tends to sand and this sanding and roughening of the surface prevents proper bonding of the asphalt tile. It is very important, therefore, that asphalt tile be applied as soon as the underlayment is properly cured and dried. If for any reason it is not possible to apply asphalt tile immediately, the surface of the underlayment must be properly protected until the asphalt tile is applied.

CAUTION: The success of the completed installation depends not only on strict adherence to the above formulas and instructions, but to a large extent upon the skill and experience of the mechanics employed in mixing and applying this type underlayment. Unless the Approved Flooring Contractor can obtain cement finishers who are thoroughly experienced in this work, the application of this underlayment should not be attempted.

Precast Gypsum Plank Sub-Floors will require a minimum 1/4" asphalt emulsion-type leveling course or underlayment. Asphalt tile shall not be applied di-

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rectly on any gypsum sub-floor. This applies to both gypsum planks or gypsum planks which have been covered with gypsum-type leveling course or underlayment.

Preparation of Precast Gypsum Plank Sub-Floors: All dirt, plaster, or foreign material shall be removed from gypsum sub-floors. The entire area shall then be primed with J-M Cut-Back Primer. Coverage will be approximately 100 sq. ft. per gallon and shall be applied with a brush, not a mop. It shall be allowed to dry 24 hours minimum, after which it shall receive a prime coat of J-M Emulsion Primer in a coverage of approximately 75 to 100 sq. ft. per gallon. Over gypsum sub-floors prepared in this manner, apply emulsion-type leveling course or underlayment using Mix No. 2 applied in accordance with mixing and application directions for J-M Emulsion Type Leveling Course and Underlayment, previously described.

Application of Asphalt Tile: After the sub-floors have been prepared in the above manner, apply J-M Asphalt Tile in accordance with standard application directions described under "Standard Application Directions for J-M Type A and Heavy Duty Asphalt Tile", following.

OLD MAGNESITE COMPOSITION AND TERRAZZO SUB-FLOORS:

When applying J-M Asphalt Tile over old Magnesite or Terrazzo sub-floors, it is particularly important that all traces of oil, wax or soap film be removed in accordance with the standard instructions previously described for removing paint, grease and oil, wax, etc.

WOOD SUB-FLOORS:

New Wood Sub-Floors:

Specifications for Application of 1/4" Type A and Heavy Duty Asphalt Tile: New wood sub-floors shall be of double construction, over joists not to exceed 16" centers and which are of sufficient structural strength to carry intended loads without deflecting. The surface flooring shall be of well-seasoned, kiln dried, T & G flooring not over 3" face width, top-nailed and toe-nailed to a tight surface. All wood floors shall be sanded to a uniform smooth surface and shall contain no cupped or springy boards. Wood floors subject to conditions which might cause buckling or rotting of the wood shall not be considered a satisfactory sub-floor for any asphalt tile. This particularly refers to wood floors that are below grade, on grade or above the ground without heat or ventilation underneath the floor. All wood floors that have been sanded are more or less open-textured and porous, and consequently may cup when covered with adhesives containing moisture. Therefore, apply to all sanded wood floors any good grade of wood-floor sealer before proceeding with application of asphalt tile in accordance with application directions.

After thoroughly removing all dirt, dust, etc., cover the floor with J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt, leaving the coated or sanded side up. Cut and fit this felt to the shape of the room as it is being laid with edges butted, not lapped. When the entire area is covered, roll the felt back one half the length of the sheets and apply a coat of a good grade linoleum paste in accordance with manufacturer's instructions. Due to the quick-setting qualities of the linoleum paste, spread only small quantities at one time and roll felt into the paste using a linoleum roller to iron out all blisters and wrinkles before the paste has thoroughly set. After the entire area has been covered with the asbestos felt in the manner described, the felt shall be thoroughly swept free of sand, dust and trimmings, using a soft hair brush.

NOTE: Linoleum paste is soluble in water and therefore should not be used over any sub-floor which is exposed to dampness.

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Over this felt, apply J-M Type A Asphalt Tile Cement and Asphalt Tile in accordance with standard application directions described under "Standard Application Directions for J-M Type A and Heavy Duty Asphalt Tile", following.

Specification for Application of 1/8" or 3/16" Type A Asphalt Tile: Over new wood floors meeting structural requirements and specifications as to smoothness, firmness, etc., as outlined above, Johns-Manville 1/8" Standard Flexboard shall be substituted for the 20-lb. Asphalt-Saturated Asbestos Roofing Felt.

Start in one corner of the room and cut the Flexboard with a carpenter's saw to fit the irregularities of the room. Then lay each sheet as soon as it is fitted in a film of J-M Lap Cement 1/32" to 1/16" thick. Lay the sheet rough side up, press firmly into the cement and nail securely to the floor using 6d casing nails. Nails are driven from the center of the sheet and worked towards the edges. Nails shall be driven on 6" to 8" centers in the body of the sheet, and on 4" centers 1/4" from the edges of the sheet. Continue laying each sheet in this manner at right angles to the run of the boards and laid with broken joints until the entire area is covered. After completing nailing of Flexboard, go over all joints, remove any excess lap cement which may have oozed up on the surface and rub down all joints using a carborundum stone or coarse sandpaper leaving a smooth and level surface. All joints shall be tight and shall be filled where necessary with a material similar to Floorstone applied in accordance with manufacturer's directions. As soon as the filler has set, apply over the Flexboard, Type A Asphalt Tile Cement in a coverage of about 110 to 125 sq. ft. per gallon and apply asphalt tile as discussed under J-M Standard Application Directions, following.

CAUTION: Special care shall be taken in driving all nails flush with the surface of the flexboard sheeting. If not, they will reflect in the surface of the finished floor.

Old Wood Sub-Floors:

Old Wood Sub-floors which meet all structural requirements as outlined for new wood sub-floors can be considered as new wood sub-floors provided they can be sanded to a smooth surface free from paint, oil, grease, etc. Over such sub-floors 1/4" Type A or Heavy-Duty Asphalt Tile can be applied with the use of asbestos felt and 1/8" or 3/16" Type A Asphalt Tile can be applied with the use of Flexboard in the manner described for "New Wood Sub-Floors".

If, however, the condition of the surface flooring is such that sanding will not remove existing irregularities or depressions, a material similar to Floorstone, as manufactured by Tamms Silica Co., of Chicago, Ill., must first be used as a leveling coat and followed by the application of J-M 1/8" Standard Flexboard in accordance with specification previously described for new wood floors. Over floors prepared in this manner, either 1/8", 3/16" or 1/4" Type A Asphalt Tile or Heavy Duty Asphalt Tile Flooring will perform satisfactorily.

Other Old Wood Sub-Floors which meet all structural requirements listed for new wood sub-floors, but which are so badly worn or uneven that they cannot be satisfactorily prepared to receive asphalt tile installed either with the use of asbestos felt or Flexboard as described above, will require an emulsion-type underlayment as hereinafter described. This emulsion-type underlayment is a leveling course only and does not in any way add to the structural strength or rigidity of the wood sub-floor.

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EMULSION TYPE LEVELING COURSE OR UNDERLAYMENT OVER WOOD SUB-FLOORS:

Preparation of Wood Sub-Floors to Receive Emulsion Type Underlayment:

All loose boards shall be thoroughly face-nailed and toe-nailed and defective boards shall be replaced. Sheet metal shall be nailed over large holes or cracks. All debris shall be swept from the floor. Over wood sub-floors prepared in this manner lay J-M 15-lb. Standard Asphalt-Saturated Rag Felt with joints lapped about 3". Over this felt apply a 1.8-lb. per sq. yd. diamond-mesh stucco lath or J-M Reinforcing. Style AA-1616, using 6d wire nails on 6" centers driven in and clinched over lath. Over the felt and lath brush on J-M Emulsion Primer diluted with the minimum amountof water required for spreading. Coverage should be approximately 75 to 100 sq. ft. to the gallon. Allow primer to dry at least three hours, overnight if possible.

Mixing and Application of J-M Emulsion Type Underlayment over Wood Sub-Floors:

Mix No. 2 - Composition for thicknesses from 1/2 in. to 3/4 in.:

(Batch to cover approximately 110 sq. ft. average thickness.)

1 bag	(7-1/2 gal.) Portland Cement
4 cu. ft.	(30 gal.) Clean Sharp Sand
7-1/2 gal.	Fibrated Flooring Asphalt
Water.	As Necessary

Mix No. 3 - Composition for thicknesses 3/4 in. or greater:

(Batch to cover approximately 90 sq. ft. 3/4" thick.)

1-1/4 bags	(9-1/2 gal.) Portland Cement
2 cu. ft.	(15 gal.) Clean Sharp Sand
3 cu. ft.	(22-1/2 gal.) Gravel, Stone or Trap Rock Chips
7-1/2 gal.	Fibrated Flooring Asphalt
Water.	As Necessary

Sand: Sand suitable for a good grade of concrete finish shall be used. It shall be free from quicksand, clay, mica, organic matter or other impurities. Insofar as possible, the sand selected shall have at least 90 percent of its content retained on a 48-mesh screen.

NOTE: "Concrete sand is usually suitable for Mix No. 2 and Mix No. 3. "Plasterer's Sand" shall not be used because the particles are too fine.

Gravel: Gravel, stone, or trap rock chips, 1/8" to 3/8" in size shall be used.

Water: The water shall be clean tap water and shall be used in sufficient quantity to give the finished mix a heavy-mortar consistency.

Equipment: The mixing of the batch can be done in a concrete mixer or by manual labor in a mixing box. The manipulation in either case is the same as that for any concrete or mortar.

Mixing procedure: The mastic materials shall be combined in the following sequence: Portland cement mixed thoroughly with sand and gravel. Add water and mix thoroughly. Add fibrated flooring asphalt and mix thoroughly. The complete mixture should be uniform in color and without streaks. It is often necessary to add a small quantity of water to the mixture after the fibrated flooring asphalt is in, but this last addition of water should be kept to the minimum which will still obtain workability in the mix.

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Application: Over the previously applied dry primer, spread on the underlayment composition to a thickness governed by screed strips which have been previously set. The mass shall be spread using a darby or a wood float and shall then be straight-edged in a manner similar to that used in placing concrete topping.

Finishing: Finishing of the underlayment shall be done in a manner similar to that of finishing concrete topping. It shall be wood-floated at the time of initial set and shall be given a steel-troweling at the time of final set. Excessive troweling shall be avoided as it tends to pull too much of the portland cement to the surface which will weaken the mix.

Curing: Care shall be taken to prevent too rapid drying, particularly in areas subjected to drafts created by elevator shafts, open windows, direct sun, etc. In order to accomplish this curing, the floor shall be covered as soon as possible after finishing with paper or damp sawdust for a period of at least 24 hours. The mix should be practically dry within 48 to 72 hours after finishing. When the mixture has thoroughly dried, apply asphalt tile in accordance with J-M standard application instructions. The importance of thorough drying cannot be over-emphasized. If asphalt tile is applied before underlayment is thoroughly dry, the moisture which will then be trapped may cause buckling of the wood floor.

NOTE: The above underlayment, while making a satisfactory fill or leveling course for rough sub-floors, is not designed to become a wearing surface and, therefore, should not be exposed to traffic until the asphalt tile is applied. If exposed to traffic, the surface of the underlayment tends to sand and this sanding and roughening of the surface prevents proper bonding of the asphalt tile. It is very important, therefore, that asphalt tile be applied as soon as the underlayment is properly cured and dried. If for any reason it is not possible to apply asphalt tile immediately, the surface of the underlayment must be properly protected until the asphalt tile is applied.

CAUTION: The success of the completed installation depends not only on strict adherence to the above formulas and instructions, but to a large extent upon the skill and experience of the mechanics employed in mixing and applying this type underlayment. Unless the Approved Flooring Contractor can obtain cement finishers who are thoroughly experienced in this work, the application of the underlayment should not be attempted.

Application of Asphalt Tile: After the sub-floors have been prepared in the above manner, apply J-M Asphalt Tile in accordance with our standard application directions discussed under "Standard Application Directions for J-M Type A and Heavy Duty Asphalt Tile", following.

Magnesite Underlayment over Wood Sub-Floors:

Magnesite underlayment may be used as an alternate for the emulsion-type previously specified. Although this material makes an excellent underlayment over solid but uneven wood floors, this type fill is not recommended unless the flooring contractor has available mechanics who are thoroughly familiar with the application of this material and unless this material is purchased already mixed from a reputable magnesite manufacturer and installed in accordance with that manufacturers' specifications.

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STANDARD APPLICATION DIRECTIONS FOR J-M TYPE A AND HEAVY DUTY ASPHALT TILE

CAUTIONS:

1. Don't fail to check contents of Asphalt Tile boxes and also areas to be covered before starting installations.
2. Don't install J-M Asphalt Tile Flooring over moist concrete slabs.
3. Don't fail to have room properly heated and ventilated.
4. Don't expect J-M Asphalt Tile to bond properly without the required film of cement.
5. Don't install J-M Asphalt Tile over rough concrete floors such as float finishes without first smoothing them up properly.
6. Don't fail to let cement dry properly before applying J-M Asphalt Tile.
7. Don't install J-M Asphalt Tile on on-grade or below-grade slabs without cut-back primer.
8. Don't install J-M Asphalt Tile that are below room temperature.
9. Don't start installation unless conditions are right, but call general contractor.
10. Don't fail to leave instruction card for care and maintenance of floor with owner or person in charge.

The following directions describe the application of J-M Asphalt Tile to the sub-floors after they have been properly prepared as previously described.

IMPORTANT: Before attempting the first step in the application of Asphalt Tile, boxes should be opened carefully, contents removed and checked for the reason that claims for defects as to size, color, marbleizing or texture will not be considered by Johns-Manville if made after installation.

Laying out Floor Areas:

Before starting the application of asphalt tile, the areas of the rooms to be covered shall be "squared" and the best method of laying asphalt tile determined depending on the size and shape of the room. It is advisable to furnish the mechanic who is to install the flooring a sketch or plan showing patterns selected and locations of fixed furniture, offsets and partitions, location of doorways, etc. so that he may proceed in an intelligent manner and avoid costly mistakes. No definite and specific instructions that will apply in all cases can be given, but, in general, asphalt tile should be laid parallel to walls which are at right angles to eliminate unnecessary cutting of asphalt tile and borders. Due to the fact that very few rooms are perfectly rectangular, the borders will vary in width because the field asphalt tile should be laid in a true rectangle as nearly as possible. To accomplish this, the mechanic must know how to properly "square the room". This can be accomplished by any one of several methods, preferred by the mechanic on the job. The most commonly known is the 3-4-5 triangle method. In all cases asphalt tile shall be laid starting at the center of the room and worked toward the walls where the width of the border can be adjusted accordingly. It is not advisable to definitely establish the width of the borders and then cut the field asphalt tile to fit. In rooms of irregular dimensions, however, it is sometimes necessary to cut the field asphalt tile along one side, but this should be avoided if at all possible.

After the room has been "squared" and chalk lines have been snapped for determining layout, apply the asphalt tile cement, leaving uncovered a few spots about one inch square on the lines so that these lines can be relocated on top of the cement. When the cement has set, snap chalk lines relocating those previously determined, cover the spots with cement where necessary, and apply field asphalt tile starting at the center of the room. When field has been applied, the border asphalt tile shall be scribed to the wall and cut and fitted in place. In large rooms, one half of the area to be covered can be completed

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before the asphalt tile cement is spread over the balance of the area, the lines relocated and the asphalt tile applied in the manner described.

Applying J-M Asphalt Tile Cement:

Spreading: Asphalt tile cement shall be spread evenly over the area to be covered with a cement finishers' trowel. Either a straight-edged or notched trowel (as preferred by the individual mechanic) shall be used. If a notched trowel is used, it is extremely important that the flat spaces between the notches shall not exceed 1/8 of an inch. In other words, the notches shall be spaced 3/16 of an inch on centers. V-shaped notches not more than 1/16" in depth shall be cut with a fine V-shaped file. These notches shall be renewed periodically, depending on the gradual wear of the trowel.

Temperature: Temperature of the cement and also of the asphalt tile, the room and the sub-floor for several days before and during application of the cement should be maintained at 70 deg. F. or higher. It is especially important that this temperature be maintained until the asphalt tile flooring has thoroughly bonded to the sub-floor.

NOTE: Adequate ventilation is important because it not only hastens drying of the cement but in most cases is an excellent precaution against the possibility of condensation forming on the surface of the cement which will affect its adhesive qualities.

Coverage: The approximate coverage which may be expected is shown in the following table.

Type of Sub-Floor	Coverage in Square Feet per Gallon
Smooth Concrete Floor	125 to 175
Asphalt-Saturated Asbestos Felt	175 to 200
Flexboard Sheeting	110 to 125
Emulsion Type Underlayment	125 to 175

Drying Period: Under good conditions of temperature and humidity asphalt tile cement will become tacky in from thirty to sixty minutes. Under extreme humid conditions and where there is lack of adequate ventilation it may require 2 to 3 hours or possibly longer for complete drying.

APPLYING J-M ASPHALT TILE:

When the asphalt tile cement is sufficiently dry, the asphalt tile shall be installed in accordance with the design and layout already determined. The field asphalt tile should be applied first; the border asphalt tile then scribed to the wall, cut and fitted in place.

Asphalt tile when heated can be cut with a linoleum knife to fit irregularities in walls, etc. A blow torch is used for heating asphalt tile before cutting. Always apply flame to the back of the asphalt tile and do not allow the flame to come in direct contact with the asphalt tile. Heat slowly in order to avoid blistering. The use of a Gundlach Asphalt Tile Cutter (Beno J. Gundlach Co., Belleville, Ill.) or a Cyclone Asphalt Tile Cutter (Hoeffert Machine Co., Racine, Wisc.) is recommended for making straight cuts. If the temperature of the asphalt tile is 70 deg. F. or more, heating will not be necessary when using the cutters. It may be necessary in some instances, however, to smooth the edges of the asphalt tile with sandpaper and a block.

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When laying marbleized asphalt tile it is ordinarily advisable to lay the asphalt tile so that the grain of the marbleizing shall be in opposite directions in adjacent tile.

To remove any spots of asphalt tile cement from surface of asphalt tile, use blade of a putty knife and rub with a cloth moistened with any one of the neutral soaps approved for use on J-M Asphalt Tile. If this fails to remove all traces of cement use 00 steel wool. Do not attempt to use gasoline or other solvent such as benzine, turpentine, etc.

Precautions: When installing borders, doorways and radiator spaces should be trimmed in first, using full sheets of border. A piece of one-inch pipe hammered slightly oval and ground down on the outside to form a die punch will be helpful in cutting holes for radiator legs. Legs of radiators should never rest directly on the asphalt tile, but should be set on small pieces of hard material such as Transite, Flexboard, ceramic tile or metal having the same thickness as the asphalt tile used, and inserted after the asphalt tile has been heated and holes punched or cut out.

Asphalt tile should not be left with unprotected edges. Suitable brass or wood edging should be securely fastened to the sub-floor to protect the edges of the asphalt tile and to prevent tripping.

Fastening Desks or other Furniture to J-M Asphalt Tile Flooring: If it is desired to fasten furniture to the floor, mark out on the floor, after the installation of asphalt tile, the points at which the bolts or screws are to be inserted. Heat the asphalt tile at these points with a blow torch. Then drill all the way through the asphalt tile and into the sub-floor. If the sub-floor is concrete, insert an expansion bolt to hold the screws. This procedure will obviate any breakage of the asphalt tile.

Application of Flexible Rubber Cove Base: Flexible rubber cove base can be successfully installed over old or new plaster walls or over wood, with rubber tile cement using brads where necessary.

CAUTION: Do not apply flexible rubber cove base in areas subjected to dampness.

CLEANING, WAXING AND MAINTENANCE:

General: All J-M Asphalt Tile installations shall be left clean, smooth, and in good condition. Wet mopping, washing or waxing shall not be attempted until the asphalt tile are thoroughly bonded to the sub-floor. If water or wax should get under the asphalt tile before they are bonded, the cement bond will be destroyed, resulting in unnecessary expense for replacements due to breakage.

The time required for asphalt tile to become properly bonded depends greatly upon atmospheric conditions and upon the amount of traffic to which the asphalt tile are subjected. As a precautionary measure, therefore, the floor should not be washed for at least one or two weeks after it has been installed.

Cleaning and Waxing: For cleaning and waxing asphalt tile, only neutral soaps, cleaners and waxes approved by Johns-Manville should be used. A list of these will be furnished on request. Cleaners and waxes containing free fat or oil will soften and disintegrate the tile. Varnishes, etc. should not be applied to J-M Asphalt Tile floors.

After scrubbing the floor thoroughly remove all traces of soap from the surface of the floor using a clean mop frequently rinsed in clear water. After the floor has become thoroughly dry, apply a coat of any one of the approved emulsion

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waxes in accordance with the manufacturers' application directions. This type wax will produce a pleasing lustre and may be brought to a high gloss by the use of a power polisher. The frequency of waxing depends entirely on the amount of traffic to which the flooring is subjected.

Ordinarily, J-M Asphalt Tile treated as described above can be maintained and kept in the best of condition by dusting with a dry yarn mop daily. Areas that are subjected to heavy traffic should be cleaned and polished at regular intervals.

CAUTION: Sweeping compounds or waxes containing oil or other solvents must not be used on asphalt tile.

Buffing: If a high glossy finish is not desired, the natural sheen of J-M Asphalt Tile can be maintained by dry buffing with a rotary power polisher. This surface treatment is recommended only when the asphalt tile floors are not subject to street dirt and grit.

NOTE: Soap powders containing strong alkalies shall under no circumstances be used, and even the neutral soaps recommended, if allowed to remain on the floor in a concentrated form will have damaging effects upon asphalt tile. The importance of the removal of all traces of soap from floor after cleaning cannot be over-emphasized.

IMPORTANT: It is essential that a copy of J-M Maintenance Instructions (Form FL-11A) be furnished upon completion of the J-M Asphalt Tile flooring construction.

PROTECTION OF ASPHALT TILE BY USE OF PROPER BEARINGS ON FURNITURE:

Resiliency and comfort are advantages of J-M Asphalt Tile Flooring which hard floors do not have. Like any resilient floor, however, concentrated loads mar its appearance. It is this resiliency which gives it its comforting and wearing qualities and the asphalt tile should receive proper care to protect it against indentation.

The asphalt tile should be protected with proper glides against sharp point loads of furniture or equipment, and heavy static loads. Metal domes must be removed from the legs of all furniture or they will make unsightly impressions on the finished flooring.

Office swivel chairs, beds, etc., should be equipped with good ball-bearing casters with wide soft rubber treads.

On portable furniture, such as straight chairs, desks, etc., glides should be used instead of metal domes.

The information on bearing equipment (Form FL-11A) should be furnished immediately upon every asphalt tile installation so that proper equipment may be provided before any damage occurs to Johns-Manville Asphalt Tile Flooring.

GENERAL CHARACTERISTICS OF ASPHALT TILE:

The following characteristics of J-M Asphalt Tile are important to note in conjunction with its use.

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Color Variance of Asphalt Tile:

The manufacture of asphalt tile consists mainly of converting small batches of raw materials into small lots of the finished product. Such a process, due to the human element involved, as well as variances of raw materials, naturally results in slight variations in the color of the asphalt tile. These color variations which are characteristic of the product, are not noticeable in floor designs involving patterns using two or more colors. If, however, an attempt is made to lay a floor of one solid color, the slight variances will be definitely noticed, and may be considered objectionable, if an absolutely even colored floor has been anticipated.

Because these slight color variations are a definite characteristic of asphalt tile, installations involving a field of one solid color should be avoided wherever possible. If solid color floors are desired in order to obtain a different color effect, the fact should be borne in mind that some slight variations in the shade of the solid color will be noticed in individual tiles on the floor.

In the marbleizing of asphalt tile no attempt is made to produce a type of veining which will result in the distribution of the marbleizing being identical on every piece of the asphalt tile. The asphalt tile will have varying degrees of marbleizing and Johns-Manville does not guarantee that character and amount of marbleizing of each asphalt tile will be identical.

Effects of Grease, Oil, Animal or Vegetable Fats on Asphalt Tile:

It is common knowledge that asphalts and asphaltic resins are soluble in oil. It is, therefore, obvious that asphalt tile is not adaptable in areas subjected to greases, oils, animal or vegetable fats in a concentrated form which would be found in areas of the following type:

Residence Kitchens (see note below)
Commercial or Institutional Kitchens
Filling Stations
Machine Shops
Behind the counters of Meat Markets
Behind the counters of Delicatessen Shops
Behind the counters of Lunch Rooms or Cafeterias
In any restaurant of the "quick and dirty" type where foodstuffs are not frequently removed from the floor.
Automobile Showrooms where grease and oil is tracked in and allowed to remain on the floor. (See note below)

NOTE: The success of asphalt tile in residential kitchens is largely a matter of good housekeeping, in that if the occasional spillage of grease or fats on such a floor is quickly removed, the asphalt tile will not be damaged. Since, however, the type of housekeeping practiced in such rooms cannot be controlled, Johns-Manville cannot give blanket approval to the use of asphalt tile in residential kitchens. Asphalt Tile has performed satisfactorily in automobile showrooms where care has been taken to prevent grease or oil from remaining on the floor for any length of time. The lighter-colored asphalt tiles are slightly less affected by grease and oil than the darker colors.

Effects of Acids on Asphalt Tile:

Asphalt tile is made from binders which in mass are acid resistant. In the asphalt tile, however, these binders occur only in the form of thin films

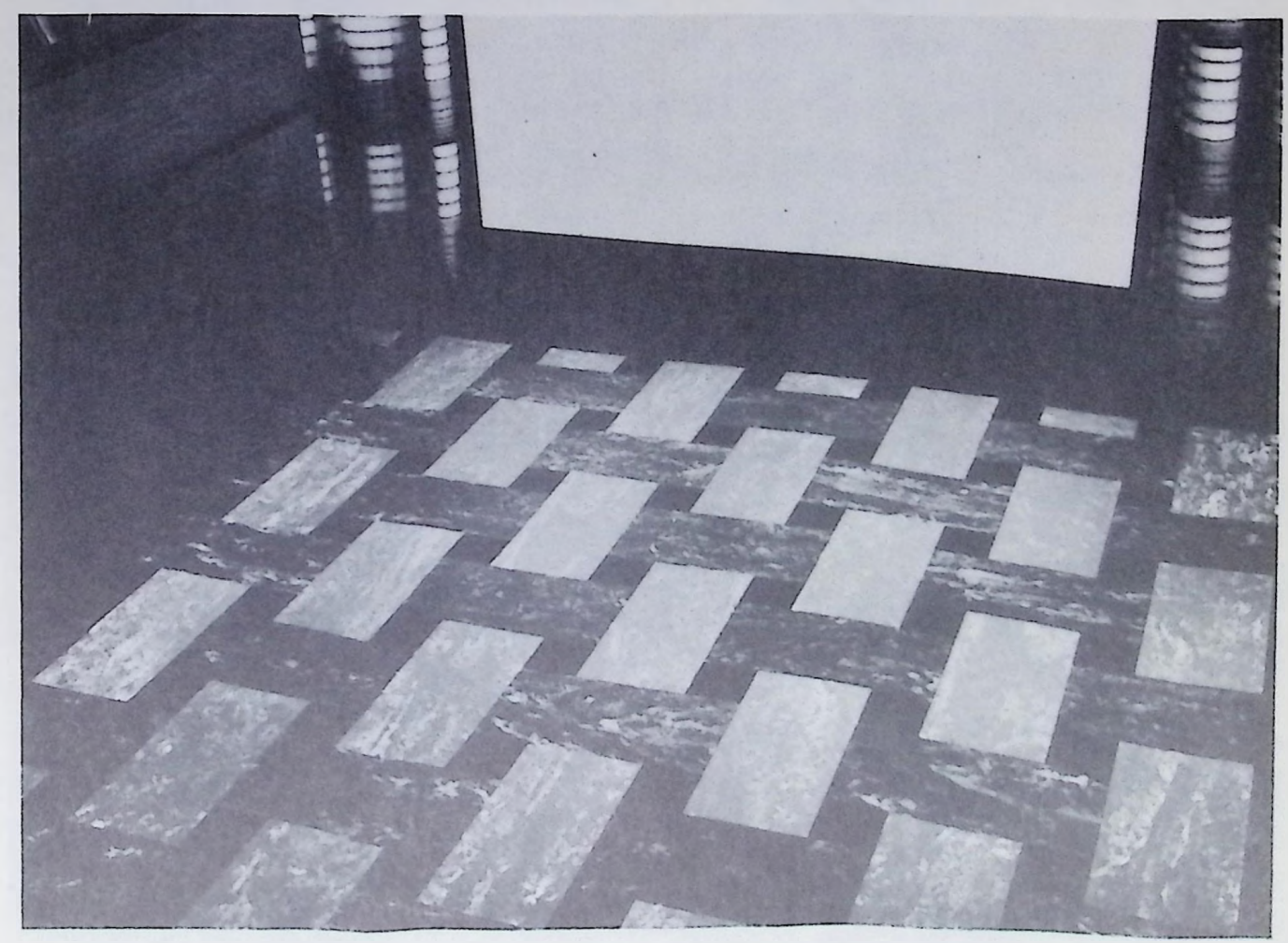
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covering the aggregate in the product, and these thin films of the binder will not last long against acid concentrations as high as 20 percent. Generally speaking, therefore, asphalt tile should never be recommended in floor areas exposed to any but the most dilute acids and then only for rare accidental exposures. Asphalt tile has, however, been satisfactorily used in the laboratories of schools, colleges and institutions, but the success of these installations has been the result of extreme care being exercised to remove immediately accidental spillage of acids from the floors.

The darker-colored asphalt tiles, particularly J-M Heavy Duty Asphalt Tile, because of their higher asphalt content, are somewhat less susceptible to the effects of acids than other colors. In many institutional laboratories, dark marbleized asphalt tile has been used for the reason that if stains on the floor do result, they will not be noticeable.

Effect of Temperature and Direct Sunlight on Asphalt Tile:

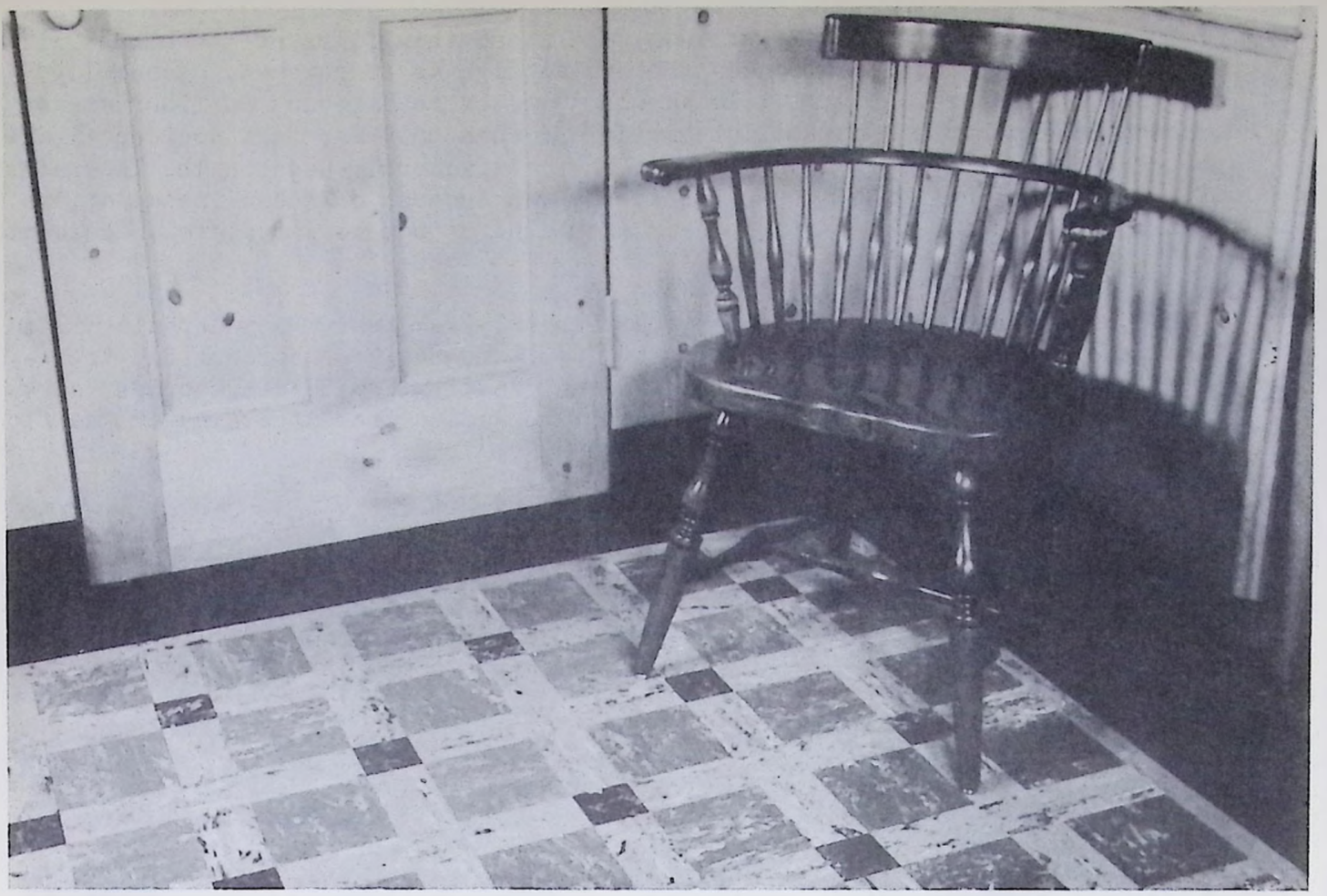
Since asphalt tile is a plastic material, it is definitely affected by extremes in temperature. Therefore, the material is not suitable for outdoor locations or on areas continually exposed to concentrated rays of the sun, or on floors that for any reason may be heated to above normal room temperature.



This floor, in marbleized colors, illustrates one of the many possible attractive designs made possible by J-M Asphalt Tile Flooring

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J-M Asphalt Tile Flooring provides an attractive and practical floor for basement recreation rooms



J-M Asphalt Tile Flooring applied to locker room of a large Y.M.C.A. Building

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A PARTIAL LIST OF INSTALLATIONS
J-M ASPHALT TILE FLOORING

OFFICE BUILDINGS

Electric Controller & Manufacturing Co., Cleveland, Ohio
Bethlehem Steel Office Building, Baltimore, Md.
Terminal Commerce Bldg., Philadelphia, Pa.
Mutual Chemical Company, Baltimore, Md.
Maytag Company, Newton, Iowa
Potosi Brewing Co., Potosi, Wisconsin
General Motors Acceptance Corp., Minneaplis, Minn.
Investors Syndicate, Minneapolis, Minn.
West Publishing Co., St. Paul, Minn.
Philco Radio & Television Co., Philadelphia, Pa.
Aluminum Co. of America, Massena, N. Y.
E. G. Rudd Mfg. Co., Philadelphia, Pa.
Caledonia Insurance Co., Hartford, Conn.
Professional Bldg., Hartford, Conn.
Bulletin Building, Philadelphia, Pa.
General Electric Co., Cleveland, Ohio
Sun Oil Co., Cleveland, Ohio
Equitable Life Assurance Society of U. S., Cleveland, Ohio
Mutual Building, Richmond, Va.
Virginia Public Service Co., Alexandria, Va.
Brookings Institute, Washington, D. C.
Times-Herald, Washington, D. C.
Pittsburgh Post Gazette, Pittsburgh, Pa.
Eckles-King Building, Washington, D. C.
Hurley-Wright Building, Washington, D. C.
Walker Building, Washington, D. C.
Professional Arts Bldg., Hagerstown, Md.
Equitable Bldg., Baltimore, Md.
Pangborn Corporation, Hagerstown, Md.
Westinghouse Electric & Mfg. Co., Mansfield, Ohio
Western Union Telegraph Co., Cleveland, Ohio
Sperry Gyroscope Co., Brooklyn, N. Y.
J. Walter Thompson Co., New York, N. Y.
Timken Roller Bearing Co., Canton, Ohio
National Smelting Co., Cleveland, Ohio
Cleveland Electric Illuminating Co., Cleveland, Ohio
Detroit Steel Products Co., Cleveland, Ohio
Hajoca Company, Philadelphia, Pa.
Sun Oil Co., Blawnox, Pa.
Metropolitan Life Insurance Co., New York, N. Y.
Air Reduction Sales Corp., Jersey City, N. J.
Union Carbide Co., New York, N. Y.
New York Life Insurance Co., New York, N. Y.
Interchemical Corp., New York, N. Y.
Northern Indiana Public Service Co., Elkhart, Ind.
Northern Indiana Public Service Co., Mishawaka, Ind.
Pierce Building, St. Louis, Mo.
Fisher Body Co., St. Louis, Mo.
Ford Motor Co., St. Louis, Mo.
American Radiator Co., St. Louis, Mo.
Pennsylvania Railroad Co., St. Louis, Mo.
Westinghouse Electric and Mfg. Co., St. Louis, Mo.
Humboldt Medical Building, St. Louis, Mo.
Acme Steel Co., Riverdale, Ill.
Film Exchange Building, Chicago, Ill.
H. O. L. C. Offices, Merchandise Mart Building, Chicago, Ill.
Pure Oil Building, Chicago, Ill.
Times Building, Bombay, India
Bogota Stock Exchange, Bogota, Columbia
Campbell Soup Co., Chicago, Ill.
National Tea Co. Office, Chicago, Ill.
Old Gold Distributors, Chicago, Ill.
Gold Medal Wine Co., Chicago, Ill.
Libbey Glass Mfg. Co., Toledo, Ohio
Chicago, Burlington and Quincy R.R., Pittsburgh, Pa.
Oakland Title Ins. Co., Oakland, California
United Drug Co., Boston, Mass.
Standard Brands of California, Oakland, Calif.
Ohio Nat'l. Life Ins. Co., Cincinnati, Ohio
Swift Packing Co., Pittsburgh, Pa.
West Penn Power Co., Springdale, Pa.
American Steel and Wire Co., Donora, Pa.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
State Automobile Insurance Association, Pittsburgh, Pa.
Superior Steel Corporation, Carnegie, Pa.
Standard Accident Insurance Co., Detroit, Mich.
Fisher Body Corporation, Detroit, Mich.
Fisher Body Corporation, Lansing, Mich.
Fisher Body Corporation, Pontiac, Mich.
Ashland Oil & Refining Co., Ashland, Ky.
United Fuel & Gas Co., Huntington, W. Va.
Westinghouse Electric & Manufacturing Co., Huntington, W. Va.
No. Carolina Insurance Co., Raleigh, N. C.
Appalachian Electric Power Co., Logan, W. Va.
American Rolling Mill, Ashland, Ky.
Potomac Electric Power Co., Washington, D. C.
Bakelite Corporation, New York, N. Y.
U. S. Government Bldg., Sunnyvale, Calif.
U. S. Government Bldg., Fort Mason, Calif.
Carbon & Carbide Co., New York, N. Y.
Chase Brass & Copper Co., New York, N. Y.
Du Pont De Nemours Co., Arlington, N. J.
Bethlehem Steel Co., Johnstown, Pa.
Pennsylvania Electric Co., Johnstown, Pa.
American Can Co., Geneva, N.Y.
Herald Traveler Bldg., Boston, Mass.
Du Pont Co., Pompton Lakes, N. J.
Du Pont Co., Wilmington, Del.
Linen Thread Co., Paterson, N. J.
Remington Rand Co., New York, N. Y.
New York Life Insurance Co., New York, N. Y.
General Electric Co., Philadelphia, Pa.
Financial Centre Bldg., San Francisco, Calif.
Balfour Bldg., San Francisco, Calif.
California Commercial Union Bldg., San Francisco, Calif.
Metropolitan Bank Bldg., Minneapolis, Minn.
Federal Reserve Bank Bldg., Minneapolis, Minn.
La Salle Bldg., Minneapolis, Minn.
First National Soo Line Bldg., Minneapolis, Minn.
Guardian Life Bldg., St. Paul, Minn.
Pere Marquette Bldg., New Orleans, La.
Atlas Bldg., Shreveport, La.
Union Planters Bank Bldg., Memphis, Tenn.
Gulf, Colorado & Santa Fe Bldg., Galveston, Tex.
Acacia Mutual Life Ins. Bldg., Washington, D. C.
Sociedad De Benificencia, Publica Del Calla, Lima, Peru
Fruit Growers Express Bldg., Washington, D. C.
Stanislaus County Fire Ins. Bldg., Modesto, Calif.
Public Service Bldg., Paterson, N. J.
G. W. Paterson Bldg., Fresno, Calif.
McGraw-Hill Bldg., New York, N. Y.
Herald-Traveler Bldg., Boston, Mass.
Fox Film Bldg., Memphis, Tenn.

COLLEGES

Pallotine Monastery, Milwaukee, Wis.
Franciscan Monastery, Burlington, Wis.
Swarthmore College, Swarthmore, Pa.
Pheiser College, Misenheimer, N. C.
St. John's Military Academy, Delafield, Wis.
Amherst College, Amherst, Mass.
St. Joseph College, Hartford, Conn.
Yale University, New Haven, Conn.
United States Naval Academy, Annapolis, Md.
University of Iowa, Iowa City, Iowa
Culver Military Academy, Culver, Ind.
Oberlin College, Oberlin, Ohio
Wooster College, Wooster, Ohio
Notre Dame University, South Bend, Ind.
St. Louis University, St. Louis, Mo.
Weslyan University, Middletown, Conn.
Marshall College, Huntington, W. Va.
Mt. St. Joseph College, Cincinnati, Ohio
Pennsylvania College for Women, Pittsburgh, Pa.
Chicago College of Dental Surgery, Chicago, Illinois
Virginia Military Institute, Lexington, Va.
University of Virginia, Charlottsville, Va.
University of North Carolina, Chapel Hill, N. C.
Ursuline College, Santa Rosa, Calif.
University of California, Berkeley, Calif.
Youngstown College, Youngstown, Ohio
Georgetown University, Georgetown, Md.
Catholic University, Washington, D. C.
Connecticut Women's College, New London, Conn.
Wells College, Aurora, N. Y.
Middlebury College, Middlebury, Vt.
Mills College, Oakland, Calif.
State Teachers College, Duluth, Minn.
Medical College of Virginia, Richmond, Va.

JOHNS-MANVILLE Building Materials

J-M Asphalt Tile Flooring
A Partial List of Installations

DATE September, 1938
(Cancelling sheet dated April, 1938)
BMF-418

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Partial List of Installations of J-M Asphalt Tile Flooring - Continued

SCHOOLS

St. Joseph's Ursuline School & Novitiate, St. Louis, Mo.
North Shore Country Day School, Winnetka, Ill.
Immaculate Conception School, Chicago, Ill.
Augusta High School (Gymnasium), Augusta, Mich.
Rantoul Community High School (Gymnasium), Rantoul, Ill.
John Deere Jr. High School, Moline, Illinois
Logan Elementary School, Moline, Ill.
School (Gymnasium), Oneida, Iowa
Washington High School, Washington, Pa.
Muse School, Muse, Pa.
School (Gymnasium), Guernsey, Iowa
Trenton High School, Detroit, Michigan
St. Joseph School, Huntington, W. Va.
Crosby High School, Waterbury, Conn.
Senior High School, Springfield, Mass.
Maryknoll Seminary, Chappaqua, N. Y.
Alexandria High School, Alexandria, Va.
Sparrows Point High School, Baltimore, Md.
Lincoln Town High School, Mahtomedi, Minn.
Whitefish Bay High School, Whitefish Bay, Wis.
Marquette Medical School, Milwaukee, Wis.
Norris Farm Boys School, Mukwonago, Wis.
School (Gymnasium), Renwick, Iowa
Woodmere School, Woodmere, L. I., N. Y.
Old Greenwich School, Old Greenwich, Conn.
Ward School, St. Louis, Mo.
Centerville School, Centerville, Pa.
St. Joseph's Seminary, Yonkers, N. Y.
Rome State School, Rome, N. Y.
Greenwich High School, Greenwich, Conn.
Berkeley County High School, Berkeley, Calif.
George Washington High School, San Francisco, Calif.
Rennselaer High School (Gymnasium), Rennselaer, Ind.
Cedar Grove School, Shreveport, La.
West End High School, San Antonio, Texas
William Wilson School, Mount Vernon, N. Y.
District 3 Grammar School, Rye, N. Y.
Quaker Ridge School, New Rochelle, N. Y.
Low Heywood School, Shippan Point, Stamford, Conn.
Englishtown School, Englishtown, N. J.
School (Gymnasium), Mattawan, Mich.
Melrose High School, Melrose, Mass.
Forest Park Junior High School, Fort Worth, Texas
Jenning Ave. Junior High School, Fort Worth, Texas
St. James School, Hagerstown, Md.
Florence Ave. School, Irvington, N. J.
Myrtle Ave. School, Irvington, N. J.
School (Gymnasium), Kalamazoo, Mich.
School (Gymnasium), Urbana, Iowa
Cissna Park Grade School (Gymnasium), Cissna Park, Ill.
South Orange Board of Education, South Orange, N. J.
Millard School, Millard, Neb.
Murray School, Murray, Neb.
Chickasha High School, Chickasha, Oklahoma
Choate School, Wallingford, Conn.
Warm Springs Indian School, Warm Springs, Ore.
Shawano High School (Gymnasium), Shawano, Wis.

HOSPITALS

Dental Clinic, Caracas, Venezuela
St. Vincent's Hospital, Bridgeport, Conn.
Julia Dyckman Memorial, Yonkers, N. Y.
Cornell Medical Center, New York, N. Y.
Roosevelt Hospital, Metuchan, N. J.
Physicians & Surgeons Hospital, New York, N. Y.
Veterans Administration, Camp Custer, Michigan
Lima State Hospital for Criminally Insane, Lima, Ohio
Bethesda Memorial Hospital, Detroit, Michigan
Marquette Medical School, Milwaukee, Wisconsin
St. Mary's Hospital, Waterbury, Conn.
Williamsburg-Greenpoint Health Center, Brooklyn, N. Y.
East Harlem Health Center, New York, N. Y.
New Jersey State Hospital, Jamesburg, N. J.
Mountainside Hospital, Montclair, N. J.
Brandon Hospital, Brandon, Mo.
Oregon State Feeble Minded Hospital, Salem, Oregon
Veterans Administration, Togus, Maine
Veterans Administration, Roanoke, Virginia
Veterans Administration, Lake City, Florida
Washington County Hospital, Hagerstown, Md.
Veterans Hospital, Perry Point, Md.
Budd Hospital, Roseau, Minn.
Milwaukee County Institutions, Wauwatosa, Wis.
St. Joseph's Hospital, Rice Lake, Wis.
Oneida City Hospital, Oneida, N. Y.
Oregon State Feeble Minded Hospital, Salem, Oregon
Letterman Hospital, San Francisco, California
State of Michigan Epileptic Hospital, Wahjamega, Michigan
New Rochelle Hospital, New Rochelle, N. Y.
Mt. Alto Veterans Hospital, Washington, D. C.
St. Christopher Hospital, Philadelphia, Pa.
Oneida City Hospital, Oneida, N. Y.
St. Elizabeth Hospital, Youngstown, Ohio
Eye, Ear, Nose and Throat Hospital, Pittsburgh, Pa.
New Martinsville, Hospital, New Martinsville, W. Va.
Ohio Valley Hospital, Wheeling, W. Va.
Bellaire Hospital, Bellaire, Ohio
Eitel Hospital, Minneapolis, Minn.
Abbott Hospital, Minneapolis, Minn.
Naeve Hospital, Albert Lea, Minn.
Highland Clinic, Shreveport, La.
City Memorial Hospital, Nacogdoches, Tex.
Maryland Tuberculosis Sanitarium, Sanitarium, Md.
Highland Sanitarium, Shreveport, La.
Tripler Hospital, Hawaiian Islands
Children's Hospital Bldg., State Tuberculosis Hospital, Sanitarium, Texas
Flint-Goodrich Hospital, New Orleans, La.
Middlesex Hospital, New Brunswick, N. J.
New York Hospital, New York, N. Y.
Mount Sinai Hospital, New York, N. Y.
St. James Riverside Hospital, Yonkers, N. Y.
Physicians' Hospital, Jackson Heights, L.I., N. Y.
New Jersey State Hospital, Marlboro, N. J.
Washington County Hospital, Hagerstown, Md.
Freedmans Hospital, Washington, D. C.
Bolling Field Hospital, Washington, D. C.
Jordan Hospital, Highland Park, Michigan
U. S. Veterans Hospital, Jefferson Barracks, Mo.
Veterans Hospital, American Lake, Wash.
McDonough County Tuberculosis Sanitarium, Illinois
King Edward VII Hospital, Hamilton, Bermuda
Upsala Hospital, Stockholm, Swedon
Veterans Hospital, Kecoughtan, Va.

CHURCHES

St. Ann's R. C. Church, Bridgeport, Conn.
St. Aiden's Church, New Haven, Conn.
Westminster Presbyterian Church, Minneapolis, Minn.
St. Roch's Church, St. Louis, Mo.
Our Lady of Angels Church, Chicago, Ill.
St. John's Presbyterian Church, Chicago, Ill.
Zion Evangical Lutheran Church, Chicago, Ill.
South Side Hebrew Church, Chicago, Ill.
St. Matthew's Lutheran Church, Chicago, Ill.
First Presbyterian Church, Detroit, Mich.
Church of Holy Family, New Rochelle, N. Y.
Grace M. E. Church, Decatur, Illinois
Keller Memorial Church, Washington, D. C.
St. Peter and Paul Cathedral, Indianapolis, Ind.
First Baptist Church, Washington, D. C.
St. Paul's Lutheran Church, Baltimore, Md.
St. Luke's Evangical Lutheran Church, Hannahstown, Pa.
Overlea Baptist Church, Baltimore, Md.
First Church of Christ Scientist, Hamilton, Ohio
Presbyterian Church, Ashland, Ky.
Twenty-first Baptist Temple, Huntington, W. Va.
Hennepin Ave. M. E. Church, Minneapolis, Minn.
St. Anthony Church, Brown's Valley, Minn.
St. Johns's Lutheran Church, Good Thunder, Minn.
Holy Rosary Church, Houston, Tex.
Church of the Immaculate Conception, Houston, Tex.
St. Paul's Methodist Church, Houston, Tex.
Keller Memorial Church, Washington, D. C.
Overlea Baptist Church, Overlea, Md.
Church of the Latter Day Saints, Berkeley, Calif.
Christ Church, Methodist Episcopal, New York, N. Y.
First Church in Malden, Malden, Mass.
Ruggles St. Baptist Church, Boston, Mass.
Myers Park Methodist Church, Charlotte, N. C.

BANKS

Ohio Bank Building, Toledo, Ohio
First National Bank, Huntington, W. Va.
Harguenot Trust Company, New Rochelle, N. Y.
Mellon Bank, Pittsburgh, Pa.
Chase National Bank, New York, N. Y.
National Bank of Washington, Washington, D. C.
Bank of America, San Francisco, Calif.
Monterey County Bank, Greenfield, Calif.
National City Realty Co., New York, N. Y.
First National Bank, Shreveport, La.
Union Bank Building, Davenport, Iowa
National City Bank, Manila, Phillipine Islands

CHAIN STORES

G. C. Murphy Co. 10-Cent Store, 5th Ave., Pittsburgh, Connelsville, New Castle & Bellofonte, Pa.
G. C. Murphy Co. 10-Cent Store, Washington, D. C.
Kroger Grocery & Baking Co., Cleveland, Ohio
Kroger Grocery & Baking Co., South Bend, Ind.

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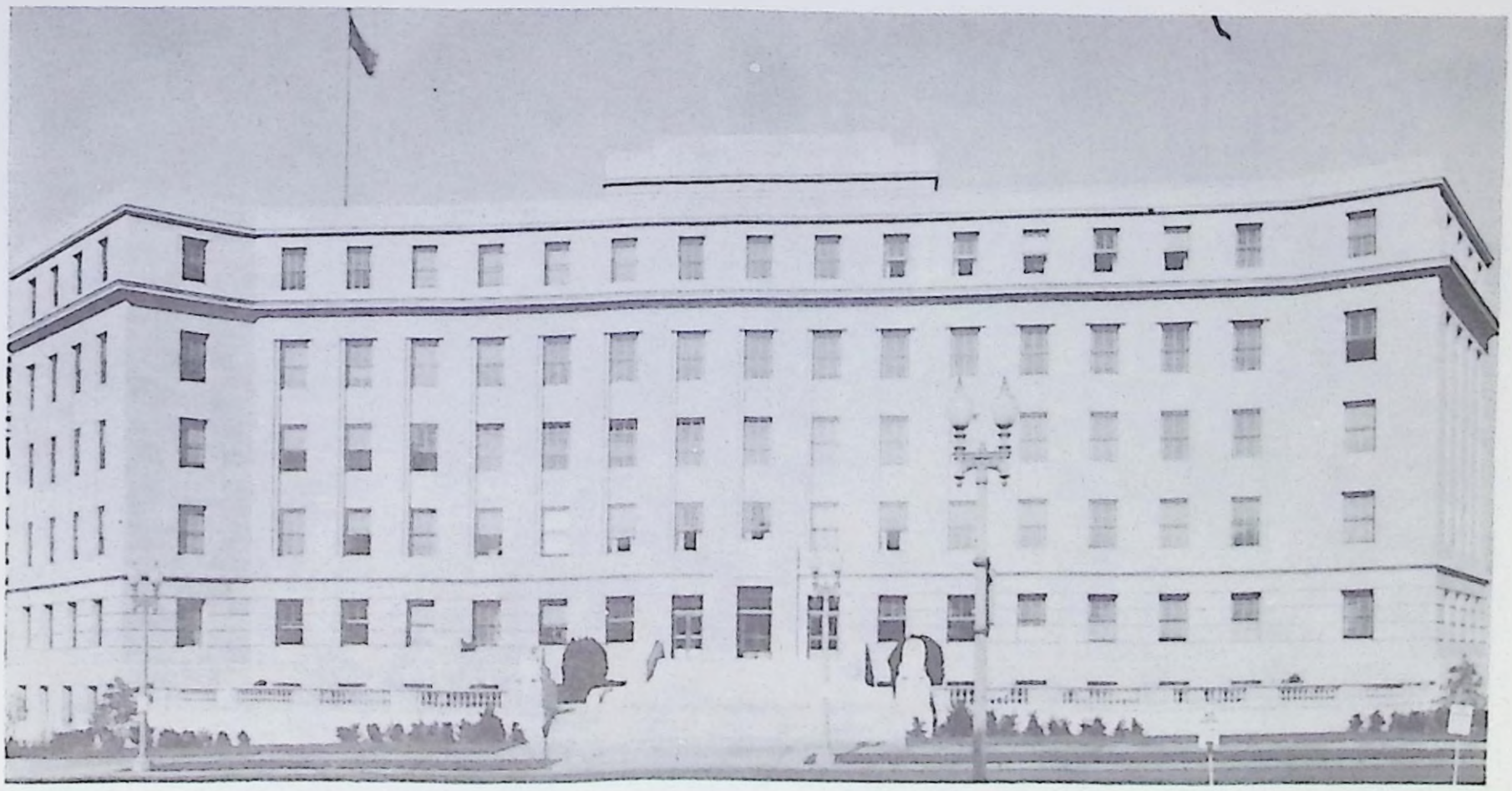
Partial List of Installations of J-M Asphalt Tile Flooring - Continued

CHAIN STORES - Continued

Kroger Grocery & Baking Co., St. Louis, Mo., Chicago, Ill.
Crown Drug Co., Kansas City, Mo.
Weinburger Drug Co., Cleveland, Ohio
Fisher Bros. Co., Cleveland, Ohio
Sanitary Grocery Co., Richmond, Va., Washington, D. C.
Peoples Drug Co., Washington, D. C.
A & P Stores, Annapolis, Md., South Bend, Ind.
A & P Stores, Chicago, Ill.
Howard Clothes Stores, New York, N. Y.
National Tea Co. Stores, Chicago, Ill.
F. W. Woolworth Co. Store, Cincinnati, Ohio
F. W. Woolworth Co. Office, Boston, Mass.
United Cigar Store, King City, Calif.
J. C. Penny Store, Martinez, Calif.
Liggetts Drug Store, Providence, R. I.
Kress Co. Store, Wailuku, Maui, T. H.
Penn Fruit Co., Philadelphia, Pa.

MISCELLANEOUS

Immigration Station, Ellis Island, N. Y.
Naval Air Station, Lakehurst, N. J.
Teaneck Armory, Teaneck, N. J.
Middlebury Town Hall, Middlebury, Conn.
Easton Town Hall, Easton, Conn.
Massillon Library, Massilon, Ohio
West Side Community Center, Cleveland, Ohio
Jewish Federation of Philanthropic Society, New York, N. Y.
Lackawanna R. R. Terminal Restaurant, Hoboken, N. J.
Rockefeller Institute of Medical Research, New York, N. J.
New York Historical Society, New York, N. Y.
Mary Lewis Convent, Brooklyn, N. Y.
Standard Brands Laboratory, Peekskill, N. Y.
U. S. Immigration Station, Honolulu
Hotel Cleveland, Cleveland, Ohio
U. S. Industrial Alchohol Laboratory, Baltimore, Md.
County Court House, Clark, S. C.
Curtis Hotel, Minneapolis, Minn.
St. Francis Hotel, St. Paul, Minn.
City Hall, Little Falls, N. Y.
Armory, Oneida, N. Y.
Central Masonic Temple, Chicago, Ill.
Chemical Laboratory, Monsanto Chemical Co., St. Louis, Mo.
Chemical Laboratory, Titanium Pigment Co., St. Louis, Mo.
Laboratory, Alcoa Ore Co., St. Louis, Mo.
Power Room, American Telephone and Telegraph Co., St. Louis, Mo.
Chicago Academy of Science, Chicago, Ill.
Charleroi Municipal Building, Charleroi, Pa.
Dormont Municipal Building, Pittsburgh, Pa.
Jewish Home for the Aged, Chicago, Ill.
Catholic Young Mens Assn., Philadelphia, Pa.
Hearns Department Store, New York, N. Y.
Free Public Library, Santa Barbara, Calif.
Academy of Science, San Francisco, Calif.
State Capitol, St. Paul, Minn.
Dallas Public Library, Dallas, Texas
WBA Radio Station, Annapolis, Md.
Lualualei Radio Station, Oahu, Hawaiian Islands
Embassy Hotel, San Francisco, Calif.
Chevy Chase Country Club, Washington, D. C.
Free Public Library, San Francisco, Calif.
City Hall, Seguin, Texas
Brookings Institute, Washington, D. C.
Kenwood Golf & Country Club, Washington, D. C.
Congressional Country Club, Washington, D. C.
King City Theatre, King City, California
Seymour Town Hall, Seymour, Conn.
Morris Library, Morris, Conn.
Essex Fells Country Club, Essex Fells, N. J.
Free Public Library, Kearney, N. J.
Wykagyl Country Club, New Rochelle, N. Y.
Downtown Athletic Club, New York City
World War Memorial, Grand Forks, N. D.
Best and Co., New York, N. Y.
M. L. Parker Department Store, Davenport, Iowa
Cuban Army Radio and Broadcasting Station, Havana, Cuba
Naval Y. M. C. A. Norfolk, Virginia
Y. M. C. A., Louisville, Ky.
Y. M. C. A., Milwaukee, Wisconsin
Y. M. C. A., Tatham House, New York, N. Y.
Y. M. C. A.,Toledo, Ohio
Y. M. C. A., Seattle, Washington
Y. M. C. A., Davenport, Iowa
Masonic and Eastern Star Home, Washington, D. C.
Bachelor Officers Quarters, Quantico, Va.
St. Agnes Home for the Aged, St. Louis, Mo.
Sandusky County Home, Sandusky, Ohio
Allegheny County Home, Woodville, Pa.
Jewish Home for the Aged, Pittsburgh, Pa.
St. Agnes Orphanage, Anchorage, Ky.
Odd Fellows Home, Saratoga, Calif.
Masonic Hall, Willits, Calif.
Home for the Aged, Yonkers, N. Y.
Hartford County Home, Warehouse Point, Conn.
Masonic Temple, Johnstown, Pa.
St. Joseph's Novitiate, Hartford, Conn.
B. P. O. E., Newport, Ky.
B. P. O. E., Moline, Ill.
Elks Home, Asbury Park, N. J.
Elks Convalescent Home, Seattle, Washington
Kingsland Apartments, St. Louis, Mo.
H. P. Selman Co., Dept. Store, Louisville, Ky.
7321 So. Shore Drive Apts., Chicago, Ill.



Acacia Mutual Life Insurance Company, Washington, D. C.

JOHNS-MANVILLE Building Materials	DATE September, 1938 (Cancelling sheet dated April, 1938)
J-M Asphalt Tile Flooring A Partial List of Installations - Continued	BMF-419

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Partial List of Installations of J-M Asphalt Tile Flooring - Continued



Brookings Institute, Washington, D. C.



Wrigley Building, Chicago, Ill.



New York Hospital, New York, N. Y.

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SPECIFICATION FOR ASPHALT TILE ON CONCRETE SLAB ON GRADE OR BELOW GRADE

WORK INCLUDED:

The work contemplated under this specification shall include all materials, labor, equipment and services necessary for and reasonably incidental to the installation of asphalt tile flooring (State in detail work to be done including colors, patterns, sizes and thickness of asphalt tile to be used in individual rooms. Since there is a wide difference in cost between colors of asphalt tile, it is important that definite colors be specified in order that estimates may be correctly submitted.) as shown on drawings or herein specified.

If a cove base is shown on plans or called for in the schedule, it shall be a 6"-high flexible rubber composition base of approved manufacture having a wall thickness of 1/8" and a floor lip of 1/8", 3/16" or 1/4" to conform to the thickness of asphalt tile specified.

WORK NOT INCLUDED:

The following work will be furnished and installed as specified under other divisions of the specification which this contractor shall read to ascertain what is called for therein.

The concrete sub-floor shall be firm and solid and shall have a top finish of at least 3/4" to 1" thick. This finish shall be composed of one part portland cement and two parts clean, screened sand. This topping shall be brought to a smooth, steel-troweled, monolithic finish free from waves and irregularities and finished to a point below the required floor level equal to the thickness of the asphalt tile flooring specified. The underfloor shall not be treated with hardeners, paint or surface coatings of any kind, and shall not have lines struck therein. It shall be free from frost or the effects of freezing and shall be left thoroughly dry and clean.

CONNECTING WORK:

This contractor shall examine all surfaces on which, or against which his work is to be applied; and he shall notify the architect in writing of any defects that he may discover which, in his opinion, he considers detrimental to the installation of his materials.

SCHEDULE:

It is suggested that, particularly on large jobs, the specification contain a schedule indicating the following:

a. Room name or number
b. Size and thickness of asphalt tile units
c. Color and arrangement of field asphalt tile (specify colors by manufacturers' numbers)
d. Color of border asphalt tile (specify colors by manufacturers' numbers)

MATERIALS:

All asphalt tile flooring and asphalt tile cement referred to in these specifications shall be of an approved manufacture and shall bear the manufacturer's label. The thickness of the asphalt tile, size, colors, etc. shall be as specified and shall be installed by a contractor approved by the manufacturer and·

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in strict accordance with the manufacturer's application directions. All asphalt tile shall conform to the requirements of the Federal Specification SS-T-306. Ten asphalt tiles shall be taken at random by the inspector for each 10,000 asphalt tiles, or fraction thereof, of each color included in the order and submitted to the tests described in Federal Specification SS-T-306. If any asphalt tiles fail to pass any of the requirements of this specification, the asphalt tiles represented by the sample will be rejected.

SAMPLES:

The contractor shall submit for approval with his bid duplicate samples of each color of asphalt tile required under his contract. Samples shall be full size, labeled with the manufacturer's name, flooring contractor's name and the name and color number of the asphalt tile.

INSTALLATION:

Prime the concrete slab using a cut-back primer of approved manufacture applied with a flooring brush, not mop. This material must not be used near any fire as it is inflammable and very volatile. Rooms must be well ventilated during its application and while it is drying. Allow the primer to dry thoroughly, which will take from 12 to 24 hours before applying asphalt tile cement. The coverage of the primer shall be approximately 300 sq. ft. per gallon.

When the cut-back primer is thoroughly dry, trowel on an emulsified asphalt tile cement of the type recommended by the manufacturer of the asphalt tile. This cement shall be spread evenly over the underfloor using a cement finishers trowel so that a gallon of cement will cover approximately 125 to 175 sq. ft. Either a straight-edged or notched trowel (as preferred by the individual mechanic) shall be used. If a notched trowel is used, the flat spaces between the notches shall not exceed 1/8 of an inch. In other words, the notches shall be spaced 3/16 of an inch on centers. V-shaped notches not more than 1/16 of an inch in depth shall be cut with a fine V-shaped file. These notches shall be renewed periodically, depending on the gradual wear of the trowel. Temperature of the cement and also of the asphalt tile, the room and sub-floor for several days before, during and after application of the cement, shall be at least 70 deg. F. After the emulsified asphalt cement has thoroughly dried and become tacky, which will require from 30 to 60 minutes unless adverse atmospheric conditions are encountered, apply the asphalt tile in accordance with the manufacturer's application directions. Radiator legs should be set on small pieces of hard material (ceramic tile or metal) of the same thickness as the asphalt tile specified. Asphalt tile shall not be left with unprotected edges where the asphalt tile does not abutt walls or other types of flooring. Suitable brass edging shall be securely fastened to the sub-floor where this condition occurs.

CLEANING:

Asphalt tile flooring shall be thoroughly cleaned (using a neutral soap or cleaner approved by the manufacturer) when directed by the architect after completion of the installation and after the asphalt tile has thoroughly bonded to the sub-floor. (If a wax finish is desired, the wax shall be of a type approved by the manufacturer for use on asphalt tile. The number of coats desired shall be specified.)

PROTECTION:

Information on bearing equipment recommended by the asphalt tile manufacturer shall be furnished by the contractor upon completion of the installation so that the proper equipment may be provided for the protection of the asphalt tile flooring against sharp-pointed loads, etc.

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SPECIFICATION FOR ASPHALT TILE ON CONCRETE SLAB ABOVE GRADE

WORK INCLUDED:

The work contemplated under this specification shall include all materials, labor, equipment and services necessary for and reasonably incidental to the installation of asphalt tile flooring (State in detail work to be done including colors, patterns, sizes and thickness of asphalt tile to be used in individual rooms. Since there is a wide difference in cost between colors of asphalt tile, it is important that definite colors be specified in order that estimates may be correctly submitted.) as shown on drawings or herein specified.

If a cove base is shown on plans or called for in the schedule, it shall be a 6"-high flexible rubber composition base of approved manufacture having a wall thickness of 1/8" and a floor lip of 1/8", 3/16" or 1/4" to conform to the thickness of asphalt tile specified.

WORK NOT INCLUDED:

The following work will be furnished and installed as specified under other divisions of the specification which this contractor shall read to ascertain what is called for therein.

The concrete sub-floor shall be firm and solid and shall have a top finish of at least 3/4" to 1" thick. This finish shall be composed of one part portland cement and two parts clean, screened sand. This topping shall be brought to a smooth, steel-troweled, monolithic finish free from waves and irregularities and finished to a point below the required floor level equal to the thickness of the asphalt tile flooring specified. The underfloor shall not be treated with hardeners, paint or surface coatings of any kind, and shall not have lines struck therein. It shall be free from frost or the effects of freezing and shall be left thoroughly dry and clean.

Where flexible rubber composition base is specified, a smooth backing of cement, wood, plaster or other suitable material shall be provided to the height of the base specified.

CONNECTING WORK:

This contractor shall examine all surfaces on which, or against which, his work is to be applied; and he shall notify the architect in writing of any defects that he may discover which, in his opinion, he considers detrimental to the installation of his materials.

SCHEDULE:

It is suggested that, particularly on large jobs, the specification contain a schedule indicating the following:

a. Room name or number
b. Size and thickness of asphalt tile units
c. Color and arrangement of field asphalt tile (specify colors by manufacturers' numbers)
d. Color of border asphalt tile (specify colors by manufacturers' numbers)
e. Color of flexible rubber base if included.

MATERIALS:

All asphalt tile flooring, asphalt tile cement (and where specified flexible rubber base) referred to in these specifications shall be of an approved manufacture and shall bear the manufacturer's label. The thickness of the asphalt tile, size, colors, etc. shall be as specified and shall be installed by a contractor approved by the manufacturer and in strict accordance with the manufacturer's applica-

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tion directions. All asphalt tile shall conform to the requirements of the Federal Specification SS-T-306. Ten asphalt tiles shall be taken at random by the inspector for each 10,000 asphalt tiles, or fraction thereof, of each color included in the order and submitted to the tests described in Federal Specification SS-T-306. If any asphalt tiles fail to pass any of the requirements of this specification, the asphalt tiles represented by the sample will be rejected.

SAMPLES:

The contractor shall submit for approval with his bid duplicate samples of each color of asphalt tile required under his contract. Samples shall be full size, labeled with the manufacturer's name, flooring contractor's name and the name and color number of the asphalt tile.

INSTALLATION:

Over the smooth, cement underfloor, trowel on an emulsified asphalt tile cement of the type recommended by the manufacturer of the asphalt tile. This cement shall be spread evenly over the underfloor using a cement-finishers trowel so that a gallon of cement will cover approximately 125 to 175 sq. ft. Either a straight-edged or notched trowel (as preferred by the individual mechanic) shall be used. If a notched trowel is used, the flat spaces between the notches shall not exceed 1/8 of an inch. In other words, the notches shall be spaced 3/16 of an inch on centers. V-shaped notches not more than 1/16 of an inch in depth shall be cut with a fine V-shaped file. These notches shall be renewed periodically, depending on the gradual wear of the trowel. Temperature of the cement and also of the asphalt tile, the room and sub-floor for several days before, during and after application of the cement shall be at least 70 deg. F. After the emulsified asphalt cement has thoroughly dried and become tacky, which will require from 30 to 60 minutes unless adverse atmospheric conditions are encountered, apply the asphalt tile in accordance with the manufacturer's application directions. Radiator legs should be set on small pieces of hard material (ceramic tile or metal) of the same thickness as the asphalt tile specified. Asphalt tile shall not be left with unprotected edges where the asphalt tile does not abutt walls or other types of flooring. Suitable brass edging shall be securely fastened to the sub-floor where this condition occurs. If flexible rubber composition base is shown on plans or called for in the schedule, this material shall be applied with rubber tile cement of approved manufacture and further fastened with brads where necessary.

CLEANING:

Asphalt tile flooring shall be thoroughly cleaned (using a neutral soap or cleaner approved by the manufacturer) when directed by the architect after completion of the installation and after the asphalt tile has thoroughly bonded to the sub-floor. (If a wax finish is desired, the wax shall be of a type approved by the manufacturer for use on asphalt tile. The number of coats desired shall be specified.)

PROTECTION:

Information on bearing equipment recommended by the asphalt tile manufacturer shall be furnished by the contractor upon completion of the installation so that the proper equipment may be provided for the protection of the asphalt tile flooring against sharp-pointed loads, etc.

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FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

TILE; ASPHALT

This specification was approved by the Director of Procurement, for the use of all departments and establishments of the Government, and shall become effective not later than December 1, 1934. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A–1. There are no other Federal specifications applicable to this specification.

B. GRADE

B–1. Asphalt tile shall be of one grade only.

C. MATERIAL AND WORKMANSHIP

C–1. *Material.*—Asphalt tile shall be composed of a thoroughly blended composition of thermoplastic binder of the asphaltic and/or resinous type, asbestos and/or raw-cotton fibers, and inert materials as fillers or pigments, formed under pressure while hot and cut to size.

C–2. *Workmanship.*—The tile shall be free from defects affecting its serviceability or appearance. The wearing surfaces of tiles shall have straight edges and square corners.

D. GENERAL REQUIREMENTS

D–1. *Size.*—Tile shall be of the dimensions specified, with a tolerance at 77° F. of minus 1/32 inch in 12 inches (see I–3).

D–2. *Thickness.*—Tile shall be ⅛ inch or $\frac{3}{16}$ inch thick as specified, with a tolerance at 77° F. of plus or minus 0.005 inch.

D–3. *Color and texture.*—Tile shall be of the color or colors specified. Tiles of plain colors shall be uniform throughout. In mottled tile, the mottling shall be worked throughout the full thickness of

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the material. The tile shall have a smooth calendered wearing surface free from sand, grit, and lumps. The color and texture shall match the approved samples.

E. DETAIL REQUIREMENTS

E–1. *Indentation.*—When subjected to a pressure of 30 pounds on a ball or hemispherically ended rod having a diameter of 0.25 inch, the tile shall show at 77° F. the following indentations:

At the end of 1 minute—not less than 0.009 inch nor more than 0.020 inch.

At the end of 10 minutes—not more than that given in table I (or interpolated therefrom) corresponding to the indentation recorded at 1 minute.

TABLE I

Recorded indentation at 1 minute	Maximum indentation at 10 minutes	Recorded indentation at 1 minute	Maximum indentation at 10 minutes
Inch	*Inch*	*Inch*	*Inch*
0.008	0.0124	0.015	0.0209
.009	.0137	.016	.0220
.010	.0149	.017	.0232
.011	.0162	.018	.0243
.012	.0174	.019	.0254
.013	.0186	.020	.0265
.014	.0197		

Under the same loading, the tile at 115° F. shall show at the end of 30 seconds an indentation of not more than 0.038 inch.

E–2. *Impact.*—The tile shall not break or crack when subjected to the specified impact test.

E–3. *Flexure.*—Pieces of tile 2 inches wide shall sustain across and with the grain, without breaking, loads concentrated at the center of a span of 8 inches of 6½ and 3 pounds for ⅜- and ⅛-inch tiles, respectively; and at break or pull-out, the deflection shall be not less than 0.4 inch.

E–4. *Curling.*—The tile shall not curl, after 120 hours' exposure to moisture, more than 0.05 inch, when subjected to the specified curling test.

E–5. *Flammability.*—The tile shall not continue flaming for more than 30 seconds after being subjected to the specified flammability test.

F. METHODS OF SAMPLING, INSPECTION, AND TEST

F–1. *Sampling.*—Ten tiles shall be taken at random by the inspector for each 10,000 tiles or fraction thereof, of each color included in the order.

F–2. *Superficial examination.*—

F–2a. *Size.*—Tiles from each lot of samples shall be examined for straightness of edges and squareness of corners and measured for width and length.

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F–2b. *Thickness.*—Tiles from each lot of samples shall be calipered at four scattered points each with a micrometer having flat bearing surfaces at both contact points of not less than one-quarter inch in diameter. The readings shall be averaged.

F–2c. *Color and finish.*—The samples shall be compared with the approved samples for color and finish.

F–3. *Physical examination.*—

F–3a. *Indentation.*—Two tiles from each lot of samples shall be subjected to the following indentation tests. Tile shall be brought to a temperature of 77° F. plus or minus 2° by keeping at this temperature for not less than 2 hours. A rod or needle with a hemispherical end 0.25 inch in diameter shall be applied to the upper surface of the tile with a pressure of 2 pounds, the tile being supported on a flat slab. The indentation dial shall be adjusted to 0 and an additional load of 28 pounds applied to the rod or needle. The readings of the dial at the end of 1 minute and 10 minutes from the time of application of the total load shall be taken as the measure of indentation. The test shall be repeated at 115° F. plus or minus 2°, the reading being taken at the end of 30 seconds. If the indentation of either tile measured as specified hereinbefore fails to meet the specified requirements in any test. the tiles represented by the sample shall be considered to have failed.

F–3b. *Impact.*—Two tiles from each lot of samples shall be cut to 6 by 6 inches, and brought to a temperature of 77° F. plus or minus 2° by keeping at this temperature for not less than 2 hours. One tile shall be supported on three 1-inch diameter steel balls equally spaced on a circle 5 inches in diameter on a steel base weighing (including the three balls) not less than 10 pounds. For $\frac{3}{16}$-inch tile, a weight, consisting of a steel cylinder 1 inch in diameter, the lower end of which shall be hemispherical, weighing 0.350 pound (tolerance plus or minus 0.005 pound), shall be dropped freely from a height of 4½ inches. For ⅛-inch tile, a weight consisting of a spherical steel ball 1 inch in diameter weighing 0.143 pound (tolerance plus or minus 0.002 pound) shall be dropped freely from a height of 4½ inches. The weight shall be guided during its fall by a slotted tube or other suitable guide which shall not impede the free fall and shall strike the tile squarely in the center. The second tile shall be tested in the same manner, except that it shall be placed on the balls so that the grain is at right angles to the direction of the grain of the first test tile. If either tile cracks or breaks, the tile represented by the samples shall be considered to have failed.

F–3c. *Flexure.*—Two pieces, each 2 inches wide and 9 inches long, shall be cut from a sample tile, 1 with and 1 across the grain, and brought to a temperature of 77° F. plus or minus 2° by keeping at this temperature for not less than 2 hours. The test piece shall be supported on two parallel steel rods one-quarter inch in diameter spaced 8 inches apart. Load shall be applied at the center of the tile through a third parallel steel rod one-quarter inch in diameter, so that deflection takes place at the rate of 4 inches per minute.

If either test piece fails to withstand the specified load or shows less than the specified deflection, the tiles represented by the sample shall be considered to have failed.

F–3d. *Curling.*—A 6- by 6-inch tile flat enough not to rock, when either side is up, on a plane surface shall be placed on a flat slab of limestone or similar porous material (having a water absorption of between 4 and 8 percent by weight), partially immersed in water so that the upper surface of the slab is between ¾ and 1 inch above the water, which shall be maintained at temperature of about 70° F. After 120 hours' exposure the amount of curling shall be determined by setting a straight edge on each of the diagonals of the tile and measuring the dip at the center. If the average of the two dips, so measured, exceeds the specified limit, the tiles represented by the sample shall be considered to have failed.

F–3e. *Flammability.*—One tile from each lot of samples shall be subjected to the following flammability test. The air shall be completely shut off from the base of a ⅜-inch Bunsen burner and the gas regulated to give a yellow flame about 1½ inches high. The specimen shall be held with the flat face vertical and the lower edge three-fourths inch above the top of the burner, and shall be exposed to the flame for 15 seconds. The burner shall then be removed and the time that flaming of the tile continues after removal of the burner shall be noted. If the first tile continues to flame for more than 30 seconds, 2 additional tiles shall be tested and the average time of flaming of the 3 tiles shall be taken as the measure of flammability.

G. PACKAGING, PACKING, AND MARKING

G–1. Any special requirements of individual departments are noted under section H.

G–2. *Packing.*—Tile shall be packed in crates or packages of such construction as to insure acceptance by common or other carrier for safe transportation at the lowest rate to the point of delivery.

G–3. *Marking.*—Shipping containers shall be marked with the name of the material, the size, thickness, color, and the quantity contained therein as defined by the contract or order under which shipment is made, the name of the manufacturer, the name of the contractor, and the number of the contract or order.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H–1. The following departmental specifications of the issue in effect on the date of invitation for bids shall form a part of this specification.

H–1a. Army: Specification No. 100–2, Standard Specifications for Marking Shipments.

H–1b. Navy: Navy Department General Specifications for Inspection of Material, copies of which may be obtained without cost upon application to the Bureau of Supplies and Accounts, Navy Department, Washington, D.C.

Slum Clearance Program: Specifications and Data on Various Building Materials (... Published by AsbestosClaims.Law
ACL Doc 21293 · Page 56 of 443 asbestosclaims.law/library/21293/56

I. NOTES

I–1. *Data required in ordering.*—Purchasing officers should cover the following particulars in purchase specifications for asphalt tile:

I–1a. *Thickness and size.*—(See I–3.)

I–1b. *Color* (see I–4) and texture; i.e., plain or mottled. Color and texture samples, if required.

I–2. Tile covered by this specification is not oil resistant and is not necessarily acid resistant. Where especially severe service conditions are to be encountered, special specifications should be prepared giving the particular requirements to be met.

I–3. *Sizes.*—Asphalt tile are commercially available in the following sizes in inches (sizes followed by * are special, are made by one or two companies only, and normally are not carried in stock):

Square: 3 by 3 *, 4 by 4 *, 4½ by 4½ *, 6 by 6, 9 by 9, 12 by 12.

Rectangular: 3 by 6 *, 4 by 12 *, 6 by 12 *, 8 by 12 *, 9 by 18, 9 by 27, 6 by 24 *, 12 by 24, 18 by 24, 12 by 36 *.

Special shapes: 6-inch rectangular hexagon *, 9⅝-inch octagon *, 12-inch hexagon *, cove bases *, cove-base corners *.

I–4. *Colors.*—Asphalt tile are commercially available in a wide variety of colors, although few manufacturers produce all colors. The colors vary somewhat in hue and shade, and the lighter colors are subject to fading and color change on exposure. Where specific color schemes are required for architectural effects, it is recommended that definite color and texture samples be required.

I–5. Users are requested to retain this specification in permanent file until a revision is issued.

I–6. An alphabetical index of Federal specifications may be obtained upon application, as noted in paragraph I–7, price to be obtained from the Superintendent of Documents.

I–7. Copies of this specification may be obtained upon application accompanied by money order or coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D.C. Price 5 cents.

I–8. It is believed that this specification adequately describes the material herein specified and that normally no samples will be necessary to determine compliance with the requirements prior to award. If for a particular purpose samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid samples should be definitely stated, the specification to apply in all other respects.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever, and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE: 1934

For sale by the Superintendent of Documents, Washington, D.C. - - Price 5 cents

Shingles and Roll Roofing

Standard-type competitive materials of proved merit

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Shingles and Roll Roofing

Asbestos and asphalt shingles and roll roofing, as treated in this section, comply with all the requirements of the Federal Specifications in their field. Complete descriptive matter and application directions for the various types of shingles and roll roofings are included.

Of special interest are the cement-asbestos shingles which will be specified on many of the projects of the United States Housing Authority. Detailed specifications for application of these shingles, so written as to be competitive, are incorporated in this section.

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J-M Rigid Asbestos Shingles

The modern demand is for fireproof roof and side wall protection which is both durable and distinctive. Because they so fully meet these requirements, J-M Rigid Asbestos Shingles are constantly becoming more popular.

Formed of asbestos fibre and portland cement, these shingles cannot burn or decay. Protective painting is never required and exterior maintenance expense is reduced to a minimum.

Recognizing the trend toward colorful roofs, Johns-Manville has sought to provide a wider choice than is found in natural quarry products and to produce pleasing variations of tone without too sharply contrasting hues and shades.

In side walls, the modern tendency is toward distinctive textures and shadow effects rather than color. This demand is fulfilled by J-M Siding Shingles.

For both roofing and siding, J-M Asbestos Shingles make possible the most effective harmony between the house and the surrounding landscape.

Asbestos Roofing Shingles

The roofing shingles are furnished in uniform or tapered thickness, with smooth or rough texture. Application may be made in one uniform color or in two or more colors laid in a blended design. They are manufactured, in sizes for economical application, in three styles known as the American, Hexagonal and Dutch Lap, to provide appropriate and attractive roofs within a wide price range.

The tapered, rough-textured Salem American Method shingles may be applied to obtain effects ranging from equal width, straight butt-line patterns to random-width, staggered designs without any regularity. These shingles are especially designed to meet the demand for a material which produces the effect of the weathered, hand-hewn, wood shingle roofs of early New England, and yet has the advantages of fire-resistance and superior durability.

Salem American Method shingles have an average weather exposure of 7″ and carry the Underwriters' Class A label. They can be supplied in random widths.

To obtain the American Method pattern at a much lower cost, Johns-Manville developed the No. 507 Cedargrain American Method shingle. This shingle, of Cedargrain texture, with a staggered butt line and a weather exposure of 5″, provides an unusually effective appearance.



This attractive roof of J-M Dutch Lap Shingles closely resembles the American Method in appearance

Where economy is a governing factor, the Hexagonal or Dutch Lap Method shingles may be used. Due to their shape, size and the manner in which they are laid, these shingles provide full protection with a minimum of material, at relatively low cost.

The Dutch Lap Method shingle, a self-aligning self-spacing shingle, can be laid with a ¼ or ⅓ side lap, with a weather exposure of 13″ x 12″ and 13″ x 10⅔″, respectively. The finished roof gives the horizontal and vertical effect of the American Method.

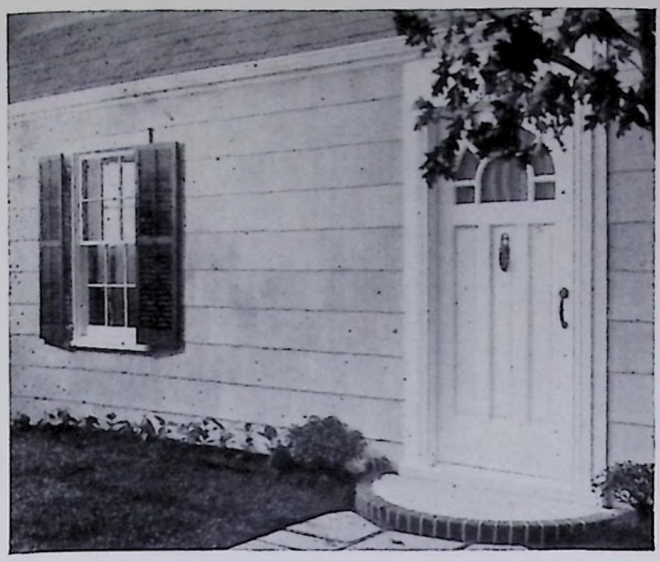
Hexagonal Method shingles give the diagonal-line effect found on old French cottages. The weather exposure is 13″ x 13″. Both Hexagonal and Dutch Lap shingles carry the Underwriters' Class B label.

Asbestos shingles are sold by the square, which means sufficient shingles to cover 100 sq. ft. of surface when applied in accordance with manufacturer's directions. Eave starters, ridge and hip shingles, and ridge roll, required by the various shingles, may be purchased separately.

RIGID ASBESTOS SHINGLES
June, 1938 (Cancelling sheet dated January, 1937) BMR 950

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The shadow lines and wood-grain texture of these J-M Asbestos Siding Shingles add charm to the side wall

Asbestos Siding

For side wall protection, comparable to the roofing shingles in fire resistance, durability and attractiveness, Johns-Manville has produced Cedargrain, Smooth and Shake-Texture Asbestos Siding Shingles, Brick-Type Asbestos Siding and Asbestos Clapboards.

Asbestos Siding Shingles: J-M Asbestos Siding Shingles, in Cedargrain and Shake-Texture, combine the quality of durability with the rich beauty of a wood-grain texture. They are made with staggered or wavy butts in sizes for economical application.

Two types are available: Cedargrain and Smooth-Texture in uniform thickness and Shake-Texture tapered to an extra thick butt. The extra thickness of the tapered shingles increases their strength and creates deeper, more attractive shadow lines.

J-M Asbestos Siding Shingles give the characteristic effect of American Method shingles. They can be easily and solidly applied over old wood shingles or clapboard siding as well as on new walls. No starter strips are required. Special face nails and felt backer strips are supplied with the shingles.

Brick-Type Asbestos Siding: This siding provides the colorful effect of a wall of genuine wire-cut brick. It is rigid and strong and makes a durable, fireproof siding which can be economically applied.

Asbestos Clapboards: These clapboards are designed to give the effect of an interesting wood-grain clapboard, yet embody the durability and safety of asbestos and portland cement. The large units make for quick and economical application.

Application Directions

Complete directions for the application of J-M Rigid Asbestos Shingles, including flashings, and treatment of valleys, hips and ridges, appear on other data sheets. The following directions summarize the important details for proper application.

Roofing Shingles:

For Salem American Method Shingles, the minimum roof pitch is 4″ per foot; for other types, 5″ per foot. When used over boards on new roofs, one layer of J-M Asbestos Slater's Felt is applied horizontally before the shingles are laid. When re-roofing over old wood shingles in fairly good condition, the felt may sometimes be omitted.

On existing roofs, where supporting members are sufficiently strong, satisfactory results can be secured by application of the new shingles directly over old wood shingles, provided missing shingles are replaced, all loose shingles firmly nailed, all curled shingles split and nailed down, and the surface made as uniform as possible. It may be necessary to smooth out the old roof deck by nailing beveled wood strips with the thick edges against the butts of the wood shingles.

Siding Shingles and Clapboards:

J-M Asbestos Siding Shingles and Asbestos Clapboards afford the best appearance when applied over a smooth plumb surface.

When application is to be made over existing wood shingles or clapboards, it is recommended that the side wall area be covered with J-M Smoothwall, a rigid, waterproof sheet material which eliminates the irregularities of the underlying surface. If Smoothwall is not used, loose, curled and decayed siding or shingles are fastened or replaced, and horizontal filler strips nailed against the butt edges of siding or shingles. Work then proceeds in the same manner as over new sheathing, as follows:

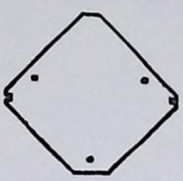
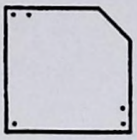
J-M Asbestos Slater's Felt is applied over the side wall and a cant strip is placed along the bottom of the side wall before the first course is applied. Joints are protected by the use of 3″ wide felt backer strips. The heads of shingles and clapboards are fastened with galvanized nails and the butts with special face nails which are inconspicuous when applied.

When Brick-Type Asbestos Siding is applied, it is important that the cant strip be laid to a chalk line to assure a level starting course. Proper head lap and even courses are provided by securing each shingle with two nails driven just clear of the top of the shingle in the course below.

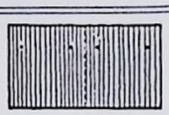
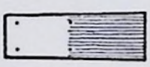
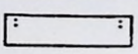
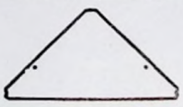
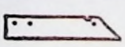
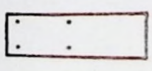
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J-M Rigid Asbestos Shingle Details

Asbestos Roofing Shingles

Shape	Catalog No.-style	Size	Type	Colors: smooth surface and (*) textured	Approx. wt. lb. per sq.	Weather exposure	Shingles per sq.	Starters and Ridge Shingles
	No. 35 Salem American method	Standard 8"x16" Random widths of 6" and 10" on special order; also 16" widths	Tapered to about ¼" butt	*No. 1. Weathered gray *No. 2. Weathered black *No. 3. Olive green *No. 4. Sea green *No. 5. Apple green *No. 6. Forest brown *No. 7. Granada red *No. 8. Touraine red	540	7"	260 (8" wide)	No. 36 Salem starter No. 37 Salem hip and ridge shingle
	No. 70 Hexagonal method	16"x16"	Uniform thickness	Mottled gray Mottled blue-black Mottled red *Mottled green Mottled copper	275	13" x 13"	86	No. 17 starter and No. 71 eaves shingle No. 97 hip and ridge shingle or ridge roll
	No. 30 Dutch Lap method	16"x16"	Uniform thickness	Mottled gray *Mottled blue-black *Mottled red *Mottled green Mottled copper	290	¼ side lap 13" x 12" ⅓ side lap 13"x10⅔"	92 for 99⅔ sq. ft. 104	No. 31 eaves starter No. 97 hip and ridge shingle or ridge roll
	No. 507 Cedar-grain American method	12"x24"	Uniform thickness	*Gray *Weathered Black *Green	270	5"	120	No. 536 starter No. 597 hip and ridge shingle

Starters and Ridge Shingles

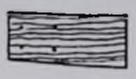
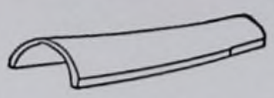
Shape	Catalog number and style	Size	Type	Colors	Pieces per 100 linear ft.	Approx. wt. lb. 100 linear ft.
	No. 36 Salem starter—Used with No. 35 Salem shingle	9" x 16"	Tapered to about ¼" butt	Same as No. 35 Salem shingle	75	225
	No. 37 Salem hip and ridge shingle—Used with No. 35 Salem shingle	4 19/32" to 5 11/32" by 16" long	Tapered to about ¼" butt	Same as No. 35 Salem shingle	340	465
	No. 17 starter—Used with No. 70 Hexagonal shingle	4" x 16"	Uniform thickness	Mixed	75	63
	No. 71 eaves shingle—Used with No. 70 Hexagonal shingle	20 15/16" wide	Uniform thickness	Same as No. 70 Hexagonal shingle	58	112
	No. 31 eaves starter—Used with No. 30 Dutch Lap shingle	3" wide	Uniform thickness	Mixed	100	60
	No. 97 hip and ridge shingle—Used with No. 30 Dutch Lap or No. 70 Hexagonal shingle	4 19/32" to 5 11/32" by 16" long	Uniform thickness	Same as No. 30 Dutch Lap	340	375
	No. 536 starter—Used with No. 507 Cedargrain shingle	7" x 24"	Uniform thickness	Same as No. 507 Cedargrain shingle	50	53

RIGID ASBESTOS SHINGLE DETAILS
June, 1938 (Cancelling sheet dated August, 1937)
BMR-951

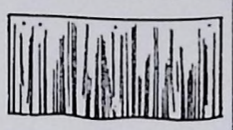
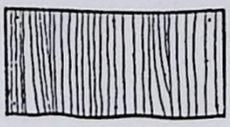
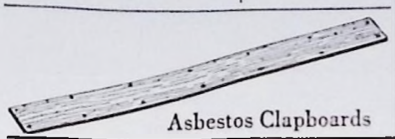
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Starters and Ridge Shingles—continued

Shape	Catalog number and style	Size	Type	Colors	Pieces per 100 linear ft.	Approx. wt. lb. 100 linear ft.
	No. 597 hip and ridge shingle—Used with No. 507 Cedargrain shingle	4¾" to 5 11/32" by 12" long	Uniform thickness	Same as No. 507 Cedargrain shingle	480	300
	Ridge Roll—Used principally with No. 30 Dutch Lap and No. 70 Hexagonal shingle	16" long, 2 15/16" radius, 13" exposure	Uniform thickness	Copper, Gray, Blue-Black*, Red*, Green* (*) textured	93	372

Asbestos Siding Shingles and Clapboards

Shape	Catalog Number	Size	Type	Colors	Texture	Approx. wt. lb. per sq.	Exposure	Shingles per sq.
	105-T	24" x 12"	Tapered to about 5/16" butt	Oyster white Blended gray	Shake Shake	260	24" x 10½"	57
	107-T	24" x 12"	Tapered to about 5/16" butt	Oyster white Blended gray	Shake Shake	270	24" x 10"	60
	105-U	24" x 12"	Uniform thickness	Blended gray Oyster white Mottled gray Special mottled gray	Cedargrain Cedargrain Smooth Smooth	185	24" x 10½"	57
	106	24" x 8"	Uniform thickness	Blended gray Oyster white	Cedargrain Cedargrain	200	24" x 6½"	93
	107-U	24" x 12"	Uniform thickness	Blended gray Oyster white	Cedargrain Cedargrain	195	24" x 10"	60
 Asbestos Clapboards		9½" x 8 ft.	Uniform thickness	White	Cedargrain	195	8" x 8 ft.	19 pieces per sq.

Asbestos Shingle and Clapboard Accessories

Asbestos Slaters' Felt: For use as a liner under asbestos shingles or clapboards. Furnished in rolls 32" wide.

Clinchers: Used with No. 30 Dutch Lap. About 200 per lb.

Copper Needle-Point Nails: For applying roofing shingles. About 210 of 1¼", 195 of 1½" and 160 of 2" nails per lb.

Copper Ridge Roll Fasteners: For attaching asbestos ridge roll sections. Approximately 55 per lb.

Copper Storm Anchors: For use with No. 70 Hexagonal shingles. Approximately 200 per lb.

Face Nails for Cedargrain Shingles and Clapboards: Bronze nails for nailing the exposed faces of rigid asbestos siding shingles and clapboards. About 600 of 1" and 350 of 1¾" nails per lb.

Galvanized Needle-Point Nails: For applying asbestos shingles and clapboards. Approximately 210 of 1¼", 195 of 1½" and 160 of 2" nails per lb.

Shingle Cutters: For cutting, and punching shingle nail holes. Model "G", 24"; Model "F", 27". Crated weight about 50 lb. Notching and face nail punching attachments also available. These cutters greatly facilitate erection.

Smoothwall: For application to old side walls before applying siding shingles or clapboards. Sheets, 40" x 60" x ⅛".

The number of nails required per square and the method of applying accessories, etc., is discussed on separate data sheets in conjunction with complete application directions for J-M Asbestos Shingles and Clapboards.

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J-M ASBESTOS SIDING SHINGLES - GENERAL APPLICATION DIRECTIONS

Claims: Each bundle of Asbestos Siding Shingles is inspected before leaving the factory and no claims for breakage will be considered after materials have been received and accepted by the buyer.

Handling: Asbestos Siding Shingles should be handled carefully and kept in a dry place. Shingles on the job should be stacked on edge, at least four inches from the ground, not more than four tiers high, and kept dry with suitable covering.

Precautionary Measures: Water running over unprotected wood sheathing, wood trim, wood gutters, etc., and then over Asbestos Siding Shingles is liable to stain such shingles. To avoid this condition, sheathing should be protected with the felt, and wood trim, etc., given at least a prime coat of paint. Gutters or eaves troughs and leaders should be in place. No more felt is to be laid than can be completely covered with the siding shingles the same day.

Nails, brackets, etc., liable to rust should be maintained painted or otherwise protected to avoid staining from this source.

Copper gutters and leaders, flashings, fly screens, and similar accessories, which may also be the source of stains, should be periodically coated with dilute spar varnish.

Preparation of Walls: For new work, all surfaces which are to receive the shingles are to be solidly wood-sheathed and covered with J-M Asbestos Slaters' Felt with horizontal joints lapped not less than 2" and vertical joints, including joints at interior and exterior corners, not less than 6".

For old work the wall surface is to be made as smooth and plumb as possible. If application is over wood shingles, or other existing siding which does not present a uniform plane surface, all loose units are to be securely nailed in place, and the surface leveled with J-M Smoothwall applied with joints butted, or tapered wood strips and Asbestos Slaters' Felt applied over the entire area. In some instances it may be more economical to remove existing siding down to the wood sheathing. Where stucco is replaced with siding shingles, all the stucco as well as all nails, wires or other projections should be removed and the sheathing covered with J-M Smoothwall or Asbestos Slaters' Felt.

Caulking: Asbestos Caulking Putty should be applied with a pressure gun to all door and window frames to prevent leaks.

Moulding: Wood mould is to be applied on frames to cover exposed edges of J-M Siding Shingles. Flash lintels with copper. (See Fig. A).

Cutting: Asbestos Siding Shingles are cut and punched the same as Asbestos Roofing Shingles. An Asbestos Shingle Cutter will do this quickly, easily and accurately. See Fig. 1 and 2 following.

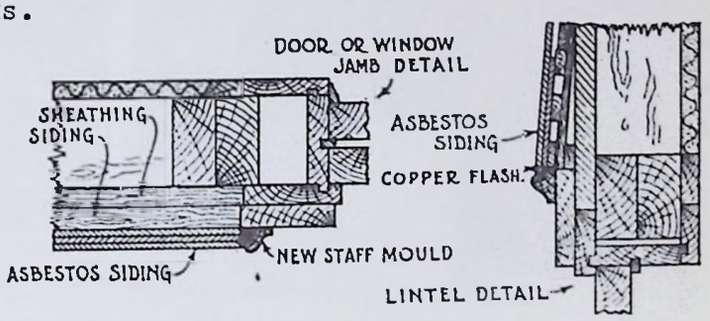


Figure A

Outside and Inside Corners: At corners, butt shingles against new or present wood corner boards, or use copper flashing underneath shingles and "weave" butt ends alternately. Copper outside corner beads may also be used. Where small pieces of shingles are needed to finish out the ends of the courses, punch holes as close to edge as possible and face nail in place.

NOTE: Recommended treatment of J-M Asbestos Siding Shingles for use where staining is encountered, is discussed on a separate data sheet entitled "Painting and Removing Stains from Cement-Asbestos Products".

JOHNS-MANVILLE Building Materials	DATE October, 1938 (Cancelling sheet dated June, 1938)
J-M Asbestos Siding Shingles General Application Directions	BMR-985

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Shingle Cutters:

In Figure 1 there is illustrated an asbestos shingle cutter with attachments. This illustration shows a tapered shingle properly placed for the cutting operation, and it will be noted that the thickest end of the shingle is entered as near as possible to the adjusting screw end of the cutter.

Complete directions for the operation of this device are attached to the cutter, attention being called herein to the proper method of placing tapered shingles, as deviation from this method is the most frequent cause of trouble. Attention is also called to attachment on the shingle cutter for punching additional holes to receive shingle nails, as well as a separate attachment to punch additional holes to receive face nails.

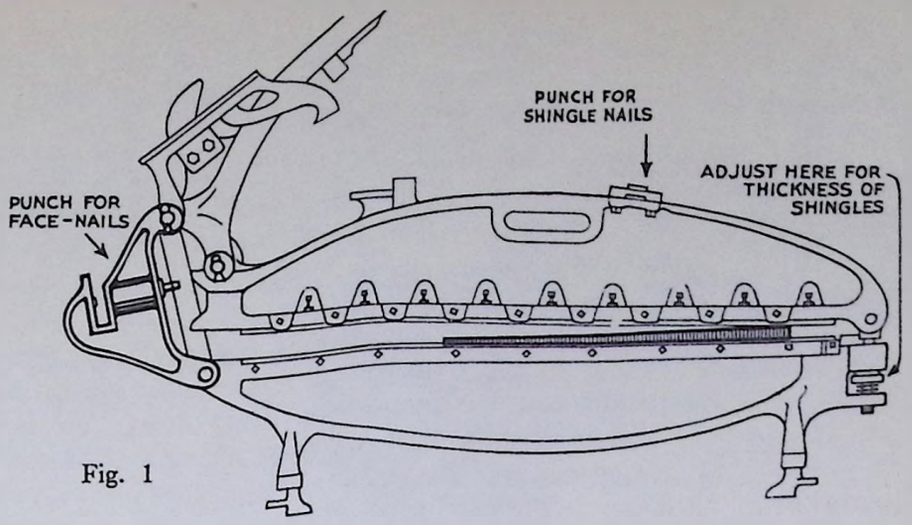


Fig. 1

Figure 2 shows the method of using this latter device.

It will also be noted that the cutter is provided with a notching device.

Accurate adjustment of the knives in relation to shingle thickness is highly important. When the cutter breaks or cracks shingles, slightly more space between the knives is needed, and when cutting requires considerable pressure or does not cut at all then the knives must be brought somewhat closer together. Seek the correct adjustment for the shingles you are cutting with the adjusting screw at right end of cutter. Never apply extreme pressure on the handle. It may damage the cutter. When the knives are dull, new knives should be installed.

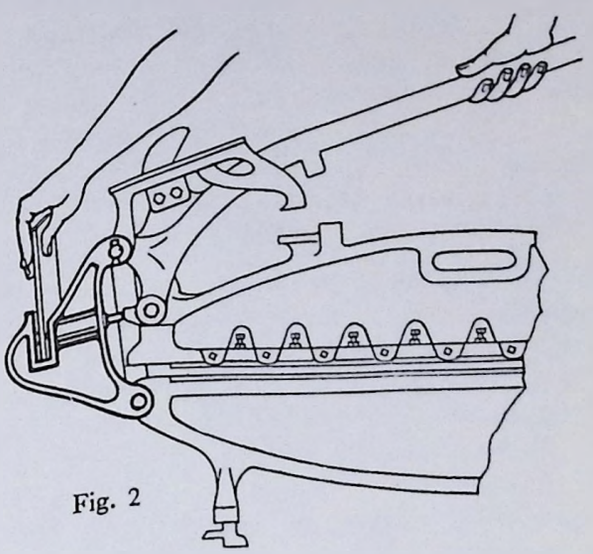
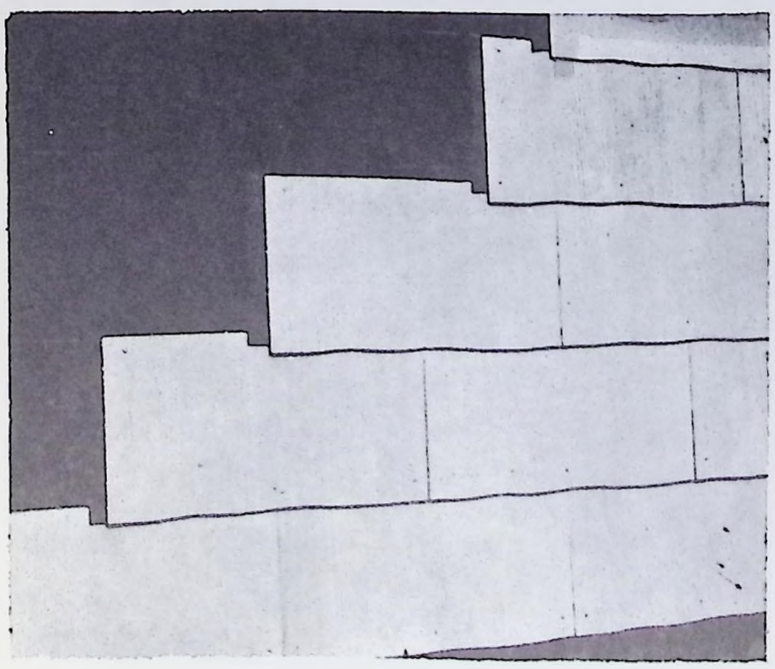
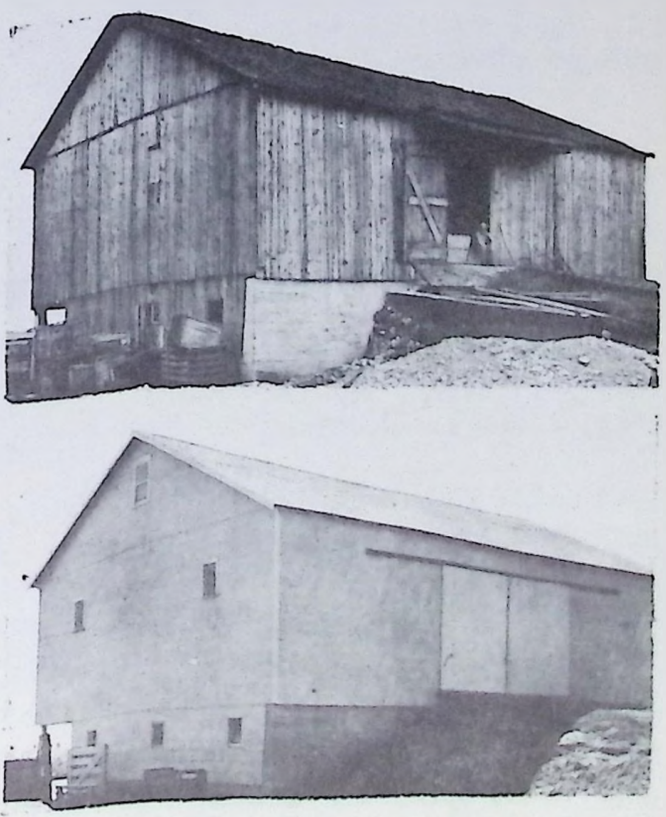


Fig. 2



In the illustration above the simplicity of application of J-M Asbestos Siding Shingles is clearly shown. The detail portrays the use of J M Asbestos Slater's Felt, applied over the entire area, and backer strips at the edges of the asbestos shingles



J-M Asbestos Siding Shingles made possible the above transformation

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J-M ASBESTOS SIDING SHINGLES
APPLICATION DIRECTIONS FOR NO. 105-U, 105-T, 107-U and 107-T

Cedargrain No. 105-U (Uniform thickness) and Shake-Texture 105-T (Tapered Thick Butt) are wavy butt shingles, 57 per square, with 1½" head lap and no side lap. One square is packed in three bundles of 19 each. Cedargrain No. 107-U and Shake-Texture 107-T are staggered butt shingles, 60 per square, with 1¼" min. - 2" max. head lap and no side lap. One square is packed in three bundles of 20 each. The unit size of all these shingles is 12" x 24".

Joints are protected by the use of 3" x 12" Asphalt Roofing Backer Strips, furnished with each square of shingles. (Backer strips of Salamander White Top Asbestos Roofing are also available at slight additional cost.) Sufficient Special Face Nails for nailing butts of shingles are included in shipment. In addition, 1-1/2 lb. of 2" or 1 lb. of 1-1/4" (new work) galvanized needle-point nails per square are required for nailing heads of shingles. No starters are required. For preparation of walls, see "General Application Directions".

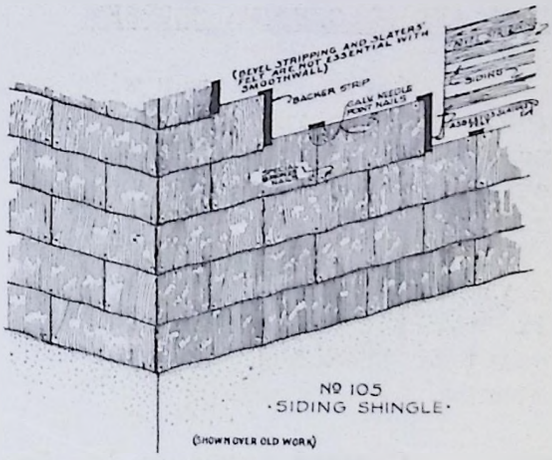
FIRST COURSE:

Apply a ¼"x1" cant strip along the bottom of the side wall to a level chalk line to insure a straight starting course. At corner, apply a backer strip folded vertically. Start with a whole shingle, allowing lower edge to extend 1/8" below the cant strip to form a drip edge. After driving the first and middle galvanized nails at head of shingle, insert a backer strip under the side edge of the corner shingle so that the strip centers under the joint between the corner shingle and the adjacent shingle. Then drive the third galvanized nail in the first shingle, and continue in this manner to the end of the course. Face-nail butts of shingle with three Special Face Nails. Drive nails snugly, but not too tight.

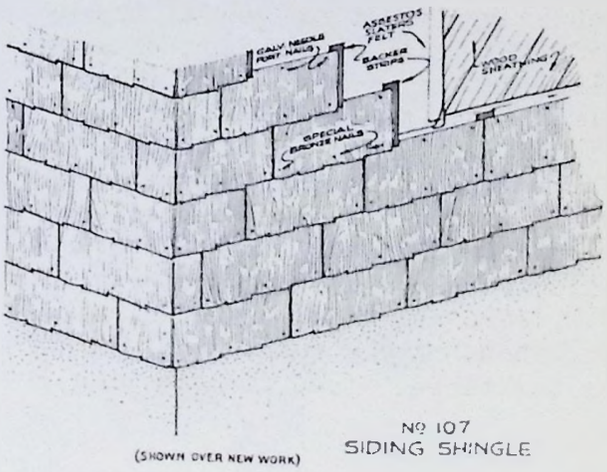
SECOND AND SUCCEEDING COURSES:

Begin at corner with a folded backer strip, lapped 1" over top of shingle below. Cut a shingle and punch two nail holes, one for galvanized nail, the same distance from the top and sides as the factory-punched hole, and one in the lower corner for special face nail, 1" from the side and 10-7/16" from the top edge for No. 105 or 9-15/16" for No. 107. Improved appearance will result if starting shingles are cut so that the joints break unevenly. (See illustrations)

Correct exposure is obtained by inserting two nails in holes at the butt of shingle, which shall rest on top of shingle below. Then drive three galvanized nails in the upper holes. Before the last one is driven snug, insert a backer strip, centered under the edge of the vertical joint, lapped 1" over shingle below. Continue course with full size shingles, butted closely together. Apply succeeding courses as described.



№ 105
SIDING SHINGLE
(SHOWN OVER OLD WORK)



(SHOWN OVER NEW WORK)
№ 107
SIDING SHINGLE

JOHNS-MANVILLE Building Materials

Application Directions
J-M Asbestos Siding Shingles No. 105, 107 and 106

DATE October, 1938
(Cancelling sheet dated March, 1938)

BMR-989

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TECHNICAL DATA SECTION

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J-M NO. 106 ASBESTOS SIDING SHINGLES
APPLICATION DIRECTIONS

No. 106 Siding Shingles:

No. 106 is a Cedargrain Shingle with wavy butt, size 8" x 24", furnished 93 per square and packed in three bundles of 31 each. Head lap is 1½" with no side lap. Joints are protected by the use of 93 Asphalt Roofing Felt Backer Strips, size 3" x 8", furnished without charge with each square of shingles. (Backer strips of Salamander White Top Asbestos Roofing are available at slight additional charge.) Sufficient Special Bronze Nails for Nailing butts of shingles are included in shipment. In addition, 2 lb. of 2" or 1-1/2 lb. of 1-1/4" (new work) galvanized nails per square are required for nailing heads of shingles. No starters are required. For preparation of walls, see "General Application Directions".

FIRST COURSE:

Apply a ¼" x 1" cant strip along the bottom of the side wall, laying to a level chalk line to insure a level starting course. At corner, apply a backer strip folded vertically. Start with a whole shingle, allowing lower edge to extend 1/8" below the cant strip to form a drip edge. After driving the first and middle galvanized nails at head of shingle, insert a backer strip under the side edge of the corner shingle so that the strip centers under the joint between the corner shingle and the adjacent shingle. Then drive the third galvanized nail in the first shingle, and continue in this manner to the end of the course. Nail butts of shingles with three Special Bronze Nails. Drive nails snugly, but not too tight.

SECOND AND SUCCEEDING COURSES:

Begin at corner with a folded backer strip, lapped 1" over top of shingle below. Cut a shingle, punch two nail holes, one for galvanized nail, the same distance from the top and sides as factory-punched hole, and one in the lower corner for casing nail, 1" from the side and 6-7/16" from the top edge. Improved appearance will result if starting shingles are cut so that the joints break unevenly.

Correct exposure is obtained by inserting Special Bronze Nails in holes at the butt of shingles, resting nails on top of shingle below. Nail head of shingles with three galvanized nails. Before driving nails snugly, insert backer strip, centered under edge of the vertical joint and lapped 1" over shingle below. Continue course with full size shingles, butted closely together. Apply succeeding courses as described. (see illustration).

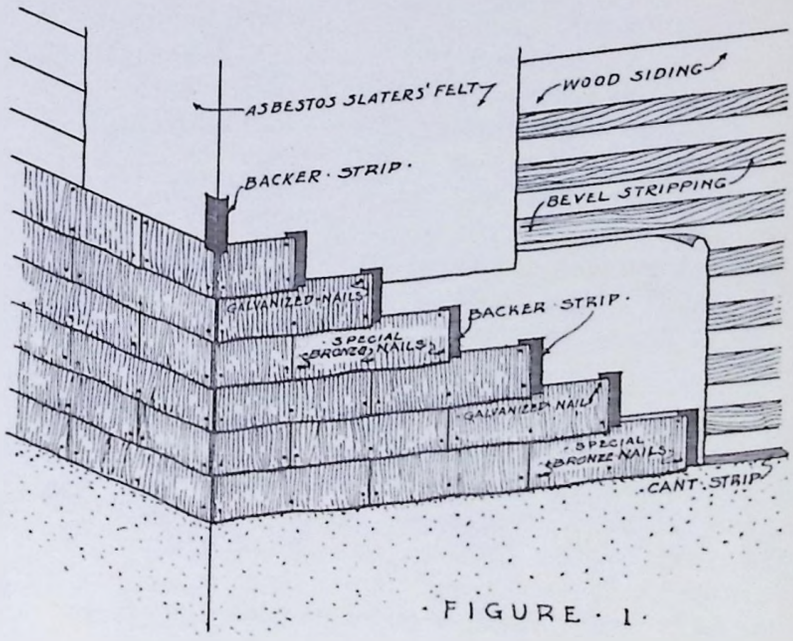


FIGURE 1

No. 106 Cedargrain Siding Shingles shown over old work. The bevel stripping and slaters felt are not necessary where J-M Smoothwall is used

CAUTION:

Use Special Bronze Nails, furnished, for nailing butts of shingles.

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J-M NO. 105-U AND NO. 106 ASBESTOS SIDING SHINGLES APPLIED IN COMBINATION
APPLICATION DIRECTIONS

These wavy-butt Cedargrain Shingles, applied in alternate courses, give a pleasing colonial effect. There are 57 No. 105-U shingles per square, packed in bundles of 19. Headlap is 1 1/2". For the No. 106 shingle, there are 93 shingles per square, packed in bundles of 31. The headlap is 1 1/2". Sufficient number of Special Bronze Nail for nailing butts of shingles are included in shipment. In addition, 2 lb. of 2" or 1 1/2 lb. of 1 1/4" (new work) galvanized needle-point nails, for nailing heads of shingles, are required per square. For preparation of walls, see "General Application Directions".

FIRST COURSE:

Apply a 1/4" x 1" cant strip along the bottom of side wall, laying it to a level chalk line to insure an even starting course. At corner, apply a backer strip folded vertically. Start with a whole No. 105 shingle, allowing lower edge to extend 1/8" below the cant strip to form a drip edge.

After driving the first and middle galvanized nails at head of shingle, insert a backer strip under the side edge of the corner shingle and the adjacent shingle. Then drive the third nail in first shingle. Continue in this manner to the end of the course.

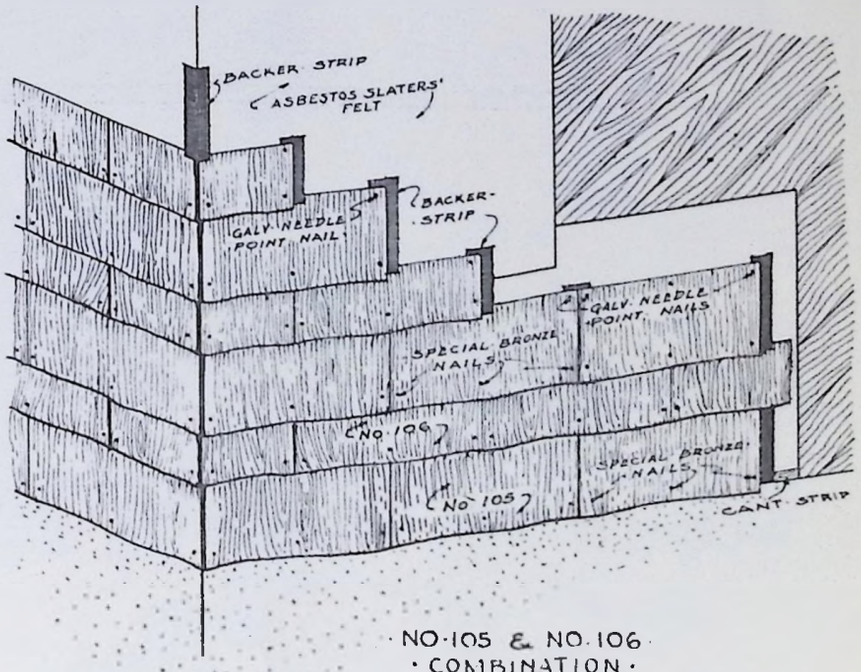
Nail butts of shingles with three Special Bronze Nails. Drive nails snugly but not too tight.

SECOND AND SUCCEEDING COURSES:

Begin at corner with folded backer strip, lapped 1" over top of shingles below. Cut a No. 106 shingle, punch two holes, one for galvanized nail, the same distance from top and side as the factory-punched hole, and one in the lower corner for Special Bronze Nail, 1" from the outer corner and 6-7/16" from the top edge.

Improved appearance will result if starting shingles are cut so that the joints break unevenly.

Correct exposure is obtained by inserting a nail in holes at butt of shingle, resting nails on top of shingle below. Nail head of shingle with three galvanized nails. Before driving third nail, insert backer strip, centered under edge of vertical joint and lapped 1" over shingle below. Continue course with full size shingles, butted closely together. Apply succeeding courses as described. (See illustration).



(SHOWN OVER NEW WORK)

NO. 105 & NO. 106 · COMBINATION · SIDING SHINGLES

CAUTION:

Use Special Bronze Nails, furnished, for nailing butts of shingles.

JOHNS-MANVILLE Building Materials	DATE October, 1938 (Cancelling sheet dated March, 1938)
Application Directions: J-M Asbestos Siding Shingles No. 105 and 106 Applied in Combination	BMR-990

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J-M BRICK-TYPE ASBESTOS SIDING SHINGLES
APPLICATION DIRECTIONS

Brick-Type Asbestos Siding:

Brick-Type Asbestos Siding produces a fireproof, brick-like surface, difficult to distinguish from real brick. There are 248 pieces per square, packed in 8 bundles of 31 each, (size 8-1/8" x 16-1/4"). The exposed brick size is 3-1/16" x 7-5/8" with 1/2" mortar lines. For each square, 4 lb. of 2" galvanized nails are required. Brick-Type starters, or full size pieces with brick section cut off, are used. For preparation of walls see "General Application Directions".

Application:

Apply a cant strip, approximately ½" thick by 3" wide, along the bottom of the side wall. Lay to a level chalk line so as to insure an even starting course.

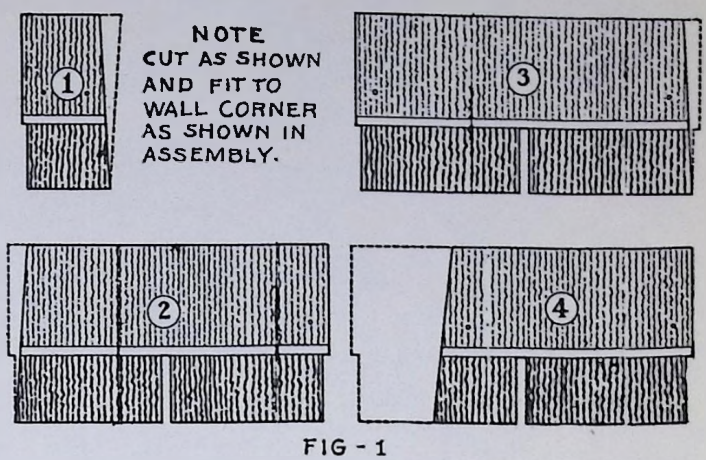


FIG - 1

First Course:

Lay the brick type starter course beginning with a half starter shingle at lower left corner. Drive nails carefully, not too tight. Over the starter course lay Brick Siding Shingles, beginning with a full-sized shingle to break joint with the starter course.

Succeeding Courses:

Shingles are laid with 3-9/16" exposure. Nails should just clear top of shingle in course below in order to give the proper head lap.

Corners:

Corners are flashed with 6" copper corner bead, wood corner boards or Brick-Type Shingles cut as shown in Fig. 1.

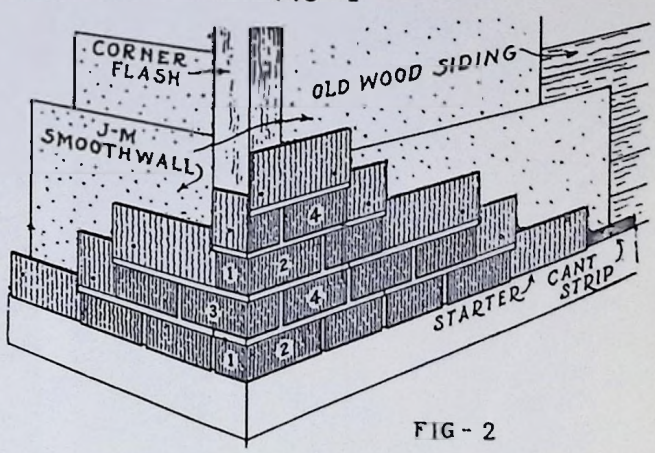


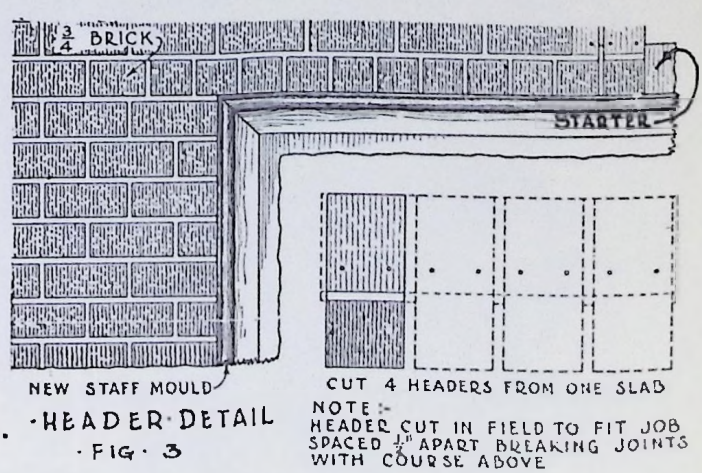
FIG - 2

Colors:

IMPORTANT. When Asbestos Brick Siding is furnished in mixed colors, match the shingles at the corners. No.1 should be the same as No.2; No.3 the same as No.4. (See Fig. 2).

Headers:

Over doors, windows and openings, a header course, cut from whole shingles (on the job) is laid with ½" vertical joints, breaking joints with course above. (See Fig. 3).



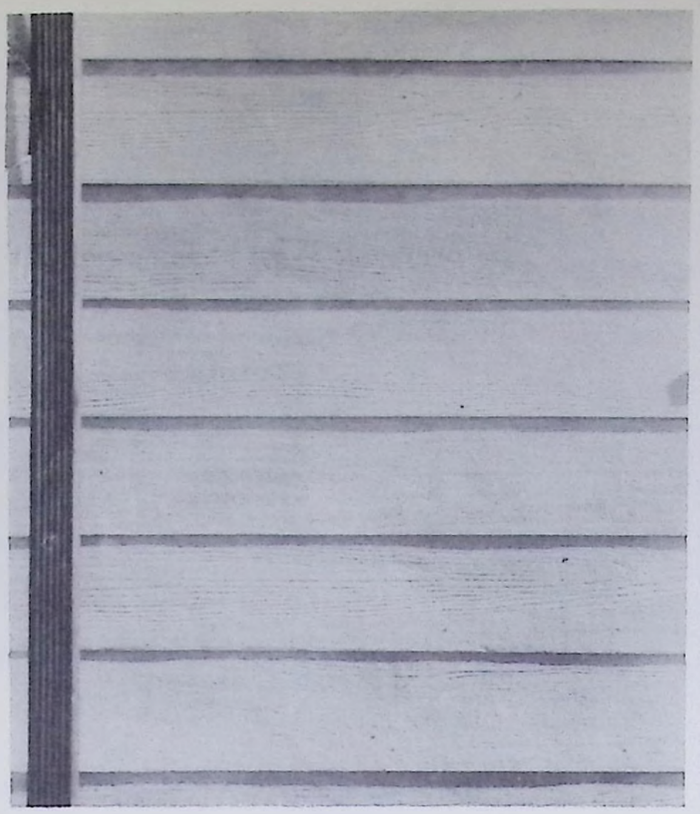
HEADER DETAIL
FIG. 3

JOHNS-MANVILLE Building Materials	DATE May, 1938 (Cancelling BMR-976.4 dated in Jan., 1937)
J-M Brick-Type Asbestos Siding Shingles Application Directions	BMR-993

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J-M ASBESTOS CLAPBOARDS
DESCRIPTION AND APPLICATION





J-M Asbestos Clapboards are grained longitudinally to give the effect of an attractive wood-textured surface. Their use assures a superior and a satisfactory siding for both new and old construction

J-M Asbestos Clapboard units, 9½" wide, 8 ft. long and 3/16" thick, make possible quick and economical erection. They are factory-punched on approximate 16" centers, 1½" from the butt edge, to receive face nails, and 1" from the head to receive galvanized iron needle-point shingle nails. The units are shipped in bundles, packed with sufficient special accessories.

To avoid breakage due to flexing, the Asbestos Clapboards should be carried and piled on edge.

PRECAUTIONARY MEASURES:

Water running over unprotected wood sheathing, wood trim, wood gutters, etc., and then over the Asbestos Clapboards is liable to stain such clapboards. To avoid this condition, sheathing should be protected with the felt, and wood trim, etc., and be given at least a prime coat of paint. Gutters or eaves troughs and leaders should be in place.

Nails, brackets, etc., liable to rust should be maintained painted or otherwise protected to avoid staining from this source.

Copper gutters and leaders, flashings, fly screens, and similar accessories, which may also be the source of stains, should be periodically coated with spar varnish.

FASTENERS:

Special face nails, 1-3/4" long, for fastening the exposed butts of the clapboards are furnished by J-M with each bundle.

Galvanized iron needle-point nails not less than 1-1/4" long are required for nailing the heads of the clapboards. These nails are not furnished with clapboard units but are obtained locally.

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JOHNS-MANVILLE Building Materials

J-M Asbestos Clapboards
Description and Application

DATE May, 1938
(Cancelling BMR-1000 & 1001 dated Sept. 1937)
BMR-1000

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TECHNICAL DATA SECTION

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Backer Strips:

Sufficient felt backer strips for use behind all end joints are furnished with each bundle.

Smoothwall:

J-M Smoothwall, a rigid, waterproof material, is obtainable for use as a leveling base over old work.

Asbestos Slaters' Felt:

Tapered wood strips may be used in place of Smoothwall to produce a uniform surface, in which case J-M Asbestos Slaters' Felt is to be applied over the entire area.

Asbestos Caulking Putty:

J-M Asbestos Caulking Putty is used to embed the clapboard units at all corner, window and door intersections.



J-M Asbestos Clapboards provide a beautiful and permanent siding

USAGE:

J-M Asbestos Clapboards are equally adaptable as siding for new work or over existing wall surfaces.

PREPARATORY WORK:

Sheathing:

New Work: All surfaces which are to receive the clapboards are to be solid wood-sheathed and covered with J-M Asbestos Slaters' Felt with horizontal joints lapped not less than 2" and vertical joints, including joints at interior and exterior corners, not less than 6".

Old Work: The wall surface to be covered is to be made as smooth and plumb as possible. If application is over wood shingles, or other existing siding which does not present a uniform plane surface, all loose units are to be securely nailed in place, and the surface leveled with J-M Smoothwall applied with joints butted, or tapered wood strips and Asbestos Slaters' Felt applied over the entire area. In some instances it may be more economical to remove existing siding down to the wood sheathing.

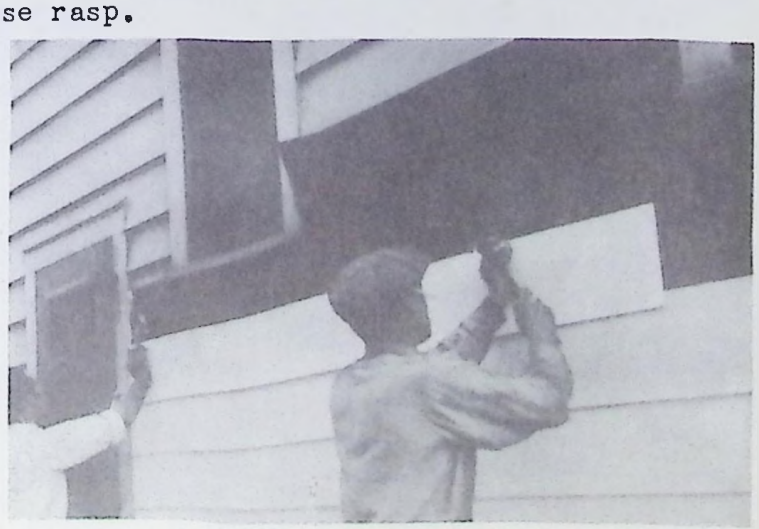
APPLICATION:

Cutting and Drilling:

Asbestos Clapboards can be worked with an "asbestos shingle cutter" or with ordinary carpenter tools. With the shingle cutter, straight or angular cuts can be made and shingle and face nail holes punched. The clapboards can be cut with an eleven point cross-cut hand saw and holes drilled with an ordinary twist drill. Rough cuts may be trued with a 14" horse rasp.



Cutting Asbestos Clapboards with a Shingle Cutter



Note the large area covered with a single unit of Asbestos Clapboard

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Erecting the Siding:

Apply a 1/4" by 2" wood strip under the Smoothwall or Slaters' Felt, continuously and at a uniform level, to underlie the butt edge of the first course and provide a cant. Strike a chalk line 9¼" up from the bottom of the cant strip. A clapboard unit is then applied with the head on this line and with backer strips centered behind each end. Secure with shingle nails driven through holes in head and face nails through the holes in butt. Do not drive shingle nails tight. Succeeding units are applied in a similar manner to complete the first course, centering backer strips behind all end joints.

After verifying that the first course is level strike a chalk line 8" up from the end thereof and apply the second course in the same manner, breaking joints with, and overlapping, the units of the first course. The backer strips to be centered behind end joints, overlapping the first course units. Holes for face nails are placed so that in applying the units with an 8" exposure, such nails will just miss the head of the preceding course. By carefully selecting short ends for appropriate locations to break joints, waste may be minimized.

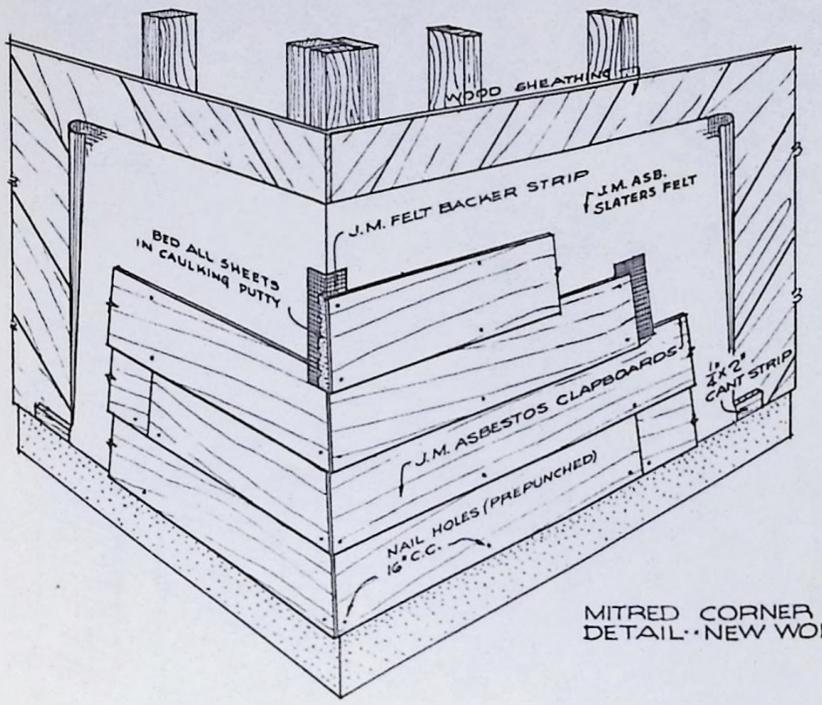
Flashing:

The heads of all window and door openings are to be flashed with 16-oz. copper or other approved non-ferrous metals. J-M Asbestos Caulking Putty is used to embed the clapboard units at all corner, window and door intersections.

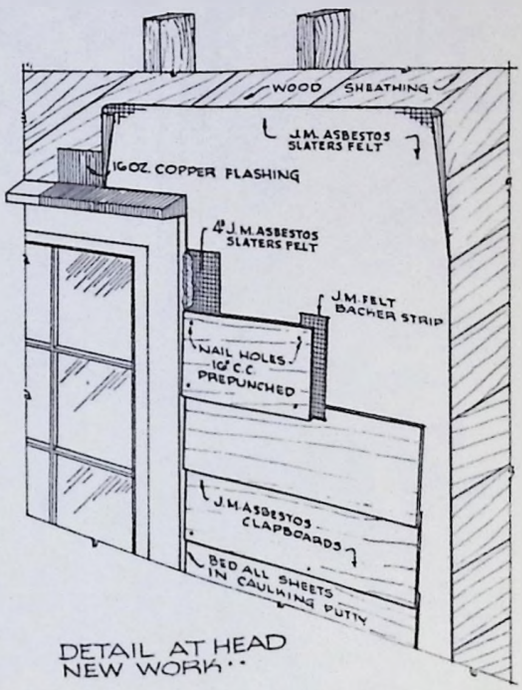
Interior or Exterior Corners:

Corners may be finished mitred or with wood corner boards.

In forming a mitred corner the units on adjacent sides in each course are to be cut to meet and overlap, alternating the side on which the lap occurs.



MITRED CORNER DETAIL--NEW WORK



DETAIL AT HEAD NEW WORK--

In forming outside corners the overlapping unit is to be cut full, the surplus being "taken down" with the rasp after the joint is formed. A backer strip is to be centered and bent to fit over the corner, overlapping the clapboard units in the preceding course. The clapboard units are to be embedded in J-M Asbestos Caulking Putty at all corners and intersections.

JOHNS-MANVILLE Building Materials	DATE May, 1938
J-M Asbestos Clapboards Description and Application	BMR-1001

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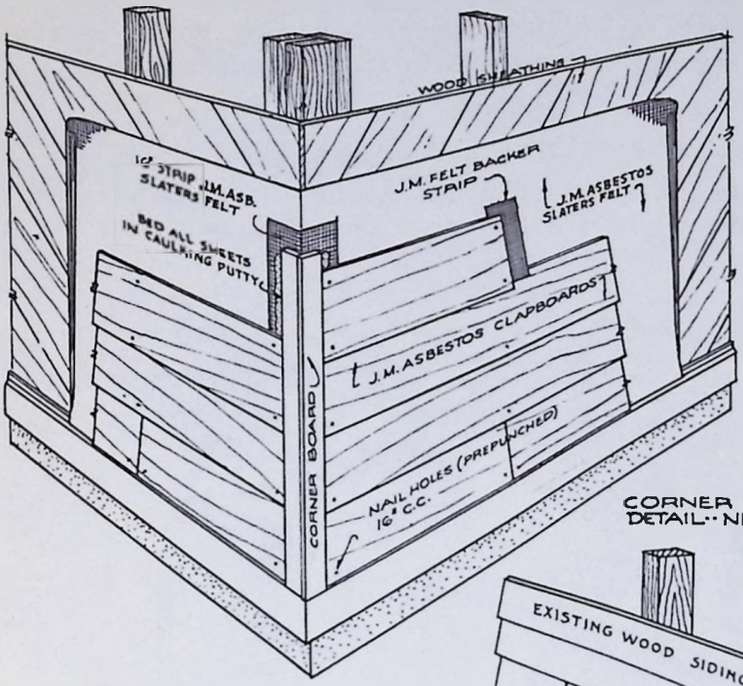
In forming a corner with corner boards such wood trim is to be sufficiently thick to project not less than 1/4" beyond the butts of the clapboards, and be installed to overlap the Smoothwall or Slaters' Felt. The clapboards are to be fitted snugly against the corner boards and be embedded in J-M Asbestos Caulking Putty at these points.

Window and Door Casing:

Window and door casing are to be installed to overlap the Slaters' Felt (or Smoothwall, if possible) and clapboards are to be fitted snugly and embedded in Asbestos Caulking Putty at the points of contact.

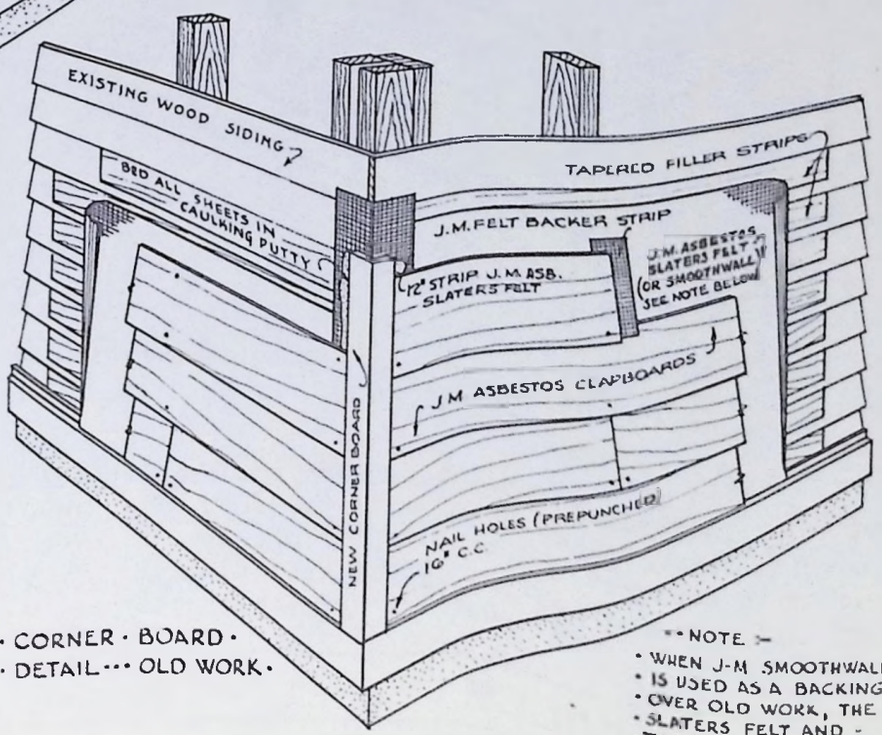


J-M Asbestos Clapboards will not burn and never require protective painting



CORNER BOARD DETAIL·· NEW WORK.

Sills are to be provided with a rabbet to receive the head of the clapboard or a suitable moulding is to be installed in the angle formed by the sill and clapboard.



· CORNER · BOARD ·
· DETAIL··· OLD WORK ·

·· NOTE :-
· WHEN J-M SMOOTHWALL ·
· IS USED AS A BACKING ·
· OVER OLD WORK, THE ·
· SLATERS FELT AND ·
· TAPERED FILLER STRIPS
· ARE NOT ESSENTIAL ·

NOTE:

Recommended treatment of J-M Asbestos Clapboards, for use where staining is encountered, is discussed on a separate data sheet entitled "Painting and Removing Stains from Cement-Asbestos Products."

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J-M RIGID ASBESTOS SHINGLES
GENERAL ROOFING APPLICATION DIRECTIONS

The following general application directions apply to all types of Rigid Asbestos Roofing Shingles. Detailed application directions for each type appear on separate Data Sheets.

MINIMUM PITCH AND ROOF SURFACE:

Minimum Pitch: The roof should have a minimum pitch of 4" to the foot for Salem American Method Shingles. No. 507 Cedargrain American Method, Hexagonal and Dutch Lap Shingles require a pitch of at least 5" to the foot.

Roof Surface: Boards on new roofs should be dry, well seasoned, of narrow width and uniform thickness, laid close (tongue and grooved preferred) and nailed with at least two nails to each rafter.

PREPARATION OF ROOF:

Servicing: Drawn down any roof boards that have warped or curled, by renailing. Clear the roof of all obstructions and sweep clean. Then cover the entire roof with horizontal courses of J-M Asbestos Slater's Felt or J-M Asphalt-Saturated Asbestos Felt not less than 15-lb. weight. Lap, hip, ridge and valley joints 12" and all other joints 4".

When application is to be made over old wood shingles it is not necessary to apply the felt, unless Underwriters' approval is required. The shingles, if in fair condition, serve the same purpose as the felt over roof boards. Also, the omission of the felt allows air to circulate so that any moisture in the wood is permitted to escape. Any shingles that have curled or "kicked-up" must be secured by nailing. Remove and replace with new shingles any that have split or decayed.

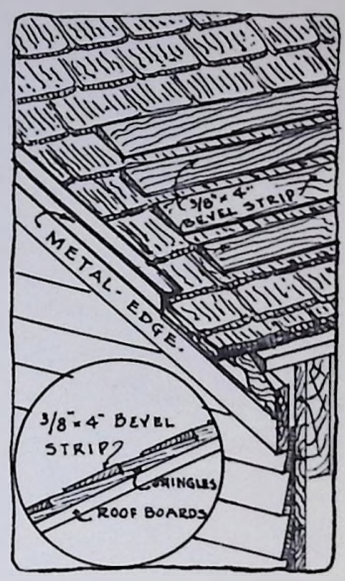
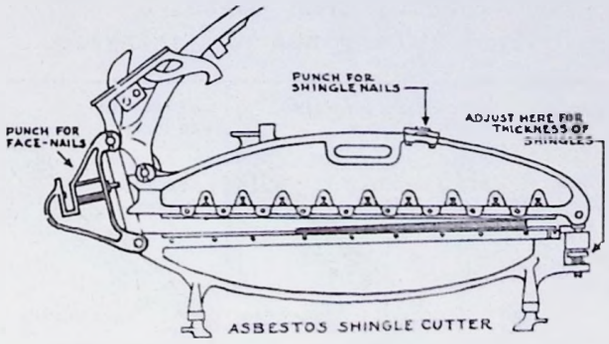


Fig. 1

Bevel Stripping: When the weather exposure of new shingles does not coincide with that of the old shingles, or where the old shingles are in poor condition, apply 3/8" x 4" bevel strips to even the roof and to provide a proper nailing surface (Fig.1). If bevel strips are not available, use wood plaster lath.

Where, for reasons of economy, stripping must be omitted, the top of a shingle may not have proper bearing. In such a case, the butt will "cock-up". When this condition occurs on an entire course, apply wood plaster lath, end to end, under the top edge of the course. Otherwise, use a small wood "shim" under each shingle.

PREPARATION AND REPLACING OF SHINGLES:



Cutting and Punching: To make straight cuts, score the shingle with the point of a chisel or hatchet blade. Then place it over a straight-edge and strike the overhanging part several blows with the hatchet or the fist. (A saw may also be used for cutting but it involves unnecessary labor.) For circular or angular cuts, place the shingle on a firm, smooth surface and punch holes in it with a pointed nail set along the lines to be cut.

Contractors should use an Asbestos Shingle Cutter to cut and punch holes in shingles quickly, easily and accurately.

JOHNS-MANVILLE Building Materials	DATE October, 1938 (Cancelling BMR-959 dated October, 1938)
J-M Rigid Asbestos Shingles General Roofing Application Directions	BMR-963

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Removing and Replacing Broken Shingles: To remove Salem American Method shingles, easily, slip a nail ripper under the broken shingle; hook it around the nails and strike the offset. This will cut or draw the nails. Remove the old shingle and secure a new one in place by driving one nail through a hole punched in the center of the shingle. Then slip a small piece of copper over the nail head and bend slightly to hold it in place (Fig. 2 and 3).

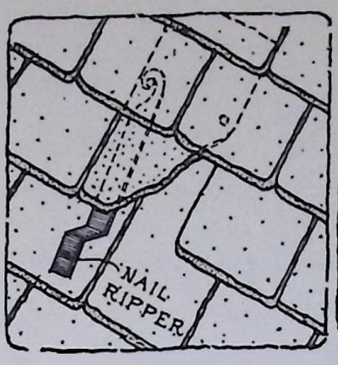


Fig. 2

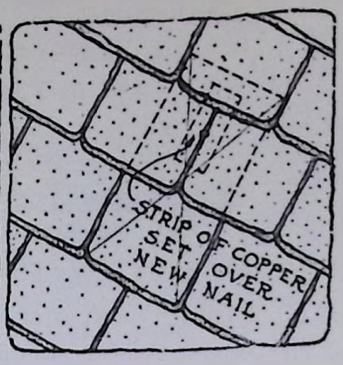


Fig. 3

To remove Hexagonal shingles, bend up and straighten the storm anchors (Fig.4) at A, B, and C, and shatter the shingle with a hammer blow. Then use the "ripper" to cut or draw the nail. Punch a small piece of copper and place over storm anchor at C (Fig. 4) and nail the upper end securely to the roof. Notch a new shingle to pass storm anchors at A and B. If nails cannot be cut or drawn, cut additional notches to pass them. Finally, slide the new shingle into place over the storm anchor at C and bend down all anchors.

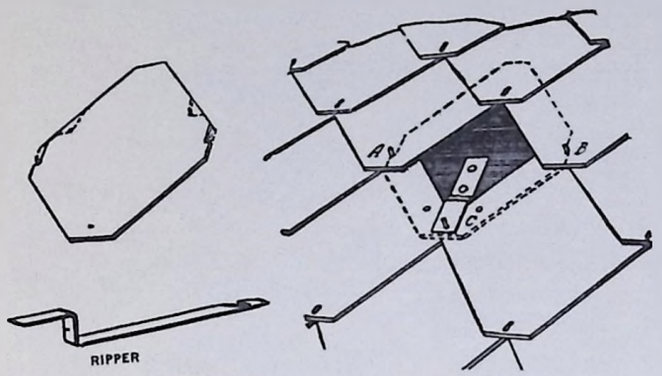


Fig. 4

For Dutch Lap Shingles, remove clinchers at A and B (Fig. 5) and cut or draw nails with the "ripper". Secure the new shingle with new clinchers at A and B.

Nails: For new roofs, use 1 1/4" No. 10 flat-head galvanized needle-point nails. When re-roofing over old wood shingles use 2" nails.

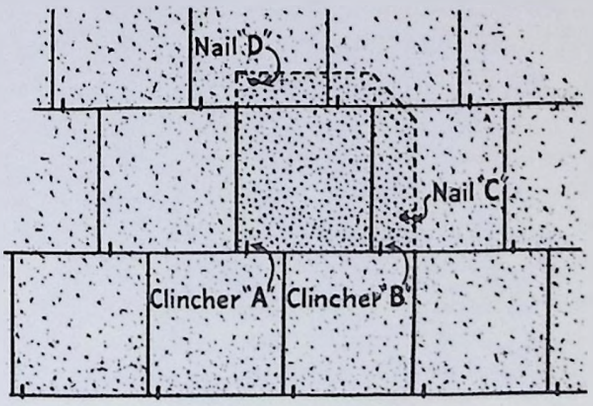


Fig. 5

APPLICATION OF SUPPLEMENTARY SHINGLES:

Eaves and Gables: To secure a finished job that will show no trace of the old roof, remove the wood shingles at eaves and gables to form a recess 3" to 4" wide and install a piece of 1" x 3" finish lumber (Fig. 6). For a more economical and especially attractive edge, install a copper or galvanized iron "metal edge" (furnished in 10 ft. lengths) directly over the old shingles (Fig. 1).

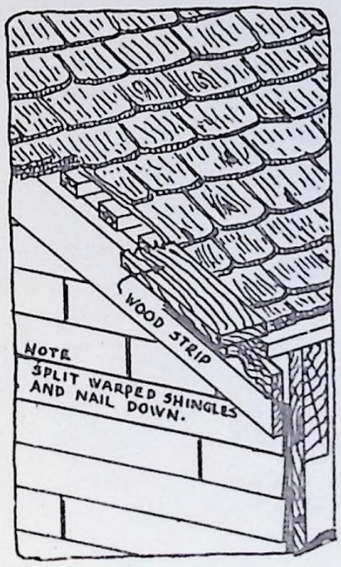


Fig. 6

Cant Strips: Remove existing eave or cornice moulding and replace it (or apply new moulding) so as to project 1/4" above the roof boards or old shingles from which the edges have been cut (Fig. 7 and 8). If desired, a cant strip, 1/4" x 1 1/2", may be applied instead, flush and parallel with the eaves (Fig. 9).

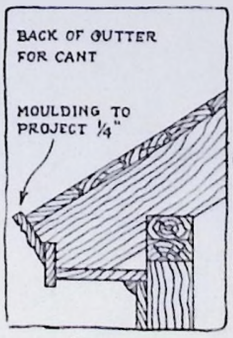


Fig. 7

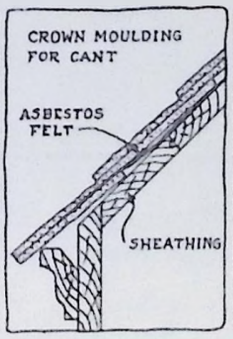


Fig. 8

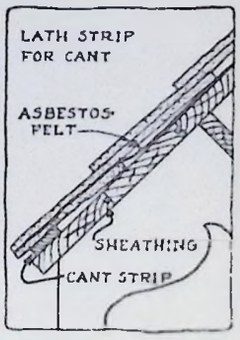


Fig. 9

Ridges and Hips: Remove existing shingles from ridges and hips. After the main body shingles are in place, apply new Ridge Roll or Boston Hip and Ridge

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Ridge Roll: Apply one 1" x 2" furring strip, edgewise, centered on ridge or hip. Project the strip 1" beyond the ridge or lower ends of hips. Cut the main body shingles to fit against the side of the strip. Cover the ridge or hip and edges of roof shingles with a narrow strip of Asbestos Felt. Next apply the Ridge Roll. On ridges, start at the end opposite the stormy side; on dormers, at the front; and on hips at the bottom.

Nail a copper Ridge Roll fastener through the hole provided on the top of the small end. Apply each succeeding section with a 3" lap over the small end of the previously-applied section. Then bend the copper strip over the lapped end. Close the open ends of the hips or ridge with a piece of shingle, cut to fit; or with Asbestos Roof Putty or portland cement (Fig. 10, 11 and 12).

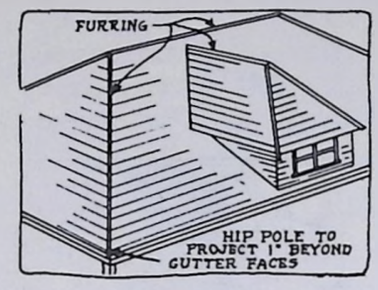


Fig. 10

Boston Ridge or Hip: Apply two furring strips, flatwise, one on each side of the ridge or hip. These strips to be 2" wide and of sufficient thickness to bring top of furring level with main body shingles. Cut main body shingles to fit against the sides of the strips. Then apply a 6" strip of Asbestos Felt and lap the ridge or hip shingles over it. Allow a 2" head lap and 7" weather exposure. Alternate or "weave" the long edges of the shingles and secure each with two nails. Point up all joints with Asbestos Roof Putty (Fig. 13 and 14).

Mitred Hip: If this type of hip finish is desired, mitre the shingles very carefully and apply as shown in Fig. 15. Reinforce the hip joint with an extra flashing strip of Asbestos Felt or, preferably, copper. Embed shingles in Asbestos Roof Putty and point up neatly.

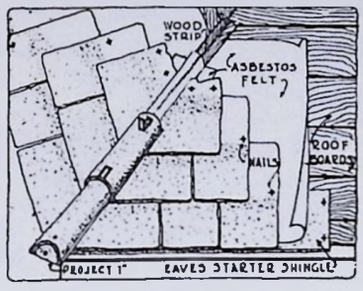


Fig. 11

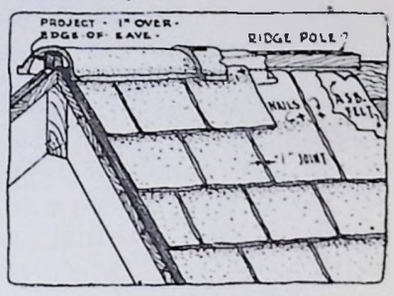


Fig. 12

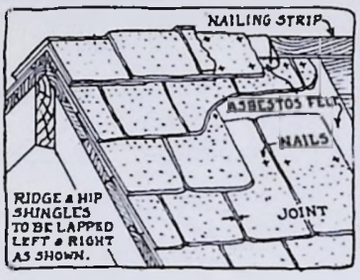


Fig. 13

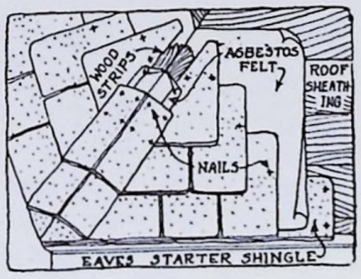


Fig. 14

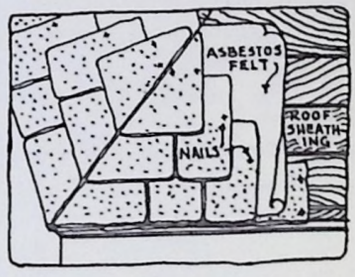


Fig. 15

Eave, Starter, Ridge and Hip Shingles: To find the quantities of each type required, refer to the table below:

No.	Description	Used with Shingle No.	Size, inches Width	Size, inches Length	Required per 100 lin. ft.	Packed per bundle	Weight lb. per 100 lin. ft.
			Approx.				
17	Starter	70 Hexagonal	4	16	75 pcs.	15	63
31	Starter (Eaves)	30 Dutch Lap	3	20	100 "	25	60
71	Eaves Shingle	70 Hexagonal	8	21	58 "	15	112
97	Hip and Ridge Shingle	30 or No. 70	5	16	340 "	17	375
36	Starter	35 American Method	9	16	75 "	15	225
37	Hip and Ridge Shingle	35 American Method	5	16	340 "	17	465
536	Starter	507 American Method	7	24	50 "	25	53
597	Hip and Ridge Shingle	507 American Method	5	12	480 "	20	300
	Ridge Roll	70 or 30	4	16	93 "	33	372

JOHNS-MANVILLE Building Materials

J-M Rigid Asbestos Shingles
General Roofing Application Directions

DATE October, 1938
(Cancelling BMR-959.1 dated June, 1938)

BMR-964
TECHNICAL DATA SECTION

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Dormers: On new roofs, omit the roof boards on the dormer overhang until the main courses of shingles are applied. On old roofs, provide a space of 1/2", in order to secure the proper clearance for the application of the new shingles on the main roof at points where the dormer overhang occurs.

Flashings: Consult the following table for suggested widths of flashings for various parts of the roof:

Location and Description of Flashing	Total Width, inches	Bent Width, inches
Regular and dormer valleys	16	8 and 8
Dormer sides and fronts	8	4 " 4
Shed dormer (connecting with main roof)	10	5 " 5
Porch roof (connecting with side walls)	10	5 " 5
Chimney; rear, front and sides (see Fig. 18 and 19)	16	to shape
Back of Scuttles (flashing bent over top edge and curb)	10	to shape
Scuttles (flashing bent over top edge and curb)	10	to shape

Construct flashings of copper, zinc, lead or tin. Lap joints in the direction of the flow of water, solder with resin flux, and fold lateral edges 1/2" over to stiffen.

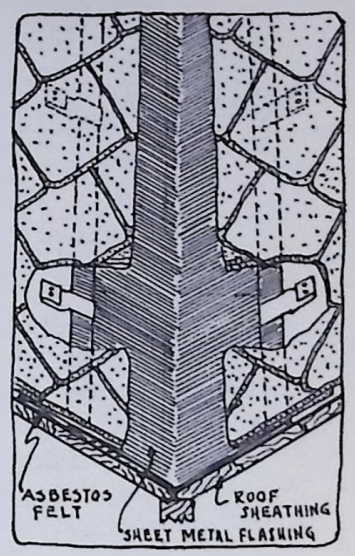


Fig. 17

Valley Construction and Flashing: On old roofs, fill valleys with wood strips (Fig. 16) to bring them flush with old shingles. When possible, construct open type valley, 4" wide at top and widening 1" every 4 ft.

Plan all flashings carefully before cutting the metal. Turn up the edges of metal valley 1/2" to form a water stop and secure it with metal cleats spaced 10" c.c. (Fig. 17). Embed shingles that border on valley in Asbestos Roof Putty.

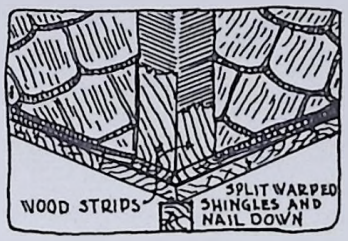


Fig. 16

Chimney Flashing: Step-flash progressively with metal flashing shingles shown in Fig. 18. Bend each shingle to extend at least 8" up the chimney side and 6" on the roof deck and nail firmly in place. Next, apply counter-flashing to extend at least 6" over the step-flashing. Rake out the mortar joints in the chimney to a depth of 1". Insert the bent edge of the counter-flashing and wedge in with two lead or strip-metal wedges per brick. After the counter-flashing is in place, point up the open mortar joints with Asbestor Caulking Putty (see Fig. 19).

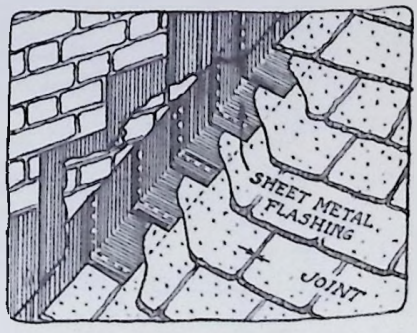


Fig. 18

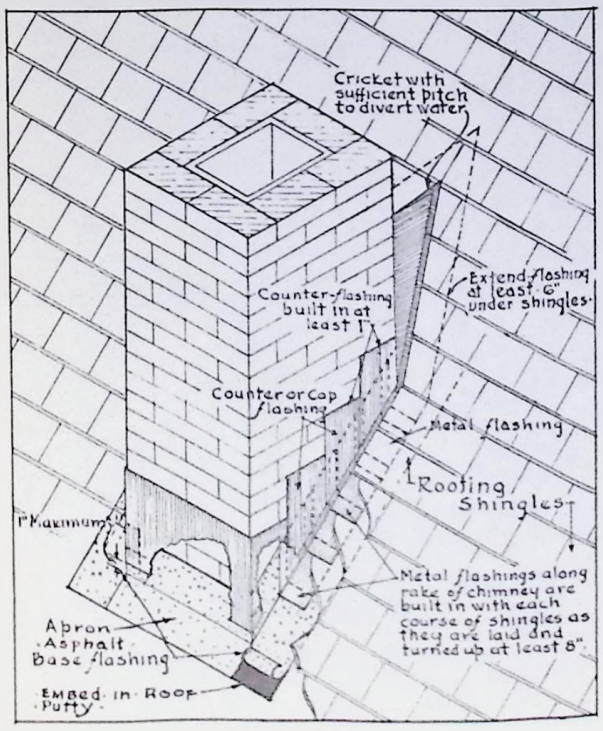
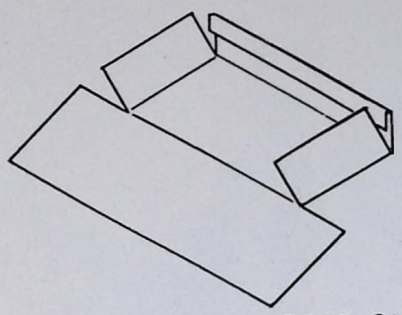


Fig. 19

If the chimney is located so that the high side will receive the flow of water or drift of snow from the slope of the roof, build a "saddle", "gusset" or "cricket" to divert the flow or drift. Flash and counter-flash the "saddle" as shown in Fig. 19.

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Dormer Window Flashing: Where dormer window rests on the roof, construct a metal pan and insert to extend 4" down the roof and 2" up on side of studs as shown in Figures 20 and 21.



TOP VIEW OF COPPER PAN

Fig. 20

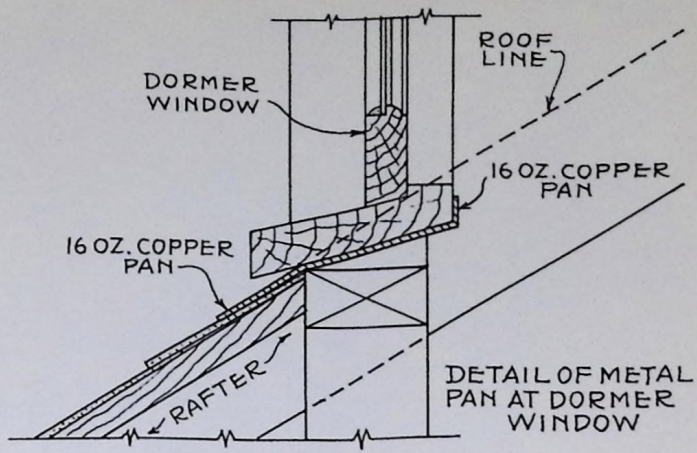
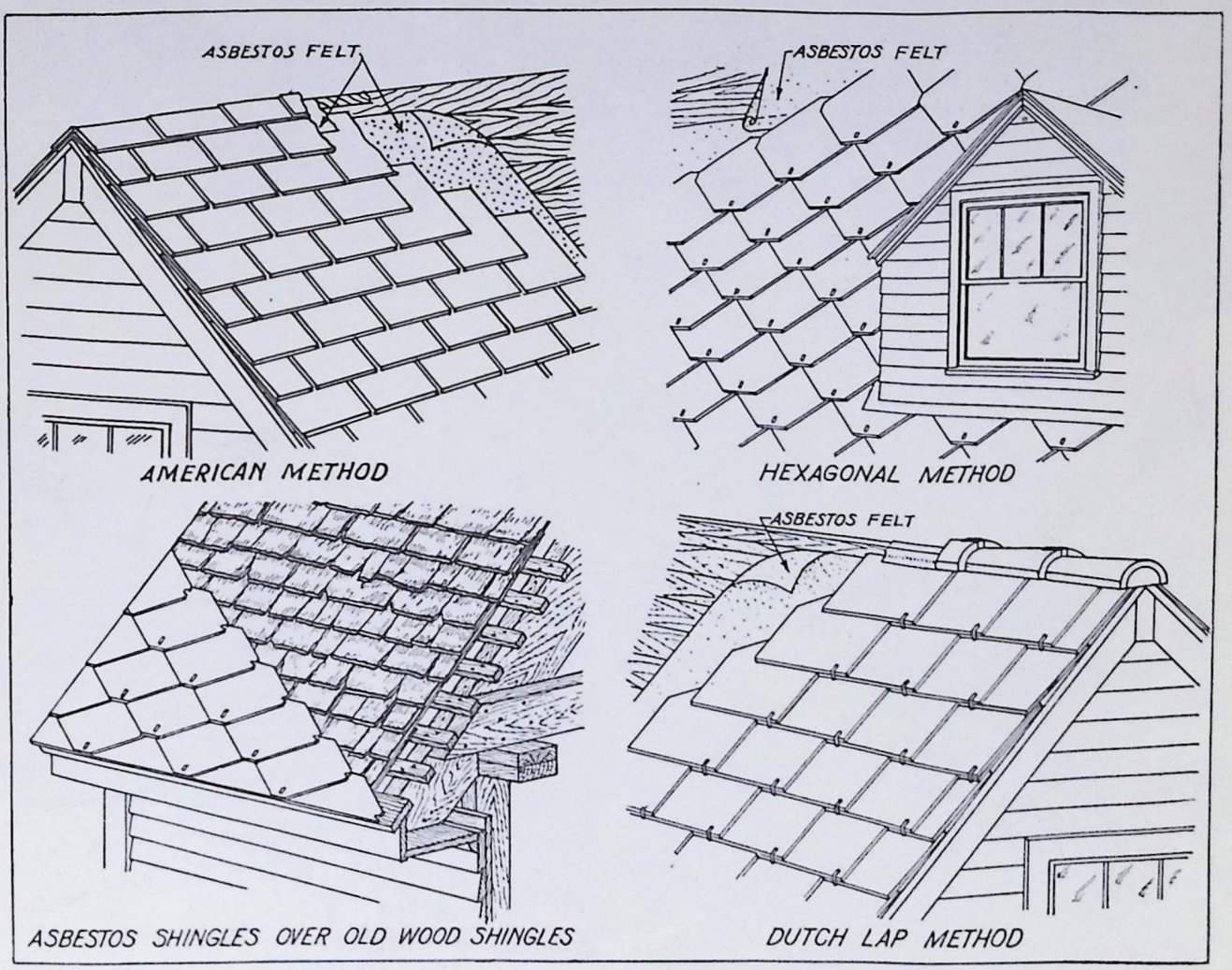


Fig. 21



Illustrating methods of laying J-M Rigid Asbestos Shingles

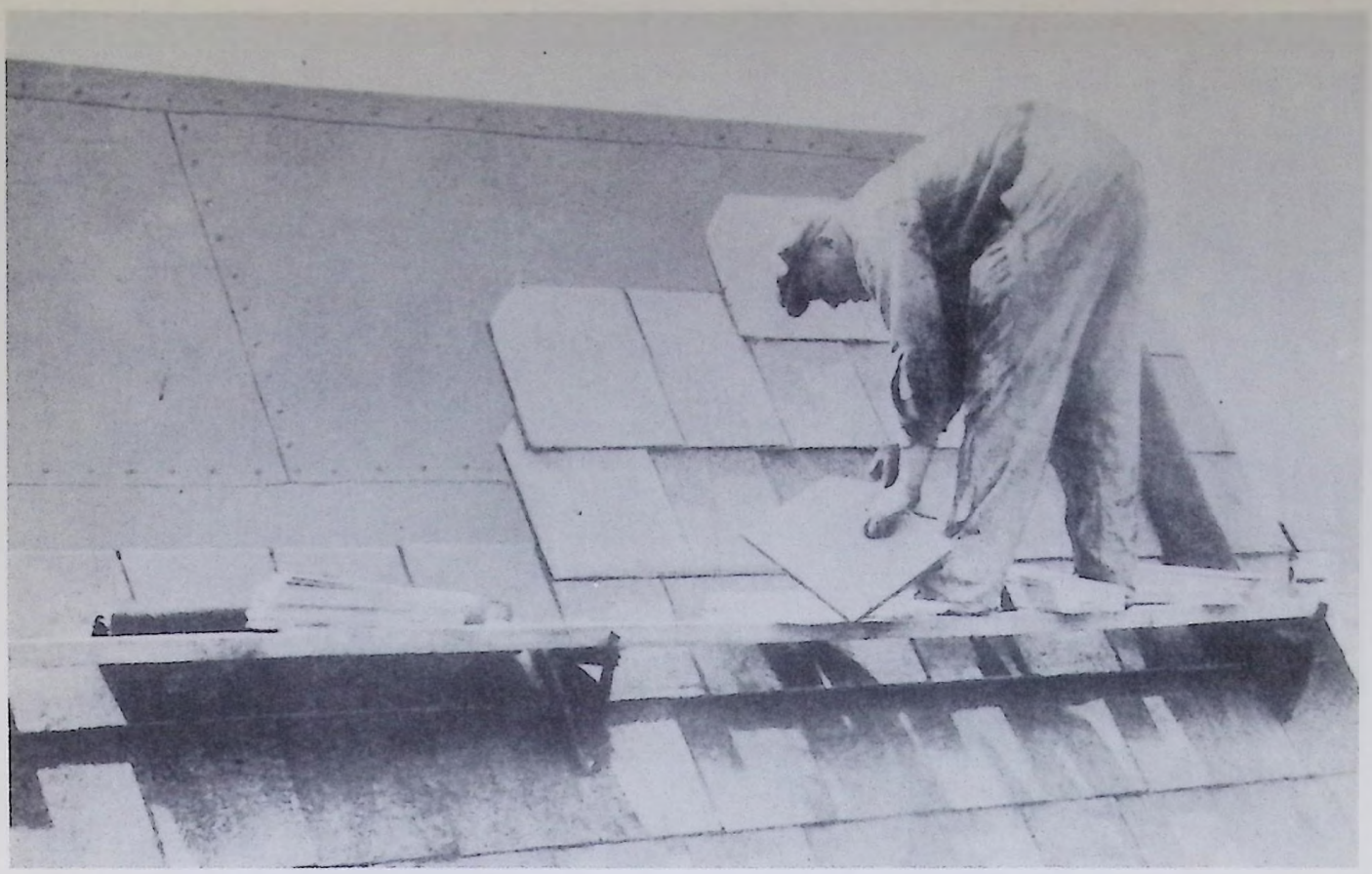
NOTE: The general application directions discussed apply to all types of Johns-Manville Rigid Asbestos Roofing Shingles. Detailed application directions for each type appear on separate Data Sheets.

JOHNS-MANVILLE Building Materials	DATE October, 1938 (Cancelling BMR-959.2 dated June, 1938)
J-M Rigid Asbestos Shingles General Roofing Application Directions	BMR-965

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Laying Dutch Lap Asbestos Shingles





Laying No. 35 Salem American Method Shingles. Note snapping of chalk lines secure proper alignment and closed valley construction

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J-M NO. 35 SALEM AMERICAN METHOD ASBESTOS SHINGLES
APPLICATION DIRECTIONS

No. 35 Salem American Method Shingles are textured and tapered to provide a roof of unusual beauty. The shingles are 8" x 16" with a weather exposure of 7". They are packed in bundles of 20. Each square requires 260 shingles, weighing approximately 540 lb. and $2\frac{1}{2}$ lb. of $1\frac{1}{4}$" or 3 lb. of 2" (use over old wood shingles) galvanized needle-point nails. Supplementary shingles used are No. 36 Salem Starters and No. 37 Salem Hip and Ridge Shingles.

The minimum allowable pitch for No. 35 Salem American Method Shingles is 4" to the foot.

General Application Directions: For directions covering preparation of roof and application of supplementary shingles, see data sheets on "General Roofing Application Directions" for J-M Rigid Asbestos Shingles.

Application of Starters: Snap a chalk line 8" from the edge of roof and apply first No. 36 Starter Shingle, with upper edge parallel to chalk line and outer edge projecting 1" beyond present eave and rake line to form drip edge. Apply succeeding starters in the same manner until the entire course is laid (see Fig. 1). (On new work, lay starters under the Asbestos or Asphalt Felt.)

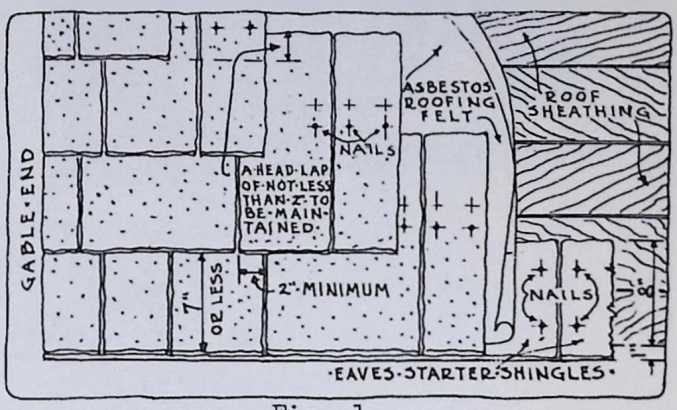


Fig. 1

Application of First and Succeeding Courses: To secure a uniform exposure, measure the distance (in inches) from eave to ridge and divide the measurement by a whole number that is approximately seven times as small. The number used as a divisor will indicate the number of courses and the result will indicate the weather exposure to be allowed (7" or the nearest smaller fraction). Snap a chalk line on each course, as it is laid, spaced the measurement of the weather exposure from the bottom of that course to serve as a guide for the butts of the succeeding course (see Fig. 1). Center side laps on shingles in course below or, in the case of random width shingles, maintain a minimum side lap of 2".

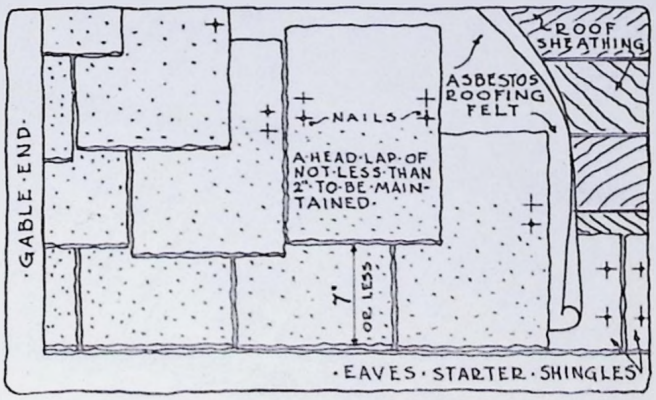


Fig. 2

Stagger-Butt Effect: If stagger-butt effect is desired, snap a second line below the normal exposure line to maintain the essential 2" head lap (see Fig. 2).

Random Width Shingles Spacing: If random width shingles are used (see Fig. 1), maintain a minimum side lap of 2" with shingle in adjacent courses. (Random width shingles of 6", 8" and 10" widths may be obtained on special order.)

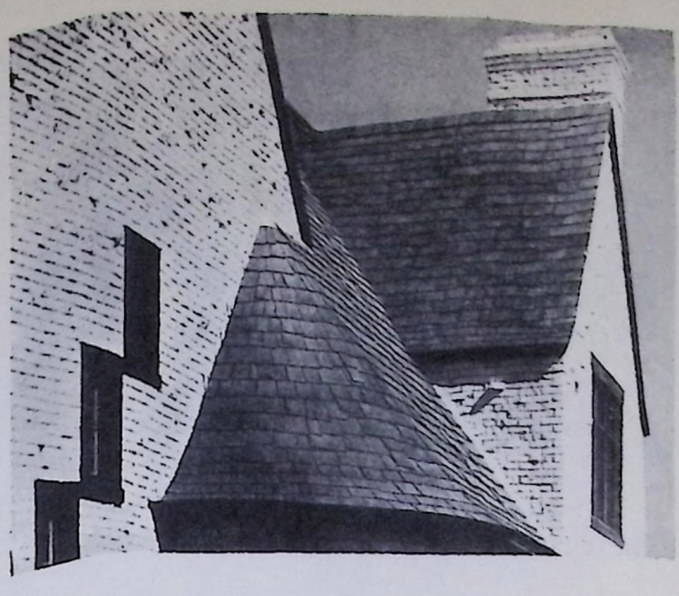
JOHNS-MANVILLE Building Materials	DATE October, 1938 (Cancelling BMR-962 dated October, 1937)
J-M No. 35 Salem American Method Asbestos Shingles Application Directions	BMR-969

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J-M No. 35 Salem American Method Shingles are appropriate on buildings of practically any architectural type



This type of roof provides harmonious colors, rugged butts, a beautifully textured surface, plus complete protection from fire and weather

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J-M NO. 30 DUTCH LAP ASBESTOS SHINGLES
APPLICATION DIRECTIONS

No. 30 Dutch Lap Shingles can be laid with a 1/4 or 1/3 side lap; the head lap is fixed at 3". For the 1/4 lap, 92 shingles and clinchers and 1 lb. of 1-1/4" No. 10 flat head, galvanized needle-point nails are required for each 99-2/3 sq. ft. When re-roofing over old shingles, similar nails 2" long are used. For the 1/3 lap, 104 shingles and clinchers per square are required. The shingles are packed 23 per bundle. They are laid with No. 31 Starters and No. 97 Hip and Ridge Shingles.

The minimum roof pitch for the No. 30 Dutch Lap Shingle is 5" to the foot.

General Application Directions: For directions covering preparation of roof and application of supplementary shingles, see "General Application Directions".

Application of Starters: Snap a chalk line 2" to 2½" up from the roof edge and apply first starter at either right or left corner so that the square end projects 1" to 1/2" over eave and rake. Depending upon whether 1/4 or 1/3 lap is desired, insert a nail in proper hole of the succeeding starter (see Fig. 1) and slide the starter over until it touches the upper corner of the starter already laid. Align to chalk line and drive both nails.

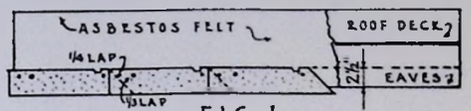


FIG. 1

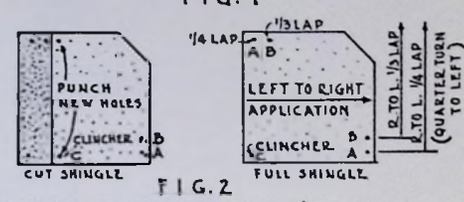


FIG. 2

Caution: As lap of entire roof depends upon the starter course, use same nail hole and lap for each starter until course is completed. (Fig. 3).

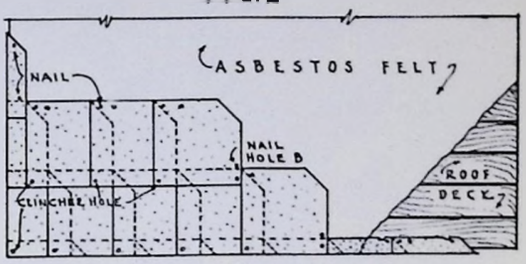


FIG. 3

Nailing: Only two nails are required for each shingle. Select the two holes, according to lap, and drive nails snugly, not too tight. (Fig. 2).

Application of First Course: In laying from left to right, place clipped edge in upper right corner. Over first starter, apply a cut shingle (3/4 width for 1/4 lap, or 2/3 width for 1/3 lap), in which two holes are punched, 1" from cut edge and 1" from top and bottom edges. Butt all succeeding shingles against the square edges of the starter strips. (See Fig. 2 and 3).

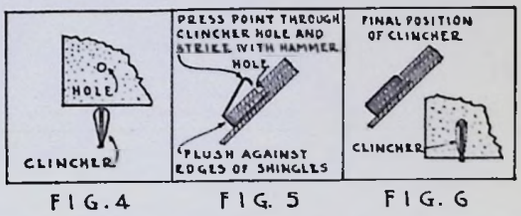


FIG. 4 FIG. 5 FIG. 6

Head Lap: Maintain head lap by inserting a nail in hole "B" (at bottom of shingle) and sliding shingle down until the nail rests on the upper edge of the starter or shingle below. Align each shingle with adjacent one before nail in upper corner is driven.

Succeeding Courses: For 1/4 lap, start second course with 1/2 shingle, third course with 1/4 shingles, fourth course with 3/4 shingle and repeat. For 1/3 lap, start second course with 1/3 shingle, third course with 2/3 shingle and repeat.

Finishing Ends of Courses: Cut the last shingle to the required width and punch two holes, 1" from cut edge and 1" from top and bottom.

Application of Clinchers: After a number of courses are laid, apply J-M Clinchers by inserting the flattened base under the shingle, below the lap, until the hooked end centers over hole "C" of upper shingle. Press end into clincher hole and tap lightly with hammer. (Fig. 4, 5 and 6).

Right to Left Application: Lay shingles with clipped edge in upper left corner, using nail holes "A" or "B" (at top of shingle) to determine side lap. (Fig. 2).

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JOHNS-MANVILLE Building Materials

J-M No. 30 Dutch Lap Asbestos Shingles
Application Directions

DATE October, 1938
(Cancelling BMR-961
dated June, 1938)

BMR-971

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J-M NO. 507 CEDARGRAIN AMERICAN METHOD ASBESTOS SHINGLES
APPLICATION DIRECTIONS

No. 507 Cedargrain American Method Shingles are cedargrain textured with staggered butt lines so that they closely resemble wood shingles. The shingles are 12" x 24" with a weather exposure of 5" and approximately 5/32" uniform thickness. They are packed in bundles of 30. Each square requires 120 shingles, weighing about 270 lb., and 2½ lb. of 1-1/4" or 3 lb. of 2" (over old wood shingles) galvanized needle-point nails. Supplementary shingles used are No. 536 Starters and No. 597 Hip and Ridge Shingles.

The minimum allowable pitch for the No. 507 Shingle is 5" to the foot.

General Application Directions: For directions covering preparation of roof and application of supplementary shingles, see data sheets on "General Roofing Application Directions" for J-M Rigid Asbestos Shingles.

Application of Starters: Snap a chalk line 6" from the edge of the roof and apply a full-sized No. 536 Starter Shingle, with the point on the chalk line and vertical edge and butt edge overhanging the gable and eave, respectively, approximately 1" to form a drip edge. Secure with four nails. See Fig. 1. Apply succeeding starters in the same manner until the entire course is laid. On new work lay the starters underneath the asbestos felt.

Application of First and Succeeding Courses: The first course of main roof shingles is laid directly over the starter course beginning with a half shingle with the vertical edge of same projecting 1" beyond the gable and the staggered butt edge, projecting approximately from 1/2" to 1" beyond the eaves. (See Fig. 2). Each succeeding shingle to be laid in a straight line parallel to the eave and with the vertical edges of shingles butted closely together, but not jammed or forced into place Apply four galvanized roofing nails per shingle, taking care not to drive nails so tightly as to cause cocking at the butt.

The second course of main body shingles is laid starting with a full size shingle so that the shoulder coincides with the point of the underlying course, (see Fig. 3). In this way the 5" exposure is automatically obtained. Where the roof area is broken by dormers, a chalk line should be used to assure proper alignment and correct meeting of the courses above the dormers.

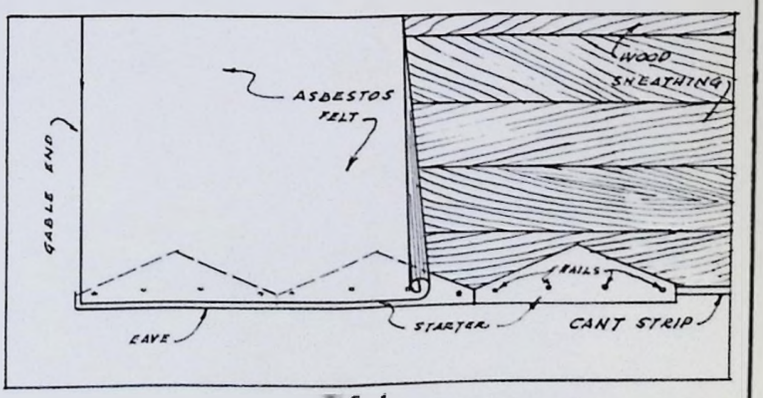


FIG. 1.

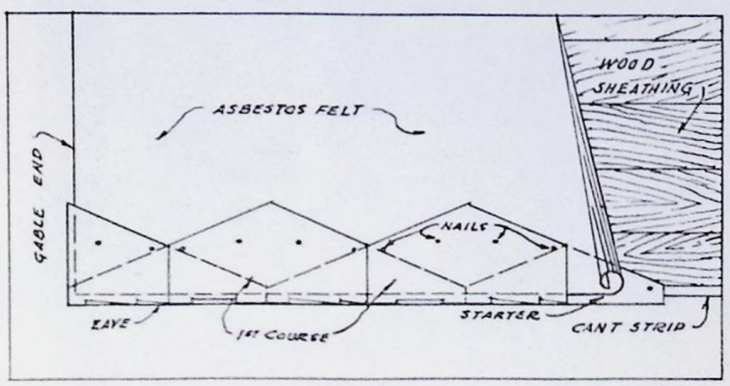


FIG. 2.

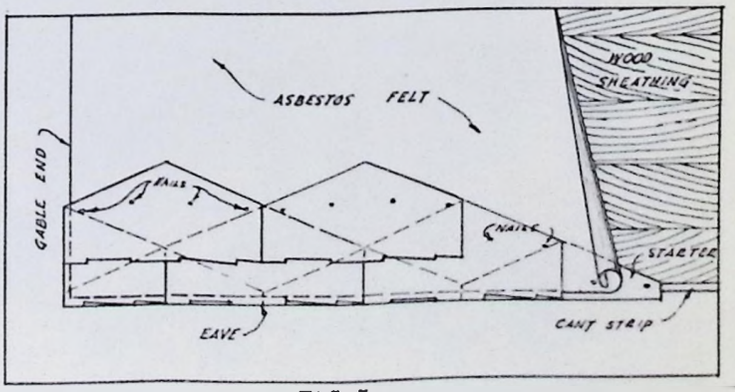


FIG. 3.

JOHNS-MANVILLE Building Materials

J-M No. 507 Cedargrain American Method Asbestos Shingles Application Directions

DATE October, 1938
(Cancelling BMR-964 dated May, 1938)
BMR-973

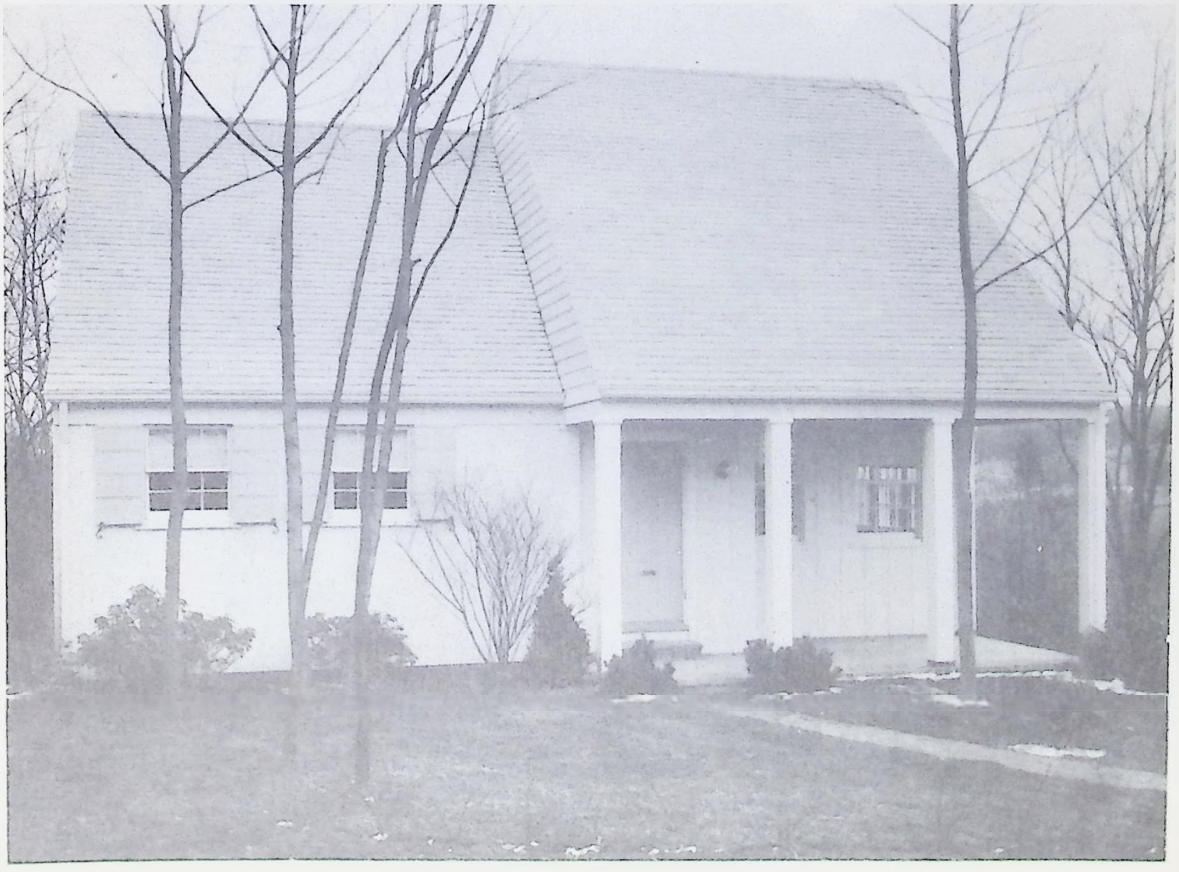
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The No. 507 Cedargrain Asbestos Shingle provides the desirable American Method pattern at an unusually low cost



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J-M NO. 70 HEXAGONAL METHOD ASBESTOS SHINGLES
APPLICATION DIRECTIONS

No. 70 Hexagonal Method Shingles provide an attractive, fireproof roof at minimum cost. The shingles are 16" x 16", with a 13" x 13", hexagonal pattern, weather exposure. The shingles are packed 15 per bundle. Each square requires 86 shingles, weighing about 275 lb.; 1 lb. of 1¼" or 1½ lb. of 2" (over old shingles) galvanized needle-point nails; and 86 J-M Copper Storm Anchors. Supplementary shingles used are No. 17 Starter, No. 71 Eaves Shingles and No. 97 Hip and Ridge Shingles.

The minimum pitch for No. 70 Hexagonal Shingle is 5" to the foot.

General Application Directions: For directions covering preparation of roof and application of supplementary shingles, see data sheets on "General Application Directions for J-M Rigid Asbestos Shingles".

Application of Starters: Snap a horizontal chalk line, 3" from the edge of roof. Lay No. 17 Starters, butted closely together with the top edges on the chalk line. See that starters overhang 1" at eaves and 1/2" at gables.

Application of Eave Shingles: Lay one end of a No. 71 Eave Shingle at center line of roof between eaves. Then lay shingles in both directions until the course is laid. Butt ends close and keep lower edge straight and flush with starter course. Insert storm anchor in holes formed by the notches in sides of shingle (see Fig. 1).

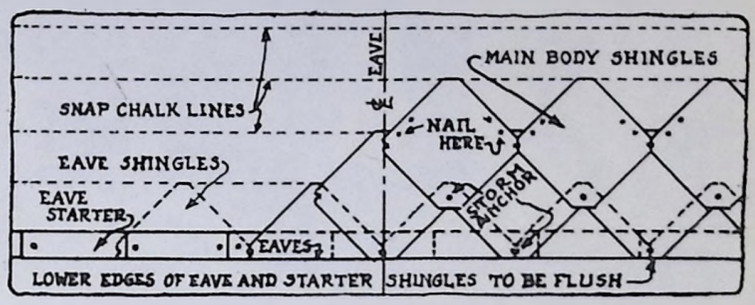


Fig. 1

Application of First and Succeeding Courses: Start the first shingle at or near the center line and place it so that the shank of the storm anchor, set in the eave shingle fits into the anchor hole. CENTER THE UPPER EDGE OF THE SHINGLE SO THAT IT WILL BE IN VERTICAL ALIGNMENT WITH THE ANCHOR HOLE.

Pass the anchor hole at the bottom of the shingle being laid over the storm anchor of the course below and as each shingle is laid, insert a storm anchor in the notch formed by butting two shingles. Nail each shingle with two nails, driven securely but not too tightly. Continue in this manner until each course is laid. Then bend down the ends of the anchor holes (see Fig. 1, 2, 3, 4 and 5).

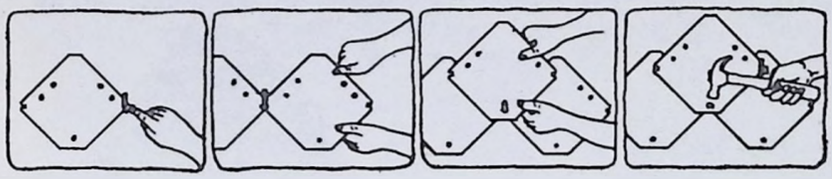


Fig. 2 Fig. 3 Fig. 4 Fig. 5

Finishing Ends of Courses: At the ends of each course, cut a whole shingle to the required width and punch a new nail hole, 1" each way from the top and the cut edge. Cut a new storm anchor hole, 1" from the cut edge and 1½" up from the lower outside corner.

Dormers: To insure alignment of shingles around the dormer, snap a chalk line above the dormer, parallel to the eaves. After each course is laid, verify, by measurement, the equal spacing on both sides from the line (see Fig. 6).



Fig. 6

JOHNS-MANVILLE Building Materials

J-M No. 70 Hexagonal Method Asbestos Shingles
Application Directions

DATE September, 1938
(Cancelling BMR-965 dated Oct., 1937)

BMR-975

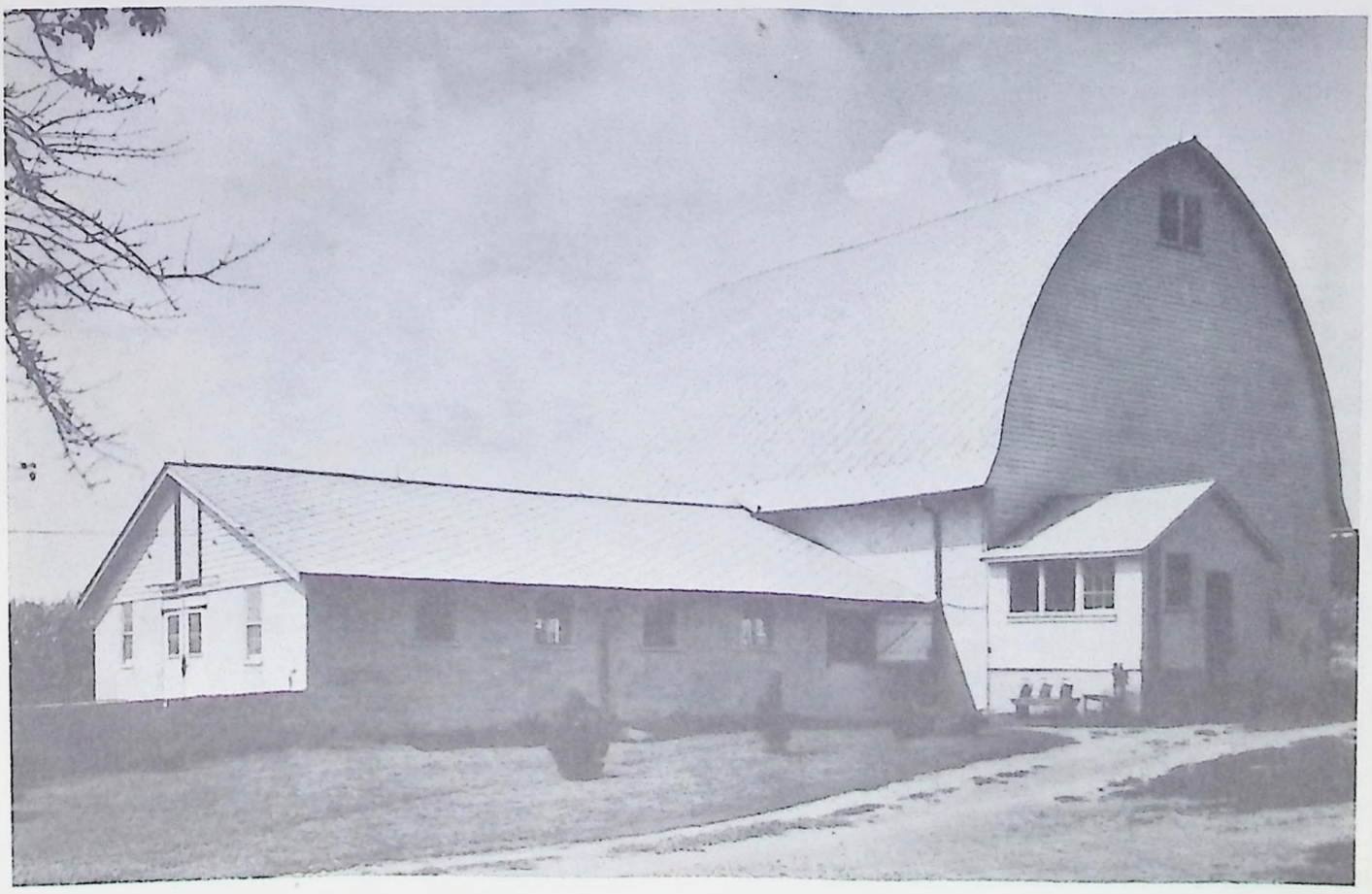
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J-M No. 70 Hexagonal Shingles were used to remodel the roof of this dwelling



The use of No. 70 Hexagonal Shingles on this large Gothic type barn roof and adjoining dairy stable is typical of many such applications

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BRIEF FORM SPECIFICATION
FOR APPLICATION OF AMERICAN METHOD ASBESTOS SHINGLES

SCOPE OF WORK:

All (state in detail surfaces to be covered) shall be roofed with Type A American Method Asbestos Shingles with necessary asbestos eave starters and ridge and hip finish. In addition to the requirements herein the asbestos shingles shall comply strictly in accordance with the U. S. Government Federal Specification SS-S-291 dated May 7, 1935.

PREPARATION:

All surfaces which are to receive the shingles shall be solidly wood sheathed and covered with one layer of asphalt-saturated rag felt weighing not less than thirty (30) pounds per 108 sq. ft., and complying with Fed. Spec. HH-F-191, Type 2, dated August 1, 1933, or asphalt-saturated asbestos felt weighing not less than fifteen (15) pounds per 108 sq. ft. The felt shall be applied horizontally with joints lapped towards the eaves and at the ends not less than three inches and held in place with tin caps and nails. Felt shall overlap not less than twelve (12) inches at all ridges and hips and shall overlap valley flashings not less than two (2) inches. The felt shall overlap all eave starters (under eave course).

A separate strip of felt shall be applied over all ridges and hips before the application of the ridge and hip finish to overlap the roof shingles.

MATERIALS:

Asbestos shingles shall be (write in standard color or colors) and approximately 8" x 16" in size or may be in random widths of 8 to 10 inches, and shall be not less than 1/4 inch thick at butts and tapered. They shall have a riffer surface, even or irregular edges, thoroughly seasoned and have a dense hard structure.

Eave starters and other shapes used at hips and ridge finish shall be of the same material as the main body shingles. Shingles shall be furnished with not less than two holes for fastening and as laid shall have seven (7) inches exposed to the weather.

The shingle nails shall have flat heads and be long enough to properly secure the shingles to the sheathing. Nails shall be either hard copper, copper clad, zinc coated, or cadmium-plated steel as specified, conforming to Federal Specification FF-N-101 dated May 3, 1932.

RIDGES AND HIPS:

All ridge and hips shall be "Boston Hip and Ridge Finish".

FLASHINGS AND VALLEYS:

Specify type of metal flashing and method of installation. State whether valleys are to be "open" or "closed" type.

WORKMANSHIP:

All shingles and supplementary shapes are to be installed strictly in accordance with best practice for this class of work and in accordance with the manufacturers' specification.

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DETAILED SPECIFICATIONS FOR FURNISHING AND APPLYING TYPE A AMERICAN METHOD CEMENT ASBESTOS SHINGLES (1/4" BUTTS)

SCOPE OF WORK:

The work contemplated under this specification shall include all materials, labor, equipment and services necessary for and seasonably incidental to the installation of Type A American Method Cement Asbestos Shingles as specified herein and on all areas as indicated on the drawings.

WORK NOT INCLUDED:

Other contractors will furnish and install the following work as specified under other divisions and other specification text which this contractor shall read so as to ascertain what is called for therein (See Note 1). (The following paragraphs which do not apply to the job at hand are to be omitted.):

(a) Furnish and install all materials composing the roof construction leaving all surfaces smooth and clean, in a satisfactory condition to receive the roofing.

(b) Furnish and install fascia or crown moulding to project above the roof sheathing sufficient to give the proper cant required by the thickness of the shingles.-OR: Furnish and install parallel and flush with the eaves a cant strip of suitable size to give the proper cant required by the thickness of the shingles.

(c) Furnish and install on all hips and ridges, furring strips of suitable size to receive the ridge and hip finish shingles.

(d) Furnish and install all flashings, sheet metal valleys, gutter linings, eaves troughs or hung gutters, leaders and all other sheet metal work in connection with the asbestos shingle roof not definitely specified herein. (See Note 2).

(e) Sheet metal of proper dimensions for such flashings as must necessarily be installed during the application of the asbestos shingles, shall be furnished by other contractors as specified under (state where specified) to be installed by the roofing contractor.

NOTE 1: Where it is the custom or it is desired that the roofing contractor include the furnishing and setting of any or all of the items included in paragraph under "work not included", such items shall be incorporated under "Scope of Work", in detail or "in accordance with the standard specification of the (sheet metal, etc.) manufacturer."

NOTE 2: The flashing requirements of an asbestos-shingle roof are similar both from the standpoint of materials used and method of application to that of a roof covered with wood shingles or slate, etc. The selection of the material to be used is left to the architect, it being recommended that copper or other non-corroding sheet metal be used, installed in accordance with the standard specification of the manufacturer. The question as to whether the flashing is to be included by the roofing contractor or others is also left to the architect, it being understood that the setting of certain flashings must be done by the former as covered in paragraph (e).

CONNECTING WORK:

The roofing contractor shall examine all surfaces on which, or against which, his work is to be applied and he shall notify the architect in writing of

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any defects that he may discover, which, in his opinion, he considers detrimental to the installation of his materials.

The contractor shall see to it that all defects are corrected before installing his work. The application of materials by this contractor shall be considered an indication of the acceptance by him of the base.

PREPARATION OF SURFACES:

Before applying any of his materials, the contractor shall clean all roof surfaces, sweep up all dust, rubbish, etc., and leave such surfaces clean and dry before the installation of his work.

VALLEYS AND FLASHINGS:

(The following is a suggested specification but not in complete detail for metal valleys and vertical flashings at walls, etc. The open type of valley formed wider at the bottom than at the top is recommended.)

Sixteen (16) ounce copper or other non-corroding metal is to be installed in one continuous piece (if feasible) in all valleys. The metal flashing shall be of sufficient width to run under the asbestos shingles at all points not less than four (4) inches. The distance of the valleys from edge of shingles to bottom of valley shall be as installed not less than four (4) inches at top of valley and widening by one (1) inch in eight (8) feet toward the bottom.

Edges of valley lining should be turned one-half (1/2) inch to form a hem or water stop, and secured to sheathing with metal cleats spaced approximately ten (10) inches center to center.

Flashings at dormers, etc., are to be formed up of same metal with wings at least four (4) inches up the wall and four (4) inches out on deck. This flashing is to be installed in step fashion in accordance with best practice and is to be either run up back of siding or similar construction or, in case of brickwork, it is to be counter-flashed likewise by step fashion properly letting top of flashing into raglet or slots in brickwork at least two (2) inches with edge turned up and extending down over base flashing at least four (4) inches. Flashing in wall to be caulked with slater's compound and held securely in place by lead plugs. Fold all exposed or loose edges of flashings back to stiffen the edge.

MATERIALS:

All cement asbestos shingles shall meet the requirements of Federal Specification No. SS-S-291, dated May 7, 1935, in addition to other requirements herein specified and shall be the equal of products known by the architect to have given satisfactory service for a period of not less than five years and shall be the product of a manufacturer regularly engaged in the production of this type of shingle.

All felt referred to in these specifications shall be asphalt-saturated rag felt and shall weigh approximately 30 lb. per 108 sq. ft. and shall comply with Federal Specification HH-F-191, Type 2, dated August 1, 1933 - or 15-lb. asphalt-saturated asbestos felt.

The shingle nails shall have flat heads and be long enough to properly secure the shingles to the sheathing. Nails shall be either hard copper, copper clad, zinc-coated, or cadmium-plated steel as specified, conforming to Federal Specifications FF-N-101, dated May 3, 1932.

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All roof putty used which is exposed to view shall be of a color which shall blend satisfactorily with the color tone of the roof.

SHINGLES:

Cement asbestos shingles shall be Type A made of portland cement and asbestos fibers or these with the addition of such pigments as may be necessary to produce specified colors. They shall have a dense, hard structure and shall be thoroughly seasoned. The colors shall not fade appreciably on exposure to atmospheric conditions.

Shingle shall be tapered and be approximately eight (8) inches wide by sixteen (16) inches long or in random widths six (6) inches and ten (10) inches and butts shall be 1/4" thick subject to tolerance allowed by Federal Specification.

NOTE: State colors or proportions of colors, thickness, "random" or "standard" widths and whether to be applied with the butts "aligned" or "staggered".

RIDGE AND HIP FINISH:

All ridges and hips shall be finished (state whether "Boston method" or "mitred".)

VALLEYS:

All valleys shall be (state whether "open" or "closed").

FASTENERS:

Each shingle shall be secured by not less than two shingle nails as specified.

INSTALLATION OF ASBESTOS SHINGLES:

All surfaces to receive the shingles shall be covered with one layer of roofing felt, of weight specified, laid parallel with eaves, lapping each layer not less than three (3) inches horizontally and six (6) inches vertically. Fasten felt with large-head galvanized roofing nails not more than nine (9) inches on centers along all sides. Felt shall extend up not less than six (6) inches on abutting vertical surfaces and two (2) inches over valley and gutter metal. The felt shall overlap not less than twelve (12) inches at all ridges and hips and to completely overlap all eave starters. A separate strip of felt shall be applied over all ridges and hips before the application of the ridge and hip finish to overlap the roof shingles.

The eaves starters or under-eaves course shall be applied under the felt, to parallel the eaves, using the regular starter shingle or the roof shingles with the heads cut off, reducing the length of the shingle to two inches greater than the weather exposure of the shingle involved.

The first course of shingles of the color, and widths specified, shall be applied to completely cover the eaves starters or under eaves course, with the butts flush therewith and with all joints broken. The remainder of the roof shall be covered with the same shingles, with the butts aligned or staggered, as specified. A minimum headlap of two inches shall be maintained and the horizontal distance between side joints in adjoining courses shall be not less than two inches. The shingles shall not be butted tightly together at the side joints, such joints to be left open approximately 3/16". The shingles shall be carried fully up to the ridges and hips or to the furring strips placed to receive the ridge and hip finish

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pieces. The exposure of the last few courses shall be adjusted to finish approximately uniform. All shingles shall have an exposure of seven (7) inches to the weather.

No portion of the un-surfaced heads of the shingles shall show in the finished job.

At gable ends, valleys, vertical surfaces adjoining the roof, etc., and wherever necessary, the shingles shall be neatly cut to fit and shall be thoroughly bedded in gray roof putty. Additional nail holes shall be made in all cut shingles so that each may be secured by not less than two nails. The shingles shall be applied to overhang not more then 1", nor less than 1/2", at eaves and gable ends and shall overlap valley and other underlying flashings not less than 4". If the valleys are specified to be open, the shingles shall be applied to provide a valley width of not less than 4" at the top, increasing towards the bottom not less than 1" for every eight feet of length of the valley.

No shingles shall be applied or left in the work which are cracked or broken. Such shingles shall be replaced with sound shingles in an approved manner.

Each shingle shall be fastened to the roof by not less than two shingle nails of the type specified which shall be driven to hold it firmly in place without producing any strain on the shingle. All nails shall be placed so as to be sufficiently covered by the overlaying shingle. No exposed nailing will be permissible except where unavoidable on ridge finish, etc., which exposed nails shall be neatly covered with the roof putty. Where shingles overlap valley flashing, gutter lining, etc., the nailing shall be done so as not to penetrate such flashings.

RIDGE AND HIP FINISH:

There are two types of finish at these points that can be installed, i.e., ridge and hip finish, Boston Method; and ridge and hip finish, Mitred Method - specify the one desired.

Application of Hip and Ridge Shingles-Boston Method: Before installing ridge and hip finish, install 2" continuous wood strips of sufficient thickness on each side of roof, dormer, etc., ridges (making 4" wide nailing strip as installed) for application of ridge shingles.

The roofing shingles are to be finished fully up to wood-nailing strips on ridges after which install two (2) thicknesses of 15-lb. asphalt-impregnated asbestos or rag felt or one (1) thickness of 30-lb. felt (same type) at least 8" wide with at least three (3) inch end lappage and securely nailed in place. This felt to be installed for entire length of ridge.

The application on main ridges shall be started at each end of the ridge, finishing at the center. On dormer, wings, and extensions, application shall be started at the end, finishing at the intersection with the main roof or main building. The application on hips shall be started at the bottom.

The hip and ridge finish shingles shall be applied with the long dimensions paralleling the ridge or hip, and each shingle as laid shall be thoroughly bedded in black asbestos roof putty. Each succeeding shingle shall overlap the shingle previously placed to provide a weather exposure of not more than seven (7) inches.

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The shingles applied on each side of the ridge and hip shall lap each other alternately right and left over the line of the ridge or hip, and shall be applied so that no portion of the unsurfaced heads of the shingles will be exposed.

At no place in the ridge and hip finish shall there be less than two (2) thicknesses of the ridge and hip finish shingles and they shall overlap the roof shingles not less than two inches (2").

Each shingle shall be secured by not less than two (2) one and one-quarter (1-1/4") inch galvanized needle point nails and exposed nailing will be permitted only where unavoidable in the last piece installed.

Ridge and Hip Finish - Mitred Method: Roofing felt applied to roof deck before application of asbestos shingles shall overlap twelve (12) inches on each side of ridge line as a reinforcement. (Wood stripping required on ridge line for applying ridge and hip finish Boston Method should not be installed).

The hip finish shingles shall be of sufficient width to enable their being secured with not less than two (2) one and one-quarter (1-1/4") inch galvanized needle point nails placed so as to be sufficiently covered by the overlying course.

The shingles applied on each side of the ridge and hip shall be thoroughly bedded in black asbestos roof putty and shall overlap each other and be neatly fitted.

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BRIEF FORM SPECIFICATIONS
FOR APPLICATION OF NO. 507 CEDARGRAIN ASBESTOS ROOFING SHINGLES

SCOPE OF WORK:

All (state in detail surfaces to be covered) shall be roofed with Johns-Manville, or approved equal, No. 507 Cedargrain Asbestos Roofing Shingles with necessary asbestos eave starters and ridge and hip finish.

PREPARATION:

All surfaces which are to receive the shingles shall be solidly wood-sheathed and covered with one layer of asphalt-saturated rag felt weighing not less than thirty (30) pounds per 108 sq. ft., and complying with Fed. Spec. HH-F-191, Type 2, dated August 1, 1933, or asphalt-saturated asbestos felt weighing not less than fifteen (15) pounds per 108 sq. ft. The felt shall be applied horizontally with joints lapped towards the eaves and at the ends not less than three inches and held in place with tin caps and nails. Felt shall overlap not less than twelve (12) inches at all ridges and hips and shall overlap valley flashings not less than two (2) inches. The felt shall overlap all eave starters (under eave course).

A separate strip of felt shall be applied over all ridges and hips before the application of the ridge and hip finish to overlap the roof shingles.

MATERIALS:

Asbestos shingles shall be light gray color, (write in any other standard color desired), thoroughly seasoned and of dense hard structure, with cedargrain texture and staggered butt line. Shingles shall be 12" x 24" and not less than 3/16" thick, weighing approximately 270 lb. per square. Main body shingles shall be furnished with not less than four holes for fastening and as laid shall have five inches exposed to the weather.

Eave starters and other shapes used as hips and ridges finish shall be of the same material as the main body shingles. Nails for securing shingles shall be 2" galvanized needle point with flat heads, using not less than four for main body shingles, four for eave starters and two for each hip and ridge finish shingle.

RIDGES AND HIPS:

All ridge and hips shall be "Boston Hip and Ridge Finish" laid with approximately 5" exposure to the weather.

FLASHINGS AND VALLEYS:

Specify type of metal flashing and method of installation. State whether valleys are to be "open" or "closed" type.

WORKMANSHIP:

All shingles and supplementary shapes are to be installed strictly in accordance with best practice for this class of work and in accordance with the manufacturers' specification.

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BRIEF FORM SPECIFICATIONS
FOR APPLICATION OF DUTCH LAP METHOD CEMENT-ASBESTOS SHINGLES

SCOPE OF WORK:

All (state in detail surfaces to be covered) shall be roofed with Type C Dutch Lap Method Cement Asbestos Shingles with necessary eave starters and ridge or hip finish. Shingles to be strictly in accordance with all requirements of U.S. Government Federal Specification SS-S-291 dated May 7, 1935.

PREPARATION:

All surfaces which are to receive the shingles shall be covered with one layer of asphalt-saturated rag felt weighing not less than thirty (30) pounds per 108 sq. ft., and complying with Fed. Spec. HH-F-191, Type 2, dated August 1, 1933, or asphalt-saturated asbestos felt weighing not less than fifteen (15) pounds per 108 sq. ft. The felt shall be applied horizontally with joints lapped towards the eaves and at the ends not less than three (3) inches and held in place with tin caps and nails. Felt shall overlap not less than twelve (12) inches at all ridges and hips and shall overlap valley flashings not less than two (2) inches. A separate strip of felt shall be applied over all ridges and hips before the application of the ridge and hip finish.

SHINGLES:

Cement Asbestos Shingles shall be Type C made of portland cement and asbestos fibers or these with the addition of such pigments as may be necessary to produce specified colors. They shall have a dense, hard structure and shall be thoroughly seasoned. The colors shall not fade appreciably on exposure to atmospheric conditions.

Asbestos shingles shall be approximately 16" x 16" x 5/32" thickness and shall weigh approximately 290 pounds per square (100 sq. ft.) when applied with a one-quarter side lap or approximately 330 pounds per square when applied with a one-third side lap. They shall be of a (state color or combination of colors to be applied) and laid with a three (3) inch head lap.

The shingle nails shall have flat heads and be long enough to properly secure the shingle to the sheathing without protruding beneath. Nails shall be hard copper, copper clad, zinc coated, cadmium or galvanized steel as specified, conforming to Federal Specification FF-N-101, dated May 3, 1932.

Asbestos starter shingles shall be of proper type for installation at eaves previous to laying of main body shingles.

NOTE: Dutch lap asbestos shingles can be laid with a one-quarter lap (approximately 4") at side of shingles or one-third lap at side (approximately 5-1/3"). The one-third side lap is the preferred method as it produces true alignment of vertical joints up the roof comparable with one-quarter side lap which offsets one (1) inch every other course.

RIDGE AND HIPS:

All ridges and hips shall be finished with (state whether "Hip & Ridge Shingles" or "Ridge Roll.").

FLASHINGS AND VALLEYS:

Specify type of metal flashing and method of installation. State whether valleys are to be "open" or "closed" type.

WORKMANSHIP:

All work installed under this contract is to be strictly in accordance with best practice for this class of work and in accordance with manufacturer's specification.

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BRIEF FORM SPECIFICATION
FOR APPLICATION OF HEXAGONAL CEMENT-ASBESTOS SHINGLES

SCOPE OF WORK:

All (state in detail surfaces to be covered) shall be roofed with Type "D" Hexagonal Cement Asbestos Shingles with necessary eave starters and ridge and hip finish. Shingles are to be strictly in accordance with all requirements of U. S. Government Federal Specification SS-S-291, dated May 7, 1935.

PREPARATION:

All surfaces which are to receive the shingles shall be covered with one layer of asphalt-saturated rag felt weighing not less than thirty (30) pounds per 108 sq. ft., and complying with Fed. Spec. HH-F-191, Type 2, dated August 1, 1933, or asphalt-saturated asbestos felt weighing not less than fifteen (15) pounds per 108 sq. ft. The felt shall be applied horizontally with joints lapped towards the eaves and at the ends not less than three (3) inches and held in place with tin caps and nails. Felt shall overlap not less than twelve (12) inches at all ridges and hips and shall overlap valley flashings not less than two (2) inches. A separate strip of felt shall be applied over all ridges and hips before the application of the ridge and hip finish.

SHINGLES:

Cement asbestos shingles shall be Type "D" made of portland cement and asbestos fibers or these with the addition of such pigments as may be necessary to produce specified colors. They shall have a dense, hard structure and shall be thoroughly seasoned. The color (state color or combination of colors to be used) and shall not fade appreciably on exposure to atmospheric conditions.

Asbestos shingles shall be approximately 16" x 16" by 5/32" thickness and shall weigh approximately 275 pounds per square (100 sq. ft.) when applied. Each shingle shall have not less than three cut corners and holes located so that shin- will be laid with a three (3) inch overlap on two edges and give a 13" x 13" exposed surface. Bottom of each shingle shall be secured in place by a copper storm anchor.

The shingle nails shall have flat heads and be long enough to properly secure the shingle to the sheathing without protruding through the underside. Nails shall be either hard copper, copper clad, zinc coated, galvanized or cadmium plated steel as specified, conforming to Federal Specification FF-N-101, dated May 3, 1932.

Cement asbestos starter shingles shall be of proper type for installation at eaves previous to laying of main body shingles.

RIDGE AND HIPS:

All ridges and hips shall be finished with (state whether "hip and ridge shingles" or "ridge roll").

FLASHINGS AND VALLEYS:

Specify type of metal flashing and method of installation. State whether valleys are to be "open" or "closed" type.

WORKMANSHIP:

All work installed under this contract is to be strictly in accordance with best practice for this class of work and in accordance with manufacturer's specification.

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DETAILED SPECIFICATIONS FOR FURNISHING AND APPLYING TYPE C DUTCH LAP METHOD CEMENT-ASBESTOS SHINGLES

SCOPE OF WORK:

The work contemplated under this specification shall include all materials, labor, equipment and services necessary for and reasonably incidental to the installation of Type C Dutch Lap Method Cement Asbestos Shingles as specified herein and on all areas as indicated on the drawings.

WORK NOT INCLUDED:

Other contractors will furnish and install the following work as specified under other divisions and other specification text which this contractor shall read so as to ascertain what is called for therein (see Note 1). (The following paragraphs which do not apply to the job at hand are to be omitted.):

(a) Furnish and install all materials composing the roof construction. Roof boards shall be dry, well seasoned, of narrow width and uniform thickness laid close - tongue and groove sheathing preferred. All sheathing shall be properly secured with at least two (2) nails to each rafter. If edges of sheathing boards are curled up, they must be drawn down and properly secured to rafters.

(b) Furnish and install on all hips and ridges, furring strips of suitable size and shape to receive the ridge and hip finish shingles.

(c) Furnish and install all flashings, sheet metal valleys, gutter linings, eaves troughs or hung gutters, leaders and all other sheet metal work in connection with the asbestos shingle roof not definitely specified herein. (See Note 2).

(d) Sheet metal of proper dimensions for such flashings as must necessarily be installed during the application of the asbestos shingles, shall be furnished by other contractors as specified under (state where specified) to be installed by the roofing contractor.

NOTE 1: Where it is the custom or it is desired that the roofing contractor include the furnishing and setting of any or all of the items included in paragraph under "Work not Included", such items shall be incorporated under "Scope of Work", in detail or "in accordance with the standard specification of the (sheet metal, etc.) manufacturer."

NOTE 2: The flashing requirements of an asbestos shingle roof are similar both from the standpoint of materials used and method of application to that of a roof covered with wood shingles or slate, etc. The selection of the material to be used is left to the architect, it being recommended that copper or other non-corroding sheet metal be used, installed in accordance with the standard specifications of the manufacturer. The question as to whether the flashing is to be included by the roofing contractor or others is also left to the architect, it being understood that the setting of certain flashings must be done by the former as covered in paragraph (d).

MATERIALS AND WORKMANSHIP:

Connecting Work: The roofing contractor shall examine all surfaces on which, or against which his work is to be applied and he shall notify the architect in writing of any defects that he may discover which, in his opinion, he considers detrimental to the installation of his materials.

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The contractor shall see to it that all defects are corrected before installing his work. The application of materials by this contractor shall be considered an indication of the acceptance by him of the base.

Preparation of Surfaces: Before applying any of his materials, the contractor shall clean all roof surfaces, sweep up all dust, rubbish, etc., and leave such surfaces clean and dry before the installation of his work.

Valleys and Flashings: (The following is a suggested specification but not in complete detail for metal valleys and vertical flashings at walls, etc. The open type of valley formed wider at the bottom than at the top is recommended.)

Sixteen (16) ounce copper or other non-corroding metal is to be installed in one continuous piece (if feasible) in all valleys. The metal flashing shall be of sufficient width to run under the asbestos shingles at all points not less than four (4) inches. The distance of the valleys from edge of shingles to bottom of valley shall be as installed not less than four (4) inches at top of valley and widening by one (1) inch in eight (8) feet towards the bottom.

Edges of valley lining should be turned one-half (1/2) inch to form a hem or water stop, and secured to sheathing with metal cleats spaced approximately ten (10) inches center to center.

Flashings at dormers, etc., are to be formed up of same metal with wings at least four (4) inches up the wall and four (4) inches out on deck. This flashing is to be installed in step fashion in accordance with best practice and is to be either run up back of siding or similar construction or in case of brickwork, it is to be counter-flashed likewise by step fashion properly letting top of flashing into raglet or slots in brickwork at least two (2) inches with edge turned up and extending down over base flashing at least four (4) inches. Flashing in wall to be caulked with slater's compound and held securely in place by lead plugs. Fold all exposed or loose edges of flashings back to stiffen the edge.

MATERIALS:

All cement asbestos shingles shall meet the requirements of Federal Specification SS-S-291 dated May 7, 1935 in addition to other requirements herein specified and shall be the equal of products known by the architect to have given satisfactory service for a period of not less than five (5) years and shall be the products of a manufacturer regularly engaged in the production of this type of shingle.

All felt referred to in these specifications shall be asphalt-saturated felt and shall weigh approximately thirty (30) pounds per 100 sq. ft. and shall comply with Federal Specification FH-F-191, Type 2, dated August 1, 1933.

The shingle nails shall have flat heads and be long enough to properly secure the shingles to the sheathing. Nails shall be either hard copper, copper clad, zinc coated, or cadmium-plated steel as specified, conforming to Federal Specifications FF-N-101, dated May 3, 1932.

The copper clinchers as specified to be used at the corners of shingles shall be special type provided for that purpose.

All roof putty used which is exposed to view shall be of a color which shall blend satisfactorily with the color tone of the roof.

SHINGLES:

Cement asbestos shingles shall be Type C made of portland cement and asbestos fibers or these with the addition of such pigments as may be necessary to

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produce specified colors. They shall have a dense, hard structure and shall be thoroughly seasoned. The colors shall not fade appreciably on exposure to atmospheric conditons.

Asbestos shingles shall be approximately 16" x 16" by 5/32" thickness and shall weigh approximately 290 pounds per square (100 sq. ft.) when applied with a one-quarter side lap or approximately 330 pounds per square when applied with a one-third side lap. They shall be of a (state color or combination of color to be applied) and laid with a three (3) inch head lap.

Asbestos starter shingles shall be of proper type for installation at eaves previous to laying of main body shingles.

NOTE: Dutch Lap asbestos shingles can be laid with a one-quarter lap (approximately 4") at side of shingles or one-third lap at side (approximately 5-1/3"). The one-third side lap is the preferred method as it produces true alignment of vertical joints up the roof comparable with one-quarter side lap which offsets one (1) inch every other course.

INSTALLATION - GENERAL DETAILS:

All surfaces to receive asbestos shingles shall be covered with one layer of thirty (30) pound asphalt-saturated rag felt or 15-lb. asphalt-saturated asbestos felt.

The sides shall be lapped towards the eaves and at the ends, not less than three (3) inches. The felt shall overlap not less than twelve (12) inches at all ridges and hips and shall overlap valley flashings not less than two (2) inches. Felt shall completely overlap all eave starters and shall be substantially nailed in place.

A separate strip of felt twelve (12) inches wide shall be applied over all ridges and hip before the application of the main body shingles.

After installation of roofing felt and necessary asbestos eave starters apply main body asbestos roofing shingles and, as applied, succeeding units in each course shall be laid to overlap the preceding unit one-third (or one-quarter if desired) and each course shall be laid with a top lap of three (3) inches.

Each unit in courses subsequent to the first course shall be placed to abutt the exposed side edge of a shingle of the preceding course. Each unit shall be secured to the roof with two (2) shingle nails and to the overlapping unit with one copper clincher.

At gable ends, valleys, vertical surfaces adjoining the roof, etc., and wherever necessary, the shingles shall be neatly cut to fit and shall be thoroughly bedded in gray roof putty. Additional nail holes shall be made in all cut shingles so that such may be secured by not less than two nails. The shingles shall be applied to overhang not more than 1", nor less than 1/2", at eaves and gable ends and shall overlap valley and other underlying flashings not less than 4". If the valleys are specified to be open, the shingles shall be applied to provide a valley width of not less than 4" at the top, increasing towards the bottom not less than 1" for every eight feet of length of the valley.

No shingles shall be applied or left in the work which are cracked or broken. Such shingles shall be replaced with sound shingles in an approved manner.

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Blending of colors: If it is specified that the shingles shall be applied in two or more colors blended, the method of blending the colors shall be as directed by the Architect.

Nailing: Each shingle shall be fastened to the roof by not less than two shingle nails and one copper clincher of the type specified which shall be driven or fastened to hold it firmly in place without producing any strain on the shingle. All nails shall be placed so as to be sufficiently covered by the overlaying shingle. No exposed nailing will be permissible except where unavoidable on ridge finish, etc., which exposed nails shall be neatly covered with the roof putty. Where shingles overlap valley flashing, gutter lining, etc., the nailing shall be done so as not to penetrate such flashings.

RIDGE AND HIP FINISH:

There are three types of finish at these points that can be installed, i. e., asbestos ridge roll, ridge and hip finish - Boston Method, and ridge and hip finish - Mitred Method. Specify one desired.

Asbestos Ridge Roll: Install continuous wood furring strip, 2" wide and of sufficient thickness, along all ridges or hips and covering the furring strip with double thickness of felt with end lappage of at least three (3) inches, and extending out on deck at least six (6) inches. The main body shingles are to be finished snugly against such stripping and ridge roll is applied directly to these strips.

Start laying of ridge roll on main roof at that end of the ridge farthest away from prevailing storms. On dormer window, start the ridge roll at the face of dormer, working back to valleys. When covering hips, start at the lower end of the hip.

The copper ridge roll fastener should be nailed on the top and through the smaller end of the ridge roll into the wood ridge strip beneath. The larger end of the next section sets over this copper fastener to a point about three (3) inches from end of ridge roll section, and the copper fastener should be bent up and over the top of the overlapping section securely tying ridge roll together.

Close in the end of the ridge roll with a piece of shingle cut exact shape of inside of open end and secure in place with a nail or screw to wood ridge strip.

Application of Hip and Ridge Shingles - Boston Method: Before installing ridge and hip finish, install 2" continuous wood strips of sufficient thickness on each side of roof, dormer, etc., ridges (making 4" wide nailing strip as installed) for application of ridge shingles.

The roofing shingles are to be finished fully up to wood nailing strips on ridges after which install two (2) thicknesses of 15-lb. asphalt-saturated asbestos or rag felt or one (1) thickness of 30-lb. felt (same type) at least 8" wide with at least three (3) inch end lappage and securely nailed in place. This felt to be installed for entire length of ridge.

The application on main ridges shall be started at each end of the ridge, finishing at the center. On dormer, rings, and extensions, application shall be started at the end, finishing at the intersection with the main roof or main building. The application on hips shall be started at the bottom.

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The hip and ridge finish shingles shall be applied with the long dimensions paralleling the ridge or hip, and each shingle as laid shall be thoroughly bedded in black asbestos roof putty. Each succeeding shingle shall overlap the shingle previously placed to provide a weather exposure of not more than seven (7) inches.

The shingles applied on each side of the ridge and hip shall lap each other alternately right and left over the line of the ridge or hip, and shall be applied so that no portion of the unsurfaced heads of the shingles will be exposed.

At no place in the ridge and hip finish shall there be less than two (2) thicknesses of the ridge and hip finish shingles and they shall overlap the roof shingles not less than two (2) inches.

Each shingle shall be secured by not less than two (2) one and one-quarter (1-1/4) inch galvanized needle point nails and exposed nailing will be permitted only where unavoidable in the last pieces installed.

Ridge and Hip Finish - Mitred Method: Roofing felt applied to roof deck before application of asbestos shingles shall overlap twelve (12) inches on each side of ridge line as a reinforcement.

(Wood stripping required on ridge line for applying ridge and hip finish Boston Method should not be installed.)

The hip finish shingles shall be of sufficient width to enable their being secured with not less than two (2) one and one-quarter (1-1/4) inch galvanized needle point nails placed so as to be sufficiently covered by the overlying course.

The shingles applied on each side of the ridge and hip shall be thoroughly bedded in black asbestos roof putty and shall overlap each other and be neatly fitted.

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SS–S–291

MAY 7, 1935

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

SHINGLES; ROOFING, CEMENT-ASBESTOS

This specification was approved by the Director of Procurement for the use of all departments and establishments of the Government and shall become effective not later than December 1, 1935. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A–1. Federal Specification FF–N–101 for nails is applicable to this specification.

A–2. Any special requirements of individual departments of the Government are noted in section H.

B. TYPES

B–1. This specification covers four general types of cement-asbestos shingles determined by variations in thickness and method of laying:

Type A.—Shingles of type A are tapered in thickness from butt to head, rectangular in shape, have smooth or rough exposed surface and even or irregular edges, and are designed to be laid with head lap according to the "American" method.

Type B.—Shingles of type B are uniform in thickness from butt to head, rectangular in shape, have smooth or rough exposed surface and even or irregular edges, and are designed to be laid with head lap according to the "American" method.

Type C.—Shingles of type C are uniform in thickness, square in shape, have smooth, granular, or rough exposed surface and straight, square edges, and are designed to be laid with combined head and side lap according to the "Dutch" or "Scotch" method. They may have one clipped corner.

Type D.—Shingles of type D are uniform in thickness, square in shape, have smooth, granular, or rough exposed surface and straight, square edges, and are designed to be laid according to the "hexagonal" or "French" method. Not less than three corners shall be cut to give the desired pattern.

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C. MATERIAL AND WORKMANSHIP

C–1. Cement-asbestos shingles shall be made of portland cement and asbestos fibers or these with the addition of such pigments and/or mineral granules as may be necessary to produce specified colors. They shall have a dense, hard structure. They shall be thoroughly seasoned.

D. GENERAL REQUIREMENTS

D–1. *Breakage.*—Shingles shall be whole and clean. Not more than 2 percent of broken shingles will be accepted.

D–2. *Supplementary shapes.*—Starters and shapes and rolls used as hip and ridge finish shall be of the same materials as the shingles.

D–3. *Holes for fastening and laps.*—

D–3a. Shingles, starters, and rolls shall be furnished with holes for fastening. The holes in type A and type B shingles shall be located to give head laps in the range 1 to 3 inches.

D–3b. Holes in type C shingles shall be located to give overlap at the head of 3 inches and a side lap of one-fourth or one-third of the width of the shingles as specified.

D–3c. Holes in type D shingles shall be located so they will be laid with a 3-inch overlap on two edges to give a 13 by 13 inch exposed surface.

D–4. *Nails and fastenings.*—Nails for shingles and rolls ("needle-point") shall be furnished in proper quantity and length. They shall have flat heads and shall be long enough to properly secure the shingles to the sheathing. Nails shall be either hard copper, copper-clad, zinc-coated, or cadmiun plated steel as specified, conforming with Federal specifications. Copper storm anchors or hooks shall be provided for type C and type D shingles. Copper clips shall be supplied for ridge rolls.

D–5. *Color and finish.*—

D–5a. The color or colors shall be as specified. Colors other than the normal gray shall be obtained by embedding lime-proof mineral pigments or mineral granules, or both, in the exposed face, or by chemical impregnation. The color shall cover butt edges that are ¼ inch or over in thickness. The colors shall not fade appreciably on exposure to light and atmospheric conditions.

D–5b. The exposed shingle surface may be smooth or slightly roughed by pits or ridges. Granular surfacing shall be obtained with mineral granules embedded to give a rough surface. Shingles having mineral granules embedded but presenting a smooth exposed surface, shall be considered as smooth-surfaced.

D–6. *Sizes.*—The standard sizes shall be as specified below. A plus tolerance of not more than $\frac{1}{16}$ inch and a minus tolerance of $\frac{1}{64}$ inch shall be allowed for individual shingles on all thicknesses. The average thickness of the butts for a given sample shall not be less than the specified thickness. For the rough-surfaced shingles, the thickness shall be taken as the average at projections and depressions. The thickness at the top of tapered shingles shall not be less than $\frac{1}{8}$ inch. A plus-or-minus tolerance of $\frac{1}{8}$ inch will be permitted in the widths and lengths supplied without requiring adjust-

ment in number of shingles or area covered. Type A and type B shingles exceeding the specified width by not more than 1½ inches and the length by not more than 2½ inches, and type C exceeding by not more than 1 inch in both dimensions, shall be accepted, but both the total area of the number of shingles supplied and the roof area that can be covered shall be not less than those for the number requisitioned of standard size.

D–6a. Type A shingles shall have butt thickness of either ¼ inch or 5/16 inch, as specified. They shall be 8 inches in width by 16 inches in length.

D–6b. Type B shingles shall be 5/32 or ¼ inch in thickness, as specified. They shall be 8 inches in width by 16 inches in length.

D–6c. Type C shingles shall be 5/32 inch thick and 16 by 16 inches.

D–6d. Type D shingles shall be 5/32 inch in thickness and 16 by 16 inches.

E. DETAIL REQUIREMENTS

E–1. *Absorption.*—The average absorption of the shingles shall be not more than 17½ percent of their dry weight as determined by the test described in paragraph F–2.

E–2. *Strength.*—The average modulus of rupture of the shingles shall not be lower than 3,000 pounds per square inch as tested dry according to paragraph F–3a, 1,250 pounds per square inch as tested after immersion according to paragraph F-3b, and not lower than 3,000 pounds per square inch as tested dry after subjection to the heat test described in paragraph F–3c.

F. METHODS OF SAMPLING, INSPECTION, AND TESTS

F–1. *Sampling.*—Ten shingles selected so as to be representative of a quantity not exceeding 50,000 pieces shall constitute a sample. Additional samples representative of the material as delivered may be taken at any time or place at the discretion of the inspector. Immediately before test the sample shall be dried to constant weight at a temperature between 212° and 220° F.

F–2. *Absorption test.*—Three shingles or representative pieces thereof, previously dried, shall be weighed separately on scales sensitive to within one-half of 1 percent of their weight. Pieces from the modulus of rupture test on dry or saturated shingles may be used. They shall then be completely immersed in soft, distilled, or rain water at room temperature (60° to 80° F.) for 24 hours. They shall then be removed from the water and again weighed separately after wiping the surface with a damp cloth. The difference between the weight after immersion and the weight when dry, multiplied by 100 and divided by the dry weight shall be taken as the absorption in percent.

F–3. *Modulus of rupture test.*—The loads shall be applied without impact by means of equipment having accuracy and sensitivity within 1 pound or 2 percent of the minimum breaking load. The specimen for each type of transverse test shall consist of not less than 4 pieces 3 inches wide, taking 2 from each shingle at right angles, and shall be tested on a span of not less than 7 or more than 10 inches. The test piece shall be supported on 2 knife edges of

the rocker type adjusted perpendicular to its long dimension. The load, W, shall be applied through the third knife edge at the middle of the specimen along a line parallel to the supporting knife edges, the finished surface of the specimen to face downward. The modulus of rupture R is computed by the formula,

$$R=\frac{3WL}{2BD^2}$$

where L is the distance in inches between the lines of support, B is the width of the specimen, and D is the average thickness under the middle knife edges, both in inches. The average thickness shall be determined to the nearest 0.002 inch.

F–3a. *Modulus of rupture test of dry shingles.*—The specimen for this test shall be tested after cooling from the drying treatment specified in paragraph F–1.

F–3b. *Modulus of rupture test after saturation.*—The specimens for this test shall be tested after immersion in water for 24 hours as outlined in paragraph F–2. The samples from the absorption test may be used.

F–3c. *Modulus of rupture test after heat exposure.*—The specimens for this test shall be tested after cooling following heating for 4 hours in a muffle furnace maintained at an average temperature of 600° F. within ±20° F., for the space occupied by the samples. The specimens shall be shielded from direct radiation from heating element or flames.

G. PACKING AND MARKING

G–1. Any special requirements of the individual departments are noted under section H.

G–2. *Packing.*—Unless otherwise specified, the subject commodity shall be delivered in standard commercial containers, so constructed as to insure acceptance by common or other carriers, for safe transportation, at the lowest rate, to the point of delivery.

G–3. *Marking.*—Unless otherwise specified, shipping containers shall be marked with the name of the material and type as defined by the contract or order under which the shipment is made, the name of the contractor, and the number of the contract or order.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H–1. The following departmental specifications of the issue in effect on date of invitation for bids shall form a part of this specification:

H–1a. *Army.*—United States Army Specification No. 100–2b, Standard Specification for Marking of Shipments.

H–1b. *Navy.*—Navy Department purchases will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y, Roofing, siding, and sheet metal work; dampproofing and membrane waterproofing, copies of which may be obtained without cost upon application to the Bureau of Yards and Docks, Navy Department, Washington, D. C.

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I. NOTES

I–1. *Items to be specified.*—Purchasers should exercise all options specified herein and should specify type; method of laying; color; surface finish as smooth, granular, or rough, or at bidder's option, any one of the three; thickness; size as defined in paragraphs D–6a, D–6b, D–6c, and D–6d; the amount of side lap for Type C shingles; length and type of hip and ridge finish; and nails or other fastenings.

I–2. *Color and surface finish.*—Cement-asbestos shingles can be obtained in various shades of gray, red, brown, black, buff, purple, green, and mixtures of these colors. The depth of color penetration is in the range 0.005 to 0.02 inch. Manufacturers' lists should be consulted to avoid, where possible, the drafting of requirements in point of color or finish that would unduly restrict competition.

Efflorescence may appear on cement-asbestos shingles within a few months after application, but generally disappears within 2 years. This does not necessarily involve a permanent change in applied colors.

I–3. *Sizes.*—Shingles of each type are to be requisitioned in one width and length. Bidders are permitted to supply them in the range of sizes for each type indicated in Paragraph D–6. The limits are placed so as to enable the widest possible competition consistent with obtaining a desired design or appearance.

I–4. Copies of this specification may be obtained upon application, accompanied by money order or coupon, or cash, to the Superintendent of Documents, Government Printing Office, Washington, D. C. Price 5 cents.

I–5. An alphabetical index of Federal specifications may be purchased, as noted in paragraph above, price to be obtained from the Superintendent of Documents.

Notice: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE: 1935

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HH-F-191

AUGUST 1, 1933

SUPERSEDING
F.S. No. 86
December 29, 1923, and
F.S. No. 295
May 20, 1925

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

FELT; ASPHALT-SATURATED, (FOR) FLASHINGS, ROOFING, AND WATERPROOFING

This specification was approved for promulgation by the Federa. Specifications Board on August 1, 1933. for the use of the departments and independent establishments of the Government in the purchase of this commodity, and shall become mandatory for all departments and independent establishments of the Government not later than February 15, 1934. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A-1. There are no other Federal specifications applicable to this specification.

A-2. Any special requirements of the individual departments of the Government are noted under section H.

B. TYPES

B-1. Asphalt-saturated felt shall be of the following types (the type or types desired shall be stated in the invitation for bids):

Type I. Asphalt-saturated felt for mineral-surfaced built-up roofing and for membrane waterproofing.

Type II. Asphalt-saturated felt for flashings.

C. MATERIAL

C-1. Material shall be composed of roofing felt made of organic fibers, impregnated with an asphaltic saturant.

D. GENERAL REQUIREMENTS

D-1. Basis of purchase shall be by the roll or by the square (100 square feet) or by weight according to agreement between purchaser and the seller.

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E. DETAIL REQUIREMENTS

E-1. *Appearance.*—Asphalt-saturated felt of both types shall be free from visible external defects, such as holes, ragged or untrue edges, breaks, rents, cracks, or indentations, and shall be uniform throughout. When unrolled at temperatures between 50° and 90° F. it shall not stick to such an extent as to cause injury. The surface of the felt shall not be coated or covered with talc or other substances which would tend to interfere with the adhesion between the felt and the plying cement. The use of silica or wood flour will be permitted. The surface shall be uniformly smooth and shall be free from areas or patches of unabsorbed saturant and superficial dry spots.

E-2. *Physical and chemical requirements.*—Material shall meet the following requirements:

Width (inches) 36±¼ or 32±¼, as called for	Type I		Type II	
	Maximum	Minimum	Maximum	Minimum
Gross weight of roll—pounds	80	50	80	50
Weight of wrapping, packing, etc—pounds	½		½	
Weight per 100 square feet, exclusive of wrapping, packing, etc—pounds	15	13	30½	27½
Pliability at 25° C. (77° F.) (cracking, on bending over a one-sixteenth inch mandrel through an arc of 180°)		None		None
Average breaking strength:				
With the fiber grain—pounds		30		40
Across the fiber grain—pounds		15		20
Volatile matter at 105° C. (221° F.)—percent	4		4	
Weight of moisture-free desaturated felt per 100 square feet—pounds		5.2		10.4
Saturation of moisture-free felt—percent		140		150
Ash of desaturated felt—percent	10		10	

F. METHODS OF INSPECTION, DETERMINATION OF WEIGHT AND WIDTH, SAMPLING, AND TESTING

Deliveries will, in general, be sampled and tested by the following methods, but the purchaser reserves the right to use any additional information to ascertain whether the material meets the specification.

F-1. *Sampling for inspection.*—From each shipment of more than 1,000 rolls, take at random a number of rolls of felt equivalent to one half the cube root of the total included in the lot. If this proves to be a fractional number, express it as the next higher digit. From each shipment of 1,000 rolls or less take at random five in each case.

F-2. *Determination of weight and width.*—The weight per 100 square feet of material, and its variation in weight; the width and its variation must be determined by the inspector and the results transmitted to the testing laboratory with the sample. Material which does not conform to the specification in these respects should be rejected by the inspector and only deliveries which conform in these respects sampled for laboratory tests.

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F-2a. Remove wrappers, cores, and other packing material from each roll selected and weigh the roll and the packing material, etc., separately to the nearest one fourth pound. Then unwind each roll and measure the length and the width of each end of the roll to the nearest one fourth inch, and reroll. Observe the appearance of the material while unrolling and rerolling.

The finished material should be free from visible external defects, such as holes, ragged or untrue edges, breaks, rents, cracks, or indentations. The rolls should be capable of being unrolled easily at temperatures between 50° and 90° F. without sticking in a manner that will cause injury. The surface of the felt should not be coated or covered with talc or other substances which would tend to interfere with the adhesion between the felt and the plying cement. The use of silica or wood flour will be permitted. The surface should be uniformly smooth and shall be free from areas or patches of unabsorbed saturant and superficial dry spots.

Compute the weight per 100 square feet of each roll examined, and from these weights compute the average weight of the shipment. In no case should this be less than 13 pounds per 100 square feet for type I felt and 27½ pounds per 100 square feet for type II felt, and any roll examined whose weight per 100 square feet is less than the minimum specified shall be cause for the rejection of the whole shipment.

F-3. *Sampling for laboratory examination.*—From the rolls examined for sampling, select one the weight of which is near the average weight of the whole lot. Unroll, and at approximately 25 feet from the end cut two samples the full width of the roll and approximately 40 inches long, label, roll carefully but do not crease, wrap, and transmit one to the testing laboratory. Retain the other sample for check analysis in case of dispute.

F-4. *Laboratory examination.*—

F-4a. *Appearance.*—Examine both sides of the sheet of felt and note for uniformity of color. The felt should be thoroughly and uniformly impregnated and should show no unsaturated spots at any point.

F-4b. *Weight.*—Trim the sample so that it is 36 inches long and the full width of the roll. Measure accurately, and weigh to the nearest gram (15 grains). From the measurements and weight so obtained compute the weight per 100 square feet. The weight so determined is only to be used in making the laboratory calculations and shall not be used as a basis for acceptance or rejection. (See F-2.)

F-4c. *Pliability.*—Cut five strips 1 inch wide and 6 inches long in the direction of the fiber grain and immerse in water at 25° C. (77° F.) for 10 to 15 minutes. Remove the strips from the water and immediately bend each strip over a mandrel one sixteenth inch in diameter through an arc of 180° at a uniform rate in approximately 2 seconds' time. Dry thoroughly and examine. If 1 or more of these 5 strips crack on this test, cut 10 strips from another part of the sample and repeat the test. If one or more of these strips crack, the material is reported as failing on the pliability test.

F-4d. *Breaking strength.*—Cut 10 strips of the felt 1 inch by 6 inches with the fiber grain and 10 strips of the same size across the

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fiber grain. Test both sets of strips at 21° C. (70° F.) in a Scott or similar testing machine of the inclination-balance type having a capacity of 100 to 150 pounds. The test strip shall be gripped 1½ inches on each end, leaving 3 inches between the clamps, and the lower jaw shall travel at the rate of 12 inches per minute. If any strip breaks nearer than one half inch to either clamp, the reading shall be disregarded and an additional strip tested in its place. The average of the 10 readings from strips cut in one direction shall be taken as the breaking strength of the sample in that direction.

F-4e. *Volatile matter.*—Cut two strips of the asphalt-saturated felt 6 inches wide and 12 inches long, weigh the strips separately, and suspend them for 5 hours in an oven at 105° to 110° C. (221° to 230° F.). Remove from the oven, cool in a dessicator, and weigh. Compute the percentage loss in weight and average the results on the two samples.

F-4f. *Weight of desaturated felt.*—Cut a strip approximately 2 inches wide and the full width of the sample, weigh, and extract with benzol (carbon tetrachloride, chloroform, or carbon bisulphide will usually give the same results but benzol should be used in case of dispute) in a suitable extraction apparatus until the solvent runs through colorless. The saturated felt may be cut into squares approximately 1 inch on each side in case an extraction apparatus of sufficient size to accommodate the whole strip is not available. Remove the desaturated felt from the extraction apparatus, dry in air until free from the odor of benzol, and brush off any adhering particles of foreign matter. Place the desaturated felt in a tared weighing bottle and heat in an oven at 105° to 110° C. (221° to 230° F.) for one half hour, cool in a dessicator, and weigh. Calculate the percentage of moisture-free felt in the sample taken for extraction and compute the weight of moisture-free desaturated felt per 100 square feet from the weight obtained in F-4b.

F-4g. *Saturation of moisture-free felt.*—The weight of saturant in the felt is the difference in weight between the original sample taken for extraction in F-4f and the weight of the desaturated felt (plus any surfacing material present). The percentage saturation of the moisture-free felt is obtained by the following formula:

$$\frac{\text{Weight of saturant}}{\text{Weight of moisture-free desaturated felt}} \times 100 = \text{percentage saturation}$$

F-4h. *Ash of moisture-free desaturated felt.*—Cut the desaturated felt obtained in F-4f into squares about 1 cm on each side and mix thoroughly. Take at random enough pieces to weigh about 10 grams, dry in an oven at 105° to 110° C. (221° to 230° F.) for one half hour, cool in a desiccator, weigh accurately, and incinerate in a weighed crucible in a muffle furnace or over an open flame until all of the carbon is consumed. Cool, weigh, and compute the percentage ash of the moisture-free destuarated felt.

G. PACKAGING, PACKING, AND MARKING

G-1. *Packaging.*—Unless otherwise specified, commercial packages are acceptable under this specification.

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G-2. *Packing.*—The rolls of saturated felt shall be securely wrapped in a substantial grade of paper of the same width as the fabric. The wrapper shall completely encircle the roll and shall be pasted at the overlap in a manner which will prevent it shifting from position. The ends of the rolls need not be covered. No roll shall contain more than two pieces and there shall not be more than three percent of rolls containing two pieces in any shipment.

G-3. *Marking.*—Each package shall be legibly marked with a description of the contents, the name of the manufacturer, the place of manufacture, the brand (if any), the net weight of the contents, and some means of identification of "the particular contract on which purchase and shipment were made." Each shipment of the material shall be accompanied by printed directions for its use.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications, of the issue in effect on date of invitation for bids, shall respectively form a part of this specification.

H-1a. *Army.*—United States Army Specification No. 100-2, Standard Specification for Marking Shipments.

H-1b. Navy Department purchases will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y, Roofing, siding, sheet-metal work; damproofing and membrane waterproofing, copies of which may be obtained without cost upon application to the Bureau of Yards and Docks, Navy Department, Washington, D.C.

I. NOTES

I-1. Type I asphalt-saturated felt is intended for use with asphalt for mineral-surfaced roofing and asphalt for waterproofing and damp-proofing in the construction of built-up roofing and membrane waterproofing respectively.

I-2. Type II asphalt-saturated felt is intended for use in the construction of flashings in connection with built-up roofing.

I-3. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-4. This specification governs all United States Government purchases of this commodity. Users are requested to retain this specification in permanent file until a revision is issued.

I-5. Interested parties are advised that an Alphabetical Index of Federal Specifications may be obtained upon application as noted in paragraph next below, price to be obtained from the Superintendent of Documents.

I-6. Copies of this specification may be obtained upon application, accompanied by money order, coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D.C. Price 5 cents.

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J-M Asphalt Shingles

To meet the need for roof and side wall protection where low initial investment is a necessary limitation, Johns-Manville has developed a comprehensive line of asphalt shingles. J-M Asphalt Shingles provide long years of service at moderate cost. The shingles are made of asphalt-saturated rag felt and coated with a surface of asphalt into which is then embedded a layer of colorful granules.

The durable color of the surface granules eliminates the expense of periodic painting while their thickness makes them highly fire retardant. The shingles carry the Underwriters' Class C label when applied as roofing; rating does not cover siding applications.

The various styles are available in a wide range of colors and blends which produce pleasing variegated



J-M Hexagonal Asphalt Shingles

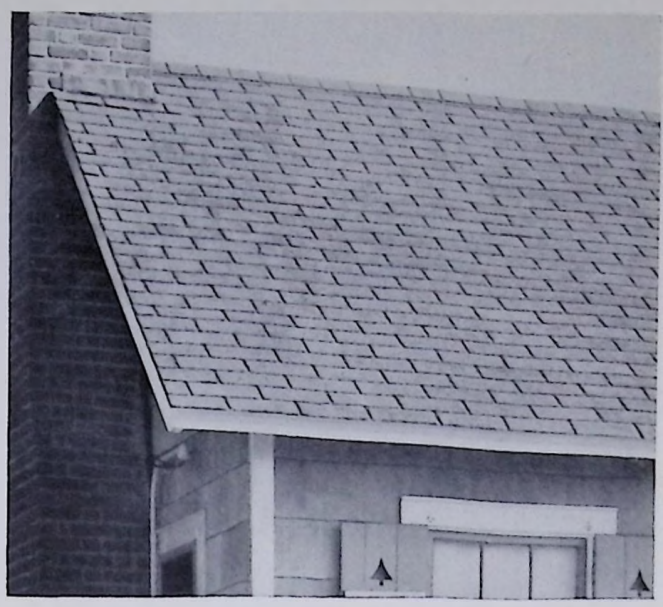
effects without too sharply contrasting hues and shades. The variety makes possible the choice of the most effective color harmony between the house and the surrounding landscape.

If desired, the shingles can be applied directly over the old wood shingles or clapboards, eliminating the cost and trouble caused by removing the old surface.

Asphalt Roofing Shingles

J-M Asphalt Shingles for roofs are made in several styles among which are square-butt strips, individual shingles and hexagonal strips. Most types are made in both standard and giant weights.

J-M Standard Thick-Butt Shingles, made with square butts, are designed to give greater protection because



J-M Square-Butt Asphalt Shingles

of an extra thickness of asphalt and granules on both front, back and edges of the tabs. This extra facing protects the saturant from the drying-out action of the sun. Because of their design, however, these shingles weigh but little more than ordinary asphalt shingles.

J-M Double Coated Strip Shingles, also made with square butts, have the second layer of asphalt and granules only on the exposed surface of the tabs where most of the weather protection is needed.



J-M Giant Individual Shingles

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Bric-Side Shingles provide a distinctive side wall at moderate cost

Asphalt Siding Shingles

In addition to the roofing shingles there is a special type of siding shingles which embodies the advantages of durability and economy found in J-M Asphalt Roofing Shingles.

J-M Bric-Side Asphalt Shingles give the appearance of a brick veneer to a frame building and eliminate the periodic expense of painting required with ordinary siding. Bric-Side Shingles are made in flexible strips on a base of selected felts which have been first saturated, then coated with refined asphalt and surfaced with colored granules. An additional coat of asphalt and colorful granules are then embedded on the exposed face and edges of the tabs on Single Dipped, and on the edges both sides of the tabs on Double Dipped. When applied, the shingles give the effect of brick laid with raked joints. A Soldier Course of Bric-Side Asphalt Shingles, for decorative use around windows and doors, together with specially constructed corner pieces, is also available.

Asphalt Shingle Accessories

J-M Standard Asphalt-Saturated Rag Felt: This felt is used as a liner under shingles and for various other purposes. It is furnished in two weights, in rolls 36″ wide. The 30-lb. weight is supplied in rolls of 216 sq. ft., weighing 65 lb.; and the 15-lb. weight in rolls of 432 sq. ft., weighing 65 lb.

Slatekote Starting Strips: Slatekote Starting Strips are cut from standard Slatekote Roofing for use with J-M Asphalt Shingles, as starters. These strips are also used to line valleys and cover hips and ridges.

The strips are furnished, in several colors, in rolls 36 ft. long in four widths: 9″, 12″, 18″ and 24″, weighing 21, 28, 42 and 56 lb. per roll respectively.

Application of J-M Asphalt Shingles

Complete directions for the application of J-M Asphalt Shingles, including flashings, and treatment of valleys, hips and ridges, appear on other data sheets. The following directions summarize the important details for proper application.

Roofing Shingles:

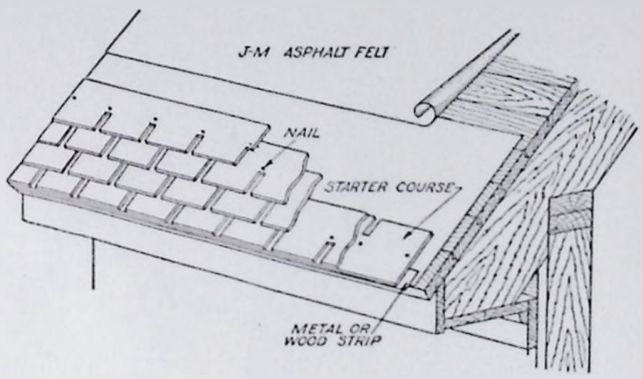
J-M Asphalt Shingles can be used on roofs where the pitch is 4″ (5″ for certain types) to the foot, or more. When used over wood sheathing, one layer of Standard Asphalt-Saturated Rag Felt, not less than 15-lb. weight, lapped at least 2″ at all joints, should be applied before the shingles are laid.

When application is to be made over old wood shingles, all decayed and missing shingles should be replaced and all loose and curled shingles securely nailed down to make the surface as smooth as possible. It may be necessary to smooth out the old roof deck by nailing on beveled wood strips with the thick edges against the butts of the wood shingles.

Siding Shingles:

Siding shingles afford the best appearance when applied over a smooth plumb surface. When application is to be made over existing wood shingles or clapboards, it is recommended that the side wall area be covered with J-M Smoothwall, a rigid, waterproof material which eliminates the irregularities of the underlying surface.

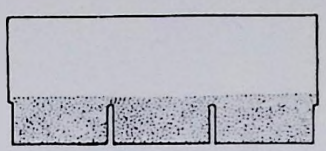
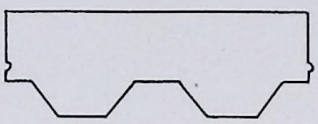
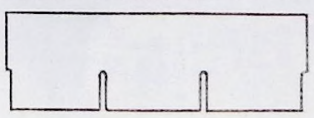
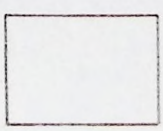
If, for reasons of economy, Smoothwall is not used, a layer of Standard Asphalt-Saturated Rag Felt, not less than 15-lb. weight, is applied directly over the old wall, after loose, curled and decayed siding or shingles have been fastened or replaced, and after horizontal filler strips have been nailed against the butt edges of the siding or shingles.



Application of slate-surfaced strip shingles

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J-M Asphalt Shingle Details

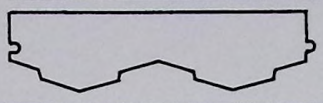
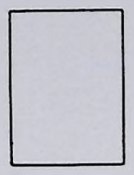
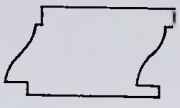
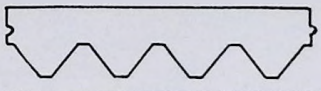
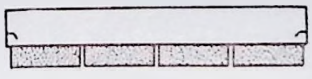
Shape	Names and colors *	Size, in.	Exposure in.	Head lap, in.	Shingles per sq.	Approx. wt. lb., per sq.
	**Standard Sealed-Edge Thick-Butt Strip Shingles** Fieldstone green — Granada blend Standard blue-black — Killarney greens Tile red — Spruce green Romany reds — Barcelona browns Inverness greens	36x12	5	2	80	230
	12″ Double Coated Thick-Butt Strip Shingles Spruce green — Inverness greens Standard blue-black — Romany reds Tile red — Killarney greens Barcelona browns — Brittany blend	36x12	5	2	80	210
	15″ Double Coated Thick-Butt Strip Shingles Spruce green — Brittany blend Tile red — Romany reds Standard blue-black — Killarney greens	36x15	5	5	80	250
	Giant Hexagonal Shingles Fieldstone green — Romany reds Standard blue-black — Brittany blend Tile red — Spruce green Normandy greens	36x12⅓	4⅔	3	86	235
	12⅓″ Standard Hexagonal Shingles Tile red — Romany reds Fieldstone green — Spruce green Standard blue-black — Brittany blend Normandy greens	36x12⅓	4⅔	3	86	186
	**11⅓″ Standard Hexagonal Shingles** Fieldstone green — Brittany blend Standard red — Romany reds Standard blue-black — Burgundy duo-blend Tile red — Gascony duo-blend Normandy greens — Picardy duo-blend Barcelona browns — Spruce Green Inverness greens	36x11⅓	4⅔	2	86	167
	12″ Double Coverage Standard Hexagonal Shingles Spruce green — Tile red Standard blue-black	36x12	4	4	100	215
	12½″ Double Coverage Standard Hexagonal Shingles Spruce green — Standard blue-black Tile red — Brittany blend Romany reds	36x12½	4	4½	100	226
	**Giant Strip Shingles** Fieldstone green — Normandy greens Standard blue-black — Brittany blend Tile red — Spruce green Romany reds	36x12	5	2	80	257
	**Giant Dutch Lap Shingles** Spruce green — Tile red Standard blue-black — Romany reds Brittany blend	16x12	13x10	2	112	162
	Standard Dutch Lap Shingles Spruce green — Tile red Standard blue-black	16x12	13x10	2	112	135

* All colors not available in all locations. Consult J-M office before selection.

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J-M Asphalt Shingle Details—continued

Shape	Names and colors *	Size, in.	Exposure, in.	Head lap, in.	Shingles per sq.	Approx. wt. lb., per sq.
	Spruce green, Inverness green Tile red, Romany red	36x10	4	2	100	172
	**10" Standard Strip Shingles** Spruce green, Normandy greens Fieldstone green, Brittany blend Standard red, Romany reds Standard blue-black, Barcelona browns Tile red, Inverness greens	36x10	4	2	100	210
	12½" Standard Strip Shingles Tile red, Standard red Spruce green, Standard blue-black Fieldstone green, Brittany blend	36x12½	4	4½	100	266
	**Giant Individual Shingles** Tile red, Spruce green Romany reds, Fieldstone green Brittany blend, Standard blue-black	16x12	5	6	225	325
	Standard Individual Shingles Spruce green, Standard red Fieldstone green, Standard blue-black Tile red, Brittany blend	12¾x9	4	4¾	378	253
	**Weatherlok Shingles** Spruce green, Tile red Standard blue-black, Burgundy duo-blend	16x16	13x13	3	86	135
	**Latch Thatch Shingles** Spruce green, Standard blue-black Tile red, Burgundy duo-blend	18x12	Max. 15x9½	Min. 2½	102	135
	**4-Point Hexagonal Re-Siding Shingles** (For siding only) Tile red, Spruce green Buff blend	36x9	4	1	100	150
	**Bric-Side Siding Shingles Single-Dipped** No. 1—Blend: black joint, or cream joint No. 2—Tile red: black joint, or cream joint No. 3—Blend: cream joint No. 4—Buff: black joint No. 5—Blend: brown joint or cream joint	36x7.1	3	1.1	131	210
	Bric-Side Siding Shingles Double-Dipped (Colors are the same as for Bric-Side Siding Shingles Single-Dipped)	36x7.1	3	1.1	131	230
	**Soldier Course for Bric-Side Shingles** (Colors are the same as for Bric-Side Siding Shingles Single-Dipped)	36x12½	—	—	Pieces per sq. 45	145
	**Corner Strip for Bric-Side Shingles** (Colors are the same as for Bric-Side Siding Shingles Single-Dipped)	13¼x7.1	—	—	25 rights 25 lefts per carton	35 lb. per carton

* All colors not available in all locations. Consult J-M office before selection.

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J-M ASPHALT ROOFING SHINGLES
GENERAL ROOFING APPLICATION DIRECTIONS

The following general application directions apply to all types of J-M Asphalt Roofing Shingles. Detailed application directions for each type appear on following data sheets.

GENERAL:

Minimum Pitch: The minimum pitch is 4" to the foot for all types of Strip Shingles with square tabs, Giant and Standard Individual Shingles, Hexagonal and Gothic Shingles; for Dutch Lap, Latch Thatch and Weatherlok Shingles, the minimum pitch is 5" to the foot.

Roof Boards: The boards must be dry, well-seasoned, of narrow width and uniform thickness, laid close together (tongue and groove preferred) and securely fastened with at least two nails in each rafter.

New buildings should be ventilated while plaster is drying by opening windows in the basement or the first floor, and the attic, to remove the damp air which otherwise might cause the roof boards to swell or warp.

On old roofs, roof boards which have warped or curled are drawn down by renailing. Clear the roof of all obstructions and sweep clean.

On new roofs, or old roofs from which shingles have been removed, apply one layer of J-M Standard Asphalt-Saturated Rag Felt, not less than 15-lb. weight, lapped at least 2" at all joints, before the application of shingles.

Preparation of Old Wood-Shingle Roofs: All decayed and missing shingles must be replaced and all loose shingles nailed. Curled shingles are secured by splitting the butt with a hatchet and nailing each corner.

It may be necessary to level out the roof deck by nailing a beveled wood strip (approximately 4" wide by 3/8" thick) over the old wood shingles. If desired, the old shingles at the eaves and gables may be cut back about 3", and 7/8" x 3" wood strips installed. This construction removes any indication that the new roof has been applied over existing wood shingles. A similar effect may be obtained by the use of a metal edge, which may be painted to match the trim color. See Fig. 2, following.

Scaffolding: The use of adjustable roof brackets when applying shingles is recommended.

Valleys: Before applying shingles, line the valleys, using non-ferrous metal or two thicknesses of heavy-weight smooth or slate-surfaced roofing. The lower valley strip to be 12" wide and the top 24" wide, both strips preferably in one piece running the entire length of the valley (Fig. 1). Nail on 12" centers 3/4" from the outside edges. If joints are necessary they must lap at least 9". Shingles must be applied exposing 4" on either side of the center at the top of the valley and 5" at the lower end.

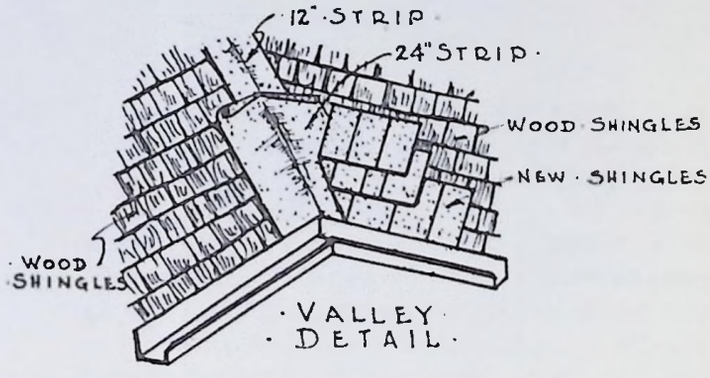


Fig. 1

JOHNS-MANVILLE Roofing and Shingles	DATE March, 1938 (Cancelling BMR-1040 to 1070 dated 1937, '36, '35 and '34.) (BMR-1040)
J-M Asphalt Roofing Shingles General Roofing Application Directions	

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APPLICATION:

Starters: Either Slatekote Starting Strips, Individual Shingles, or Strip Shingles may be used as starters. The starters must be laid to a chalk line and must project not less than 1/2" over the eaves to form a drip edge.

Hips and Ridges: The last course of shingles must be lapped over the hip or ridge and covered with Slatekote Starting Strip, 9" wide, bent equally on each side and nailed on 2" centers 3/4" from the edges. (Fig. 2). However, by the use of Individual Shingles or similar sizes cut from Square Butt Strip Shingles, a better appearance may be obtained. Two Individual Shingles are laid over each other to start. Standard Weight Shingles are exposed 4" and nailed 5" from the exposed end; Giant Weight Shingles are exposed 5" and nailed 6" from the exposed end. Each shingle is nailed with two nails, 3/4" from each side.

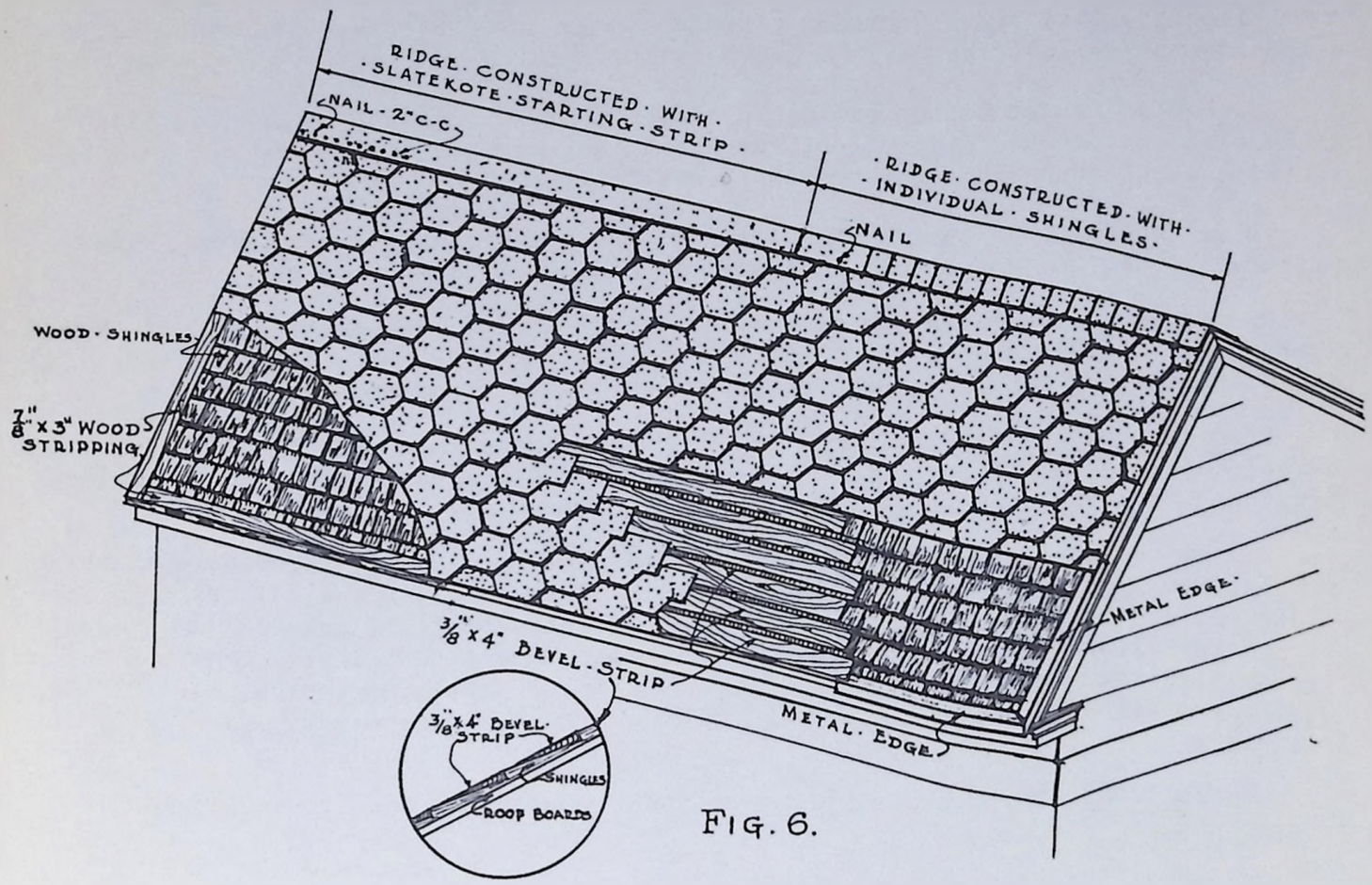


FIG. 6.

Flashing: Copper, tin, lead, or asphalt roofing may be used for flashing. Recommended widths for metal flashings are: Main valley, 16"; dormer valley, 8"; front of dormer where sill is above roof, 8". Where sill rests on roof, a metal pan is built extending 4" down the roof and back of sill at least 1". The pan should be 2" wider than the opening and the ends bent up to fit in between opening studs. (See Fig. 3). Where porch and house connect, an 8" flashing is used; where roof and shed dormer contact, a 10" flashing. The shingles on the edges of all valleys must be well bedded in Asbestos Roof Putty.

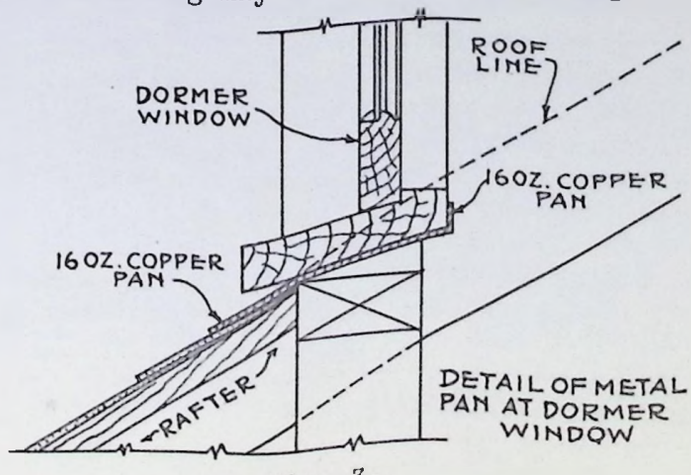


Fig. 3.

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Chimney Flashing: To insure proper chimney flashing, all chimneys should be counter-flashed with tin, copper, zinc or lead. The first step is to cut Asphalt Roll Roofing into strips about 18" wide, bending these to fit the sides and ends of the chimney, as shown in Fig. 4. Before nailing, they should be embedded in Asbestos Roof Putty.

The asphalt felt flashing is then "step-flashed" with metal shingles, which are bent so that they will extend under each course of roofing shingles on the lower end and also into the 1" deep cut-out mortar joints of the chimney.

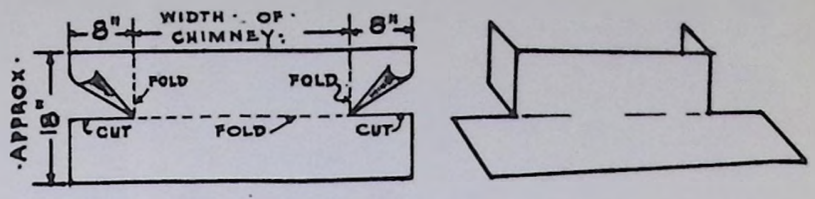


Fig. 4

The metal flashing is then wedged securely in the open joints which are filled with portland cement mortar or Asbestos Roof Putty. (See Fig. 5).

Saddle on Rear of Chimney: A "saddle," "gussett" or "crickett" should be built on the high side of the chimney if it is located so that it will receive the "wash" of rain or snow from the slope of the roof. (See Fig. 5).

Yankee or Box Gutter: When re-lining gutters, heavy-weight smooth or slate-surfaced roofing 18" wide should be used, bent to fit and to extend 1/8" over the lower edge of the gutter and nailed on 4" centers on this edge. Nails should not be used in any part of the water course.

Unavoidable joints should lap at least 9" with the "run" of the water or slope of the gutter, and be well embedded in Asbestos Roof Putty and pressed solidly together.

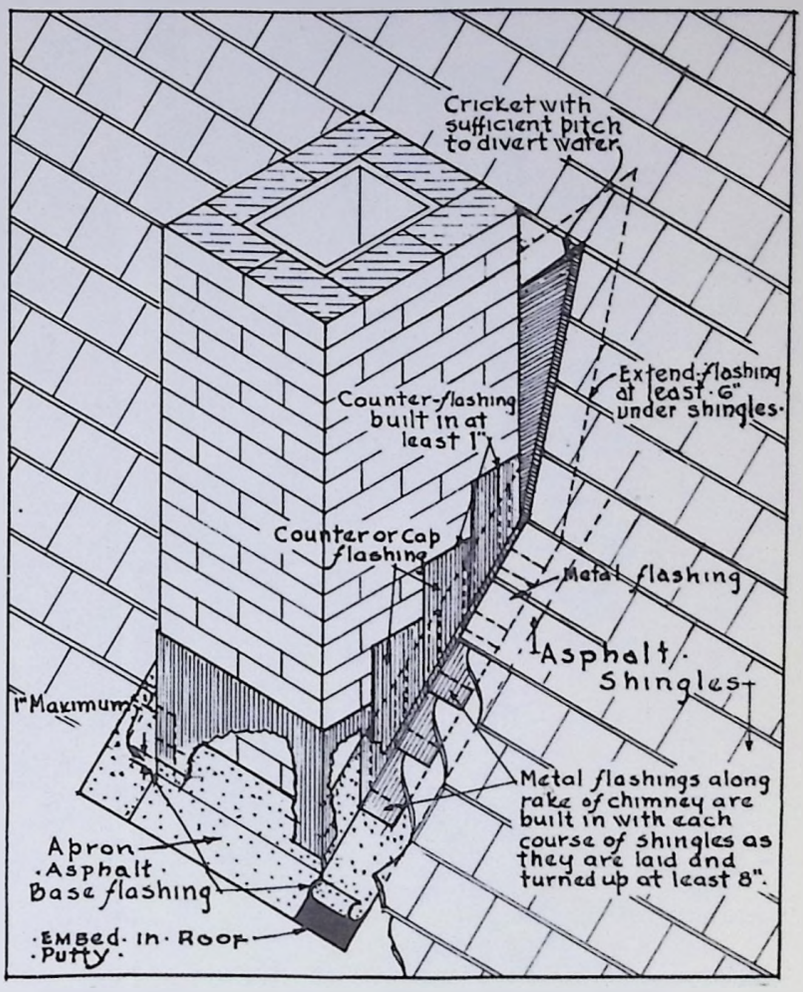


Fig. 5

For best results, it is recommended that the entire gutter lining be embedded in Asbestos Roof Putty.

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J-M ASPHALT STRIP SHINGLES
APPLICATION DIRECTIONS

These particular application directions, covering J-M Asphalt Strip Shingles, comprise the following shingle types - (minimum roof pitch = 4" to the foot):

Name	Size inches	Exposure inches	Head Lap, in.	Shingles per sq.	Approx. wt. lb. per sq.	Material (weight)
Square Tab Strip Shingles						
Giant Strip	12 x 36	5	2	30	257	Giant
10" Standard Strip	10 x 36	4	2	100	210	Standard
12 1/2" Standard Strip	12 1/2 x 36	4	4 1/2	100	266	Standard
Standard Sealed-Edge Thick-Butt	12 x 36	5	2	80	230	Standard
12" Double-Coated Thick-Butt	12 x 36	5	2	80	210	Standard
15" Double-Coated Thick-Butt	15 x 36	5	5	80	250	Standard
Hexagonal Strip Shingles						
Giant Hexagonal	12 1/3 x 36	4 2/3	3	86	235	Giant
12 1/3" Standard Hexagonal	12 1/3 x 36	4 2/3	3	86	186	Standard
11 1/3" Standard Hexagonal	11 1/3 x 36	4 2/3	2	86	167	Standard
10" Standard Gothic	10 x 36	4	2	100	172	Standard
12" Double Coverage Standard Hexagonal	12 x 36	4	4	100	215	Standard
12 1/2" Double Coverage Stand. Hexagonal	12 1/2 x 36	4	4 1/2	100	226	Standard

GENERAL APPLICATION DIRECTIONS:

For directions covering preparation of roof, application of supplementary shingles and flashings, see "General Application Directions for J-M Asphalt Roofing Shingles" discussed on preceding sheets.

NAILS AND NAILING:

Type of Nail: Galvanized Roofing Nails.

New Work or Roofs with Old Shingles Removed: For Standard Weight Shingles 1" nails are used; Giant Weight and Thick Butt require 1 1/4" nails.

Old Work: When re-roofing over old wood shingles, 1 3/4" nails are used for all shingle types.

Nailing: Strip shingles are always nailed from the center of the strips towards the ends. Giant and Standard Strip Shingles are nailed 1" above each cut-out and on the ends 1 1/2" from the outside edge. The Thick-Butt Shingles are nailed in the double-thick part of the shingles, 5 1/2" up from the butt edge with one nail on each side of the cut-out. Hexagonal Strip Shingles are nailed with four nails, 1" above the cut-outs. Nailing is started in the center of the strip with two nails above the center cut-out 1/2" in from the upper corners. This locates the nails approximately 5" apart. End nails are placed 1 1/2" in from the outside edges. For Gothic Shingles three nails are used per strip, located 1 1/2" above the cut-outs. Nailing is

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started with one nail in the center of the strip above the middle cut-out. End nails are located 1 1/2" in from the outside edges.

APPLICATION:

Starters: Starters are applied as discussed under "General Roofing Application Directions" on preceding pages. However, wherever available, Slatekote Starting Strips, 9" wide, of corresponding color should be used to minimize possibility of leakage at cross joints. The strips are nailed sufficiently to hold in place until the first course is started.

Giant, Standard and Thick-Butt Strip Shingles: If the Strip Shingles are used for starters the cut-outs are laid up the roof for Giant and Standard Strip Shingles and down the roof for the Thick-Butt Shingles. In each case the starters are laid so as to project 1/2" over the eaves to form a drip edge. After starter course is completed, the first course is begun by placing the strips so that the cut-outs face downward with the butts flush with the bottom of the starter course. This course is then completed across the entire roof. From the first strip of the following course, 1 1/2 tabs are cut off so that the cut-outs will center over the tab below. Joints are similarly broken in the following courses. (See Fig. 1 and 2). The strips are laid with the ends barely touching. The exposure is determined by the depth of the cut-outs.

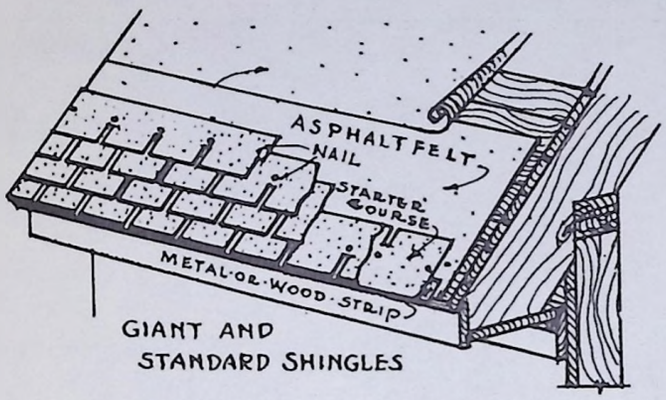


Fig. 1

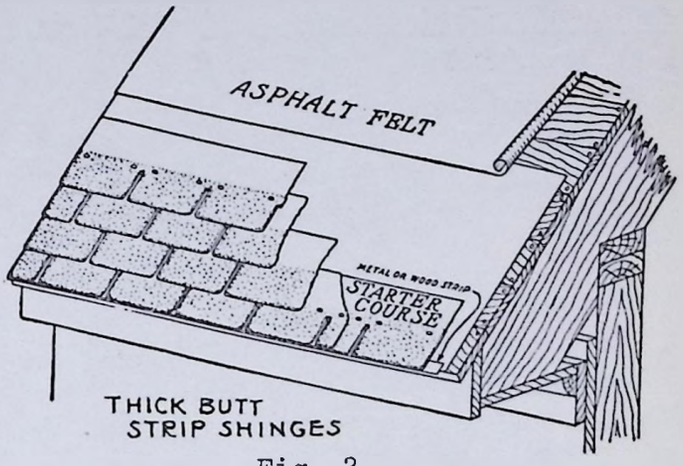


Fig. 2

Hexagonal Strip Shingles: If the Strip Shingles are used for starters, they are laid with the butts up and the straight edges projecting 1/2" over the eaves to form a drip edge. A 1/2 tab or 9" is cut from the first strip of the starter course. After the starter course is laid, the first course is begun with a full strip, butt down, and the strips continued across the entire roof with the butts flush with the bottom of the starter course. The second course is started with a strip from which 1/2 tab or 9" has been cut, with the tab end flush with the cut-out of the first course. This results in a hexagonal pattern. The third course is started with a full shingle; fourth course with a cut shingle, etc. (See Fig. 3). The strips are laid with the ends barely touching. Exposure is determined by the automatic method of laying.

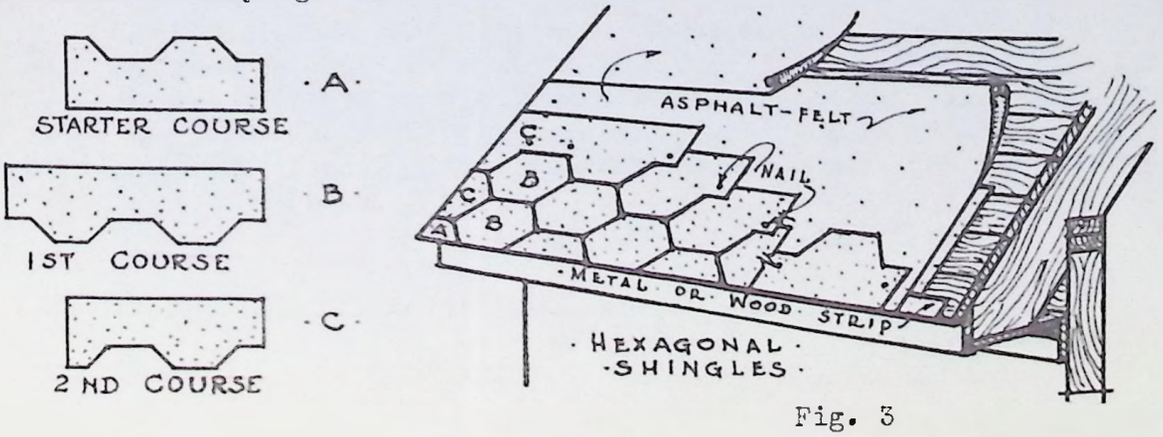


Fig. 3

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J-M ASPHALT SHINGLES - INDIVIDUAL AND DUTCH LAP
APPLICATION DIRECTIONS

These particular application directions, covering J-M Asphalt Individual and Dutch Lap Shingles, comprise the following shingle types - (minimum roof pitch= 4" to the foot for Individual Shingles; 5" to the foot for Dutch Lap):

Name	Size inches	Exposure inches	Head lap, in.	Shingles per sq.	Approx. wt. lb. per sq.	Material (weight)
Individual Shingles						
Giant Individual	12 x 16	5	6	225	325	Giant
Standard Individual	9 x 12 3/4	4	4 3/4	378	253	Standard
Dutch Lap Shingles						
Giant Dutch Lap	12 x 16	10 x 13	2	112	162	Giant
Standard Dutch Lap	12 x 16	10 x 13	2	112	135	Standard

GENERAL APPLICATION DIRECTIONS:

For directions covering preparation of roof, application of supplementary shingles and flashings see "General Application Directions for J-M Asphalt Roofing Shingles" discussed on preceding pages.

NAILS AND NAILING:

Type of Nail: Galvanized roofing nails.

New Work or Roofs with Old Shingles Removed: For Standard Weight Shingles, 1" nails are used; Giant Weight Shingles require 1 1/4" nails.

Old Work: When re-roofing over old wood shingles, 1 3/4" nails are used for both Standard and Giant Weight Shingles.

Nailing: Giant Individual Shingles are nailed with two nails in each shingle 6" above the butt, 3/4" in from each side. Standard Individual Shingles are secured by two nails driven 5" above the butt and 3/4" in from each side. Dutch Lap Shingles are nailed in opposite and lower corners, 1" in from each side of the corner. For securing the exposed corner of Dutch Lap Shingles with copper clips, see under "Application" following.

APPLICATION:

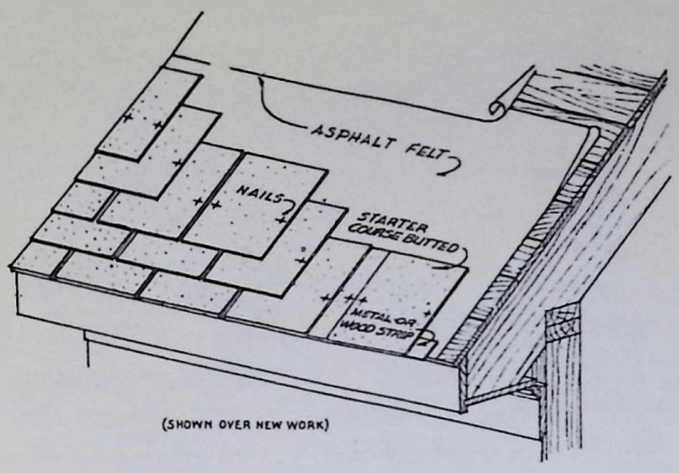
Starters: Starters are applied as discussed under "General Roofing Application Directions" on preceding pages. However, wherever available, Slatekote Starting Strips, 9" wide, of corresponding color should be used to minimize possibility of leakage at cross joints. The strips are nailed sufficiently to hold in place until the first course is started.

Giant and Standard Individual Shingles: All Individual Shingles are laid vertically. If the shingles are used for starters, they are laid, butted together, to extend across the entire roof with the butts projecting 1/2" over the eaves to form a drip edge. The first course is then laid directly over the starter course with the butts flush with the bottom of the starters, starting at the left with a 1/2 shingle so that all joints are broken. Giant Shingles are spaced 3/4" apart; Standard Shingles, 1/2" apart. The butts are laid flush with the butts of the starter course. The next course is started with a full shingle, third course with a 1/2 shingle, fourth course with a whole shingle, and repeat. (See Fig. 1, fol-

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lowing). The exposure for Giant Shingles is 5"; for Standard Shingles, 4".



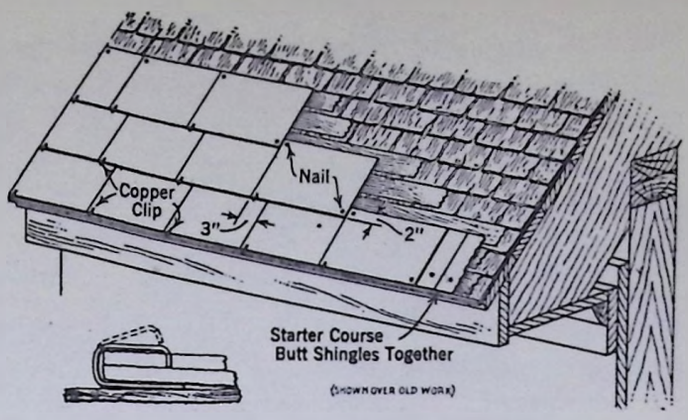


Fig. 2

Fig. 1 Illustrating methods of applying Individual and Dutch Lap Shingles

Giant and Standard Dutch Lap Shingles: All Dutch Lap Shingles are laid horizontally. If the shingles are used for starters, they are laid, butted together, to extend across the entire roof with the butts projecting 1/2" over the eaves to form a drip edge. The first course is then laid directly over the starter course with the butts flush with the bottom of the starters, beginning at the end of the roof with a section of shingle 3" wide by 12" high. (See Fig. 2). A full-sized shingle is then applied to overlap this 3" section. Additional full-sized shingles are then applied to complete the first course, lapping each one 3" over the side of the next shingle of the same course. The second course is started with a shingle laid flush with the exposed vertical edge of the second shingle in the first course; cut to size so that the opposite edge is flush with the edge of the roof and lapped 2" over the top of the shingle in the first course. Additional shingles in this course are then applied, butting against the exposed vertical edge of the shingles in the course below and lapped 2" over the top of the first course. Additional courses are applied in the same manner.

A copper clip, furnished with the shingles, is placed in each exposed corner so that the long, straight, pointed side rests on the surface below and the hooked section comes around and over the lapped portion of the shingles. The clip is struck a light hammer blow which drives the prong into the surface of the top shingle.

Dutch Lap Shingles must not be exposed more than 10" x 13". They may be applied, however, with a smaller exposure, requiring more shingles per square, if a greater head lap or side lap, or both is desired.



J-M Asphalt Shingles combine low cost with the desirable advantages of fire resistance, attractive appearance and long life

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J-M Ready-to-Lay Roofings

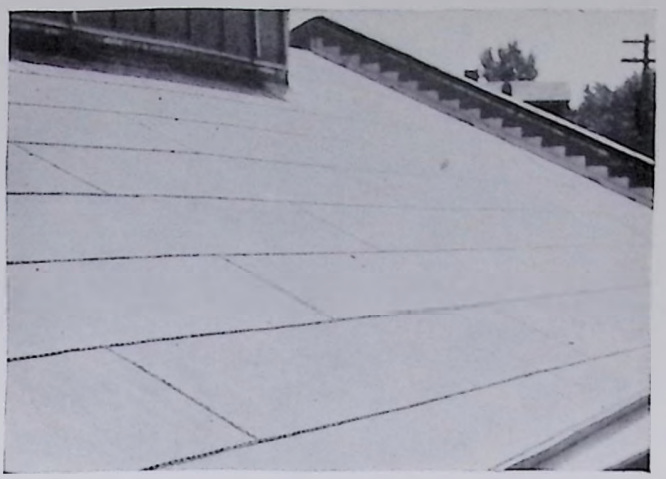
Asbestos Ready-to-Lay Roofings

J-M Asbestos-Ready-to-Lay Roofings, made of asbestos felt thoroughly impregnated with asphalt, are rot-proof, weather-proof and highly fire-resisting. They are particularly adapted to pitched roofs of factories, many types of industrial buildings, garages, service stations, houses, barns, sheds, etc. The roofings are manufactured in three general types: smooth black top, smooth white top, and mineral surfaced. Flexstone Smooth-Surfaced Roofing may be used for roof pitches as low as 2″ to the foot; Slate-Surfaced Flexstone and White Top Roofing, for minimum roof pitches of 3″ to the foot. The roofings are packed with galvanized nails, lap cement and butt-lap strips. If specified, they are supplied without nails and cement or with galvanized or zinc Pyramid Kaps, nails, lap cement and butt-lap strips. The weights given are approximate.

Flexstone Smooth-Surfaced Roofing: This roofing consists of three or four plies of asphalt-impregnated asbestos felt, cemented together with asphalt into heavy, strong sheets. The sheets are furnished with a smooth surface, 32″ x 80″, six sheets per sq. Three-ply material, designated "Heavy," is shipped in crates containing sufficient material for 500 sq. ft. of roof surface. The shipping weights are 80 lb. per sq. crated, and 66 lb. uncrated. Four-ply material, "Extra Heavy," is shipped in crates containing sufficient material for 400 sq. ft. Weights for shipment are 98 lb. per sq. crated, and 83 lb. per sq. uncrated. Heavy and Extra-Heavy carry the Underwriters' Class B label.

Flexstone Slate-Surfaced Roofing: A heavy asphalt-impregnated asbestos felt, surfaced on one side in red, green, or blue-black mineral granules, especially designed for steep-roofed buildings where color is desired in the finished roof. The material is furnished in 1-sq. rolls, 32″ wide, with 2″ selvage, weighing 85 lb., and carries the Underwriters' Class B label.

J-M White Top Roofing: This roofing is made of plies of asphalt-impregnated asbestos felts cemented together with asphalt, with a white (unimpregnated) asbestos felt on top. It has been used on many industrial buildings on the back of saw-tooth construction because of its clean, attractive, light-reflecting surface and its fire and weather-resisting properties. White Top Roofing is supplied in three weights, Standard, Heavy and Extra Heavy, each with a 2″ black selvage edge for laps. Standard (3-ply) is furnished in 1 or 2-sq. rolls, 32″ wide, weighing 55 lb. per sq. and Heavy (3-ply) in 1 or 2-sq. rolls, 32″ wide, weighing 60 lb. per sq. Rolls are cut into pieces 13 ft. 6″ long. Extra Heavy (4-ply) is furnished six flat 32″ x 80″ sheets per sq., 4 sqs. per crate, weighing 98 lb. per sq. crated and 83 lb. per sq. uncrated. Heavy carries the Class B and Extra Heavy the Class A Underwriters' label.



Flexstone Roofing, applied with Pyramid Kaps, presents a neat appearance as well as providing a serviceable roof

Asphalt Ready-to-Lay Roofings

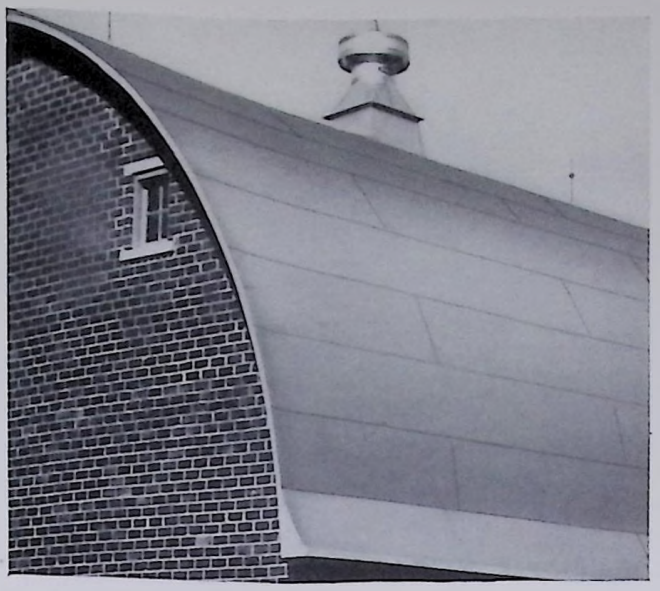
Johns-Manville manufactures several types of asphalt roll roofings, with an asphalt-saturated rag felt base, at a somewhat lower cost than the more enduring asbestos roofings. Since the life of rag felt roofing is largely dependent upon the type and quantity of saturant and coating, Johns-Manville uses only those asphalts that best resist the action of sun and weather in order to provide maximum service and durability. Asphalt ready-to-lay roofings are furnished smooth-surfaced and mineral-surfaced in accordance with the following descriptions—weights given are approximate, and accessories are shipped as described unless otherwise specified:

Smooth-Surfaced Asphalt Roofings:

Pilot-Roofing: This material, one of the highest quality smooth-surfaced asphalt roofings, is finished with a smooth talc surface on one side and a veined mica surface on the other. It is recommended for steep-roofed buildings. The roofing is furnished in 1-sq. rolls (108 sq. ft.), 36″ wide, with lap cement and galvanized nails (Pyramid Kaps furnished at a slight

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J-M Ready-to-Lay Roofings are particularly adapted to steep-roofed buildings

additional cost). There are four weights supplied: Medium, 45 lb. per sq.; Heavy, 55 lb. per sq.; Extra Heavy, 65 lb. per sq.; and Super Heavy, 75 lb. per sq. All weights carry the Underwriters' Class C label. The minimum roof pitch is 2″ to the foot.

Service Roofing: This is a medium grade asphalt roofing, furnished in 1-sq. rolls (108 sq. ft.) 36″ wide and in four weights: Light, 35 lb. per sq.; Medium, 45 lb. per sq.; Heavy, 55 lb. per sq.; and Extra Heavy, 65 lb. per sq. The light weight is packed with bright nails and lap cement; the other weights with galvanized nails and lap cement. Heavy and Extra Heavy carry the Underwriters' Class C label. The minimum roof pitch is 2″ to the foot.

Planet Roofing: Planet, a lower priced roofing than Service but offering good value for use on temporary structures, is made with a veined talc surface on both sides. The roofing is furnished in 1-sq. rolls (108 sq. ft.), 36″ wide, with lap cement and bright nails. There are three weights supplied: Light, Medium, and Heavy, weighing 35, 45 and 55 lb. per sq. respectively. The minimum roof pitch is 2″ to the foot.

Mineral-Surfaced Asphalt Roofings:

Mineral-Surfaced roofings are especially adapted where color is desired in the finished roof. They are manufactured from rag felts heavily saturated and coated with asphalt, with colored mineral granules securely embedded in the asphalt on the upper surface. The minimum roof pitch for each of the mineral-surfaced asphalt roofings is 3″ to the foot. Descriptions of the several types manufactured follow—all weights given are approximate:

Slatekote Roofing: The standard type of Slatekote is furnished in 1-sq. rolls (108 sq. ft.), 36″ wide, with 2″ selvage edge for lap. Lap cement and galvanized nails are included. The roofing, weighing 90 lb. per sq. and carrying the Underwriters' Class C label, is supplied in red, green, blue-black, tile red, spruce green and variegated. Rolls of Slatekote, 18″ wide, with 2″ selvage edge, containing 116 sq. ft., and weighing 99 lb. per roll, are available on special order only. Slatekote roofing is also available cut in strips for starting shingles, lining valleys and covering hips and ridges. The strips are furnished in rolls, 36 ft. long in four widths, 9″, 12″, 18″ and 24″, weighing 21, 28, 42 and 56 lb. per roll, respectively. Both the starting strips and 18″ rolls are available in red, green, blue-black, tile red and spruce green.

Modernedge Slatekote Roofing: This variety of Slatekote has a split through the center of the roll in a pyramid pattern to effect thatch-like roof lines. It is furnished in 32″-wide rolls to cover 100 sq. ft. roof area, in four colors: Mossfield, Redfield, Romany Blendfield and Killarney Blendfield. The roofing, packed without nails or cement, weighs 105 lb. per sq. and carries the Underwriters' Class C label.

Slatekote Diamond-Point Roofing: This material, the same as Slatekote with the rolls split down the center to provide diamond-point strips, is furnished in red, green, blue-black, spruce green and variegated colors, in rolls 32″ wide, to cover 100 sq. ft. roof area. The roofing is packed without nails or cement and weighs 105 lb. per roll. It carries Underwriters' Class C label.

Split Sheet Slatekote Roofing: This style of Slatekote is made 36″ wide, with 17″ slate surfacing and 19″ selvage for cementing, for use as a finishing sheet over built-up roofs where color is desired. Also used where a mineral surface is wanted on steep roofs. The roofing is furnished in red, green and blue-black, in rolls weighing 55 lb., containing sufficient material for about 51 sq. ft. weather exposure. It is packed without nails or cement.

Tuftex Roofing: Tuftex, a lighter weight mineral-surfaced roofing than Slatekote, is furnished in 1-sq. rolls (108 sq. ft.), 36″ wide with 2″ selvage edge and packed with lap cement and galvanized nails. The roofing weighs 75 lb. per sq. and is supplied in red, green, tile red, spruce green and blue-black.

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Application of J-M Ready-to-Lay Roofings

Roof Pitches:

Ready-to-lay roofings are not suitable for use on flat surfaces, nor should they be used on roofs surrounded by parapet walls or other vertical surfaces where stoppage of leader outlets would result in water backing up and lying on the roof. In other words, these roofings should not be used on any surface that cannot be depended upon to drain water freely.

The minimum roof pitch over which smooth-surfaced read-to-lay roofings (except White Top) may be applied is 2″ to the foot. White Top and mineral-surfaced ready-to-lay roofings require a minimum roof pitch of 3″ to the foot.

Roof Surfaces:

Ready-to-lay roofing is usually applied directly over wood sheathing, which should be composed of well-seasoned roof boards, closely laid, preferably tongue and groove, and secured with at least two nails to each rafter. Any boards that warp or curl should be drawn down by re-nailing. Any loose nails should be re-driven, knot holes or cracks covered with tin and the roof cleared of all obstructions and swept clean. This should provide a sound, smooth nailing surface.

In the case of an existing roof of old shingles, it is advisable to remove the shingles and provide close sheathing to receive the new roofing.

On old tin roofs, if the roof boards are laid close and in good condition, it is better to remove the tin. Application can be made over the tin, however, provided all standing seams and sharp edges are flattened down and nailed before the roofing is applied.

The application is as important as the materials in determining the satisfactory service to be obtained where this type of roof covering is adaptable. Particular attention should therefore be paid to detailed directions for use. See drawing on other side of page.

Laps:

Roofing is always laid so that water runs over the laps, never against exposed edges. Horizontal laps should be at least 2″, sealed with lap cement and nailed ¾″ from edge with nails on 2″ centers. On asbestos roofing, vertical end laps are butted, and under all vertical butted end joints, 6″ wide strips of roofing felt (included with shipments) are applied, centered under the joint. These strips are coated with lap cement, into which the ends of the roofing felts are firmly embedded and nailed 2″ on centers, ¾″ from the edge. On asphalt read-to-lay roofing, vertical laps, minimum 4″, are formed by lapping over the roofing felts and cementing them together securely, with nails 1″ apart, staggered.

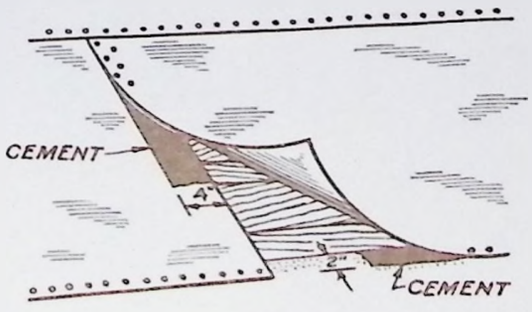
Pyramid Kaps provide a superior method of fastening laps and edging strips on smooth surface ready-to-lay roofing. They are particularly effective because they prevent buckling, puckering or tearing away at the laps and assure an evenly exerted pressure at all points. They should not be used, however, with mineral-surfaced roofings, nor with White Top Roofing.



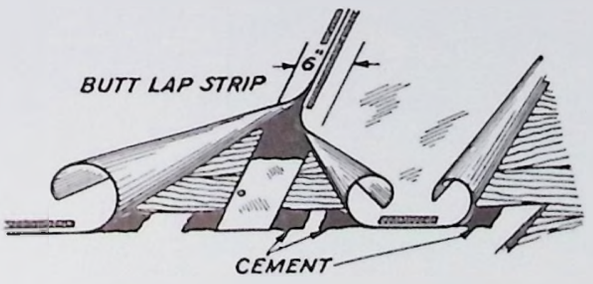
Pyramid Kaps

Pyramid Kaps are made either of galvanized metal or of solid zinc and are furnished in strips approximately 14¼″ long, ten caps to the strip. They are applied in a continuous line, end-to-end, along all horizontal and vertical laps, and edging strips; on horizontal laps, ¼″ from edge, and on each side of vertical joints, ¾″ from edge.

Complete application directions for J-M Ready-to-Lay Roofings appear on other data sheets.



Vertical lap on asphalt roofings

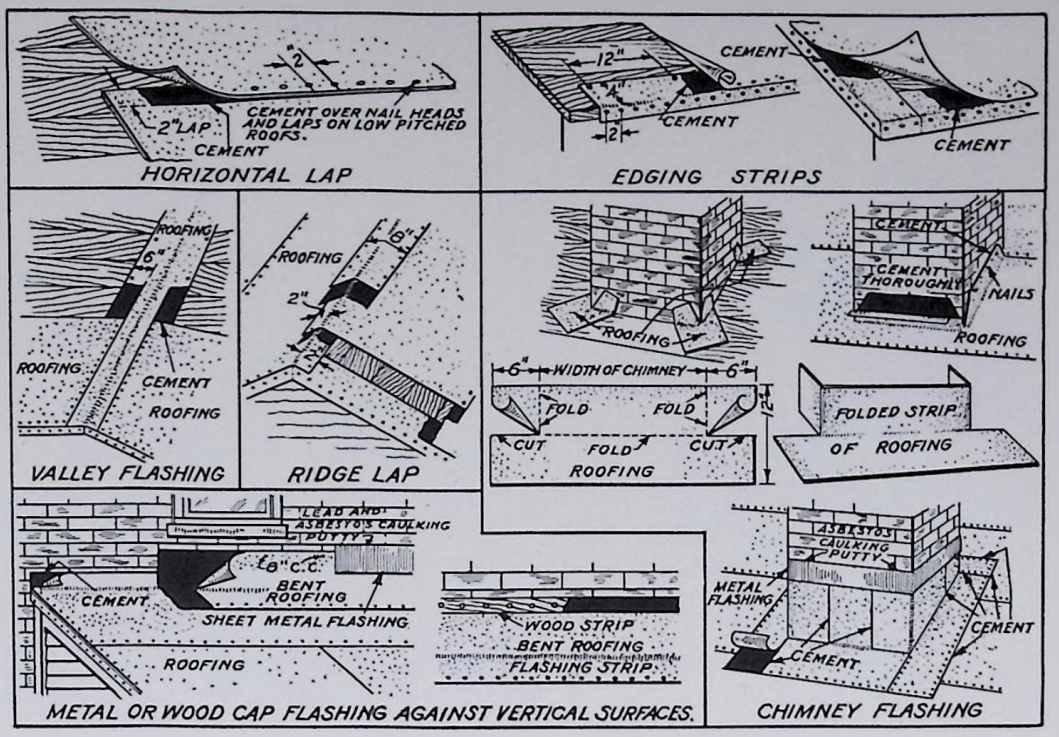


Vertical lap on asbestos roofings

APPLICATION OF READY-TO-LAY ROOFING
May, 1937 (Cancelling sheet dated August, 1936)
BMR 505

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Ready-to-Lay Roofing application details

J-M Roofing Cements, Coatings and Accessories

J-M Asbestos Fibrous Roof Coating: A high-grade black roof coating made of asbestos fibre and asphalt in the right consistency for brush application, with asbestos fibre ground for a smooth coating, or unground for use where the roof is in bad condition, such as rusted metal roofs. Covering capacity, 75 to 150 sq. ft. per gal., depending on condition of roof, and whether coating is ground or unground. Asbestos Fibrous Roof Coating is shipped in 1-gal. cans, six per case, and in 5, 30 and 55-gal. containers.

J-M Asbestos Roof Putty: A waterproofing cement, made of high-grade asbestos fibres and minerals, used for patching leaky roofs, setting flashing flanges around vent pipes and other purposes. The putty remains waterproof and plastic, expanding and contracting with the underlying surface. It adheres tightly to metal, felt, wood or glass. Furnished in red, in 1, 5, 10, 25, 50 and 150-lb. containers; in gray, in 1, 5, 10, 35, 60 and 175-lb. containers; in black, in 1, 5, 10, 25, 45, 135 and 500-lb. containers; and in green and brown in 5, 10 and 35-lb. containers. All 10-lb. cans are packed 12 per case, the smaller sizes 24 per case.

J-M Lap Cement: This material is similar to the cement packed in each roll of ready-to-lay roofing but is shipped in 1, 5, 25 and 50-gal. containers for use where roofing is shipped without accessories. The 1-gal. cans are packed 6 per case. Also packed in pint cans, 72 per case.

J-M Regal Roof Coating: . A black, high-grade asphaltic roof coating, applied cold as a surface finish on smooth-surfaced roofs. One gal. (8 lb.) is required per 100 sq. ft. Furnished in 1, 5, 25 and 50-gal. containers. The 1-gal. cans are packed 6 per carton.

J-M Roofing Tape: A waterproofing fabric for use with roof coatings and putties for mending or bridging large cracks or holes. Furnished in rolls of 36 linear ft., 3″ wide, 4 rolls per carton.

J-M Special A. R. Roof Putty: A more adhesive material than Asbestos Roof Putty, black in color. Especially suitable for quick repairs on smooth surface asphalt roofs where it is necessary to seal plies of felt together. Packed in 8, 24, 40 and 120-lb. containers. The 8-lb. size is furnished in cases of six.

Other Materials: J-M Ready-Mixed Asbestile and Bonded Roofing Asphalts are described under Bonded Built-up Roofs; Asbestos Caulking Putty, Asbestos Slaters' Felt, Asphalt Felt and Rosin-Sized Sheathing Paper in the section covering "Building Materials, Miscellaneous"; and Aquadam, Concrete Primer, Expansion Joint Filler and Standard Asphalt Waterproofing Cement in the "Waterproofing and Miscellaneous Asphalt Products" Section.

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JOHNS-MANVILLE READY-TO-LAY ROOFINGS
APPLICATION DIRECTIONS



J-M Asbestos Ready-to-Lay Roofing was used to cover the large roofing area required by this barn

The following application directions are for J-M Asbestos Ready-to-Lay Roofings and J-M Asphalt Ready-to-Lay Roofings.

Application of these two types of ready-to-lay roofings is as important as the materials in determining the satisfactory service to be obtained where this type of roof covering is adaptable.

Special Precautions: Under the heading of "Special Precautions", on the last page of these application directions, there is a general summary of important factors essential to the construction and treatment of ready-to-lay roofing.

Preparation of Surface:

Application over New Roofs: Roof should be dry, well-seasoned boards of narrow width and uniform thickness, laid close (tongue and grooved preferred) and secured with at least two nails to each rafter. Any boards that warp or curl should be drawn down by renailing. Clear the roof of all obstructions and sweep it clean.

Application over Old Wood Shingles: (This method of application is not recommended. Wherever possible, remove all old shingles and provide a solidly boarded surface.)--Old roofs should be "serviced" by surface nailing at the lower corners any wood shingles which have curled or "kicked up" so that they will be as even as possible. Remove and replace with new ones any that are badly split or decayed to provide proper nailing support. Remove all ridge shingles. Nails, 1-1/2" long, to go through shingles and penetrate roof boards are essential.

Application over Old Tin Roofs: When roof boards are close and in good condition, remove tin, all loose nails and other projections.

When removal of tin is impracticable, flatten all standing seams and sharp edges and renail where necessary to provide the smoothest possible surface.

JOHNS-MANVILLE Building Materials

J-M Ready-to-Lay Roofings
Application Directions

DATE September, 1938
(Cancelling sheet dated Sept., 1937)

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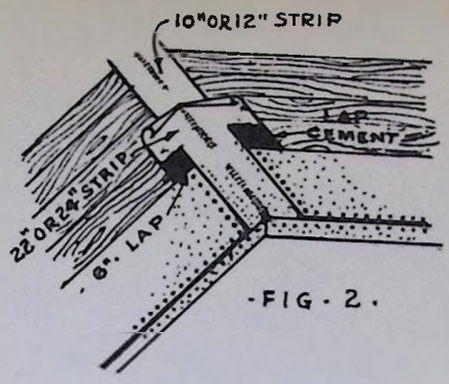
TECHNICAL DATA SECTION

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Minimum Roof Pitches:

Asbestos or asphalt smooth-surfaced roofing may be safely applied on pitches as low as 2" per foot; White Top and Flexstone Slate-Surfaced Asbestos Roofing and Mineral Surfaced Asphalt Roofing on pitches as low as 3" per foot.

Ready-to-lay roofings are not suitable for flat roofs or where parapet walls or leader stoppage may cause water to stand on roof. Such areas should be covered with built-up roofing.



· FIG. 2.

Valleys:

Apply valley flashing by cutting the rolls lengthwise into two continuous strips: asbestos rolls, one 10" and one 22" wide, and asphalt rolls, one 12" and one 24" wide. Lay the narrow strip first. Then cover this with the wider strip and nail on 12" centers, 3/4" from outside edges. (See Fig. 2).

Main Roof:

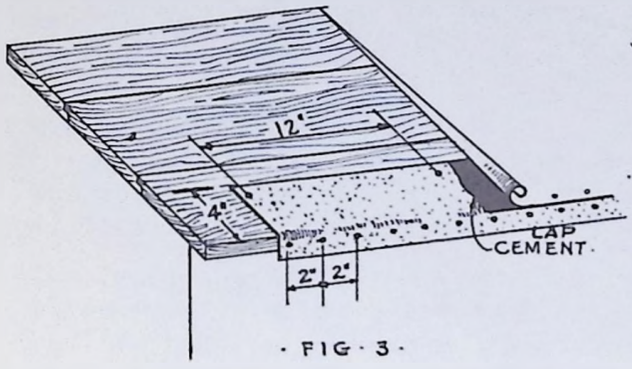
Cut each 1-sq. roll cross-wise into three sheets, the asbestos 13 ft. 6" and the asphalt 12 ft. long, and pile them on an even surface so that they may flatten thoroughly. Avoid cutting one sheet on top of another. Use a square and cut with a sharp knife to assure clean straight edges.

Edging:

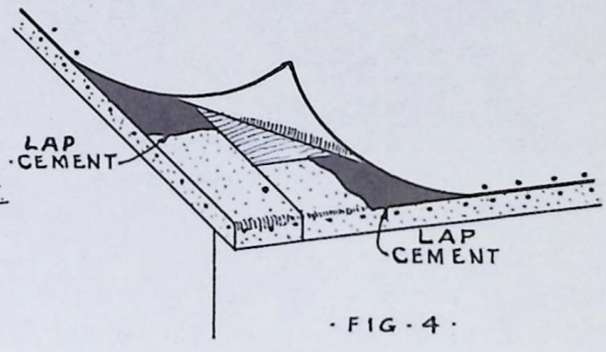
Carefully split sufficient sheets into six equal widths, approximately 6" wide, to form edging or starting strips which should be bent over the edge of the roof board or fascia and project 1/4" to 1/2" beyond to form a drip edge. Nail on 2" centers on the edge of the roof board and on 12" centers on the roof proper. (See Fig. 3 and 4).

Application on Low-Pitched Roofs:

First Course: Coat edging strip thoroughly with lap cement and apply first sheet, with the selvage edge up, flush with eave and gable end. Stretch sheet smoothly, embed the lower edge firmly in lap cement and nail 3/4" from upper edge on 12" centers.

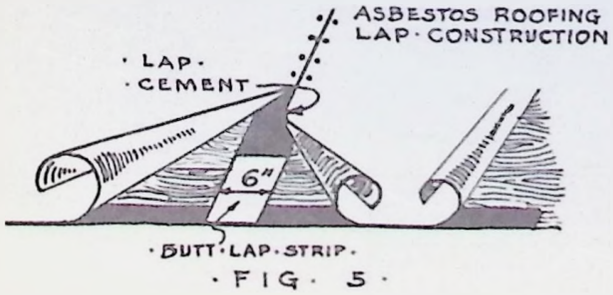


· FIG · 3 ·



· FIG · 4 ·

Nails spaced 3/4" from lower edge and on 2" centers, should start from center of sheet and extend in both directions. (See Fig. 4).



· FIG · 5 ·

Apply succeeding sheets in a similar manner to the end of the course.

End Laps or Vertical Joints: For asbestos roofing vertical joints, butt the sheets over 6"-wide butt-lap strips which should be centered under the joint and heavily coated with lap cement. Then secure each side with a row of nails 3/4" from the edge and on 2" centers. (See Fig. 5).

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Asphalt roofing vertical joints are lapped 4", thoroughly cemented and secured with two staggered rows of nails, spaced on 1" centers; the first row 3/4" and the second 1-3/4" from the outer edge. (See Fig. 6).

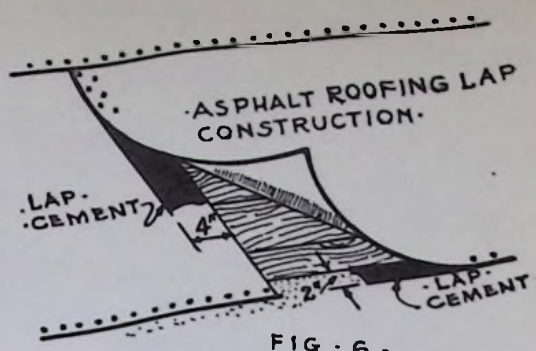


FIG. 6.

End laps over valleys should be at least 6" wide with sheets neatly cut on an angle to form parallel line with center of valley. Completed valley should be 6" to 8" wide. Thoroughly coat valley strip under the lap with cement and embed the sheet firmly. Nail in the same manner as vertical joints. (See Fig. 1).

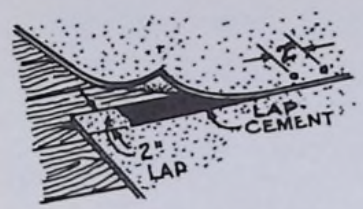
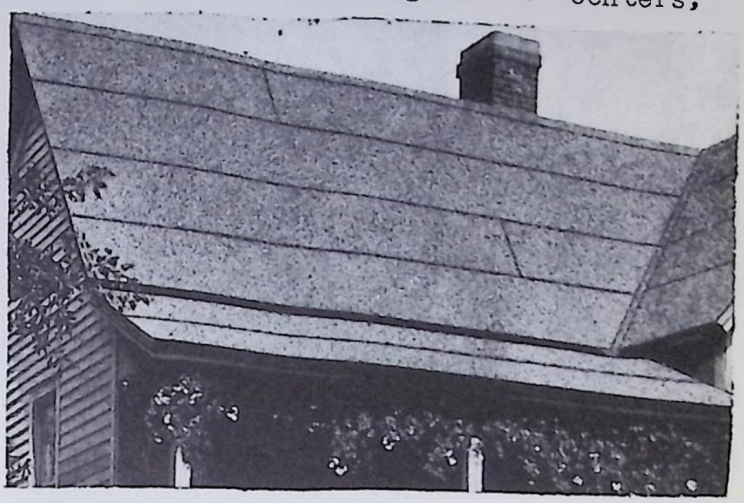


FIG. 7.

Second and Succeeding Courses: Start second course with a sheet cut in half to break vertical joints similar to brickwork; start third course with a whole sheet and continue to alternate in this manner to the ridge. Nail each sheet 3/4" from the upper edge on 12" centers; raise lower edge, apply lap cement on the selvage edge of the sheet already laid and embed upper sheet firmly. Start nailing from center and space nails on 2" centers, 3/4" from lower edge. (See Fig. 7).


J-M Ready-to-Lay Roofings serve effectively on steep-roofed buildings

Horizontal Joints: Lap all horizontal joints 2" over the selvage edge of the sheet below.

Selvage edges are designed for laps; they should not be left exposed.

Thoroughly score the white-surfaced part of any lap joint through to the asphalt layer with a sharp tool, to insure a proper lap-cement bond.

Application on Steep-Pitched Roofs:

First Course: After valley flashing and edging strips are in place, start application of first sheet at top of roof at gable end. Allow selvage edge, (which will later be folded over) to extend 2" above the ridge.

The temporary application of two courses of wood 2x4's laid to a straight chalk line across the roof, 30" and 60" from the top of ridge to their upper edges when applying asbestos roofing, and 34" and 68" for asphalt roofing, will simplify the laying of sheets and permit the workmen to proceed more safely.

Rest the sheets on the 2x4 and nail the upper edge to the ridge on 12" centers. Apply succeeding sheets with end laps or vertical joints in the same manner as described for low-pitched roofs, except that the nailing is postponed until the next lower course is in place.

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JOHNS-MANVILLE Building Materials

J-M Ready-to-Lay Roofings
Application Directions

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BMR-511
TECHNICAL DATA SECTION

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Second and Succeeding Courses: Remove the upper 2x4 and relocate it with its upper edge 30" below the upper edge of the 2x4 in place when applying asbestos roll roofing or 34" below for asphalt roofing.

Start with a half-sheet to break joints and after raising the lower edge of the sheet above, nail upper edge on 12" centers. Continue with succeeding sheets until the course is laid.

Return to starting point, raise upper sheet and apply lap cement to the selvage edge, embed upper sheet firmly and complete the nailing of vertical joints in upper course. Then nail horizontal joints. Space nails as described in instructions on low-pitched roofs. Continue with succeeding courses in same manner, starting alternately with a whole and a half-sheet to break joints.

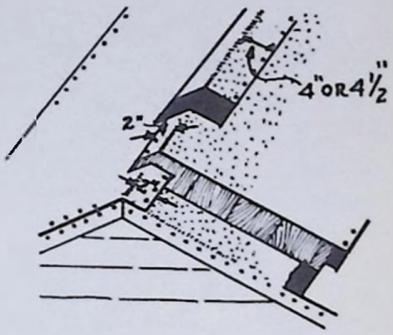
Preventing Wrinkling or Buckling:

As roofing does not stretch, wrinkles or buckles are usually caused by twisting and pulling to keep the proper lap width. This condition may be avoided by snapping a chalk line at the top of each course parallel with the eave or ridge. By pulling the top of the roofing sheet taut while nailing to this chalk line, a smooth roof will result.

Application of Ridge Cap:

Cut asbestos roofing into strips 8" and asphalt roofing 9" wide, in continuous lengths if possible. If joints are necessary they should break near the center of the roof sheet below and lap at least 4".

Carefully bend strip at center so that it will extend 4" or 4-1/2" on either side of ridge. Apply lap cement in a 2"-wide layer and nail on 2" centers, 3/4" from outside edges. (See Fig. 9).



· FIG. 9 ·

Where possible, use ladders and ladder jacks to prevent damage to the finished roof.

Guarding Against Wind Pressure.

Where high winds prevail, or where roof boards are spaced more than 1/2" apart, roofing will be subjected to wind pressure from beneath.

This condition can be considerably relieved by lapping each sheet one-half of its width over the preceding sheet, cementing laps 2" from the exposed edge and spacing nails on 1-1/2" centers, 3/4" from the outside edge. This will provide a doubly strong resistance to wind pressure.

Another method is to lay the roof in the usual manner and reinforce it by applying strips of roofing 2" wide, centered over the rafters, coated with lap cement and nailed on 2" centers at the center of the strip. Cover nail heads and edges with lap cement.

If wind pressure exists while the roofing is being applied, use roofing asphalt, which is melted and applied hot, instead of lap cement. It sets more rapidly and will avoid the danger of laps being blown open.

Where old roof boards are separated, it is recommended that they be removed and relaid close together, or that filler strips be inserted to make the boarding as solid as possible.

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Application of Flashing to Walls:

Cut and bend roofing to fit snugly in the angle and extend 4" up on wall. Cement it thoroughly and nail on 8" centers, 3/4" from upper edge.

A triangular wood strip, placed in the angle will avoid the sharp bend, increase the life of the flashing and divert the flow of water. (See Fig. 10).

Cut counter flashing strip 12" wide, fold and apply in angle, and cement to wall and roof deck.

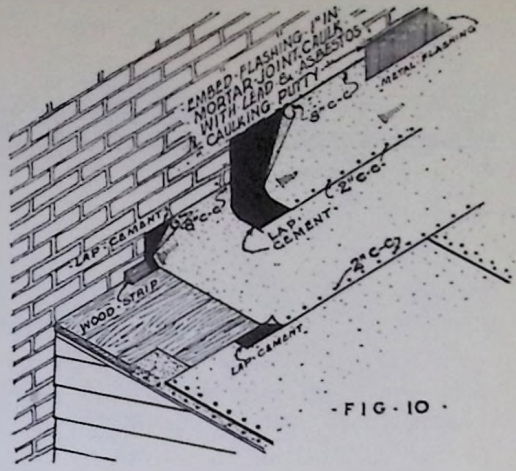


FIG. 10.

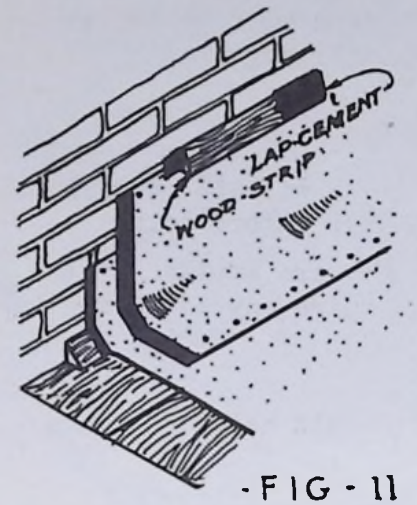


FIG. 11

A metal counter flashing should be used wherever possible. The flashing should be installed as shown in Fig. 10.

Where no metal flashing is provided, secure upper edge of counter flashing by applying a half-round wood moulding or bevel strip securely nailed to wall. Coat this strip with lap cement. Nail lower edge of counter flashing to roof deck, spacing nails on 2" centers, 3/4" from outer edge. (See Fig. 11).

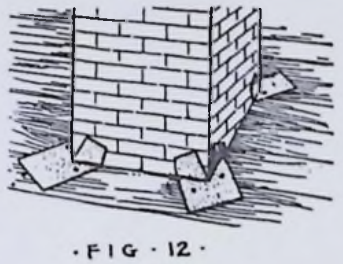
On fire walls, where no metal flashing is provided, instead of the 12" wide counter flashing strip, use a width sufficient to extend up to and under the coping. Cement and nail like counter flashing.

Chimney Flashing:

First apply 4" square pieces of roofing cut and snugly fitted to chimney corners, as shown in Fig. 12.

Proceed to cut and fit roofing sheets (Fig. 13) and install counter flashing in the manner described for wall flashing.

The four pieces of counter flashing required shall be 12" longer than the sides of the chimney and cut, bent and applied as shown in Fig. 14, 15 and 16.


FIG. 12.

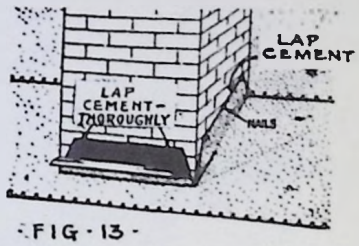


FIG. 13.

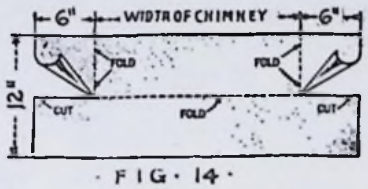
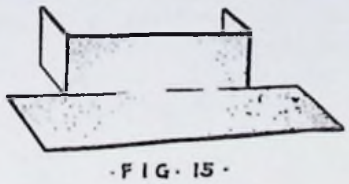


FIG. 14.


FIG. 15.

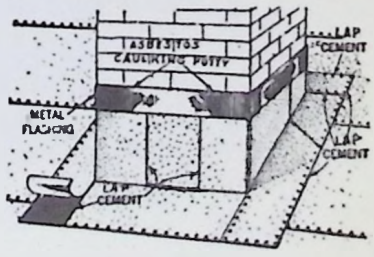


FIG. 16.

Pyramid Kaps:

Pyramid Kaps are used only in the application of smooth-surfaced roofing. They are supplied in strips, zinc or galvanized, both 14-1/4" long.

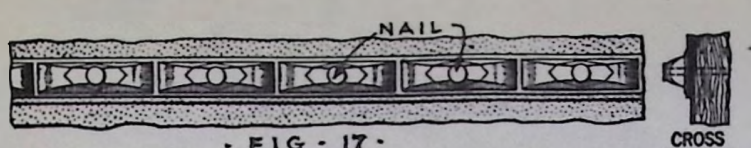
JOHNS-MANVILLE Building Materials	DATE September, 1938 (Cancelling sheet dated Sept., 1937)
J-M Ready-to-Lay Roofings Application Directions	BMR-512

PRINTED IN U.S.A. TECHNICAL DATA SECTION

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Pyramid Kaps are applied butted end to end 1/4" from the outside edge, and nailed in the center of each cap, starting from end of strip. (See Fig. 17).



· FIG · 17 ·

The use of Pyramid Kaps will improve the appearance as well as the wearing quality of the roof.

Application as Siding:

When used as siding for poultry houses, sheds and farm buildings, prepare the wall surface by re-nailing all loose or warped boards, remove any projecting nails or other obstructions, split the rolls in half, lengthwise, and apply vertically with a 2" side lap. Nail on 12" centers, 1/2" from outside edge. When all the siding is applied, cover joints with pre-painted, half-round wood batten strips or secure with Pyramid Kaps, nailed end to end, flush with outer edge.

Painting Asphalt Roofing:

The serviceability of asphalt smooth-surfaced roofing will be indefinitely prolonged if given a coat of J-M Regal Roof Coating at two-year intervals.

Other types of roof coatings are not recommended and are applied at the owner's risk. Asbestos or slate-surfaced roofings do not require any added coating.

Special Precautions:

(a) Plan the horizontal application of sheets to avoid nailing joints between roof boards.

(b) Plan and lay out all flashing before cutting.

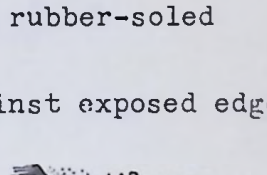
(c) Cover knot holes with pieces of tin before applying roofing.

(d) Drive nails straight. Remove any that enter a joint, and repair hole by inserting a piece of roofing between the sheets, cement it on both sides and nail it in a solid bearing. Do not nail through a single thickness of roofing.

(e) Select a warm, clear day, when roof is dry and wear rubber-soled shoes to prevent damage to roofing.

(f) Construct laps so that the water runs over, not against exposed edges. Thoroughly cement all laps.

(g) Inspect roof carefully when completely applied. Remove any loose nails and repair any tears or nail holes. Thoroughly seal all exposed edges and nail-heads with lap cement. (See Fig. 13). Pyramid Kaps do not require any coating of lap cement, except where unusual conditions, such as gases or acid fumes exist.



· FIG · 18 ·

(h) Liquid lap cement works best while lukewarm. If it chills and thickens, place cans in a warm place or set them in hot water. As it is inflammable, do not expose it to flame. If open cans have dried out, add naphtha and stir until the cement is of proper consistency.

(i) For re-roofing over wood shingles, use 1-1/2" nails.

(j) Avoid walking on a finished roof more than is absolutely essential.

(k) Leaks can usually be located from the inside. As the roofing material itself is positively waterproof, unless damaged, leaks will always occur in the laps, joints or flashings, and with care can be located at these points.

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SS-R-521
AUGUST 1, 1933
SUPERSEDING
F.S. No. 296
May 20, 1925

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

ROOFING AND SHINGLES; ASPHALT-PREPARED, MINERAL-SURFACED

This specification was approved for promulgation by the Federal Specifications Board on August 1, 1933, for the use of the departments and independent establishments of the Government in the purchase of this commodity, and shall become mandatory for all departments and independent establishments of the Government not later than February 1, 1934. It may be put into effect, however, at any earlier date, after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A-1. There are no other Federal specifications applicable to this specification.

A-2. Any special requirements of the individual departments of the Government are noted under section H.

B. TYPES

B-1. Mineral-surfaced prepared roofing shall be of the following types. (The type or types desired shall be specified in the invitation for bids.)

Type I. Mineral-surfaced asphalt prepared, ready or roll roofing.
Type II. Mineral-surfaced asphalt shingles.

C. MATERIAL

C-1. Mineral-surfaced asphalt prepared roofing and shingles shall be composed of roofing felt made of organic fibers saturated and coated on both sides with asphalt and surfaced on the side to be exposed to the weather with mineral granules. The other side may be dusted with talc or mica to prevent sticking in the package.

D. GENERAL REQUIREMENTS

D-1. *Basis of purchase.*

D-1a. Basis of purchase shall be by the roll or by the square (to cover 100 square feet) according to agreement between purchaser and seller.

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D-2. *Color and appearance.*—The mineral granules shall be distributed uniformly over the entire surface (except as noted below) and when so specified the color shall substantially match a sample mutually agreed upon by buyer and seller. The coating and surfacing must extend to the edge of the sheet of roofing or of the shingles, except that roll roofing may have an unsurfaced lapping edge approximately 2 inches wide along one side of the sheet. The edges of the sheet of roofing or of the shingle shall not be ragged. Satisfactory roofing will not stick and will be free from visible external defects, such as holes, ragged or untrue edges, rents, cracks, indentations, or lumps of coating.

D-3. *Trimmings.*—If desired, trimmings shall be as specified in order ----------.

D-4.—*Physical and chemical requirements* applicable to both types of roofing.

	Maximum	Minimum
Heat test at 80° C. (176° F.) (sliding, blistering, absorption of the surface coating or loss of mineral granules)	----------	None
Volatile matter at 80° C. (176° F.) (percent)	1½	----------
Weight of moisture-free desaturated felt per 108 square feet (pounds)	----------	10. 8
Thickness of desaturated felt (inch)	----------	0. 05
Total weight of organic fibers and bitumen per 108 square feet (pounds)	----------	45

E. DETAIL REQUIREMENTS

E-1. *Requirements applicable to type I roofing.*—Width (inches), 36 (±¼ inch), or 32 (±¼ inch), as called for.

	Maximum	Minimum
Area of roll—square feet	----------	108
Weight per roll of wrapping, packing, nails, and cement—pounds	5	----------
Weight per 108 square feet of roofing—do	----------	80
Pliability at 25° C. (77° F.). (cracking on bending 90 degrees over a rounded edge of ¾-inch radius)	None	----------
Saturation of felt—percent	----------	160
Nails (zinc coated):		
Gauge of wire	12	10
Diameter of heads—inch	----------	9/16
Thickness of heads—do	----------	0. 025
Length of shank—do	1	¾
Number per 108 square feet of 36-inch roofing	----------	250
Number per 108 square feet of 32-inch roofing	----------	275

Lap cement.—The lap cement shall be of such nature as to firmly bind the laps without injurious effect upon the roofing. It shall consist of a suitable bituminous material dissolved in a volatile

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solvent. Not less than three fourths of a pint per 108 square feet shall be furnished for 36-inch roofing and not less than 1 pint per 108 square feet for 32-inch roofing.

E-2. *Requirements applicable to type II roofing.*—The size and form of the shingles shall be as specified in the invitation for bids and they shall also meet the following requirements:

	Maximum	Minimum
Weight per 108 square feet, pounds		83
Saturation of felt, percent		175

Nails.—Nails shall be as specified for type I roofing except that they shall be 1 inch long when the shingles are laid on solid sheathing and 1½ to 1¾ inches long when laid over old shingles. Nails for shingles shall be purchased separately and the number required will depend upon the size and form of the shingles and shall be agreed upon by the purchaser and seller.

F. METHODS OF INSPECTION, DETERMINATION OF WEIGHT AND WIDTH, SAMPLING AND TESTING

Deliveries will, in general, be sampled and tested by the following methods, but the purchaser reserves the right to use any additional information to ascertain whether the material meets the specification.

F-1. *Sampling for inspection.*—From each shipment select at random rolls of roofing or packages of shingles equivalent to the cube root of the total number included in the lot. If the cube root is a fractional number, express it as the next higher digit.

F-2. *Determination of weight and width.*—The weight per 108 square feet of material, and its variation in weight: The width of roll roofing and its variation must be determined by the inspector and the results transmitted to the testing laboratory with the sample. Material which does not conform to the specification in these respects should be rejected by the inspector and only deliveries which conform in these respects sampled for laboratory tests.

F-2a. *Type I mineral-surfaced asphalt prepared roofing.*—Remove the wrappers, other packing material, nails, and cement from each roll selected and weigh the roll and the packing material, etc., separately to the nearest one-fourth pound. Then unwind each roll and measure the length and width of the rectangular portion of the roll to the nearest one-fourth inch and reroll. Observe the appearance of the roofing while unrolling and rerolling. The mineral granules should be uniformly distributed over the entire surface (except as noted below) and when so specified the color shall substantially match the sample mutually agreed upon by buyer and seller. The coating and surfacing may extend to the edge of the sheet of roofing, but an unsurfaced lapping edge approximately 2 inches wide along one side is permissible. The edges of the sheet should not be ragged. Compute the area, and the weight per 108 square feet of each roll taken. Should the weight of any roll per 108

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square feet be less than the minimum weight specified, 80 pounds, it shall be cause for rejection of the whole shipment. Compute also the weight of the packing materials, nails, and cement.

F-2b. *Type II mineral-surfaced asphalt shingles.*—Remove the wrappers and other packing material from each package of shingles taken and weigh the shingles and also the packing material to the nearest one-fourth pound. Count the number of shingles or strips in each package taken, compute the area, and from these results and the weight compute the weight per 108 square feet. A minimum weight of less than 83 pounds shall be cause for rejection of the whole shipment. Observe the color and general appearance of the shingles while counting them and compare with the mutually agreed upon sample. The mineral granules should be uniformly distributed over the entire surface of the shingles. The coating and surfacing should extend to the edge of each shingle. The edges should not be ragged. No patches of coating should show through the mineral surfacing nor should the coating be broken from the edges. The shingles should be of the specified shape and should not stick together in the package to such an extent as to injure the coating when unpacked.

F-3. *Sampling for laboratory examination.*—

F-3a. *Type I mineral-surfaced asphalt prepared roofing.*—From the rolls examined for sampling, select one, the weight of which is near the average weight of the lot. Unroll, and at approximately 10 feet from the end cut two samples the full width of the roll and approximately 40 inches long, label, roll carefully, but do not crease, wrap, and transmit one to the testing laboratory. Retain the other for use in case of dispute.

F-3b. *Type II mineral-surfaced asphalt shingles.*—For sampling take, in the case of individual shingles, two shingles from each package examined or, in the case of strip shingles, one strip from each two packages examined. Carefully wrap, label, and transmit to the testing laboratory. The sample submitted to the laboratory shall contain at least six individual shingles or two strips. Samples similar to those transmitted to the testing laboratory should be taken and retained for use in case of dispute.

F-4. *Laboratory examination.*—

F-4a. *Color and appearance.*—Examine both sides of the roofing or shingles and note the color and general appearance and compare them with the mutually agreed upon sample.

F-4b. *Weight.*—

F-4b (1). *Type I mineral-surfaced asphalt prepared roofing.*—Trim the sample so that it is 36 inches long and the full width of the roll (except that material having an unsurfaced lapping edge shall have that edge trimmed off). Measure accurately and weigh to the nearest gram (15 grains). From the measurements and weight so obtained compute the weight per 108 square feet. The weight so determined is only to be used in making the laboratory calculations and shall not be used as a basis for acceptance or rejection (see F-2).

F-4b (2). *Type II mineral-surfaced asphalt shingles.*—Weigh each shingle or strip submitted to the nearest gram (15 grains); measure

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to the nearest one sixteenth inch and from the weights and area so obtained compute the weight per 108 square feet. The weight so determined is only to be used in making laboratory calculations and shall not be used as a basis for acceptance or rejection (see F-2).

F-4c. *Pliability (type I only).*—Cut five strips 1 inch wide and 6 inches long in the direction of the fiber grain and immerse them in water at 25° C. (77° F.) for 10 to 15 minutes.

Remove the strips from the water and immediately bend each strip with the exposure side up, 90 degrees over the edge of a block (which has been rounded to a radius of ¾ inch), at a uniform speed, in approximately 2 seconds time. Dry thoroughly and examine.

If 1 or more of these 5 strips crack on this test, cut 10 strips from another part of the sample and repeat the test. If one or more of these strips crack, the material is reported as failing on the pliability test.

F-4d. *Behavior on heating at 80° C. (176° F.) for two hours.*—Cut two strips from the roofing or shingles approximately 8 inches by 8 inches, weigh, and suspend vertically for two hours in an oven at 80° C. (176° F.), plus or minus 3° C. (5° F.). Remove at the end of this period and note any flowing, sagging, blistering, or absorption of the surface coating. Cool, weigh, and compute the loss in weight.

F-4e. *Weight of moisture-free, desaturated felt.*—Cut two strips approximately 2 inches wide and 8 inches long from the roofing, weigh accurately and extract with benzol [1] in a suitable extraction apparatus until the benzol runs through colorless and contains no soluble material. The roofing may be cut into squares approximately 1 inch on each side in case an extraction apparatus of sufficient size to accomodate the whole strips is not available. Retain the extract for any mineral matter it may contain. Remove the desaturated felt from the extractor, dry in air until free from the odor of benzol, and brush off any adhering mineral matter, retaining it with the mineral matter in the extractor. Place the desaturated felt in a tared weighing bottle, dry in an oven at 105° to 110° C. (221° to 230°F.) for one half hour, cool in a desiccator, and weigh. Calculate the percentage of moisture-free desaturated felt in the sample taken for extraction and compute the weight of moisture-free desaturated felt per 108 square feet from the weight obtained in F-4b.

F-4f. *Thickness of desaturated felt.*—Cut one of the strips of felt obtained in F-4d into four equal portions and caliper each piece at four equally spaced points at least three quarters of an inch from a cut edge with a micrometer having flat bearing surfaces, or if the strips were cut into pieces in F-4d take at random 16 pieces of the felt and caliper each piece at its center. Average the readings.

F-4g. *Total weight of organic fiber and bitumen.*—Combine the mineral matter from the extractor and from the surface of the desaturated felt with that obtained by the filtration or evaporation and ignition of the benzol extract from F-4e, dry in air until free from the odor of benzol, heat for one half hour in an oven at 105° to 110° C. (221° to 230° F.), cool and weigh. Calculate the percentage of mineral

[1] Carbon tetrachloride, chloroform or carbon bisulphide will usually give the same results but benzol should be used in case of dispute.

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matter in the sample taken for extraction and compute the total mineral matter per 108 square feet from the weight obtained in F-4b. Subtract this weight from the weight computed in F-4b.

F-4h. *Saturation of felt.*—Cut two strips of the original roofing or shingle approximately 2 inches wide and 8 inches long and warm them in an oven at about 80° C. (176° F.). Strip off the surfacing and coatings, taking care that as little as possible of the saturated felt is removed with the coatings, and that none of the coatings adhere to the felt. Weigh the saturated felt obtained and extract in a suitable extractor with benzol [2] until the benzol runs through colorless and contains no soluble material.

Remove the desaturated felt from the extractor and dry in air until free from the odor of benzol. Place in a tared weighing bottle, dry at 105° to 110° C. (221° to 230° F.) for one half hour and weigh. From the weight obtained and the original weight compute the percentage saturation of the moisture-free felt as follows:

$$\frac{\text{Weight of saturated felt} - \text{Weight of desaturated felt}}{\text{weight of desaturated felt}} \times 100 = \text{percentage saturation of moisture-free felt.}$$

G. PACKAGING, PACKING, AND MARKING

G-1. *Packaging.*—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. *Packing.*

G-2a. The roofing shall be put up in rolls of 108 square feet. No roll shall contain more than two pieces of roofing, nor shall there be more than 3 percent of rolls containing two pieces in any shipment. The rolls shall be tightly wound and securely wrapped in a substantial grade of paper. The wrapper shall completely encircle the roll and shall be pasted at the overlap in a manner which will prevent it shifting from position. The ends of the roll shall be protected with metal caps, cloth, or other suitable means. The nails and lap-cement shall be furnished either in each roll or in bulk, as specified in the order. When furnished in bulk, the cloth or metal ends may be omitted. Rolls for export shipment shall be packed as agreed upon by the purchaser and seller.

G-2b. Shingles shall be packed in bundles weighing not more than 135 pounds gross. The bundles shall either be packed in cardboard cartons or between wooden or cardboard ends and tied with rope, wire or steel bands so as to make a substantial package, as may be agreed upon by the purchaser and seller.

G-3. *Marking.*—Each package or roll shall be legibly marked with a description of the contents, the name of the manufacturer, the place of manufacture, the brand (if any), the net weight of the contents, and some means of identification of "the particular contract on which purchase and shipment were made". Each shipment of the material shall be accompanied by printed directions for its use.

[2] See note under F-4a.

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SS-R-501
AUGUST 1, 1933
SUPERSEDING
F.S. No. 214
September 30, 1924

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

ROOFING; ASPHALT-PREPARED, SMOOTH-SURFACED

This specification was approved for promulgation by the Federal Specifications Board on August 1, 1933, for the use of the departments and independent establishments of the Government in the purchase of this commodity, and shall become mandatory for all departments and independent establishments of the Government not later than February 1, 1934. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A-1. There are no other Federal specifications applicable to this specification.

A-2. Special requirements of individual departments of the Government are noted under section H.

B. GRADES

B-1. Smooth-surfaced prepared roofing shall be of the following grades. (The grade or grades desired shall be specified in the invitation for bids.)

Grade A.—Heavy weight.
Grade B.—Medium weight.

C. MATERIAL

C-1. This asphalt-prepared roofing shall be composed of roofing felt made of organic fibers, saturated and coated on both sides with asphaltic compounds and surfaced with finely powdered talc or mica, which must prevent sticking in the rolls.

D. GENERAL REQUIREMENTS

D-1. Basis of purchase shall be by the roll (to cover 100 or 200 square feet, according to agreement between purchaser and the seller).

E. DETAIL REQUIREMENTS

E-1. *Appearance.*—The surface in both grades of roofing shall be smooth or finely veined in appearance. Deeply ribbed roofing will

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not be acceptable. The coating shall be uniformly applied on both sides and up to the edge of the sheet, and no uncoated spots or defects—such as blisters or large lumps of coating—shall be perceptible.

E-2. *Physical and chemical requirements.*—

Width, inches, 36±¼ or 32±¼, as specified	Grade A		Grade B	
	Max.	Min.	Max.	Min.
Area of roll—square feet		108 / 216		108 / 216
Average gross weight per 108 square feet—pounds		55		45
Weight per roll of wrapping, packing, nails, and cement—pounds	3		3	
Weight per 108 square feet of roofing—pounds		50		40
Pliability at 25° C. (77° F.) (cracking on bending 90° over a rounded edge of ¾-inch radius)		None		None
Heat test at 80° C. (176° F.) (sliding, blistering, or absorption of the surface coating)		None		None
Weight of moisture-free desaturated felt per 108 square feet—pounds		13.5		10.8
Thickness of desaturated felt—inch		0.060		0.048
Weight of total ash of roofing per 108 square feet—pounds	9		9	
Saturation of felt—percent		[1] 160		[1] 150
Nails (zinc-coated):				
Gage of wire	12	10½	12	10½
Diameter of heads—inch		⅜		⅜
Thickness of heads—do		0.025		0.025
Length of shank—do	1	¾	1	¾
Number per 108 square feet of 36-inch roofing		250		250
Number per 108 square feet of 32-inch roofing		275		275

[1] The sheet of felt shall be thoroughly and uniformly saturated.

E-3. *Lap cement.*—The lap cement shall be of such nature as firmly to bind the laps without injurious effect upon the roofing. It shall consist of a suitable bituminous material dissolved in a volatile solvent. Not less than three fourths of a pint per 108 square feet shall be furnished for 36-inch roofing and not less than one pint per 108 square feet for 32-inch roofing.

F. METHODS OF INSPECTION, DETERMINATION OF WEIGHT AND WIDTH, SAMPLING, AND TESTING

Deliveries will, in general, be sampled and tested by the following methods, but the purchaser reserves the right to use any additional information to ascertain whether the material meets the specification.

F-1. *Sampling for inspection.*—From each shipment take at random rolls of roofing equivalent to the cube root of the total number included in the lot. If the cube root is a fractional number, express it as the next higher digit.

F-2. *Determination of weight and width.*—The weight per 108 square feet of material, and its variation in weight: The width and its variation must be determined by the inspector and the results transmitted to the testing laboratory with the sample. Material

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which does not conform to the specification in these respects should be rejected by the inspector and only deliveries which conform in these respects sampled for laboratory tests.

F-2a. Remove the wrappers, other packing material, nails, and cement from each roll selected and weigh the roll and the packing material, etc., separately to the nearest one-fourth pound. Then unwind each roll and measure the length and width of the rectangular portion of the roll to the nearest one fourth inch, and reroll. Observe the appearance of the roofing while unrolling and rerolling. Satisfactory roofing will not stick and will be free from visible external defects, such as holes, ragged or untrue edges, breaks, rents, cracks, indentations, or lumps of coating. Unless the coating covers both sides and extends to the edge of the sheet, the material should be rejected.

Compute the area and weight per 108 square feet of each roll selected, and from these weights compute the average weight of the shipment. Should the weight of any 108 square feet be less than the minimum weight specified (40 pounds for medium and 50 pounds for heavy) it shall be cause for the rejection of the whole shipment. Compute also the average weight of the packing materials, nails, and cement.

F-3. *Sampling for laboratory examination.*—From the rolls examined for sampling, select one, the weight of which is near the average weight of the lot. Unroll, and at approximately 10 feet from the end cut two samples the full width of the roll and approximately 40 inches long, label, roll carefully, but do not crease, wrap, and transmit one to the testing laboratory. Retain the other for use in case of dispute.

F-4. *Laboratory examination.*—

F-4a. *Weight.*—Trim the sample so that it is 36 inches long and the full width of the roll. Measure accurately and weigh to the nearest gram (15 grains). From the measurements and weight so obtained compute the weight per 108 square feet. The weight so determined is only to be used in making the laboratory calculations and shall not be used as a basis for acceptance or rejection. (See F-2.)

F-4b. *Appearance.*—Examine both sides of the sample and note the appearance. The coating should extend to the edge of the sheet, which should not be ragged. No uncoated spots or defects, such as blisters or large lumps of coating, should be perceptible.

F-4c. *Pliability.*—Cut five strips 1 inch wide and 6 inches long in the direction of the fiber grain and immerse them in water at 25° C. (77° F.) for 10 to 15 minutes. Remove the strips from the water and immediately bend each strip, with the exposure side up, 90° over the edge of a block (which has been rounded to a radius of ¾ inch) at a uniform speed, in approximately 2 seconds' time. Dry thoroughly and examine. If one or more of these five strips crack on this test, cut 10 strips from another part of the sample and repeat the test. If one or more of these strips crack, the material is reported as failing on the pliability test.

F-4d. *Behavior on heating at 80° C. (176° F.) for five hours.*—Cut a strip of the roofing approximately 8 by 8 inches and suspend it vertically for five hours in an oven maintained at 80° C. (176° F.)

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plus or minus 3° C. (5° F.). Remove at the end of this period, and note any flowing, sagging, blistering, or absorption of the surface coating.

F-4e. *Weight of moisture-free, desaturated felt.*—Cut two strips approximately 2 inches wide and 8 inches long from the roofing, weigh accurately, and extract with benzol (carbon tetrachloride, chloroform or carbon bisulphide will usually give the same results, but benzol should be used in case of dispute) in a suitable extraction apparatus until the benzol runs through colorless and contains no soluble material. The roofing may be cut into squares approximately 1 inch on each side in case an extraction apparatus of sufficient size to accommodate the whole strips is not avilable. Remove the desaturated felt from the extractor, dry in air until free from the odor of benzol, and brush off any adhering mineral matter. Place the desaturated felt in a tared weighing bottle, dry in an oven at 105° to 110° C. (221° to 230° F.) for one half hour, cool in a desiccator, and weigh. Calculate the percentage of moisture-free desaturated felt in the sample taken for extraction and compute the weight of moisture-free desaturated felt per 108 square feet from the weight obtained in F-4a.

F-4f. *Thickness of desaturated felt.*—Cut one of the strips of felt obtained in F-4e into four equal portions and caliper each piece at four equally spaced points at least three quarters of an inch from a cut edge with a micrometer having flat bearing surfaces, or if the strips were cut into pieces in F-4e take at random 16 pieces of the felt and caliper each piece at its center. Average the readings.

F-4g. *Total ash of roofing.*—Cut two strips of the roofing approximately 2 inches wide and 8 inches long into squares about 1 cm on each side and mix thoroughly. Take at random enough pieces to weigh about 10 grams, dry in an oven at 105° to 110° C. (221° to 230° F.) for one half hour, cool in a desiccator, weigh accurately, and incinerate in a weighed crucible in a muffle furnace or over an open flame until all of the carbon is consumed. Cool, weigh, and calculate the percentage ash of the roofing and compute the weight per 108 square feet from the weight obtained in F-4a.

F-4h. *Saturation of felt.*—Cut two strips of the original roofing approximately 2 inches wide and 8 inches long and warm them in an oven at about 80° C. (176° F.). Strip off the surfacing and coatings, taking care that as little as possible of the saturated felt is removed with the coatings and that none of the coatings adhere to the felt. Weigh the saturated felt obtained and extract in a suitable extractor with benzol (see F-4e) until the benzol runs through colorless and contains no soluble material.

Remove the desaturated felt from the extractor and dry in air until free from the odor of benzol. Place in a tared weighing bottle, dry at 105° to 110° C. (221° to 230° F.) for one half hour, and weigh. From the weight obtained and the original weight compute the percentage saturation of the moisture-free felt as follows:

$$\frac{\text{Weight of saturated felt} - \text{weight of desaturated felt}}{\text{Weight of desaturated felt}} \times 100 = \text{percentage saturation of moisture-free felt}$$

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Cut three 2-inch strips of the roofing at random across the entire sheet and split them open for their full length. The felt so exposed shall be uniformly saturated, showing no gray or unsaturated spots.

G. PACKAGING, PACKING, AND MARKING

G-1. *Packaging.*—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. *Packing.*—The asphalt-prepared roofing shall be put up in rolls of 108 or 216 square feet as specified in the order. No roll shall contain more than two pieces of roofing nor shall there be more than 3 percent of such rolls in a shipment. The rolls shall be tightly wound and their ends shall be protected with metal caps, scrap roofing cloth, or other suitable means. The wrapper shall be of a substantial grade of paper of the same width of the fabric and shall completely encircle the roll.

G-3. *Marking.*—Each package shall be legibly marked with a description of the contents, the name of the manufacturer, the place of the manufacture, the brand (if any), the net weight of the contents, and some means of identification of "the particular contract on which purchase and shipment were made." Each roll shall contain printed directions for laying. Nails and lap cement shall be furnished either in each roll or in bulk, as specified in the contract.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications, of the issue in effect on date of invitation for bids, shall respectively form a part of this specification.

H-1a. ARMY: United States Army Specification No. 100-2, Standard Specification for Marking Shipments.

H-1b. NAVY DEPARTMENT purchases will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y, Roofing, Siding, and Sheet-metal Work; dampproofing and membrane waterproofing; copies of which may be obtained without cost upon application to the Bureau of Yards and Docks, Navy Department, Washington, D.C.

I. NOTES

I-1. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-2. This material is intended primarily for use on temporary buildings.

I-3. This specification governs all United States Government purchases of this commodity. Users are requested to retain this specification in permanent file until a revision is issued.

I-4. Interested parties are advised that an alphabetical Index of Federal Specifications may be obtained upon application.

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SS-R-511

AUGUST 1, 1933

SUPERSEDING
F.S. No. 423
July 9, 1926

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

ROOFING; ASPHALT AND ASBESTOS-PREPARED, MINERAL-SURFACED

This specification was approved for promulgation by the Federal Specifications Board on August 1, 1933, for the use of the departments and independent establishments of the Government in the purchase of this commodity, and shall become mandatory for all departments and independent establishments of the Government not later than February 15, 1934. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A-1. There are no other Federal specifications applicable to this specification.

A-2. Any special requirements of the individual departments of the Government are noted under section H.

B. TYPE

B-1. Mineral-surfaced, asphalt, and asbestos-prepared roofing shall be of one type only.

C. MATERIAL

C-1. This prepared roofing shall be composed of asbestos roofing felt, containing at least 85 percent of asbestos fiber, saturated and coated with asphaltic compounds. One side shall be surfaced with mineral granules. The other side may be dusted with talc or mica to prevent sticking in the rolls.

D. GENERAL REQUIREMENTS

D-1. *Basis of purchase.*—

D-1a. Basis of purchase shall be by the roll or by the square (to cover 100 or 200 square feet) according to agreement between purchaser and the seller.

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E. DETAIL REQUIREMENTS

E-1. *Color and appearance.*—The mineral granules shall be uniformly distributed over the entire surface (except as noted below) and when so specified the color shall substantially match a sample mutually agreed upon by buyer and seller. The coating and mineral surfacing must extend to the edge of the sheet on one side and may have an unsurfaced lapping edge approximately 2 inches wide on the other side. The edges of the sheet shall not be ragged.

E-2. *Physical and chemical requirements.*—

Width, inches, $36 \pm \frac{1}{4}$ or $32 \pm \frac{1}{4}$, as called for

	Maximum	Minimum
Area of roll—square feet		108
Weight per roll of wrapping, packing, nails, and cement—pounds	5	
Weight per 108 square feet of roofing—pounds		80
Heat test at 80° C. (176° F.) (sliding, blistering, absorption of the surface coating, or loss of mineral granules)		None
Volatile matter at 80° C. (176° F.)—percent	1½	
Weight of moisture-free desaturated felt per 108 square feet—pounds		18
Thickness of desaturated felt—inch		0.045
Ash of desaturated felt—percent		70
Composition of felt: Asbestos fiber, percent (remainder may be hair, cotton rags or linters, starch or other suitable binding materials)		85
Saturation of felt—percent		60
Weight of material other than mineral surfacing, and mineral matter in the coating per 108 square feet—pounds		45
Nails (zinc-coated):		
Gage of wire	12	10
Diameter of heads—inch		3/8
Thickness of heads—inch		0.025
Length of shank—inch	1	¾
Number per 108 square feet of 36-inch roofing		250
Number per 108 square feet of 32-inch roofing		275

E-3. *Lap cement.*—The lap cement shall be of such nature as to firmly bind the laps without injurious effect upon the roofing. It shall consist of a suitable bituminous material dissolved in a volatile solvent. Not less than three fourths of a pint per 108 square feet shall be furnished for 36-inch roofing and not less than one pint per 108 square feet for 32-inch roofing.

F. METHODS OF INSPECTION, DETERMINATION OF WEIGHT AND WIDTH, SAMPLING, AND TESTING

Deliveries will, in general, be sampled and tested by the following methods, but the purchaser reserves the right to use any additional information to ascertain whether the material meets the specification.

F-1. *Sampling for inspection.*—From each shipment select at random rolls of roofing equivalent to the cube root of the total number included in the lot. If the cube root is a fractional number, express it as the next higher digit.

F-2. *Determination of weight and width.*—The weight per 108 square feet of material and its variation in weight: The width and its variation must be determined by the inspector and the results

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transmitted to the testing laboratory with the sample. Material which does not conform to the specification in these respects should be rejected by the inspector and only deliveries which conform in these respects sampled for laboratory tests.

F-2a. Remove the wrappers, other packing material, nails and cement from each roll selected and weigh the roll and the packing material, etc., separately to the nearest one fourth pound. Then unwind each roll and measure the length and width of the rectangular portion of the roll to the nearest ¼ inch and reroll. Observe the appearance of the roofing while unrolling and rerolling. Satisfactory roofing will not stick and will be free from visible external defects, such as holes, ragged or untrue edges, breaks, rents, cracks, indentations, or lumps of coating. The mineral granules should be uniformly distributed over the entire surface (except as noted below), and when so specified the color should substantially match the mutually agreed-upon sample. The coating and surfacing may extend to the edge of the sheet of roofing, but an unsurfaced lapping edge approximately 2 inches wide along one side is permissible. The edges of the sheet should not be ragged. Compute the area and weight per 108 square feet of each roll taken. Should the weight of any roll per 108 square feet be less than the minimum weight specified, 80 pounds, it shall be cause for the rejection of the whole shipment. Compute also the average weight of the packing materials, nails, and cement.

F-3. *Sampling for laboratory examination.*—From the rolls examined for sampling, select one, the weight of which is near the average weight of the lot. Unroll and, at approximately 10 feet from the end, cut two samples the full width of the roll and approximately 40 inches long, label, roll carefully but do not crease, wrap, and transmit one to the testing laboratory. Retain the other for use in case of dispute.

F-4. *Laboratory examination.*—

F-4a. *Color and appearance.*—Examine both sides of the roofing and note the color and general appearance and compare them with the mutually agreed upon sample.

F-4b. *Weight.*—Trim the sample so that it is 36 inches long and the full width of the roll (except that material having an unsurfaced lapping edge shall have that edge trimmed off). Measure accurately and weigh to the nearest gram (15 grains). From the measurements and weights so obtained compute the weight per 108 square feet. The weight so determined is only to be used in making the laboratory calculations and shall not be used as a basis for acceptance or rejection.

F-4c. *Behavior on heating at 80° C. (176° F.) for 2 hours.*—Cut two strips from the roofing approximately 8 by 8 inches, weigh, and suspend vertically for 2 hours in an oven at 80° C. (176° F.) plus or minus 3° C. (5° F.). Remove at the end of this period and note any flowing, sagging, blistering, or absorption of the surface coating. Cool, weigh, and compute the loss in weight.

F-4d. *Weight of moisture-free, desaturated felt.*—Cut two strips approximately 2 inches wide and 8 inches long from the roofing,

weigh accurately, and extract with benzol [1] in a suitable extraction apparatus until the benzol runs through colorless and contains no soluble material. The roofing may be cut into squares approximately one inch on each side in case an extraction apparatus of sufficient size to accommodate the whole strip is not available. Retain the extract for any mineral matter it may contain. Remove the desaturated felt from the extractor, dry in air until free from the odor of benzol and brush off any adhering mineral matter, retaining it with the mineral matter in the extractor. Place the desaturated felt in a tared weighing bottle, dry in an oven at 105° to 110° C. (221° to 230° F.) for one half hour, cool in a desiccator, and weigh. Calculate the percentage of moisture-free, desaturated felt in the sample taken for extraction and compute the weight of moisture-free desaturated felt per 108 square feet from the weight obtained in F-4b.

F-4e. *Thickness of desaturated felt.*—Cut one of the strips of felt obtained in F-4d into four equal portions and caliper each piece at four equally spaced points at least three fourths of an inch from a cut edge with a micrometer having flat bearing surfaces or, if the strips were cut into pieces in F-4d, take at random 16 pieces of the felt and caliper each piece at its center. Average the readings.

F-4f. *Ash of moisture-free desaturated felt.*—Cut the desaturated felt obtained in F-4d into squares about 1 cm on each side and mix thoroughly. Take at random enough pieces to weigh about 10 grams, dry in an oven at 105° to 110° C. (221° to 230° F.) for one half hour, cool in a desiccator, weigh accurately, and incinerate in a weighed crucible in a muffle furnace or over an open flame until all of the carbon is consumed. Cool, weigh, and compute the percentage ash of the moisture-free desaturated felt.

F-4g. *Material other than mineral surfacing and mineral matter in the coating per 108 square feet.*—Combine the mineral matter from the extractor and from the surface of the desaturated felt with that obtained by the filtration or evaporation and ignition of the benzol extract from F-4d, dry in air until free from the odor of benzol, heat for one half hour in an oven at 105° to 110° C. (221° to 230° F.), cool, and weigh. Calculate the percentage of mineral matter other than in the felt in the sample taken for extraction and compute this total mineral matter per 108 square feet from the weight obtained in F-4b. This weight, plus the weight of moisture-free desaturated felt subtracted from the weight obtained in F-4b, is the weight of material other than mineral matter in 108 square feet of roofing.

F-4h. *Saturation of felt.*—Cut two strips of the original roofing approximately 2 inches wide and 8 inches long and warm them in an oven at about 80° C. (176° F.). Strip off the surfacing and coatings, taking care that as little as possible of the saturated felt is removed with the coatings and that none of the coatings adhere to the felt. Weigh the saturated felt obtained and extract in a suitable extractor with benzol [1] until the benzol runs through colorless and contains no soluble material.

[1] Carbon tetrachloride, chloroform, or carbon bisulphide will usually give the same results, but benzol should be used in case of dispute.

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Remove the desaturated felt from the extractor and dry in air until free from the odor of benzol. Place in a tared weighing bottle, dry at 105° to 110° C. (221° to 230° F.) for one half hour, and weigh. From the weight obtained and the original weight compute the percentage saturation of the moisture-free felt as follows:

$$\frac{\text{Weight of saturated felt} - \text{Weight of desaturated felt}}{\text{Weight of desaturated felt}} \times 100$$
$$= \text{Percentage saturation of moisture-free felt}$$

G. PACKAGING, PACKING, AND MARKING

G-1. *Packaging.*—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. *Packing.*—The prepared roofing shall be put up in rolls of 108 square feet. No rolls shall contain more than two pieces of roofing nor shall there be more than 3 percent of such rolls in a shipment. The rolls shall be tightly wound and their ends shall be protected with metal caps, scrap roofing cloth, or other suitable means. The wrapper shall be of a substantial grade of paper of the same width of the fabric and shall completely encircle the roll.

G-3. *Marking.*—Each package shall be legibly marked with a description of the contents, the name of the manufacturer, the place of manufacture, the brand (if any), the net weight of the contents, and some means of identification of "the particular contract on which purchase and shipment were made." Each roll shall contain printed directions for laying. Nails and lap cement shall be furnished either in each roll or in bulk, as specified in the contract. Roofing for export shipment shall be packed as mutually agreed upon by purchaser and seller.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications, of the issue in effect on date of invitation for bids, shall respectively form a part of this specification.

H-1a. ARMY: United States Army Specification No. 100-2, standard specification for marking shipments.

H-1b. NAVY DEPARTMENT PURCHASES will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y, Roofing, Siding, and Sheet-Metal Work; Damp-proofing and Membrane Waterproofing, copies of which may be obtained without cost upon application to the Bureau of Yards and Docks, Navy Department, Washington, D.C.

I. NOTES

I-1. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

J-M Building Papers and Felts

Asbestos Slaters Felt:

A high-grade asbestos product used as a sheathing felt and as a liner under shingles, tile or slate. The asphalt-saturated felt is furnished in 3-sq. rolls, 32″ wide, weighing 45 lb. per roll; tar-saturated, in 4-sq. rolls, 32″ wide, weighing 65 lb. per roll.

Asphalt Felt:

Standard Asphalt-Saturated Rag Felt used as a sheathing felt, under shingles, slate or tile; also for certain built-up roofs. Furnished in 36″-wide rolls:

Nominal weight per square, lb.	Area of roll, sq. ft.	Total weight per roll, lb.
30	216	65
24	216	52
15	432	65
14	432	60
12	432	52

Asphalt or Tarred Slaters Felt:

An inexpensive sheathing felt, supplied asphalted or tarred, in 500-sq. ft. rolls 36″ wide, for use as a liner under roofs and on walls. Rolls weigh 30 lb.

Blue Plaster Board:

A heavy weight, dry sheathing paper, furnished in rolls 36″ wide, colored light blue, used for lining walls in inexpensive house construction, and also as a sheathing paper. The 250-sq. ft. rolls weigh 30 lb. and the 500-sq. ft. rolls weigh 60 lb.

Deadening Felt:

Unsaturated rag felt for use in walls and floors to keep out sounds and drafts. Also used under linoleum and as a base for wall paper.

Width	Wt. per sq. yd.	Sq. ft. per roll	Approx. wt. per roll
36″	¾ lb.	450	38 lb.
36″	1 lb.	450	50 lb.
36″	1½ lb.	450	75 lb.

House Sheathing:

A heavy weight asphalt-saturated and coated rag felt for house sheathing. Packed in rolls of 200-sq. ft., 36″ wide, weighing 60 lb. per roll.

Improved Weathertite Building Paper:

A strong kraft building paper, asphalt-infused. Remains waterproof indefinitely and is wind-proof to the bursting point. Will not bleed or stick and can be bent in cold weather without cracking. It is odorless and vermin-proof and may be crumpled without damage. Furnished in 500-sq. ft. rolls, 36″ wide, in three weights—Standard, Medium, and Heavy, weighing 12, 16 and 24 lb. per roll, respectively.



Asbestos Slaters Felt as a liner under Asbestos Shingles

No. 2 Tarred Sheathing:

A high-grade waterproof tarred sheathing felt, which is wind-proof, moisture-proof, and does not rot. The 32″-wide rolls, 432 sq. ft. area, weigh 65 lb.

Reinforced Building Paper:

Two plies of strong kraft paper cemented together with asphalt and reinforced with a heavy mesh of jute cords spaced ½″ apart both ways. Tear-proof and waterproof. Furnished in 500-sq. ft. rolls, 36″ wide, weighing 33 lb.

Rosin-Sized Sheathing Paper:

An inexpensive red or blue sheathing paper in rolls 36″ wide, for sheathing houses, protecting new woodwork, etc. Furnished in four weights—4, 5, 6 and 8 lb. per 100 sq. ft. Rolls contain 500 sq. ft. and weigh 20, 25, 30 and 40 lb., respectively. Blue paper is not furnished in the 40-lb. weight.

Smoothwall:

A rigid waterproof sheet material primarily intended for application to old side walls before applying siding shingles or clapboards. Furnished 40″ by 5 ft., ⅛″ thick, 6 sheets per bundle, 60 lb. per sq.

Tarred Thread Felt:

A tarred waterproof sheathing felt, in rolls 36″ wide, with 9 threads running lengthwise of the sheet to prevent tearing. Waterproof, wind-proof and does not rot. Weight of 250-sq. ft. rolls, 21 lb.; weight of 500-sq. ft. rolls, 42 lb.

Vaporseal Paper:

A vapor-resisting paper, furnished in 36″-wide rolls containing 500 sq. ft. and weighing about 20 lb. per roll, supplied only for use with J-M Home Insulation.

(All weights shown on this page are approximate)

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J-M Asbestos Caulking Putty

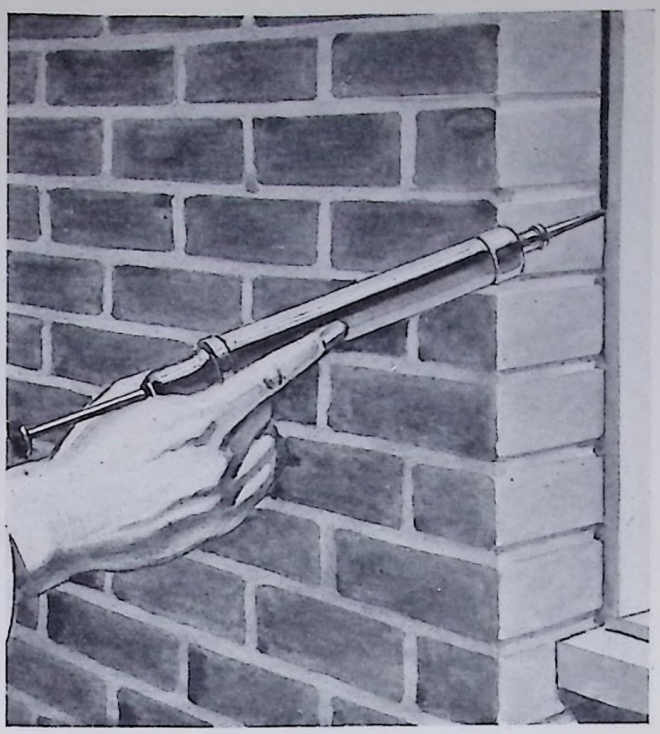
J-M Asbestos Caulking Putty is made of asbestos fibre, pigments and drying oils, blended to withstand alternate expansion and contraction and varying weather conditions. It will not dry or run in hot weather nor become brittle in cold weather, but will remain in a plastic condition indefinitely. J-M Asbestos Caulking Putty will adhere to wood, metal, brick or stone, and is recommended for use wherever it is desirable to caulk for protection against water, moisture, or infiltration of air.

J-M Asbestos Caulking Putty is used for setting metal or wood window and door frames in wood, masonry or concrete walls; setting metal sash in art stone; setting skylights, scuttles, copings, etc.; pointing up or repairing tin, slate, glass, concrete, cement or stone; glazing steel sash; caulking around sewer, gas and water pipes where they pass through walls; and for caulking sidewalk lights.

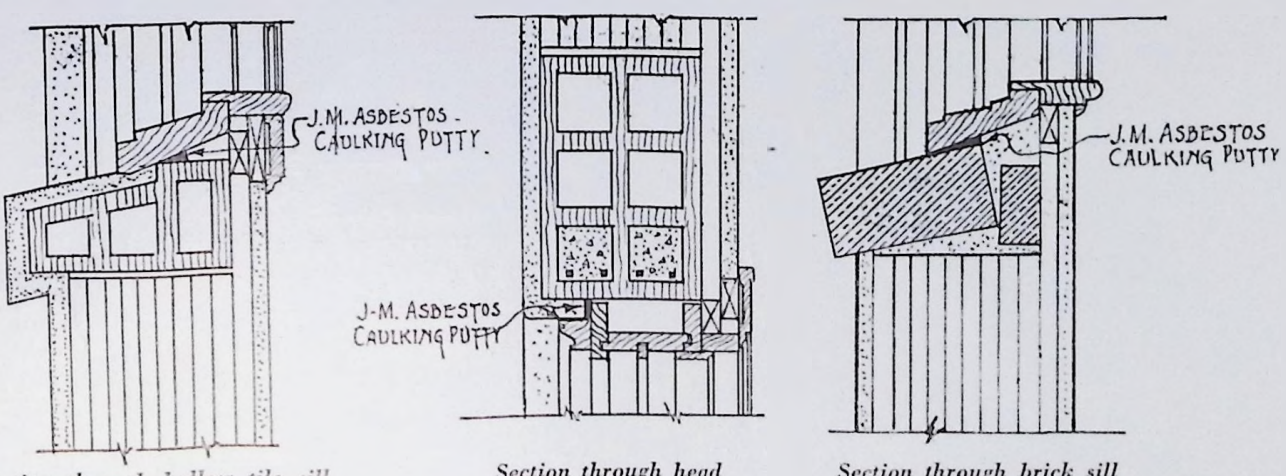
Asbestos Caulking Putty is shipped in 1, 5, 10, 35, 60 and 175-lb. containers as indicated below:

Container	Approx. shipping weight
175-lb. drum	195 lb.
60-lb. drum	65 lb.
35-lb. can	40 lb.
carton of 6, 10-lb. cans	68 lb.
carton of 12, 5-lb. cans	68 lb.
carton of 24, 1-lb. cans	32 lb.

The caulking putty is gray in color and furnished in two grades: Knife grade, manufactured for application with a trowel or putty knife; and gun grade, for use with a caulking gun, such as the "Vital Automatic Glazing & Caulking Gun," sold by the Vital Manufacturing Company, Cleveland, Ohio. The grade of putty desired should be specified on the order.



J-M Asbestos Caulking Putty being applied with a caulking gun



Section through hollow tile sill — *Section through head* — *Section through brick sill*

Construction details showing location of Asbestos Caulking Putty

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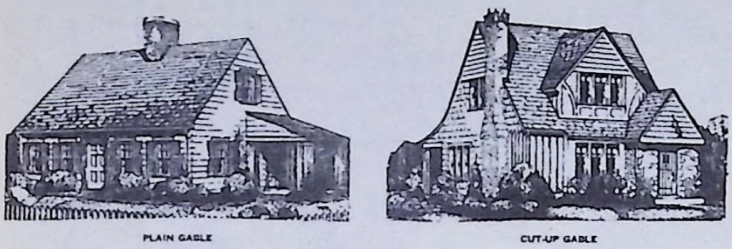
SKETCHING AND ESTIMATING INSTRUCTIONS
ASBESTOS AND ASPHALT SHINGLES AND READY-TO-LAY ROOFING

ROOFING

General: Estimators will find a quick yet accurate method of arriving at roofing quantities and selling prices without the necessity of "counting" courses or climbing on the roof by observing the following instructions.

1. Draw a Sketch. Outline of the foundation and all projecting portions, including porches, to be roofed.

2. Compute the "flat" or ground area in square feet. This is easily developed by multiplying the width by the length for rectangular houses. If the house is "ell" shaped with one or more projections, the separation of the sketch into logical rectangles, when multiplied separately and added together, will give the "flat" area.







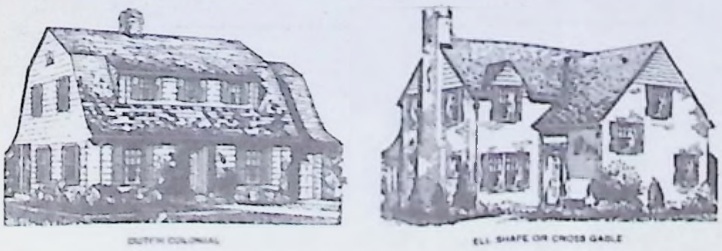


Figure 1

3. Select the type of roof. It may be Gable, Hip, Dutch Colonial, Plain, Cut-Up with Dormers, or include two separate types, such as a gable and hip in the same roof. This can be determined by observation. See figure 1.

4. Determine the roof pitch. This is the slope or rafter length which increases as the ridge height increases and can best be explained by the diagram of a 20-ft. wide roof cross section which also shows the ridge heights, pitches and rafter lengths. See figure 2.

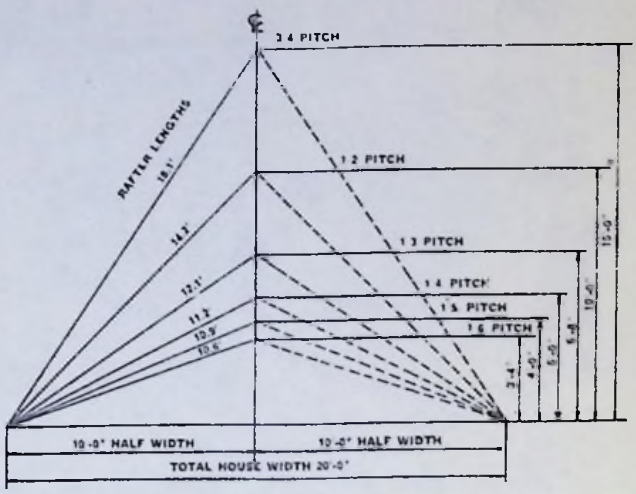


Figure 2

By observing the above diagram it can be seen that in a house 20 ft. wide the rafter lengths and ridge heights vary as follows:

	*Rafter Length	Ridge Height
1/6 pitch becomes	21'1"	3'4"
1/5 pitch becomes	21'9 1/2"	4'0"
1/4 pitch becomes	22'5"	5'0"
1/3 pitch becomes	24'2 1/2"	6'8"
1/2 pitch becomes	28'5"	10'0"
3/4 pitch becomes	36'2 1/2"	15'0"

*These dimensions are correct to the nearest common builders fraction.

5. Determine the overhang: This is the distance which the roof projects beyond or over the wall line.

6. Miscellaneous Accessories: Items such as starters, ridge, valleys, gutters, flashings, etc., can be easily estimated after the previous steps have been performed.

Sketching and Estimating:

1. Use the J-M Roof Estimate Sketch blank (95-168) and draw an outline of the foundation including roofed porches and other roofed portions which may extend beyond the foundation.
2. Determine the roof overhang (the distance the roof projects over the wall line).
3. Insert the dimensions of the foundation plus roof overhang on the sketch.

JOHNS-MANVILLE Building Materials

Sketching and Estimating Instructions
Asbestos and Asphalt Shingles and Ready-to-Lay Roofing

DATE July, 1938
(Cancelling BMR-955 & 955.1 dated in 1937)
BMR-956

PRINTED IN U.S.A.

TECHNICAL DATA SECTION

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4. Determine the type of roof (by observation), see figure 1 and note it on the sketch blank.

5. Determine the roof pitch by means of the J-M Pitch Card and insert on sketch blank.

To use the pitch card, stand 50 to 100 feet away from the building in order to see roof peak. Hold pitch card by its round edge, at eye level. Focus the angles of the card with the ridge or peak of the roof until the angle that corresponds with the peak is found. See figure 3.

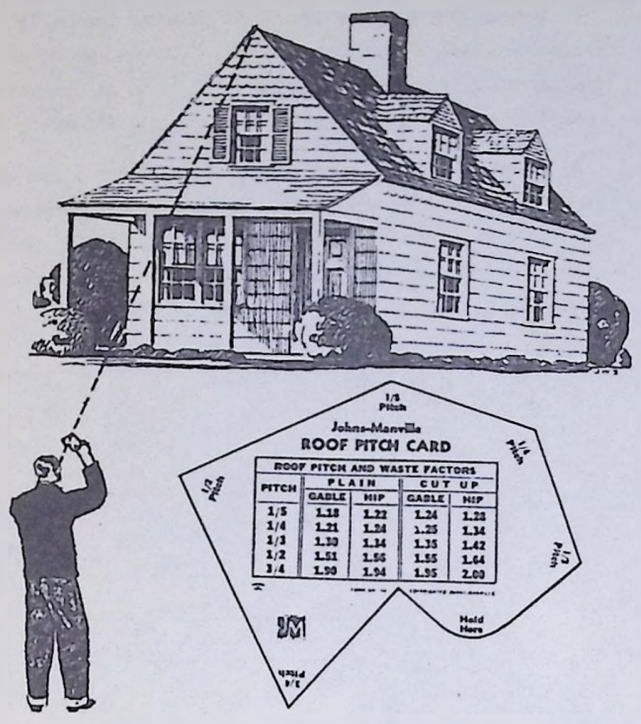


Figure 3

6. The major roof slope will determine the proper pitch factor to be used in arriving at the total sq. ft. roof area. Refer to columns 1, 2, 3, 4 and 5 in following factor table. These pitch factors are also found on the J-M Pitch Card.

If there are dormers on the roof, and their pitch is the same as or less than the pitch of the roof, the waste allowance, for cut-up roofs, will cover the area of the dormer roofs. If porches are to be roofed, figure roof area in the same manner.

Table Which Includes Allowances for Pitch and Waste In Columns 2, 3, 4 and 5 Also Hip and Rafter Length

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8
	Plain Roofs		Cut-up Roof		Main Hip	Rafter	Short
Pitch	Gable	Hip or Cross Gable	Gable	Hip	Length Factor	Length Factor	Hip Factor
1/6	1.15	1.19	1.21	1.25	.75	1.06	1.50
1/5	1.18	1.22	1.24	1.28	.75	1.09	1.50
1/4	1.21	1.24	1.25	1.34	.75	1.12	1.50
1/3	1.30	1.34	1.35	1.42	.78	1.21	1.56
1/2	1.51	1.56	1.55	1.64	.87	1.42	1.74
3/4	1.90	1.94	1.95	2.00	1.03	1.81	2.06

7. Multiply the total "flat" area by the proper pitch factor to find number of squares of roofing required. (Adjust to nearest square, half square or bundle.)

Houses having two pitches or "double pitch," such as "dutch colonials," which are usually 1/3 and 3/4 pitch. Results sufficiently accurate can be obtained by adding the two pitch factors together and dividing by 2 to find the unknown factor.

For example: The dutch colonial house, 24' x 30', has a flat area of 720 sq. ft. It has a double pitch, approximately one half of the slope is 1/3 pitch and the other half 3/4 pitch. It is a plain gable type roof.

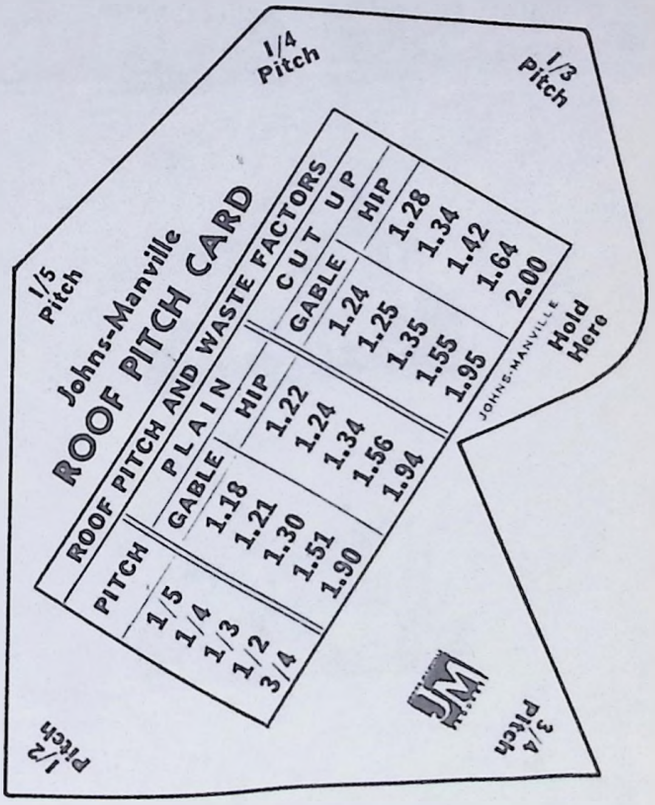
Solution: The 1/3 pitch factor is—1.30
The 3/4 pitch factor is—1.90

The new factor is 3.20 ÷ 2 or 1.60
Multiply 720 sq. ft. by 1.60 = 1152 sq. ft. or 11 1/2 squares

Dormer Areas: Where dormers only are to be re-roofed, or where the sides of dormers are to be finished with siding or roofing, the table below will be found convenient.

DORMER ROOF AND SIDE AREAS
(For 1/2 Pitch Roofs)

Feet Width	No. Wds.	Lift Type sq. ft. Roof	Lift Type sq. ft. Wall	Lift Type lin. ft. Ridge	Lift Type lin. ft. Starter	Gable Type sq. ft. Roof	Gable Type sq. ft. Wall	Gable Type lin. ft. Starter	Gable Type lin. ft. Ridge	Hip Type sq. ft. Roof	Hip Type sq. ft. Wall	Hip Type lin. ft. Starter	Hip Type lin. ft. Ridge & Hips
5	1	79	88	..	6	60	60	10	12	69	52	20	18
6	1	93	94	..	7	72	70	10	12	85	58	22	19
7	1	106	100	..	8	80	80	10	12	97	64	22	20
8	2	119	88	..	9	86	70	10	12	103	52	24	21
9	2	132	94	..	10	94	75	10	12	116	58	26	22
10	2	145	100	..	11	100	85	10	12	128	64	28	23
11	2	159	106	..	12	110	90	10	12	144	70	32	24
12	3	172	93	..	13	120	80	10	12	159	57	32	25



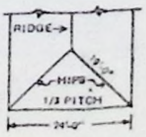
Roof Pitch Card
Actual Size

Hips and Valleys:

To find hip or valley lengths to nearest larger 6" or foot, proceed as follows:

1. Find pitch with J-M Pitch Card.
2. Measure the side where they intersect, and find length in table. (See example 1)

Example 1
Roof Pitch — 1/3
Width — 24'
Hip Length = 19' Ans.

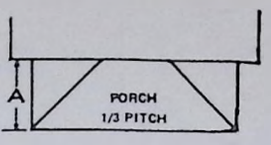


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3. Where they do not intersect, measure the side where they join the building. (See "A," ———) and **double the amount given in table.** (See Example 2.)
4. Always include overhang in measurement.

Example 2

Roof Pitch 1/3
Width "A" 8′
Double 6′-6″ (The Table Figure) = 13′ Ans.



HIP AND VALLEY TABLE

Wth Ft.	ROOF PITCH Up to 1/4	Up to 1/3	Up to 1/2	Up to 3/4	Wth Ft.	ROOF PITCH Up to 1/4	Up to 1/3	Up to 1/2	Up to 3/4
	Linear Feet of Hip or Valley					Linear Feet of Hip or Valley			
4′	3′0″	3′6″	3′6″	4′6″	25′	19′0″	19′6″	22′0″	26′0″
5′	4′0″	4′0″	4′6″	5′6″	26′	19′6″	20′6″	23′0″	27′0″
6′	4′6″	5′0″	5′6″	6′6″	27′	20′6″	21′0″	23′6″	28′0″
7′	5′6″	5′6″	6′6″	7′6″	28′	21′0″	22′0″	24′6″	29′0″
8′	6′0″	6′6″	7′0″	8′6″	29′	22′0″	23′0″	25′6″	30′0″
9′	7′0″	7′0″	8′0″	9′6″	30′	22′6″	23′6″	26′0″	31′0″
10′	7′6″	8′0″	9′0″	10′6″	31′	23′6″	24′6″	27′0″	32′0″
11′	8′6″	8′6″	10′0″	11′6″	32′	24′0″	25′0″	28′0″	33′0″
12′	9′0″	9′6″	10′6″	12′6″	33′	25′0″	26′0″	29′0″	34′0″
13′	10′0″	10′6″	11′6″	13′6″	34′	25′6″	26′6″	30′0″	35′0″
14′	10′6″	11′0″	12′6″	14′6″	35′	26′6″	27′6″	30′6″	36′0″
15′	11′6″	12′0″	13′0″	15′6″	36′	27′0″	28′0″	31′6″	37′0″
16′	12′0″	12′6″	14′0″	16′6″	37′	28′0″	29′0″	32′6″	38′6″
17′	13′0″	13′6″	15′0″	17′6″	38′	28′6″	30′0″	33′0″	39′6″
18′	13′6″	14′6″	16′0″	18′6″	39′	29′6″	30′6″	34′0″	40′6″
19′	14′6″	15′0″	16′6″	20′0″	40′	30′0″	31′6″	35′0″	41′6″
20′	15′0″	16′0″	17′6″	21′0″	41′	31′0″	32′0″	36′0″	42′6″
21′	16′0″	16′6″	18′6″	22′0″	42′	31′6″	33′0″	37′0″	43′6″
22′	16′6″	17′6″	19′6″	23′0″	43′	32′6″	33′6″	37′6″	44′6″
23′	17′6″	18′0″	20′0″	24′0″	44′	33′0″	34′0″	38′6″	45′6″
24′	18′0″	19′0″	21′0″	25′0″	45′	34′0″	35′0″	39′6″	46′6″

Ridge:

Gable Type Roofs—Figure linear feet from gable to gable.

Hip Type Roofs—Figure linear feet between point of intersection of hip rafters with the ridge (this is the difference in feet between the width and length of a hip roof).

CAUTION: When estimating Hips and Ridges, figure to nearest larger square, bundle or roll.

Starters:

Gable Type Roofs—Double the linear feet of ridge.

Hip Type Roofs—Lin. ft. of entire exposed edge of roof.

Eaves Shingles—For some types of asbestos shingles, eaves shingles, in addition to starters, are required. —— (estimate them same as starters)

Caution: When estimating Starters, figure to nearest larger square, bundle or roll.

Servicing:

This operation consists of replacing on old roofs, any missing shingles and re-nailing any others which may have warped or curled. Add the service charge per square for the total number of roof squares.

Stripping:

Either ½″x 3″ or ½″x 4″ wood bevel strips, or, in some instances, wood mason lath, are nailed at the butts of old wood shingles, particularly for asphalt roofs, in order to even the surface so that the new roofing will have a secure nailing and lay flat indefinitely. For asbestos roofs, stripping is necessary, in order to prevent the rigid shingles from "cocking up." Figure this charge by the number of squares of roofing and add to estimate.

Flashings:

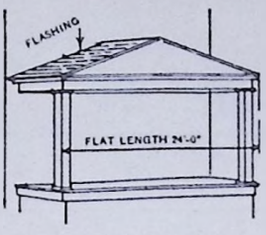
Building projections, such as porches, bay windows, entrances, garages, wing buildings, solariums, etc., require flashing where they join the main structure. To estimate linear feet, including lap and waste, proceed as follows:

1. Determine pitch and type of roof, i.e., gable or hip.
2. **Gable Roofs**—Measure ground or **flat length** and find total lin. ft. of flashing in table opposite "Length" column. (See Example 1.)
3. **Hip Roofs**—Measure width and find length of both slopes in "width" column. Add "flat" length which is found by subtracting **twice the width** from the total length. (See Example 2.)
4. Always include overhang in measurements.

FLASHING TABLE

Width	Length	ROOF PITCH 1/5	1/4	1/3	1/2	3/4	Width	Length	ROOF PITCH 1/5	1/4	1/3	1/2	3/4
		Linear Feet of Flashing							Linear Feet of Flashing				
3	6	8	8	8	10	13	17	34	38	39	42	50	63
4	8	10	10	11	13	16	18	36	40	41	45	52	67
5	10	12	12	13	15	20	19	38	42	44	47	55	70
6	12	15	15	16	18	24	20	40	45	46	49	58	74
7	14	17	17	18	21	27	21	42	47	48	52	61	78
8	16	19	19	20	24	31	22	44	49	50	54	64	81
9	18	21	21	23	27	34	23	46	51	53	57	67	85
10	20	23	23	25	30	38	24	48	53	55	59	69	89
11	22	25	26	28	33	42	25	50	55	57	62	72	92
12	24	27	28	30	35	45	26	52	58	59	64	75	96
13	26	30	30	33	38	49	27	54	60	61	66	78	100
14	28	32	32	35	41	53	28	56	62	64	69	81	103
15	30	34	35	37	44	56	29	58	64	66	71	84	107
16	32	36	37	40	47	60	30	60	66	68	74	86	111

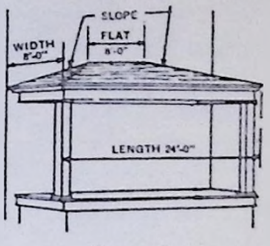
Gable Type Roof



Example 1

Ground Length is 24′
Length Column Reads 30′
Total Lin. Ft. = 30′

Hip Type Roof



Example 2

Ground Width is 8′
Width Column Reads 20′
Add "Flat" Length 8′

Total Lin. Ft. = 28′

Chimney Flashing—Estimating Instructions:

1. Count the number of brick wide and long in one course. The proper pitch column in the table will give the lin. ft. of flashing, including waste and lap for four sides.
2. Where only three sides are flashed, such as a chimney on the side of a house, deduct the number of inches to the nearest foot corresponding with the number of brick on the unflashed side.
3. Where chimneys are to be equipped with a "saddle" or "cricket", to divert water or snow, deduct the number of inches to the nearest foot corresponding with the number of brick on the side affected, and to the remaining flashing, add the saddle price.
4. Stucco and stone chimney dimensions may be determined either by actual measurement or observation.

CHIMNEY FLASHING TABLE

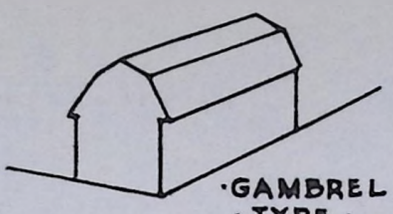
No. of Brick Wide	No. of Brick Long	Inches Wide	Inches Long	Pitch of Roof to 1/3	to 1/2	to 3/4	No. of Brick Wide	No. of Brick Long	Inches Wide	Inches Long	Pitch of Roof to 1/3	to 1/2	to 3/4
				Linear Feet of Flashing							Linear Feet of Flashing		
2	2	18″	18″	11	11	12	2½	2	22″	18″	12	12	13
2	2½	18″	22″	12	12	13	2½	2½	22″	22″	13	13	14
2	3	18″	26″	13	13	15	2½	3	22″	26″	14	14	15
2	3½	18″	30″	13	14	16	2½	3½	22″	30″	14	15	17
2	4	18″	34″	14	15	17	2½	4	22″	34″	15	16	18
2	4½	18″	38″	15	16	19	2½	4½	22″	38″	16	17	20
2	5	18″	43″	15	17	21	2½	5	22″	43″	16	18	22
2	5½	18″	47″	16	18	22	2½	5½	22″	47″	17	19	23
2	6	18″	51″	17	19	23	2½	6	22″	51″	18	20	24
2	6½	18″	55″	18	20	24	2½	6½	22″	55″	19	21	25
2	7	18″	60″	19	21	25	2½	7	22″	60″	20	22	26
2	7½	18″	64″	20	22	27	2½	7½	22″	64″	21	23	28
2	8	18″	68″	21	23	28	2½	8	22″	68″	22	24	29

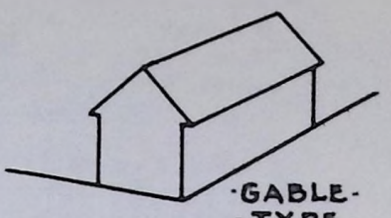
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Slum Clearance Program: Specifications and Data on Various Building Materials (1938)
ACL Doc 21293 · Page 152 of 443
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Barn Roof Surface Estimating Tables







Tables (which include ample waste allowances) give length in feet over ridge from plate to plate.

Estimating: To find roof areas, measure width of barn, add overhangs, and find nearest corresponding larger width in tables below.

Multiply roof factor given (for type of roof being estimated) by the total length of barn inclusive of overhangs; add starters and ridge (figure 1 sq.ft. per lin.ft.) and adjust final total to nearest larger half or full square.

Gable areas are figured solid. For siding estimating, deduct for windows or mow doors.

Barn Width	Gothic Type Roof			Gambrel Type Roof			Gable Type 1/3 Pitch Roof			Gable Type 1/2 Pitch Roof		
	Roof Factor	Ridge Hgt.	Gable sq.ft.	Roof Factor	Ridge Hgt.	Gable sq.ft.	Roof Factor	Ridge Hgt.	Gable sq.ft.	Roof Factor	Ridge Hgt.	Gable sq.ft.
10	17.6	6.5	40	16.0	5.56	36	12.6	3.33	17	14.7	5.0	25
11	19.4	7.2	49	17.6	6.10	43	12.9	3.67	20	16.1	5.5	30
12	21.2	7.8	58	19.2	6.76	52	15.2	4.00	24	17.6	6.0	36
13	23.0	8.4	68	20.8	7.22	60	16.4	4.33	28	19.1	6.5	42
14	24.7	9.2	78	22.4	7.80	70	17.7	4.67	35	20.6	7.0	49
15	26.5	9.7	89	24.0	8.33	80	19.0	5.00	38	22.0	7.5	56
16	28.2	10.4	102	25.6	8.90	91	20.2	5.33	43	23.5	8.0	64
17	30.0	11.0	114	27.2	9.45	103	21.4	5.67	48	25.0	8.5	72
18	31.8	11.7	130	28.8	10.00	116	22.6	6.00	54	26.5	9.0	81
19	33.4	12 3	144	30.4	10.55	129	24.0	6.33	60	28.0	9.5	90
20	35.2	13.0	160	32.0	11.20	144	25.2	6.67	67	29.4	10.0	100
21	37.0	13.6	176	33.6	11.80	159	26.4	7.00	74	30.8	10.5	110
22	38.8	14.3	193	35.2	12.35	174	27.8	7.33	81	32.3	11.0	121
23	40.6	14.9	210	36.8	12.90	189	29.0	7.67	88	33.8	11.5	132
24	42.0	15.6	230	38.4	13.50	206	30.3	8.00	96	35.2	12.0	144
25	44.0	16.2	250	40.0	14.10	225	31.5	8.33	103	36.8	12.5	156
26	46.0	16.8	268	41.6	14.60	244	32.8	8.67	113	38.2	13.0	168
27	47.9	17.6	290	43.2	15.20	262	34.0	9.00	122	39.7	13.5	182
28	49.4	18.1	313	44.8	15.70	281	35.4	9.33	130	41.2	14.0	196
29	50.6	18.8	338	46.4	16.30	302	36.6	9.67	140	42.5	14.5	210
30	53.0	19.4	358	48.0	16.90	324	37.8	10.00	150	44.0	15.0	225
31	55.0	20.0	382	49.6	17.40	346	39.2	10.33	161	45.5	15.5	240
32	56.5	20.7	410	51.2	18.00	368	40.3	10.67	170	47.0	16.0	255
33	58.0	21.5	445	52.8	18.60	394	41.6	11.00	182	48.5	16.5	272
34	60.0	22.2	465	54.4	19.20	415	43.0	11.33	192	50.0	17.0	290
35	62.0	22.6	487	56.0	19.70	440	44.2	11.67	204	51.5	17.5	306
36	64.0	23.4	518	57.6	20.20	466	45.5	12.00	216	53.0	18.0	324
37	65.8	24.0	550	59.2	20.80	492	46.7	12.33	228	54.5	18.5	342
38	67.0	24.7	578	60.8	21.40	516	48.0	12.67	240	56.0	19.0	360
39	69.0	25.2	605	62.4	21.95	545	49.2	13.00	254	57.5	19.5	380
40	70.4	26.0	640	64.0	22.60	578	50.5	13.33	266	59.0	20.0	400

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J-M Asbestos and Asphalt Shingles

Sample Roofing Estimate Form - Asbestos Shingle Example:

ROOFING ESTIMATE FORM

NAME R. T. Burns — JOB LOCATION Same

ADDRESS 90 Oak Street, Rahway, N.J. — SALESMAN J. C. Brady — DATE 1/23/37

MATERIAL	SIZE	TYPE	QUANTITY	UNIT PR.	SELLING PRICE	REMARKS
#70 Hex. Asbestos Shingle	16" x 16"	Mottled Green	19 Sq.		Local Price	No Wood Stripping
#77 Hip & Ridge "	5" x 16"	" "	38 Bdls.		" "	
#17 Starter "	4" x 16"	" "	11 Bdls.		" "	
#71 Eaves "	20 15/16"	" "	9 Bdls.		" "	
Metal Eaves Strip	10"	16 oz. Copper	220 Lin. Ft.		" "	
Wood Strip	1" x 2"	For Hip & Ridge	189 " "		" "	
Valley Flashing	16"	16 oz. Copper	42 " "		" "	
Chimney "	10"	" "	16 " "		" "	
Porch "	10"	" "	30 " "		" "	
Dormer "	8"	" "	75 " "		" "	
Servicing			19 Sq.		" "	
TOTAL CASH SELLING PRICE					Local Price	

ROOF AREA

	HOUSE	HOUSE	PORCH	PORCH
TYPE	Cut-Up Hip		Plain Hip	
PITCH	1/2		1/2	
LENGTH	26		8	
WIDTH	x 38	x	x 22	x
	208			
	78			
FLAT AREA	988		176	
FACTOR	x 1.64	x	x 1.56	x
	3952		1056	
	5928		880	
	988		176	
TOTAL	1620		275	= 1895 SQUARES 19

HIPS	LIN. FT.
HOUSE 26' = 23 x 4	92
PORCH 8' = 7'-0" x 4	28
DORMERS 8' = 7'-0" x 6	42
TOTAL	162

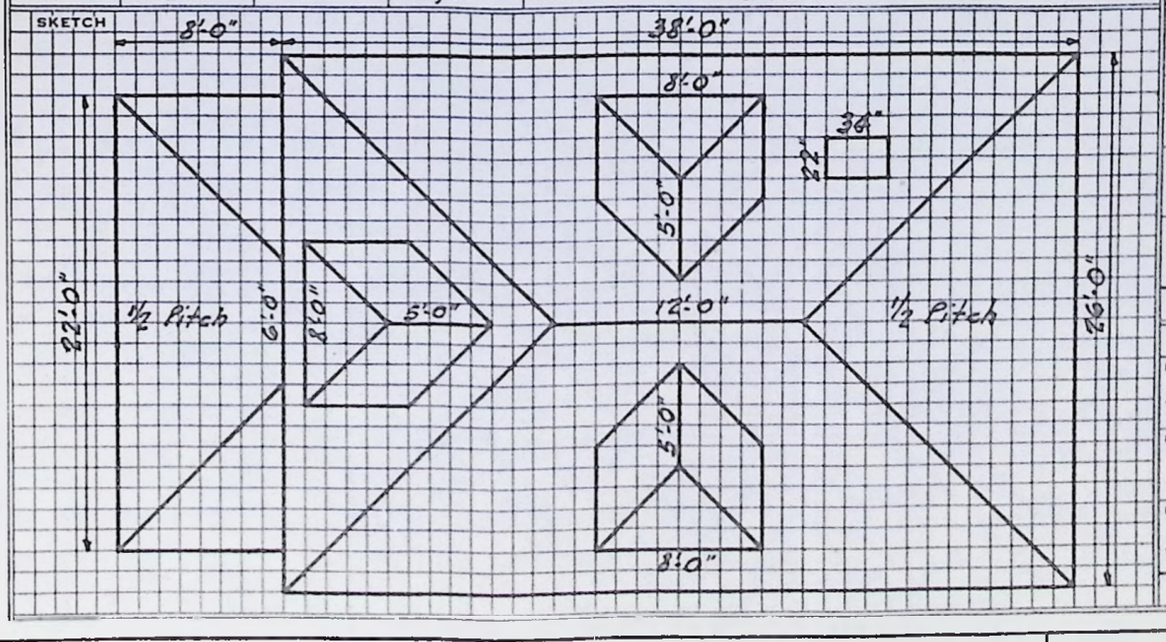
RIDGES	LIN. FT.
HOUSE 38 - 26	12
PORCH None	
DORMERS 5 x 3	15
TOTAL	27

STARTERS	LIN. FT.
HOUSE 38 26 / 38 26 / 76 + 52	128
PORCH 8 / 8 / 16 + 22	38
DORMERS 5 / 5 / 8 / 18 x 3	54
TOTAL	220

FLASHING	LIN. FT.
DORMER 5 x 1.42 x 6 / 8 x 3 / Laps 2'8" x 3	43 / 24 / 8
VALLEY 8' = 7'-0" x 6	42
PORCH 8'-0" Width / Flat Length	24 / 6
CHIMNEY 22" x 34"	16
TOTAL	163

EAVES STRIP	LIN. FT.
HOUSE 38 + 26 + 38 + 26	128
PORCH 8 + 8 + 22	38
DORMER 3(5 + 5 + 8)	54
TOTAL	220

SKETCH



JOHNS-MANVILLE Building Materials

Asbestos and Asphalt Shingles - Sketching and Estimating Instructions - Sample, J-M Roofing Estimating Form (95-168)

DATE July, 1938
(Cancelling BMR-955.5 and 955.6 dated 1937)
BMR-958

PRINTED IN U. S. A.

TECHNICAL DATA SECTION

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J-M Asbestos and Asphalt Shingles

Sample Roofing Estimate Form - Asphalt Shingle Example:

ROOFING ESTIMATE FORM

NAME R. T. Burns — JOB LOCATION Same

ADDRESS 90 Oak Street, Rahway, N.J. — SALESMAN J. C. Brady — DATE 1/23/37

MATERIAL	SIZE	TYPE	QUANTITY	UNIT PR.	SELLING PRICE	REMARKS
Giant Ind. Asphalt Sh.	12"x16"	Spruce Green	19 sq.		Local Price	with wood stripping
" " Starters	12"x16"	" "	3 bdls.		" "	
" " Hip & Ridge	12"x16"	" "	8 "		" "	
Wood Eaves Strip	1"x3"		220 Lin. Ft.		" "	
Servicing			19 sq.		" "	
Chimney Flashing	10"	16 oz. Copper	16 Lin. Ft.		" "	
Porch "	10"	" "	30 " "		" "	
Valley "	16"	" "	42 " "		" "	
Dormer "	8"	" "	75 " "		" "	
TOTAL CASH SELLING PRICE						

ROOF AREA

	HOUSE	HOUSE	PORCH	PORCH
TYPE	Cut-up Hip		Plain Hip	
PITCH	1/2		1/2	
LENGTH	38		22	
WIDTH	x 26	x	x 8	x
	228			
	76			
FLAT AREA	988		176	
FACTOR	x 1.64	x	x 1.56	x
	3952		1056	
	5928		880	
	988		176	
TOTAL	1620		275	= 1895

SQUARES 19

HIPS	LIN. FT.
HOUSE 26' = 23'-0" x 4	92
PORCH 8' = 7'-0" x 4	28
DORMERS 8' = 7'-0" x 6	42
TOTAL	162

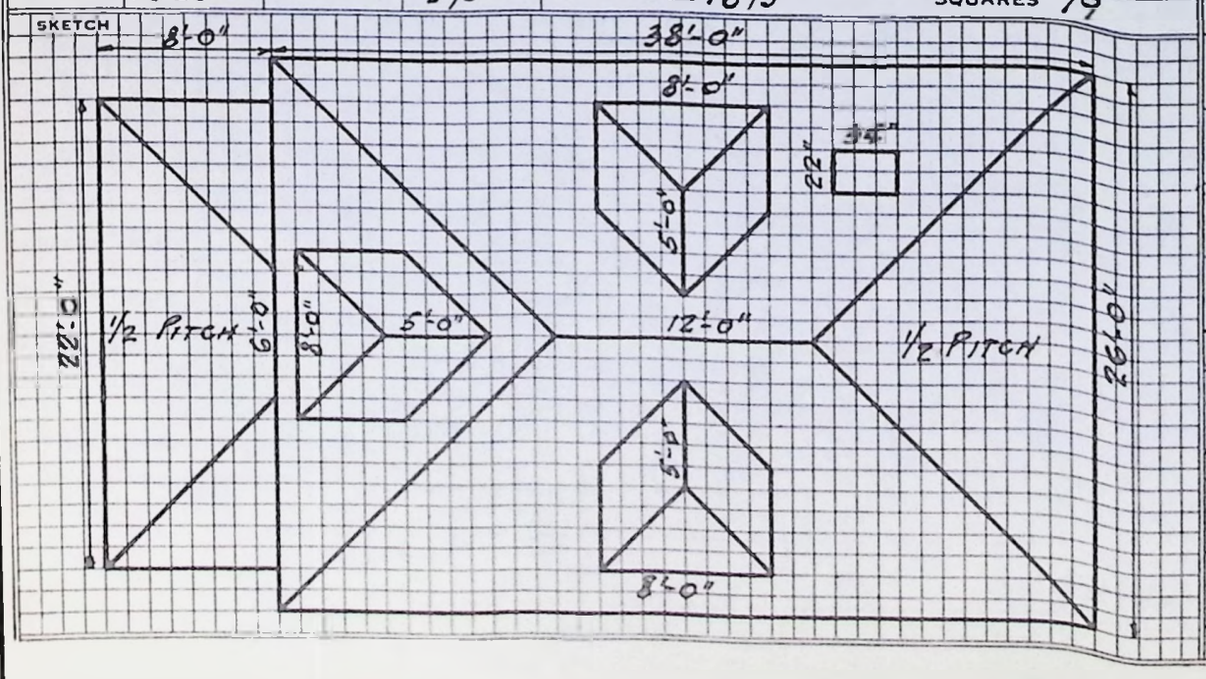
RIDGES	LIN. FT.
HOUSE 38 - 26	12
PORCH None	
DORMERS 5'-0" x 3	15
TOTAL	27

STARTERS	LIN. FT.
HOUSE 38 26 / 38 26 / 76 + 52	128
PORCH 8 / 8 / 16 + 22	38
DORMERS 5 / 5 / 8 / 18 x 3	54
TOTAL	220

FLASHING	LIN. FT.
DORMER 5 x 1.42 x 6 / 8'-0" x 3 / LAPS 2'-8" x 3	43 / 24 / 8
VALLEY 8' = 7'-0" x 6	42
PORCH 8'-0" width / Flat Length	24 / 6
CHIMNEY 22" x 34"	16
TOTAL	163

EAVES STRIP	LIN. FT.
HOUSE 38+26+38+26	128
PORCH 8+8+22	38
DORMER 3 x (5+5+8)	54
TOTAL	220

SKETCH



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J-M ASBESTOS AND ASPHALT SIDING SHINGLES, ASBESTOS CLAPBOARDS
METHOD OF ESTIMATING

Sketch outline of each elevation on J-M Siding Estimating Form (95-169)*. Measure from corner to corner along each side of house and add all projections, such as bay windows, etc.

Measure height of wall to be covered with siding, from point where siding starts at bottom to the top of wall, by suspending steel measuring tape from highest window. Use extension rule or rod to find gable height and place these dimensions in the space provided for each elevation.

Multiply width by height for elevation sq. ft. area; from this, deduct the combined window and door sq. ft. area to arrive at the net sq. ft. area for each elevation. (Many estimators instead of measuring doors and windows allow 20 sq. ft. per door and 15 sq. ft. per window. Also, where wall heights and wall treatment are uniform, many estimators arrive at the total gross area by multiplying perimeter by height and deducting total area of openings). Multiply gable width by height and divide by two to find gable sq. ft. area.

Waste Allowance: To the total net sq. ft. area add 8 percent for waste, and figure to the nearest larger half or full square, or nearest bundle of shingles.

Corners: Add heights of elevations to find lin. ft. of corner boards (two boards; one 3" and one 4" are used for each corner). (If metal corner bead or flashing is used, only figure one foot for each lin. ft. or corner.)

Moulding: Add sides and bottom of window and door frame to find lin. ft. of moulding.

Flashing: Add widths of window and door frames to find lin. ft. of flashing, allowing 3 ft. per window and 3 ft. 6" per door.

Caulking: Around door and window openings, to prevent leaks, use J-M Asbestos Caulking Putty.

Wood Stripping: 1" x 3" No. 2 boards, ripped diagonally into bevel strips, or ordinary 4-ft. wood plaster lath, make a good job when used with a covering of J-M Asbestos Slaters' Felt or 12 or 15-lb. J-M Standard Asphalt-Saturated Rag Felt. To arrive at the lin. ft. or pieces of 4'0" lath required per square, measure the exposure of present siding, and multiply total sq. ft. area by the correct exposure in inches to find the lin. ft. or number of 4'0" lath required.

Exposure, inches	4	4½	5	5½	6	6½	7	7½	8	8½
Stripping, lin. ft.	300	288	240	224	200	188	172	160	152	144
Number of 4'0" Lath	75	72	60	56	50	47	43	40	38	36

J-M Smoothwall: Wood stripping and felt are not necessary when Smoothwall is used.

Labor: The most efficient results in siding application have been obtained by a crew consisting of two mechanics and one helper.

Stucco Removal: All stucco as well as all nails, wire or other projections should be removed and the sheathing covered with Smoothwall, Asbestos Slaters' Felt or the 12 or 15-lb. Standard Asphalt-Saturated Rag Felt.

Clean-up: Each job will require a nominal charge per square for clean-up.

*J-M Siding Estimating Forms, No. 95-169, may be obtained in pads of 50 at 20¢ a pad.

JOHNS-MANVILLE Building Materials

J-M Asbestos and Asphalt Siding Shingles,
Asbestos Clapboards - Method of Estimating

DATE June, 1938
(Cancelling BMR-970 to 972 dated Jan., 1937)

BMR-931

PRINTED IN U.S.A.

TECHNICAL DATA SECTION

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Illustrated Sample

J-M Siding Estimate Form (Form No. 95-169)

SIDING ESTIMATE FORM

NAME J. C. Brown — JOB LOCATION Same

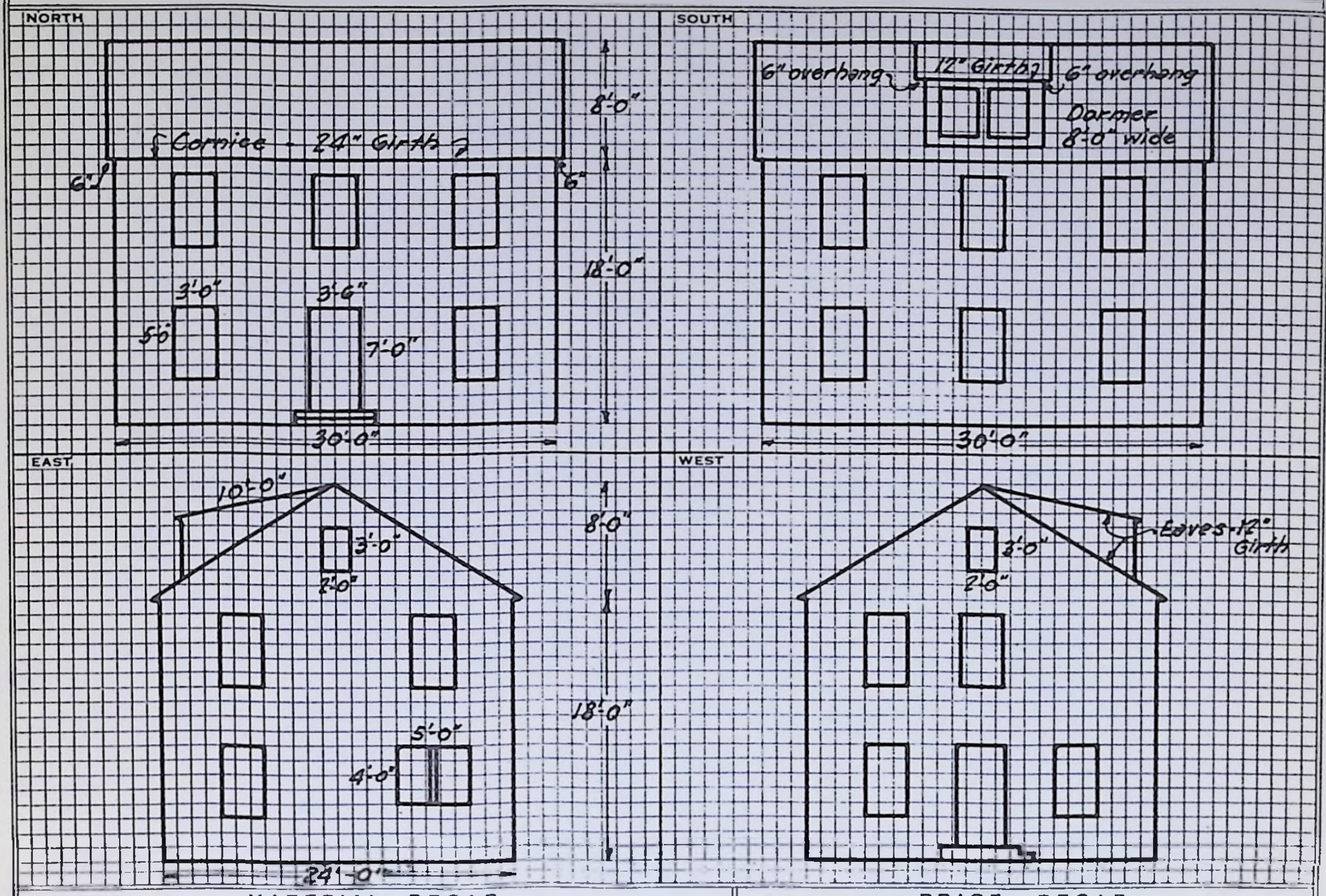
ADDRESS 324 Dean St. Brooklyn, N.Y. — BY B.F. Smith — DATE 6/10/38

SKETCH ELEVATIONS OF BUILDING TO BE SIDED — INDICATE LENGTHS, WIDTHS AND HEIGHTS — SHOW SIZES OF WINDOWS AND DOORS

TYPE OF NEW SIDING Shingles or Clapboards — CORNER BOARDS None — CORNER BEADS None — MITRE CORNERS Yes

COLOR Per Type of Siding — WOOD STRIPPING Yes — SMOOTHWALL None

EXPOSURE OF EXISTING SIDING 6 inches — FLASHING — COPPER Yes — GALVANIZED None



MATERIAL RECAP.

ELEVATION	HOUSE SQ. FT.	GABLE SQ. FT.	DORMER SQ. FT.	FLASHING LIN. FT.	CORNERS LIN. FT.
NORTH	445			18½	
SOUTH	450		88	24	
EAST	357	94		16	
WEST	352	94		17½	
TOTAL	1604	188	88		
ADD WASTE 8 %	128	15	incl.		
HOUSE TOTAL	1732	TOTAL LIN. FT.		76	None
GABLE TOTAL	203	MOULDINGS		NO. DOORS	NO. WINDOWS
DORMER TOTAL	88	NORTH ELEV.		1	5
		SOUTH ELEV.			8
		EAST ELEV.			6
		WEST ELEV.		1	5
		TOTAL		2	24
TOTAL SQ. FT.	2023 = 20⅓ SQUARES				

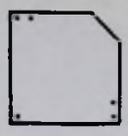
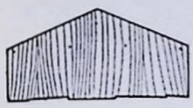
PRICE RECAP.

MATERIAL			UNIT PRICE	SELLING PRICE
SIDING	20⅓	SQS.		Local Prices
FLASHING 8 " WIDE	76	L.FT.		" "
FLASHING " WIDE		L.FT.	None	
CORNERS		L.FT.	None	
MOULDING DOORS	2	EA.		" "
MOULDING WDS.	24	EA.		" "
CAULK FRAMES		EA.	None	
REMOVE STUCCO		SQS.	"	
PAINT DOORS		EA.	"	
PAINT WDS.		EA.	"	
PAINT CORNICE		L.FT.	"	
PAINT CORNICE		L.FT.	"	
CLEAN UP JOB	20⅓	SQS.		" "
TOTAL SELLING PRICE				Local Price

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JOHNS-MANVILLE RIGID ASBESTOS ROOFING SHINGLES

Style	Description and Catalog Number (GROUP A PRODUCTS)	Colors	Apr. Wt.			Stocked	Not Stocked
	**No. 30—DUTCH LAP METHOD‡—** (16" x 16"). A self aligning, self spacing, reversible shingle using J-M Clincher.‡ Beautiful blended and variegated effects easily obtained. Packed 23 shingles per bundle, it requires 92 shingles, 92 J-M Clinchers‡ and 1 lb. 1¼" galvanized nails per square, actual coverage 99⅓ sq. ft., laying with ¼ sidelap. Can also be laid with ⅓ sidelap requiring 104 shingles per square. *Underwriters' Class B label.* ‡*Patented*	Mottled Gray *Mottled Blue-Black *Mottled Red *Mottled Green Mottled Copper	290 290 290 290 290				
		(Based on 92 shingles per square for ¼ side lap)					
	**No. 70 — HEXAGONAL METHOD —** (16" x 16"). Low priced rigid Asbestos Shingles of conventional design. Provide permanent fireproof roofs at low cost. Packed in convenient bundles of 15 shingles each. 86 shingles, 1 lb. 1¼" galv. nails and 86 storm anchors required per square. Exposed 13" x 13" to weather providing full 3" overlap. Use starters Nos. 17 and 71. *Underwriters' Class B label.*	Mottled Gray Mottled Blue-Black Mottled Red *Mottled Green Mottled Copper	275 275 275 275 275				
	**No. 35 — SALEM AMERICAN METHOD**—(8" x 16"). Tapered to approx. ¼" butts with top and side edges trimmed. A rough-textured shingle which makes a roof of unusual beauty. 260 shingles per square; packed in 13 bundles of 20 shingles each. Exposure 7". 2½ lbs. 1¼" galv. nails per square. Use No. 36 starters and No. 37 Hip and Ridge Shingles. *Underwriters' Class A label.* *Random width of 6", 10" and 16" on special order only at $ per square additional to list price. Equal number of 6" and 10" pieces must be ordered.*	*No. 1—Weathered Gray *No. 2—Weathered Black *No. 3—Olive Green *No. 4—Sea Green *No. 5—Apple Green *No. 6—Forest Brown *No. 7—Granada Red *No. 8—Touraine Red	540 540 540 540 540 540 540 540				
	**No. 507—CEDARGRAIN AMERICAN METHOD—**(12"x24") — Uniform thickness. The newest development in Asbestos Shingles which gives American Method effect resembling wood shingles at little more than the cost of Dutch Laps. 5" Exposure, minimum headlap 2", 120 shingles per square packed in four bundles. 2½ lbs. 1¼" galv. nails required per square. Use No. 536 Starters and No. 597 Hip and Ridge Shingles.	*Gray *Weathered Black *Green	270 270 270				

2" nails required for re-roofing over old wood shingles.

Colors designated by (*) have textured surface. All others are smooth surface.

RIGID ASBESTOS SHINGLE ACCESSORIES

Description	Unit
J-M Clinchers—Approx. 200 per lb.	per 100 pieces
Copper Storm Anchors—Approx. 200 per lb.	per 100 pieces
Copper Ridge Roll Fasteners—Approx. 55 per lb.	per 100 pieces
Galvanized Needle Point Nails: 1¼"—Approx. 210 per lb. 1½"—Approx. 195 per lb. 2"—Approx. 160 per lb.	per lb.
Copper Needle Point Nails:	per lb.
Face Nails for Cedargrain Shingles— 1"—Approx. 600 per lb.—plated bronze 1¼"—Approx. 350 per lb.—plated bronze	per lb.
TOUCH-UP PAINT FOR CEDAR-GRAIN SHINGLES: For painting exposed cut edges of Cedargrain shingles at corners, etc. Furnished in green	per pint can
J-M SMOOTHWALL: (Group A) A new type wind and water-proof base sheet for use on Cedargrain and other re-siding jobs. Superior to and easier to apply than asphalt felt and wooden furring strips. Furnished in sheets 40" x 60" x ⅛" thick. Packed in bundles of 6 sheets (100 sq. ft. net) Weight 60 lbs. per square	per square

SHINGLE CUTTERS

Model "G"—24"
Model "F"—27"

Notching attachment extra

Face Nail Punching attachment extra

Crated weight approx. 50 lbs. each

J-M ASBESTOS SLATERS FELT (Group X)

For sheathing houses and as a liner under Asbestos Shingles. Made of high grade asbestos felt. Furnished in two types:

Tar Saturated—15 lbs. per sq.—4 sq. per roll—32" wide

Asphalt Saturated—15 lbs. per sq.—3 sq. per roll—32" wide

J-M Siding Shingle Cleaner—A special cleaning solution for washing dirt or soot from Asbestos Siding Shingles. Furnished in one quart bottles or in cartons containing 4 one-quart bottles. Mix with 10 equal parts of warm water.

JOHNS-MANVILLE Building Materials

Blank Price List
J-M Rigid Asbestos Roofing Shingles

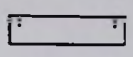
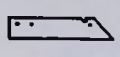
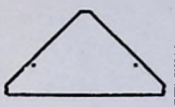
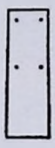
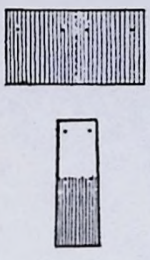
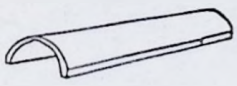
DATE June, 1938
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BMR-1208

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JOHNS-MANVILLE RIGID ASBESTOS STARTERS AND RIDGE SHINGLES

Style	Description and Catalog Number (GROUP A PRODUCTS)	Colors	Apx. Wt.			Stocked	Not Stocked
	**No. 17 — STARTER** — For use with No. 70 Hexagonal Shingles. 75 pieces per 100 lineal feet. Packed 15 pieces per bundle. Size 4" x 16".	Mixed Colors	63				
	**No. 31 — EAVES STARTER** — For use with No. 30 Dutch Lap Shingles. 100 pieces per 100 lineal feet. Packed 25 pieces per bundle.	Mixed Colors	60				
	**No. 71 — EAVES SHINGLE** — For use with No. 70 Hexagonal Shingles. 58 pieces per 100 lineal feet. Packed 15 pieces per bundle. Each eaves shingle is 20 1/8" wide.	Mottled Gray Mottled Blue-Black Mottled Red *Mottled Green Mottled Copper	112 112 112 112 112				
	**No. 97—HIP AND RIDGE SHINGLE**— For use with No. 30 or No. 70 Shingles. Size 4 13/32" to 5 1/2" wide by 16" long. 340 shingles per 100 lineal feet. Packed 17 per bundle.	Mottled Gray *Mottled Blue-Black *Mottled Red Mottled Copper *Mottled Green	375 375 375 375 375				
	**No. 36 SALEM STARTER and No. 37 SALEM HIP AND RIDGE SHINGLE** —For use with No. 35 Salems. Cut from the same stock as No. 35 Salems. No. 36 Starter is 9" x 16", tapered to 1/4" butt, requiring 75 pieces per 100 lineal feet; packed 15 pieces per bundle. No. 37 Hip and Ridge Shingle is 4 13/32" to 5 1/2" wide, by 16" long, requiring 340 pieces per 100 lineal feet; packed 17 shingles per bundle.	No. 36 Salem Starters *All colors—same as No. 35 Shingles *No. 37 Salem Hip & Ridge Shingles No. 1—Weathered Gray No. 2—Weathered Black No. 3—Olive Green No. 4—Sea Green No. 5—Apple Green No. 6—Forest Brown No. 7—Granada Red No. 8—Touraine Red	225 465 465 465 465 465 465 465 465				
	**No. 536—STARTER**— For use with No. 507 Cedargrain American Method Shingles — 24" wide—50 pieces per 100 lineal feet packed 25 pieces per bundle.	*Gray *Weathered Black *Green	53 53 53				
	**No. 597—HIP AND RIDGE SHINGLE** — For use with No. 507 Cedagrain American Method Shingles—4 3/4" to 5 1/2" wide by 12" long—480 pieces per 100 lineal feet packed 20 pieces per bundle.	*Gray *Weathered Black *Green	300 300 300				
	**RIDGE ROLL** — 93 sections required per 100 lineal feet. Packed in crates.	Copper Gray *Blue-Black *Red *Green	372 372 372 372 372				

2" nails required for re-roofing over old wood shingles.

Colors designated by (*) have textured surface. All others are smooth surface.

JOHNS-MANVILLE Building Materials

Blank Price List
J-M Rigid Asbestos Starters and Ridge Shingles

DATE June, 1938
(Cancelling sheet dated June, 1937)
BMR-1209

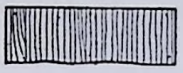
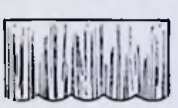
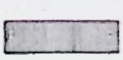
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JOHNS-MANVILLE RIGID ASBESTOS SIDING SHINGLES

Style	Description and Catalog Number (GROUP A PRODUCTS)	Texture	Colors	Apr. Wt.			Stocked	Not Stocked
	**No. 105-U — CEDARGRAIN SIDING SHINGLE** — (12"x24")—Uniform thickness—57 shingles (3 bundles) per square. Special nails for butts and ragfelt backer strips for vertical joints furnished with shingles. Headlap 1½". 1¼ lbs. 2" galv. nails per square required for concealed nailing when residing. No starters required.	Cedargrain Cedargrain Smooth Smooth	Blended Gray Oyster White Mottled Gray Special Mottled Gray	195 195 195 195				
	**No. 105-T—SHAKE TEXTURE SIDING SHINGLE** — (12"x24")—Tapered to ⅛" butts—57 shingles (3 bundles) per square. Special nails for butts and ragfelt backer strips for vertical joints furnished with shingles. Headlap 1½". 1¼ lb. 2" galv. nails per square required for concealed nailing when residing. No starters required.	Shake Shake	Blended Gray Oyster White	260 260				
	**No. 106 — CEDARGRAIN SIDING SHINGLE** — (8"x24") — Uniform thickness—93 shingles (3 bundles) per square. Special nails for butts and ragfelt backer strips for vertical joints furnished with shingles. Headlap 1½". 2 lbs. 2" galv. nails per square required for concealed nailing when residing. No. starters required.	Cedargrain Cedargrain	Blended Gray Oyster White	212 212				
	**No. 107-U — CEDARGRAIN SIDING SHINGLE** — (12"x24")—uniform thickness—60 shingles (3 bundles) per square. Special nails for butts and ragfelt backer strips for vertical joints furnished with shingles. Exposure 10". Minimum headlap 1¼". 1½ lbs. 2" galv. nails per square required for concealed nailing when residing. No starters required.	Cedargrain Cedargrain Smooth Smooth	Blended Gray Oyster White Mottled Gray Special Mottled Gray	205 205 205 205				
	**No. 107-T—SHAKE TEXTURE SIDING SHINGLE** — (12"x24")—Tapered to ⅛" butts—60 shingles (3 bundles) per square. Special nails for butts and ragfelt backer strips for vertical joints furnished with shingles. Exposure 10". Minimum headlap 1¼". 1¼ lbs. 2" galv. nails per square required for concealed nailing when residing. No starters required.	Shake Shake	Blended Gray Oyster White	270 270				
	**No. 108-U — CEDARGRAIN SIDING SHINGLE** — (12"x24")—Uniform thickness—63 shingles (3 bundles) per square. For use in combination with 105-U, 106-U and 107-U to obtain decorative effects. Special nails for butts and ragfelt backer strips for vertical joints furnished with shingles. Exposure 9½". Minimum headlap 1-9/16". 1¼ lbs. 2" galv. nails per square required for concealed nailing when residing. No starters required.	Cedargrain Cedargrain	Blended Gray Oyster White	215 215				
	**No. 108-T—SHAKE TEXTURE SIDING SHINGLE** — (12"x24")—Tapered to ⅛" butts—63 shingles (3 bundles) per square. For use in combination with 105-T and 107-T to obtain decorative effects. Special nails for butts and ragfelt backer strips for vertical joints furnished with shingles. Exposure 9½". Minimum headlap 1-9/16". 1¼ lbs. of 2" galv. nails required for concealed nailing when residing. No starters required.	Shake Shake	Blended Gray Oyster White	285 285				
ASBESTOS CLAPBOARDS —(9½" wide by 8' long). Approx. 3/16" uniform thickness. A new J-M development which combines the economy and beauty of clapboard siding with the durability of asbestos-cement products. Exposure 8". Equivalent of 19 full-sized pieces required per square. Packed 2 bundles per square, each containing 8 full-sized pieces plus a number of shorter pieces 32", 48", 64" or 80" long. Ragfelt backer strips for vertical joints and face nails for butts furnished with the clapboards. 1¾ lbs. 2" galv. nails required for concealed nailing when residing. No starters required.			White	195				
	**BRICK-TYPE ASBESTOS SIDING** — (8⅛" x 16¼"). Rigid and strong, it makes a permanent, fireproof side wall that looks and lasts like brick. 248 pieces per square, packed in eight bundles, 31 pieces per bundle. Brick size, 3⅝" x 7⅝" with ½" mortar lines. 4 lbs. of 2" galvanized nails per square. Use Brick-Type starters or full size pieces with brick portion cut off.		•Red •Mulberry •Buff	440 440 440				
	**BRICK-TYPE STARTERS**—For use with Brick-Type Asbestos Siding. 75 pieces per 100 lineal feet. Packed 25 pieces per bundle. Size 4⅛" x 16¼".		•Gray	75				

• Indicates textured surface.

JOHNS-MANVILLE Building Materials

Blank Price List
J-M Rigid Asbestos Siding Shingles

DATE June, 1938

(Cancelling sheet dated June, 1937)

BMR-1210

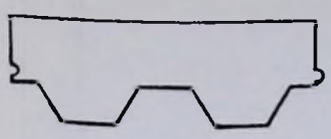
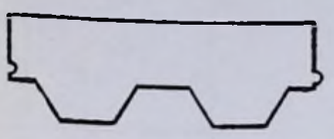
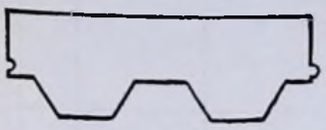
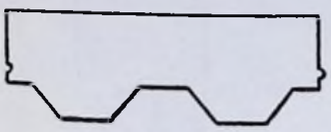
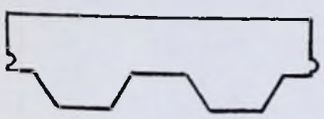
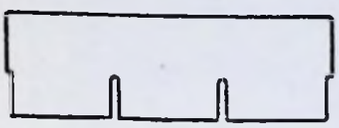
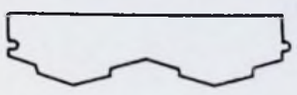
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JOHNS-MANVILLE ASPHALT SHINGLES

Style	Description	Group	Unit	Underwriters' Label Class	Weight	Colors			Stocked	Not Stocked
	**GIANT HEXAGONAL SHINGLES** Length—36″ Width—12⅓″ Exposure—4⅓″ Headlap—3″ Tabs—2 Shingles per sq.—86 Bundles per sq.—3 Type Material—Giant	B	Sq.	C	235					
	**12⅓″ STANDARD HEXAGONAL SHINGLES** Length—36″ Width 12⅓″ Exposure—4⅓″ Headlap—3″ Tabs—2 Shingles per sq.—86 Bundles per sq.—2 TypeMaterial—Standard	B	Sq.	C	186					
	**11⅓″ STANDARD HEXAGONAL SHINGLES** Length—36″ Width—11⅓″ Exposure—4⅓″ Headlap—2″ Tabs—2 Shingles per sq.—86 Bundles per sq.—2 TypeMaterial—Standard	B	Sq.	C	167					
	**12½″DOUBLECOVERAGE STANDARD HEXAGONAL SHINGLES** Length—36″ Width—12½″ Exposure—4″ Headlap—4½″ Tabs—2 Shingles per sq.—100 Bundles per sq.—3 TypeMaterial—Standard	B	Sq.	C	226					
	**12″ DOUBLE COVERAGE STANDARD HEXAGONAL SHINGLES** Length—36″ Width—12″ Exposure—4″ Headlap—4″ Tabs—2 Shingles per sq.—100 Bundles per sq.—3 TypeMaterial—Standard	B	Sq.	C	215					
	**GIANT STRIP SHINGLES** Length—36″ Width—12″ Exposure—5″ Headlap—2″ Tabs—3 Shingles per sq.—80 Bundles per sq.—3 Type Material—Giant	B	Sq.	C	257					
	**10″ STANDARD GOTHIC STRIP SHINGLES** Length—36″ Width—10″ Exposure—4″ Headlap—2″ Tabs—2 Shingles per sq.—100 Bundles per sq.—2 Type Material—Standard	B	Sq.	C	172					

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JOHNS-MANVILLE Roofing and Shingles

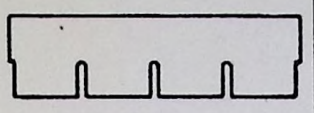
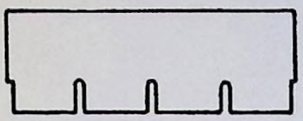
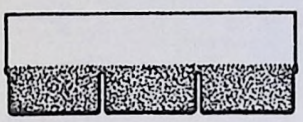
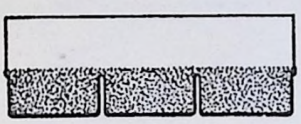
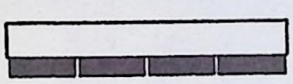
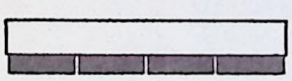
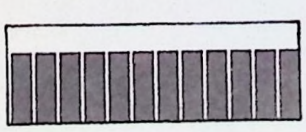
Blank Price List
J-M Asphalt Shingles

DATE December, 1937
(Cancelling BMR-1211 to 1219 dated 1936 & 1937)
(BMR-1211)

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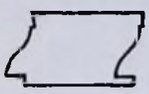
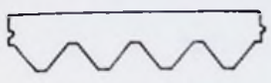
JOHNS-MANVILLE ASPHALT SHINGLES

Style	Description	Group	Unit	Underwriters' Label Class	Weight	Colors			Stocked	Not Stocked
	**10″ STANDARD STRIP SHINGLES** Length—36″ Width—10″ Exposure—4″ Headlap—2″ Tabs—4 Shingles per sq.—100 Bundles per sq.—2 TypeMaterial—Standard	B	Sq.	C	210					
	**12½″ STANDARD STRIP SHINGLES** Length—36″ Width—12½″ Exposure—4″ Headlap—4½″ Tabs—4 Shingles per sq.—100 Bundles per sq.—3 TypeMaterial—Standard	B	Sq.	C	266					
	**DOUBLE COATED THICK-BUTT STRIP SHINGLES** Length—36″ Width—12″ or 15″ Exposure—5″ Headlap—2″ or 3″ Tabs—3 Shingles per sq.—80 Bundles per sq.—2 or 3 TypeMaterial—Standard with Butts Double Thick	B B	Sq. Sq.	C C	210 250					
	**STANDARD SEALED-EDGE THICK-BUTT STRIP SHINGLES** Length—36″ Width—12″ Exposure—5″ Headlap—2″ Tabs—3 Shingles per sq.—80 Bundles per sq.—3 TypeMaterial—Standard with Butts Double Thick and Sealed Edges	B	Sq.	C	230					
	**BRIC-SIDE SHINGLES SINGLE DIPPED** Length—36″ Width—7.1″ Exposure—3″ Headlap—1.1″ Tabs—4 Shingles per sq.—131 Bundles per sq.—3 TypeMaterial—Standard with Butts Extra Thick on Face Side.	B	Sq.	—	210					
	**BRIC-SIDE SHINGLES DOUBLE DIPPED** Length—36″ Width—7.1″ Exposure—3″ Headlap—1.1″ Tabs—4 Shingles per sq.—131 Bundles per sq.—3 TypeMaterial—Standard with Butts Extra Thick on Both Sides.	B	Sq.	—	230					
	**Soldier Course for Bric-Side Shingles** Length—36″ Width—12½″ Pieces per sq.—45 Bundles per sq.—2 TypeMaterial—Standard with Exposed Face Area Extra Thick.	C	Sq.	—	145					
	**CORNER STRIPS for BRIC-SIDE SHINGLES** Length—13¼″ Width—7.1″ Pieces per Carton—50 (25 Rights—25 Lefts) TypeMaterial—Standard with Butts Extra Thick on Face Side	C	Carton	—	35					

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JOHNS-MANVILLE ASPHALT SHINGLES

Style	Description	Group	Unit	Underwriters' Label Class	Weight	Colors			Stocked	Not Stocked
	**GIANT INDIVIDUAL SHINGLES** Length—16″ Width—12″ Exposure—5″ Headlap—6″ Tabs—1 Shingles per sq.—225 Bundles per sq.—4 Type Material—Giant	C	Sq.	C	325					
	**STANDARD INDIVIDUAL SHINGLES** Length—12¾″ Width—9″ Exposure—4″ Headlap—4¾″ Tabs—1 Shingles per sq.—378 Bundles per sq.—4 TypeMaterial—Standard	C	Sq.	C	253					
	**LATCH THATCH SHINGLES** Length—18″ Width—12″ Max. Exposure—9½″x15″ Min. Headlap—2½″ Shingles per sq.—102 Bundles per sq.—2 TypeMaterial—Standard	C	Sq.	C	135					
	**WEATHERLOK SHINGLES** Size—16″x 16″ Exposure—13″x 13″ Lap—3″ Shingles per sq.—86 Bundles per sq.—2 TypeMaterial—Standard	C	Sq.	C	135					
	**STANDARD DUTCH LAP SHINGLES** Length—16″ Width—12″ Headlap—2″ Sidelap—3″ Shingles per sq.—112 Bundles per sq.—2 Exposed Corner Fastened With Copper Clip Furnished with Shingles TypeMaterial—Standard	C	Sq.	C	135					
	**GIANT DUTCH LAP SHINGLES** Length—16″ Width—12″ Headlap—2″ Sidelap—3″ Shingles per sq.—112 Bundles per sq.—2 Exposed Corner Fastened with Copper Clip Furnished with Shingles Type Material—Giant	C	Sq.	C	162					
	**4-POINT HEXAGONAL RESIDING SHINGLE** *For Siding only* Length—38″ Width—9″ Exposure—4″ Headlap—1″ Tabs—4 Shingles per sq.—100 Bundles per sq.—2 Type Material—Standard	C	Sq.	—	150					

JOHNS-MANVILLE Roofing and Shingles

Blank Price List
J-M Asphalt Shingles and Slatekote Roll Roofings

DATE December, 1937

(BMR-1212)

PRINTED IN U. S. A.

TECHNICAL DATA SECTION

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SLATEKOTE ROLL ROOFINGS

Style and Description	Group	Unit	Underwriters' Label Class	Weight	Colors			Stocked	Not Stocked
SLATEKOTE ROOFING Length—36′ Width—36″ Gross Area—108 sq. ft. Selvage Edge—2″ Colored Heavy Slate Surface on One Side Packed with Galv. Nails and Lap Cement	C	Sq.	C	90					
18″ SLATEKOTE ROOFING Length—77⅓′ Width—18″ Gross Area—116 sq. ft. Selvage Edge—2″ Colored Heavy Slate Surface on One Side Packed with Galv. Nails and Lap Cement Special Order Only	C	Sq.	—	99					
TUFTEX ROOFING Length—36′ Width—36″ Gross Area—108 sq. ft. Selvage Edge—2″ Colored Heavy Slate Surface on One Side Packed with Galv. Nails and Lap Cement	C	Sq.	—	75					
SLATEKOTE DIAMOND POINT ROOFING Width—32″ Net Area—100 sq. ft. Colored Heavy Slate surface on one side No nails or cement furnished	C	Sq.	C	105					
MODERN EDGE SLATEKOTE ROOFING Width—32″ Net Area—100 sq. ft. Colored Heavy Slate surface on one side No nails or cement furnished	C	Sq.	C	105					
SPLIT SHEET SLATEKOTE ROOFING Length—36′ Width—36″ Selvage Edge—19″ Weather Area—51 sq. ft. Heavy Slate Surface on 17″ of Width of One Side No nails or cement furnished	C	Roll	—	55					
SLATEKOTE STARTING STRIPS Length—36′ Widths—9″, 12″, 18″ and 24″ Material same as Slatekote Roofing No nails or lap cement furnished.	C	Roll	—	21 28 42 56	9″ Wide 12″ Wide 18″ Wide 24″ Wide				

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SMOOTH ROLL ROOFINGS

Style and Description	Group	Unit	Underwriters' Label Class	Weight	Weights			Stocked	Not Stocked
PILOT ROOFING Length—36′ Width—36″ Gross Area—108 sq. ft. Packed with Galv. Nails and Lap Cement Smooth Talc Surface on One Side and Veined Mica Surface on Other Side	C	Sq. Sq. Sq. Sq.	C C C C	45 55 65 75	Medium Heavy Extra Heavy Super Heavy				
SERVICE ROOFING Length—36′ Width—36″ Gross Area—108 sq. ft. Medium, Heavy and Extra Heavy Packed with Galv. Nails and Lap Cement Light Packed with Bright Nails and Cement Veined Talc Surface Both Sides	C	Sq. Sq. Sq. Sq.	— — C C	35 45 55 65	Light Medium Heavy Extra Heavy				
PLANET ROOFING Length—36′ Width—36″ Gross Area—108 sq. ft. Packed with Bright Nails and Lap Cement Veined Talc Surface Both Sides	C	Sq. Sq. Sq.	— — —	35 45 55	Light Medium Heavy				
DURO-TOP CAP SHEET ROOFING Length—72′ Width—36″ Gross Area—216 sq. ft. No nails or cement furnished	C	Roll	—	68					
REGAL CAP SHEET ROOFING Length—72′ Width—36″ Gross Area—216 sq. ft. No nails or cement furnished	C	Roll	—	68					
HOUSE SHEATHING Length—66⅔′ Width—36″ Gross Area—200 sq. ft. No nails or cement furnished	C	Roll	—	60					

JOHNS-MANVILLE Building Materials

Blank Price List
J-M Smooth Roll Roofings and Building Papers and Felts

DATE October, 1938
(Cancelling sheet dated Dec., 1937)
BMR-1213
TECHNICAL DATA SECTION

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BUILDING PAPERS

Style and Description	Group	Unit	Underwriters' Label Class	Weight	Size or Weight			Stocked	Not Stocked
RED ROSIN-SIZED SHEATHING PAPER Width—36″ Gross Area—500 sq. ft.	D D D D	Roll Roll Roll Roll	— — — —	20 25 30 40	20 Lb. Weight 25 Lb. Weight 30 Lb. Weight 40 Lb. Weight				
BLUE ROSIN-SIZED SHEATHING PAPER Width—36″ Gross Area—500 sq. ft.	D D D	Roll Roll Roll	— — —	20 25 30	20 Lb. Weight 25 Lb. Weight 30 Lb. Weight				
DEADENING FELT Width—36″ Gross Area—50 sq. yds. Type Material—Unsaturated Rag Felt	D D D	Roll Roll Roll	— — —	38 50 75	¾ Lb. Weight 1 Lb. Weight 1½ Lb. Weight				
BLUE PLASTER BOARD Width—36″ Gross Area—250 sq. ft. or 500 sq. ft.	D D	Roll Roll	— —	30 60	250 Sq. Ft. Roll 500 Sq. Ft. Roll				
IMPROVED WEATHERTITE BUILDING PAPER Width—36″ Gross Area—500 sq. ft. Type Material — Strong Kraft Paper infused with Asphalt. Not Coated	M M M	Roll Roll Roll	— — —	12 16 24	Standard Weight Medium Weight Heavy Weight				
REINFORCED BUILDING PAPER Width—36″ Gross Area—500 sq. ft. Type Material—Two Ply Strong Kraft Paper Cemented with Asphalt and Reinforced with ½″ Mesh of Cord.	M	Roll	—	33	500 Sq. Ft. Roll				

ASPHALT AND TARRED FELTS

Style and Description	Group	Unit	Underwriters' Label Class	Weight	Weights and Sizes			Stocked	Not Stocked
STANDARD ASPHALT-SATURATED RAG FELT Width—36″ Gross Area—432 sq. ft. for 12 lb., 14 lb. and 15 lb. weights Gross Area—216 sq. ft. for 24 lb. and 30 lb. weight	F F F F F	Roll Roll Roll Roll Roll	C — C C —	65 52 65 60 52	30 Lb. Weight 24 Lb. Weight 15 Lb. Weight 14 Lb. Weight 12 Lb. Weight				
ASPHALT SLATERS FELT Width—36″ Gross Area—500 sq. ft.	F	Roll	—	30					
TARRED SLATERS FELT Width—36″ Gross Area—500 sq. ft.	F	Roll	—	30					
No. 2 TARRED SHEATHING Width—32″ Gross Area—432 sq. ft.	F	Roll	—	65					
TARRED THREAD FELT Width—36″ Gross Area—250 sq. ft. or 500 sq. ft. Type Material — Tarred Sheathing with 9 threads running lengthwise of sheet	F F	Roll Roll	— —	21 42	250 Sq. Ft. Roll 500 Sq. Ft. Roll				
STANDARD TAR-SATURATED RAG FELT Width—32″ Gross Area—432 sq. ft. for 12 lb., 14 lb. and 15 lb. weights	F F F	Roll Roll Roll	C C —	65 60 52	15 Lb. Weight 14 Lb. Weight 12 Lb. Weight				

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ASBESTOS READY ROOFINGS

Style and Description	Group	Unit	Underwriters' Label Class	Weight	Weights and Completing Materials			Stocked	Not Stocked
FLEXSTONE SLATE SURFACE Width—32″ Gross Area—108 sq. ft. Asbestos Base, Slate Surfaced Roofing	K	Sq.	B	85	Felt Only—(No Nails, Cement or Kaps) With Galv. Nails and Lap Cement With Galv. Pyramid Kaps, Nails and Cement With Zinc Pyramid Kaps, Nails and Cement				
FLEXSTONE SMOOTH SURFACE Length—80″ Width—32″ 6 Sheets per sq.	K	Sq.	B	66	**Heavy (3 Ply)** Felts Only—(No nails, cement or Kaps) With Galv. Nails and Lap Cement With Galv. Pyramid Kaps, Nails and Cement With Zinc Pyramid Kaps, Nails and Cement				
	K	Sq.	B	83	**Extra Heavy (4 Ply)** Felts Only—(No nails, cement or Kaps) With Galv. Nails and Lap Cement With Galv. Pyramid Kaps, Nails and Cement With Zinc Pyramid Kaps, Nails and Cement				
A high-grade, smooth-surfaced roofing consisting of several plies of asphalt-saturated asbestos felt cemented together with asphalt.									
WHITE TOP Standard and Heavy Length—~~40′ 6″~~ and 81 Width—32″ Gross Area—108 sq. ft. and 216 sq. ft.	K	Sq.	B	55	**Standard (3 Ply)** Felts Only—(No nails, cement or Kaps) With Galv. Nails and Lap Cement With Galv. Pyramid Kaps, Nails and Cement With Zinc Pyramid Kaps, Nails and Cement				
	K	Sq.	B	60	**Heavy (3 Ply)** Felts Only—(No nails, cement or Kaps) With Galv. Nails and Lap Cement With Galv. Pyramid Kaps, Nails and Cement With Zinc Pyramid Kaps, Nails and Cement				
Extra Heavy Length—80″ Width—32″ 6 Sheets per sq.	K	Sq.	A	83	**Extra Heavy (4 Ply)** Felts Only—(No nails, cement or Kaps) With Galv. Nails and Lap Cement With Galv. Pyramid Kaps, Nails and Cement With Zinc Pyramid Kaps, Nails and Cement				
Asphalt saturated asbestos felt plied together with a top sheet of lasting white asbestos. Especially made for use where light reflection is important.									
ASBESTOS SLATERS FELT Length—122′ Width—32″ Gross Area—324 sq. ft. No Nails or Cement Furnished.	K	Roll	—	45					

JOHNS-MANVILLE Roofing and Shingles

Blank Price List
J-M Asbestos Ready Roofings

DATE December, 1937

(BMR-1214)

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Rock Wool and Insulating Board

Standard-type competitive materials of proved merit

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Rock Wool and Insulating Board

Various types of insulating and interior-finish materials are specified by governmental agencies for a variety of designs under the jurisdiction of the United States Housing Authority. These materials are treated in the following section.

All of the insulating board and rock wool products have been used on Federal Housing, P.W.A. and resettlement projects and comply with the requirements of Federal Specifications for their respective fields.

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J-M Home Insulation

J-M Home Insulation consists of special grades of rock wool for retarding heat flow through walls, ceilings and floors of frame houses. Its purpose is to assist in keeping buildings warm in winter and cool in summer, thereby providing greater comfort with lower fuel bills. Home Insulation is permanent, fireproof, non-conductive of electricity, and does not nourish vermin. Moreover, the insulation will not attract moisture from the air. Its efficiency is maintained throughout the life of the building structure.



More essential to the home-owner's comfort than fidelity to architectural style, J-M Home Insulation also effects large savings in fuel costs

The Utility of Insulation

Heating systems vary in efficiency. One system may heat a house with less fuel cost than another system, under like conditions of service, but the gain or loss by the use of either system is but a small amount when compared with the saving or loss due to the type of house construction employed. This factor is often overlooked when heating systems are being planned.

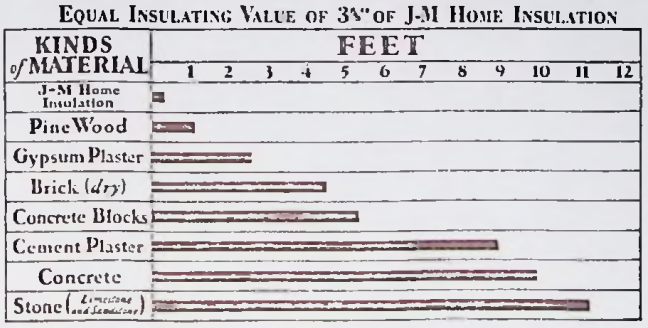
A pound of coal contains from 12,000 to 14,500 B.t.u. When this is burned in the average domestic heating system, it has been estimated that about 50 percent is lost because of imperfect combustion, etc. The remaining 50 percent goes to heat the house and it is from this that the saving is made.

The term "dead air space" was formerly in common use as applying to the hollow space in building walls, and the popular impression was that this prevented heat transmission something like the space in the walls of a thermos bottle. It has been conclusively proved, however, that this notion was fallacious and that a material which contains a great number of small confined air spaces per unit volume is much more effective as an insulator than an empty space in which air currents may circulate.

It is obvious that the most practical method of home insulation is to fill every void and crevice of a house with a material containing these minute air spaces. Johns-Manville does just this with Home Insulation.

The roof or attic floor of any home can be insulated, as can also the walls of any house of frame construction, whether stucco, clapboard, brick veneer or shingles. Insulation for existing construction is not recommended where it makes direct contact with solid masonry walls because moisture gathers on the masonry. However, in new construction, insulation may be applied provided the inner face of the masonry wall is thoroughly waterproofed before application.

COMPARATIVE THICKNESSES OF VARIOUS WALLS REQUIRED TO EQUAL INSULATING VALUE OF 3½" OF J-M HOME INSULATION



The Advantages of Insulation

Home Insulation is an investment which begins to pay dividends as soon as it is installed. The immediate benefits include the following:

Increase in Home Comfort
Improvement of Health Conditions
Addition to Property Value
Reduction in Outside Noises
Aid in Fire Prevention
Decrease in Furnace Operation
Reduction in Fuel Costs

A more detailed description of these advantages is given in subsequent paragraphs on the following page.

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Increases General Home Comfort:

(a) Warmer in winter. No rooms "hard to heat" are found where an adequate heating system is installed in an insulated house.

(b) Cooler in summer. The upper floor rooms can be kept at a temperature close to that of the lower floors. Indoor temperatures will sometimes run as much as 15 deg. F. lower than the outside temperature during the heat of the day.

(c) Waste attic space, used for storage, can be made into extra bedrooms, play rooms, etc.

Improves Health Conditions:

(a) Frame walls, if uninsulated, usually permit air infiltration in large quantities, resulting in drafts. Heat exchange next to such walls also sets up air currents or drafts within the room.

(b) Ventilation is under more positive control in the insulated house.

(c) Insulation aids in cutting down the number of air changes in a house and thus considerably reduces the evaporation required to moisten the indoor air properly, thereby helping to prevent colds.

Adds to Property Value:

House insulation has received wide publicity in the past few years through advertising, government reports, magazine articles, etc., and it is safe to predict that in the near future an uninsulated house will not be considered a good investment.

Reduces Outside Noise:

Insulation in the walls and ceiling of a house helps to eliminate disturbing outside noises.

Aids in Preventing Fires:

The average frame house, due to its construction, is a fire hazard. Filling the walls and ceilings with a fireproof insulating material lessens the possibility of the house catching fire from overheated flues because furnace "forcing" then becomes unnecessary. Furthermore, as long as the insulation is in place, it will prevent the passage of flame between the walls.

Decreases Furnace Operations:

In an insulated house it is possible to reduce materially the usual period of furnace operation by the judicious use of fireplaces, cookstoves, and auxiliary heaters during the chilly days of spring and autumn. With reduced furnace operation there is a consequent saving of labor in the handling of fuel and ashes. In addition, the heating plant will require considerably less attention because of the ease of uniformly maintaining comfortable temperatures.

Reduces Fuel Costs:

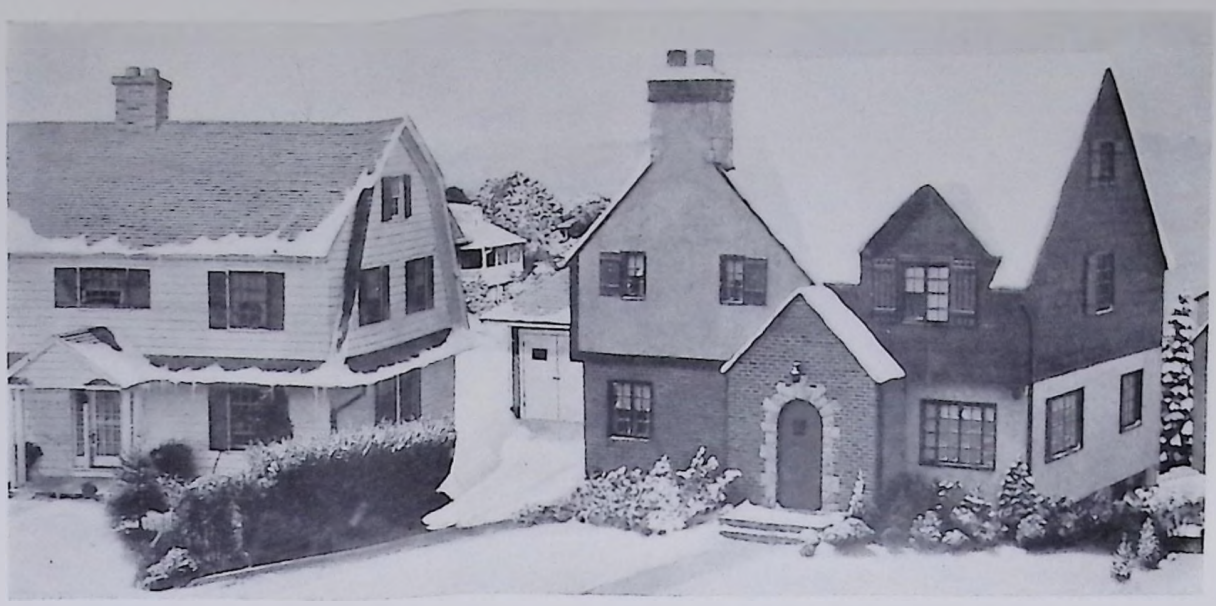
A survey covering a large number of individual cases indicates that for an average insulated house of six to eight rooms, an annual saving of 20 to 35 percent of the fuel bill may be expected. These figures may safely be taken as a fair average, although numerous examples of greater savings have been recorded.



The Williams Inn, Williamstown, Mass., insulated with J-M Home Insulation

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J-M Type B Home Insulation



A striking contrast between insulated and uninsulated houses. The melting snow on the house at the left indicates how heat leaks through uninsulated construction

J-M Type B Home Insulation, designed for the complete insulation of new houses under construction, is rock wool prefabricated into batts of convenient size to facilitate economical and rapid coverage.

The Type B batt is manufactured with a heavy, water-resisting paper affixed to one face, covering the entire surface and extending 1½" on the long sides of the batt. These 1½" laps, neatly folded back along the membrane backing in manufacture, are turned out and tacked or stapled to the studs, rafters, or joists after the batts are placed in the desired location. The paper backing helps to prevent the passage of vapor and resists the penetration of moisture from excess water in fresh plaster.

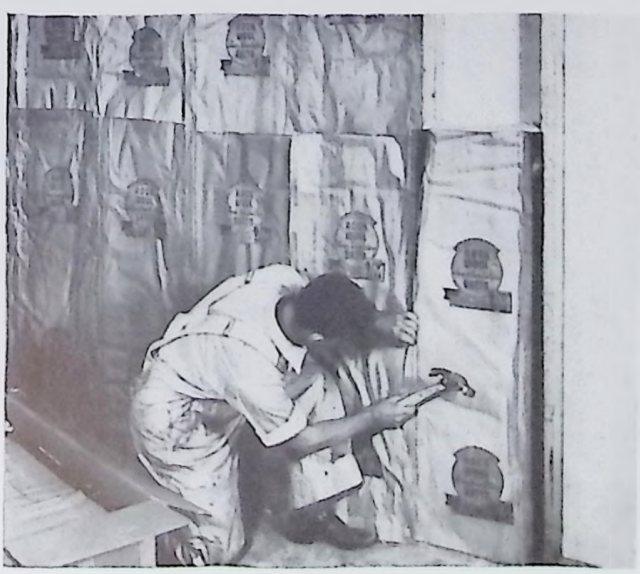
Type B batts are furnished Ful-Thik and Semi-Thik. Ful-Thik batts are manufactured in full wall-stud thickness and Semi-Thik batts with an average thickness of 2". The net area, as shown in the table, is the actual surface measure of the batts alone. The installed area is the overall measure of the surface covered with batts applied between studs on 16" centers.

Size in inches	Thickness designation	No. per carton	Area, sq. ft. net	Area, sq. ft. installed
15 x 48	Ful-Thik	4	20.0	21.3
15 x 48	Semi-Thik	6	30.0	32.0
15 x 23	Ful-Thik	8	19.2	20.4
15 x 23	Semi-Thik	12	28.8	30.7

The 15" x 48" size is especially suitable for attic floors and for sidewalls. The smaller, 15" x 23" batts are particularly adaptable for overhead work.

The batts are easily applied and can readily be cut and adjusted to provide continuity of insulation in odd-shaped spaces or areas. When installed, Type B Home Insulation forms a homogeneous mass of solid insulation, completely enveloping every portion of the house where a permanent barrier to the passage of heat is essential for comfort and economy.

Where to install: The purpose of insulation, of course, is to keep heat in or out of the living portion of the house. In general, if the attic is unfinished and



Securing Ful-Thik Type B batts between studs. Installation is easily and rapidly accomplished

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The 1½" paper laps are particularly effective when securing Type B batts in place between rafters

not to be used for living quarters it is obviously better to stop the heat flow at the attic floor line instead of at the roof. Therefore, the Type B batts are installed between studs from the foundation to the roof and between the top story ceiling joists.

Where the presence of an attic floor makes the above procedure impractical, the batts should be installed between the rafters and between the studding in the gable ends. An attic which contains a heated room is similarly insulated, except that the batts are installed between the rafters only to ceiling height and then across between the ceiling joists.

In all cases it is important that pipes and other equipment, containing water outside the insulated space, be carefully insulated as a protection against freezing. Also, that attics and similar spaces outside the insulated portions of the house, with modern tight roof construction, be adequately ventilated by louvres or similar means to provide cross ventilation.

How to install: When the insulation is applied between studs or between roof rafters the batts are placed with the unpapered side against the sheathing or shingle lath.

Where Ful-Thik batts are used between 4" studding or where rafters are no more than 4" in depth, the paper laps are tacked to the face of the studs. When studs or rafters exceed 4" in depth, or when Semi-Thik batts are used with 4" studding, the paper laps are turned out on the sides and tacked.

Type B batts when installed between ceiling joists are laid with the paper side down, on top of the lath or plaster base. If lathing is not in place, or if it is impossible to get above the ceiling joists, the batts can be placed from the underside with the paper lapping the underside of joists and tacked.

On installations where plaster is to be applied, after the installation of the batts it is important that adequate ventilation be provided in the interior of the building to facilitate drying.

Complete application directions for installing the various types of insulation for new construction appear on other data sheets.

Junior Batts

J-M Ful-Thik Junior Batts are equal in quality to the Type B Batts except that they do not have the water-resisting paper backing. They are particularly recommended where stud spaces are uneven or badly cut up by diagonal framing members. Junior Batts, furnished 12" x 15" in full wall-stud thickness, are packed in cartons containing 16 batts with an installed surface measure of 21.3 sq. ft.

To act against the penetration of vapor, J-M Vaporseal Paper should be placed between the insulation and the heated or occupied portions of the house. This paper, manufactured in 36"-wide rolls containing 500 sq. ft., weighs about 20 lb. per roll.

Type C Home Insulation

J-M Type C Home Insulation, also designed for new houses under construction, is an improved form of loose rock wool manufactured in pieces 8" x 15" by full wall-stud thickness, without the water-resisting paper backing. The pieces are packed 18 per paper bag and have an installed surface measure of 16 sq. ft.

The Type C pieces do not have the rigidity or other advantages of the Type B batts, although the pieces are far superior to ordinary loose wool in ease of handling. If the pieces are crushed thin or out of shape in transit, they can easily be fluffed-back to normal thickness by a gentle shake.

J-M Vaporseal Paper, manufactured in 36"-wide rolls containing 500 sq. ft. and weighing about 20 lb. per roll, should be placed between the insulation and the heated or occupied portions of the house.

Type L Home Insulation

Type L is loose rock wool shipped in bulk in paper bags containing approximately 35 lb. This type of Home Insulation must be packed entirely by hand and cannot produce the same quality job possible with the other types discussed.

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STANDARD SPECIFICATION FOR INSTALLING TYPE B HOME INSULATION

(Since the furnishing and applying of Home Insulation in this form may be made a part of the carpentry specification, the following has been prepared to be so included. To this specification is to be appended the proper paragraph or paragraphs selected from the Detailed Specifications as applicable to the particular job.)

The Contractor shall furnish and install Johns-Manville Ful-Thik Home Insulation, Type B, to completely insulate the portions of the building as shown and noted on the drawings or herein specified, and placed in accordance with the manufacturer's printed instructions entitled "Directions for Applying Johns-Manville Rock Wool Home Insulation, Type B".

(Insert here detailed specifications applying to the particular job.)

DETAILED SPECIFICATIONS

No. 1 - Finished Attics:

The insulating material shall be installed in attic spaces between rafters, between attic ceilings joists, between studs in gable ends, and in dormers which adjoin finished attic portions, to provide a continuous blanket of insulation over entire roof area.

No. 2 - Unfinished Attics: (Insulation installed between rafters)

The insulating material shall be installed in attic spaces between rafters and between studs in gable ends, etc., to provide a continuous blanket of insulation over the entire roof area.

No. 3 - Unfinished Attics: (Insulation installed between ceiling joists)

The insulating material shall be installed between ceiling joists to provide a continuous blanket of insulation over entire ceiling area.

No. 4 - Exterior Walls*: (Wood Frame Construction)

The insulating material shall be installed in all exterior walls to completely fill such walls from top of foundation wall to roof to provide a continuous blanket of insulation surrounding the occupied portion of the house.

No. 5 - Exterior Walls*: (Solid Masonry Construction)

(The inner face of the exterior walls shall be waterproofed, by others, before the insulating material is installed.) The insulating material shall be installed in all exterior walls in the spaces between the furring (which spaces shall be not less than 2" deep) from top of foundation wall to roof to provide a continuous blanket of insulation surrounding the occupied portion of the house.

* (1) (If a garage is attached to, or is under, the house, the following is to be added:) The insulating material shall be installed in all walls between the garage and the house - or - The insulating material shall be installed in the ceiling of the garage.

* (2) (If there are heated portions of the house projecting beyond the main walls as for example, over an open porch, garage, etc., the following should be added:) The insulating material shall also be installed between the floor joists under all heated portions of the house which are exposed on the under side.

JOHNS-MANVILLE Building Materials

J-M Home Insulation
Standard Specification for Installing
Type B Home Insulation

DATE April, 1938
(Cancelling sheet dated Nov. 1936)
BMM-39

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TECHNICAL DATA SECTION

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J-M HOME INSULATION FOR NEW CONSTRUCTION
APPLICATION DIRECTIONS FOR TYPE B FUL-THICK AND SEMI-THICK BATTS

Johns-Manville Type B Home Insulation is rock wool in convenient batt form, with paper backing, for easy installation between open studding, rafters or joists. For closed, inaccessible spaces Type A Home Insulation applied pneumatically is recommended.

GENERAL INSTRUCTIONS:

It is essential that all areas be thoroughly covered to avoid heat-leaking voids or crevices.

Ventilation, Air Conditioning, Freezing:

Attics and all similar spaces which are outside the insulated portions of the house (for example, where the insulation is installed between the ceiling beams, under the attic floor) shall be adequately ventilated, where modern tight roof construction is employed, by being connected with the outside air through louvres, windows or similar means, such louvres or windows being provided at opposite ends of such spaces so there will be cross ventilation.

On jobs where plaster is to be applied after the installation of the batts it is important that adequate ventilation be provided in the interior of the building to facilitate drying.

If air conditioning or a heating system involving humidification of interior air is used, humidification should not be employed until the building is thoroughly dried out.

Protection against freezing shall be provided on pipes and other equipment containing water which are located in these spaces.

WHERE TO INSTALL:

The purpose of insulation is to keep heat in or out of the living portion of the house. If the attic is unfinished and not used for living quarters, it is obviously better to stop the heat flow at the attic floor line instead of the roof. The following sketches indicate where insulation should be installed for best results.

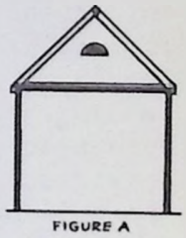


FIGURE A

In a house with a thoroughly ventilated unfinished attic which has no open stairwell leading into it, the insulation may be installed in outside walls and between the top story ceiling joists as shown in Fig. A.

When the above conditions are not fulfilled or when the attic is floored, the batts should be installed between the roof rafters as shown in Fig. B and between the studding in the gable ends. An attic which contains a heated room should be insulated by installing the batts between the rafters and ceiling joists, as shown in Fig. C.

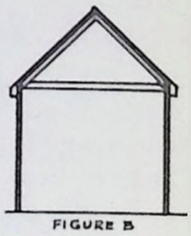


FIGURE B

Where the batts are to be installed in the furred spaces (which spaces to be not less than 2" deep) behind masonry construction, the inner face of such masonry is to be waterproofed before application of the insulation.

If a garage is attached to, or is under, the house the batts are to be installed in all walls between the garage and house, or, in the ceiling of the garage.

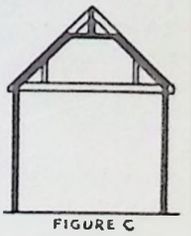


FIGURE C

If there are heated portions of the house projecting beyond

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the main walls as, for example, over an open porch, etc., the batts are to be installed between the floor joists under all heated portions of the house which are exposed on the underside.

HANDLING AND INSTALLATION:

Type B Batts have a sheet of waterproof paper on one face extending 1-1/2" on the long sides, as shown in Fig. D. The batts should be butted snugly together. Odd-shaped areas are insulated by cutting or tearing a part of the rock wool from the full batt. However, it is important that the paper be left on the remainder of the batt to provide for the lap.

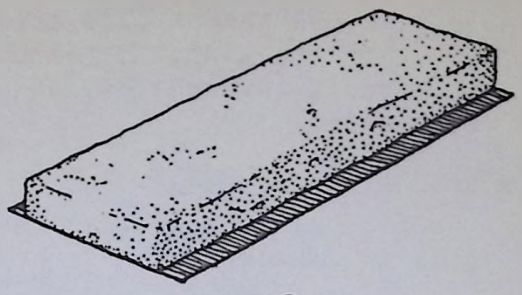


FIG. D

How to Unpack: The carton, placed on the floor with the side marked "top" facing upwards, is slit and the flaps opened. The batts are then removed by inverting the carton.

Then, the fingers are slid under the sides and near the far end of the batt, with thumbs on top of paper backing, so that a firm grasp is obtained upon both the paper backing and the rock wool while lifting from the pile and setting in place.

Installation of Type B Ful-Thik and Semi-Thik Batts:

Between Studs: In insulating exterior walls the batts shall be installed between the studs from the top of the foundation to the roof, placed with the unpapered side against the sheathing. Where "Ful-Thik" batts are used in 4" studding, the paper laps shall be tacked to the face of the studs (Fig. E).

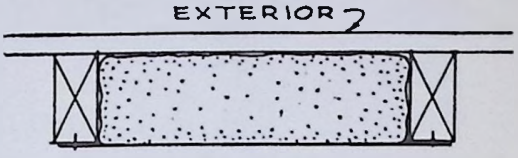


FIG. E
FUL-THIK BATTS BETWEEN 4" STUDS

Where studding is more than 4", or where "Semi-Thik" batts are used between 4" studs, the paper laps shall be turned out on the sides of the studs and tacked (Fig. F).

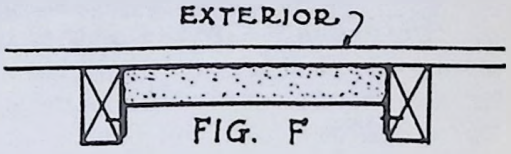


FIG. F
SEMI-THIK BATTS BETWEEN 4" STUDS OR FUL-THIK BATTS BETWEEN STUDS EXCEEDING 4" IN DEPTH

Between Ceiling Joists: The batts are laid with paper side down between ceiling joists on top of lath or plaster base (Fig. H). If lathing is not in place, or if impossible to get above ceiling joists, the batts can be placed from the underside with the paper lapping the underside of joists and tacked (Fig. E). The junction between the ceiling and exterior walls shall be thoroughly insulated by carrying the ceiling batts to the face of the outside sheathing.

Between Roof Rafters: The batts shall be installed between the rafters, with the unpapered side against the sheathing or shingle lath, etc. The paper laps shall be turned out on the sides of the rafters and continuous wood strips applied over the laps and secured as shown in Fig. G. (If rafters are 4" the "Ful-Thik" batts are installed as shown in Fig. E, except that the wood strips are applied over the paper laps.)

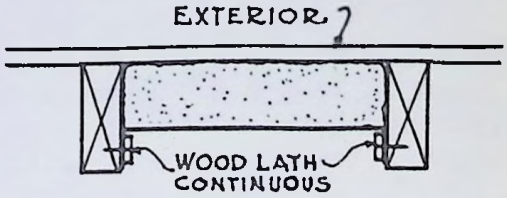


FIG. G
FUL-THIK BATTS BETWEEN RAFTERS EXCEEDING 4" IN DEPTH

Fastening: A convenient method of securing the paper is to use one of the approved types of automatic hand stapling devices now on the market, although the use of wood strips is preferable. Maximum spacing of fasteners shall be 6" center to center. On face of studs, joists or rafters which are to receive lath, etc., fasteners sufficient only to hold paper temporarily in place need be used.

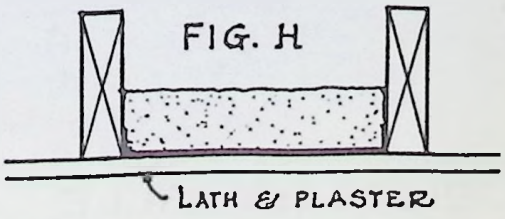


FIG. H
FUL-THIK BATTS BETWEEN CEILING JOISTS

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J-M HOME INSULATION FOR NEW CONSTRUCTION
APPLICATION DIRECTIONS FOR JUNIOR BATTS AND TYPE C PIECES

Johns-Manville Type C Pieces and Junior Batts consist of rock wool formed into pieces or batts, without paper backing for easy installation between open studding, rafters or joists. For closed, inaccessible spaces Type A Home Insulation applied pneumatically is recommended.

GENERAL INSTRUCTIONS:

It is essential that all areas be thoroughly covered to avoid heat-leaking voids or crevices.

Ventilation, Air Conditioning, Freezing:

Attics and all similar spaces which are outside the insulated portions of the house (for example, where the insulation is installed between the ceiling beams, under the attic floor) shall be adequately ventilated, where modern tight roof construction is employed, by being connected with the outside air through louvres, windows or similar means, such louvres or windows being provided at opposite ends of such spaces so there will be cross ventilation. Protection against freezing shall be provided on pipes and other equipment containing water which are located in these spaces.

On jobs where plaster is to be applied after the installation of the batts it is important that adequate ventilation be provided in the interior of the building to facilitate drying.

If air conditioning or a heating system involving humidification of interior air is used, humidification should not be employed until the building is thoroughly dried out.

WHERE TO INSTALL:

The purpose of insulation is to keep heat in or out of the living portion of the house. If the attic is unfinished and not used for living quarters, it is obviously better to stop the heat flow at the attic floor line instead of the roof. The following sketches indicate where insulation should be installed for best results.

In a house with a thoroughly ventilated unfinished attic which has no open stairwell leading into it, the insulation may be installed in outside walls and between the top story ceiling joists as shown in Fig. A.

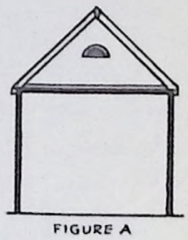


FIGURE A

When the above conditions are not fulfilled or when the attic is floored, the batts should be installed between the roof rafters as shown in Fig. B and between the studding in the gable ends. An attic which contains a heated room should be insulated by installing the batts between the rafters and ceiling joints, as shown in Fig. C.

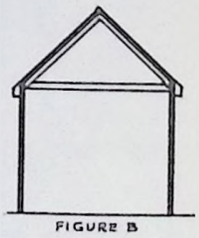


FIGURE B

Where the batts are to be installed in the furred spaces (which spaces to be not less than 2" deep) behind masonry construction, the inner face of such masonry is to be waterproofed before application of the insulation.

If a garage is attached to, or is under, the house the batts are to be installed in all walls between the garage and house, or, in the ceiling of the garage.

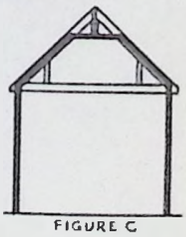


FIGURE C

If there are heated portions of the house projecting beyond the main walls as, for example, over an open porch, etc., the batts

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are to be installed between the floor joists under all heated portions of the house which are exposed on the underside.



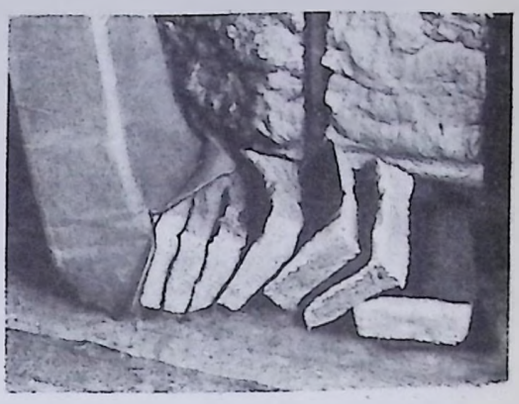
Junior Batts - 12" x 15"

HANDLING AND INSTALLATION:

Junior Batts and Type C Home Insulation are not manufactured with paper backing but are packed with paper separators between each layer to facilitate handling. Type C Pieces are packed in bags and the Junior Batts in cartons.

How to Unpack:

Type C Pieces: The top of the bag is slit open and the contents emptied on the floor, at the same time dragging the bag slightly to one side. Each piece will then be separate and easy to handle. Before applying, each end of the piece is grasped and given a gentle shake, fluffing it up to the full thickness of the studding. Where stud or rafter spacing is 24" between centers, one piece is placed horizontally and one piece vertically.



Type C Pieces - 8" x 15"

Junior Batts: The carton is placed on the floor with the side marked "top" facing upwards. Then, after the carton is slit and the flaps opened, it is turned over to empty the contents.

Installation of Type C Pieces and Junior Batts:

General: The pieces or batts must be butted snugly together to eliminate voids. Odd-shaped spaces are filled by breaking the pieces or batts to size.

A membrane of J-M Vaporseal Paper shall be installed directly to the inside faces of framing members (rafters, joists or studs). Such paper to be placed between the insulation and the heated or occupied portions of the building. The vaporseal paper (furnished 36" wide) shall be run paralleling the framing members, in continuous lengths (from plate to sill, etc.), with all joints formed over framing members, lapped not less than 2" and secured with large head tacks spaced on no greater than 12" centers. Such paper shall not be spanned tightly between framing members, but slackly, so as not to interfere with the keying of the plaster.

If joist spaces are inaccessible from above, or if no interior finish treatment is planned, nails, staggered on 8" centers, shall be driven into the framing members (joists or rafters) and a soft-annealed galvanized iron wire shall be woven between the nails to support the pieces or batts as they are placed. The paper membrane shall then be installed.

Building paper that is waterproof, but not vapor-proof, shall be used over the exterior sheathing.

Floors: In attic floors the plaster base and plaster shall be applied after the vapor-proof membrane. When the plaster has set, the pieces or batts shall be installed between the joists from above.

Roof Rafters, Roofs of Dormers or Bay Windows: As the membrane is installed towards the ridge, pieces or batts shall be filled in between rafters. Plaster base and plaster or other interior finish shall then be installed.

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CONDUCTIVITIES AND CONDUCTANCES OF BUILDING MATERIALS AND INSULATIONS

Material	Description	Authority	Density lb. per cu. ft.	Mean Temperature deg. F.	Conductivity or Conductance (see note a)
Aerocrete	Cellular concrete	A	40.0	75	1.06
Aerocrete	Cellular concrete	A	70.0	75	2.18
Air Space	(as between wall materials) assumed 3-5/8" wide	G	-	-	1.10*
Asbestos	Sheet	I	49.3	110	0.29
Asbestos	Corrugated board	I	20.4	110	0.48
Asbestos Millboard	Pressed asbestos	S	60.5	86	0.84
Asbestos Shingles	Asbestos and cement compressed	A	65.0	75	6.00*
Asbestos Wood	Asbestos and cement compressed	S	123.0	86	2.70
Balsa Wood	Across grain	S	8.8	90	0.38
Balsam Wool	Chemically treated wood fibre between layers of paper (not compressed)	S	2.2	90	0.27
Beaverboard	Rigid insulation made from sugar cane fibre	A	13.8	75	0.33
Brickwork	Mortar bond	I	132.0	100	4.00 to 5.00
Cabots Quilt	Eel grass between Kraft paper (not compressed)	S	3.4	90	0.25
Celotex	Rigid insulation made from sugar cane fibre	S	13.2	90	0.34
Concrete	Stone, 1-2-4 mix	I	140.0	110	8.30
Concrete	Cinder	A	110.0	75	5.20
Cork	Regranulated, about 3/16" particles	S	8.1	90	0.31
Corkboard	Pure, no added binder	S	7.0	90	0.27
Corkboard	Pure, no added binder	S	14.0	90	0.34
Dry Zero Blanket	Pliable slab form of insulation made from ceiba fibre	A	1.6	75	0.24
Fir	Across grain (one surface finished)	I	33.4	-	1.00
Fir Sheathing	With building paper	M	-	30	0.71*
Fir Sheathing	Building paper and pine lap siding	M	-	20	0.50*
Fir Sheathing	Building paper and stucco	M	-	20	0.82*
Flaxlinum	Flax fibre	S	13.0	90	0.31
Gyplap	Gypsum between layers of heavy paper (1/2" thick)	S	53.5	90	2.60*
Gypsum	Plaster	S	46.2	86	2.32
Gypsum	Solid tile	M	51.8	70	1.66
Gypsum	Solid tile	M	75.6	76	2.96
Hair Felt	Felted cattle hair	S	13.0	90	0.26
Hairinsul	75% hair; 25% jute	S	6.3	90	0.27
Haydite	Heat-treated clay aggregate concrete, standard blocks, 8" x 8" x 16"	A	73.0	-	1.62
Insulating Board	Rigid insulation made from wood fibre	S	18.0	90	0.34
Insulex	Cellular gypsum, dry	S	12.0	90	0.44
Insulex	Cellular gypsum, dry	S	30.0	90	1.00
Lath	With 3/8" plaster. Total thickness 3/4"	M	-	70	2.50*
Linofelt	Flax fibres between paper (not compressed)	S	4.9	90	0.28
Lith	Rock wool, flax and straw pulp with binder	S	14.3	90	0.40
Magnesia	85% Magnesia; 15% asbestos. Rigid	S	19.3	86	0.51
Masonite	Rigid insulation made from exploded wood fibre	A	19.8	75	0.33
Pine, yellow	Across grain	A	-	-	1.00
Pine siding	Lap siding 4" wide, and building paper	M	-	16	0.81*
Plaster	Cement	I	-	-	8.00
Rock Cork	Rock wool block with binders	S	14.5	77	0.33
Rock Wool	Fibrous material made from rock (all forms)	S	10.0	90	0.27
Roofing	Built-up bitumen and felt, gravel or slag surfaced. Assumed total thickness 1/4"	I	-	-	1.325*
Sawdust	Ordinary	S	-	86	1.04
Shavings	Ordinary	S	-	86	0.71
Sheetrock	Gypsum mixed with sawdust between layers of heavy paper (0.39" thick)	S	60.7	90	3.60*
Shingles	Slate	G	-	-	10.37
Shingles	Wood	G	-	-	1.28*
Stone	Building	G	-	-	12.50
Stucco		I	-	-	8.00
Surfaces	(Moving air - 15 mph)	G	-	-	6.00*
Surfaces	(Still air)	G	-	-	1.68*
Ten Test	Rigid insulation made from wood fibre	T	-	52	0.33
Thermax	Made from shredded wood and cement	A	24.2	72	0.40
Thermofelt	Hair and asbestos fibres, felted	S	7.8	90	0.28
Thermofelt	Jute and asbestos fibres, felted	S	10.0	90	0.37
Thermofill	Dry, fluffy, flaked gypsum	S	19.8	90	0.35
Thermofill	Dry, fluffy, flaked gypsum	S	34.0	90	0.60
Tile	Encaustic or Terrazzo	G	-	-	12.00
Tile	2" hollow clay, 1/2" plaster both sides	I	120.0	110	1.00*
Tile	4" hollow clay, 1/2" plaster both sides	I	127.0	100	0.60
Tile	6" hollow clay, 1/2" plaster both sides	I	134.3	105	0.47*
Torfoleum	Peat moss compressed into sheet form	S	10.2	92	0.29

Authorities:

- A Armour Institute of Technology - Tests by J. C. Peebles
- G A.S.H.V.E. Guide, 1934
- I University of Illinois - Tests by A. C. Willard, L. C. Lichty and L. A. Harding
- M University of Minnesota - Tests by F. B. Rowley
- S U. S. Bureau of Standards
- T University of Toronto - Tests by E. A. Allcut

(a) Conductivities expressed in B. t. u. per hour per square foot per degree Fahrenheit per inch of thickness.

*Conductances, indicated by an asterisk opposite the figures, expressed in B.t.u. per hour per square foot per degree Fahrenheit for thickness stated or used in building construction, not per 1 in. thickness.

JOHNS-MANVILLE Building Materials, Miscellaneous

Conductivities and Conductances of Building Materials and Insulations

DATE March, 1935
(Cancelling 4-I-13-X-1, dated October 2, 1929)
(BMM-60)

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TECHNICAL DATA SECTION

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J-M Insulating Board, Sheathing and Lath

J-M Insulating Board is a light-weight, moisture-resisting board which combines structural strength with efficient insulation. It is made of shredded wood fibers, interlaced and densely compacted into a strong, stiff board which can be easily cut, sawed and nailed.

The board is a light buff in color, the natural shade of the wood fibre. The exposed side presents a modern fabric effect, the other side has a waffle-like surface. This material, one of the most economical materials available for interior use, is furnished with square edges in thicknesses of ½" and 1", 4 ft. wide, in lengths of 4, 5, 6, 7, 8, 9, 10 and 12 ft. Also furnished ½" thick and 8 ft. wide, on special order, in 6, 8, 10 and 12 ft. lengths. The 1" thickness is supplied with a natural finish. In addition to the natural finish, the ½" thick size in 4 ft. widths is supplied with "Glaze-Coat," a smooth, ironed, coated finish. The ½" sheets are wrapped 6 per package; 1" sheets 4 per package. Sheets 1" thick consist of two ½" sheets cemented together. The board weighs about 0.80 lb. per sq. ft. per ½" thickness.

Insulating Board harmonizes with practically any decorative scheme although it can be painted, stained or decorated with any standard wood finish. Directions for painting and staining Insulating Board products appear on another data sheet.

J-M Insulating Board also has some sound-deadening value. It is supplied in various forms for special purposes, each of which has a self-explanatory name. Decorative styles for interiors are furnished in addition to those described on this page.

J-M Batten Strips: Batten strips, beveled and with Glaze-Coat finish, are available 2½" wide, ½" thick, in lengths of 8, 10 and 12 ft., for paneling with large-size sheets of Insulating Board. The strips are wrapped 36 pieces per package.

J-M Weathertite Sheathing

J-M Weathertite Sheathing, similar to Insulating Board, is specially manufactured for sheathing purposes. The material, made $^{25}/_{32}$" thick to conform to millwork standards, is coated on both sides and all edges with a high-grade black asphalt which affords protection against water and moisture penetration. The thickness of the board makes it adaptable to all



J-M Weathertite Sheathing, highly resistant to distortion, is easily and economically erected

frame requirements, so that it can be used freely in place of wood. Weathertite Sheathing is furnished $^{25}/_{32}$" thick, 4 ft. wide by 8, 9, 10 and 12 ft. long, with square edges. It is wrapped four sheets per package.

The sheathing is more resistant to distortion than diagonally-applied wood sheathing and can be applied in approximately one-third the time ordinarily required for structures sheathed with wood. In addition, it provides a far greater protection against heat and cold than does wood.

J-M Insulating Lath

J-M Insulating Lath, the same material as Insulating Board, is furnished 18" x 48", with the long edges shiplapped and all edges beveled. Furnished ½" and 1" thick. The 1" thickness is composed of ½" sheets spot-cemented and stapled together. Wrapped 16 and 8 pieces per package, respectively.

J-M Insulating Lath eliminates plaster waste, unsightly lath marks and lessens the possibility of the plaster cracking because of the strong bond which the waffle-like surface makes with the plaster.

J-M Rigid Roofinsul

J-M Rigid Roofinsul is the same material as Insulating Board but furnished in the most practical size for roof insulation. 24" x 48", ½" and 1" thick*; 1½" and 2" thick on special order. Supplied in packages containing 12, 6, 4 and 3 pieces, respectively. When greater thicknesses than ½" are desired, sheets are spot-cemented and stapled together and are furnished with a ¾" shiplap joint on all four sides.

* All Roofinsul from Waukegan is 22" x 47" in ½" thickness with sq. edges and 1" thickness with edges shiplapped ½". The 1" thickness is homogeneous, not cemented or stapled.

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Slum Clearance Program: Specifications and Data on Various Building Materials (1938)
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J-M Hard Board and PanLboard

J-M Standard Hard Board

J-M Hard Board is a grainless, knotless, all-wood fibre board which has greater density and toughness and is more waterproof than the southern pine from which it is made. Its hard, glossy surface is highly resistant to abrasion and wear. The minimum modulus of rupture is 5000 lb. per sq. in. and it will not crack, split or splinter and works easily with ordinary carpenter's tools.

In its natural state, the pleasing color and smooth surface of Hard Board, with its mottled or burl effect, presents a most attractive appearance. If, to conform with the surroundings, it is desirable to use an additional finish on the Hard Board, it can be painted or stained, or finished by any method used on wood, after a priming coat of lead or zinc and oil or a ready-mixed paint reduced with linseed oil.

J-M Tempered Hard Board

J-M Tempered Hard Board is Standard Hard Board impregnated with a special compound and baked. The tempering process increases the density and strength. For fine scroll work or intricate machining, Tempered Hard Board works to even a cleaner edge than Standard Hard Board.

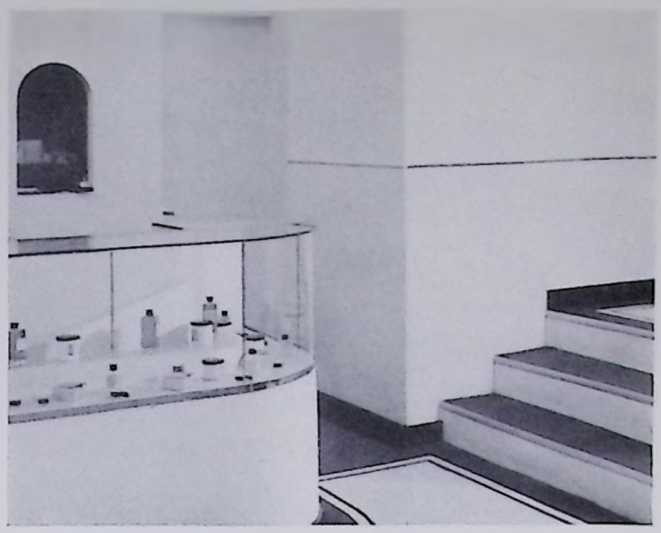
Hard Board Sizes, Weights and Uses:

Both J-M Hard Board and J-M Tempered Hard Board are available in four thicknesses: 1/8", 3/16", 1/4" and 5/16". The 1/8" and 3/16" thicknesses are furnished 4 ft. wide by 6, 8, 9, 10 and 12* ft. known as "longs," and also in "shorts," 4 ft. wide by 1, 2, 3 and 4 ft. long. The 1/4" and 5/16" thicknesses are available in one size only, 4 ft. wide by 12 ft. long. The 1/8" and 3/16" thicknesses when wrapped are packed 6 sheets "longs," 10 sheets "shorts," to each package, respectively; 1/4" and 5/16" thicknesses, 3 sheets to the package.

Thickness, inches	Standard Hard Board, lb. per sq. ft., approx.	Tempered Hard Board, lb. per sq. ft., approx.
1/8	0.73	0.78
3/16	1.02	1.07
1/4	1.32	1.37
5/16	1.62	1.67

Tempered Hard Board is also available, 1/8" thick only, in 4 ft. x 12 ft. sheets scored in 4" squares. Furnished wrapped only, 6 sheets per package.

* When ordered in an equal number of 5 and 7-ft. lengths, will be furnished at the 4 by 12-ft. price without cutting charge.



Walls and showcase of J-M Hard Board, painted

Uses for Hard Board: Standard Hard Board or Tempered Hard Board can be used practically anywhere that wood can be used, and for many purposes for which wood is unsuitable. Typical uses follow:

Paneling	Shelving	Clothes Hampers
Partitions	Furniture	Window Display
Table Tops	Radiator Shields	Folding Screens
Store Counters	Book and Magazine Racks	

J-M Standard PanLboard

J-M Standard PanLboard, provides a board which is denser and tougher than Insulating Board, making it adaptable for uses where the exceptional strength and density of Hard Board are not required. It is furnished, 1/4" thick, 4 ft. wide in "longs," 5, 6, 7, 8, 9 10 and 12*ft. and "shorts," 1, 2, 3 and 4 ft. Furnished, when wrapped, 6 sheets "longs," 10 sheets "shorts," to each package, respectively. It weighs about 0.80 lb. per sq. ft.

Standard PanLboard has a hard and attractive surface which especially recommends it for interior use as a wall or ceiling finish.

J-M De Luxe PanLboard

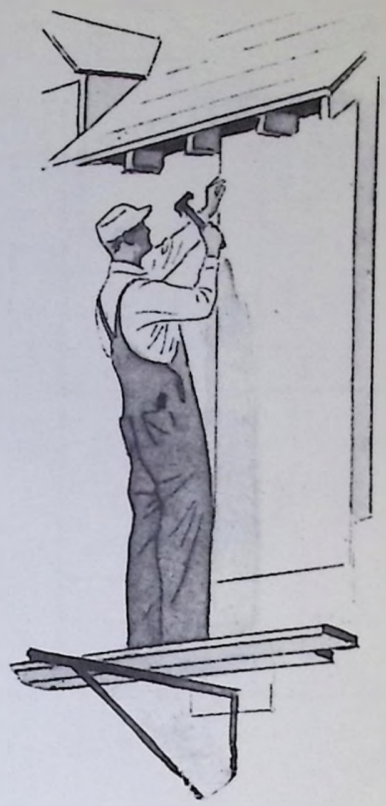
J-M De Luxe PanLboard is an even tougher, denser product than PanLboard though not as dense as J-M Hard Board. De Luxe PanLboard is darker in color than PanLboard. It is manufactured 1/4" thick in "longs," 4 ft. wide by 6, 8, 9, 10 and 12* ft. long, and "shorts," 4 ft. wide by 1, 2, 3 and 4 ft. long. Packaging is the same as for Standard PanLboard. It weighs approximately 1.02 lb. per sq. ft.

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APPLICATION DIRECTIONS
J-M WEATHERTITE SHEATHING

DIRECTIONS FOR APPLICATION:



Framing:

Studs and rafters shall be accurately spaced at 16" centers. Headers, not less than 2" x 4", shall be provided to center behind all end joints of the Weathertite Sheathing.

Sheathing:

The sheathing shall be installed in the largest pieces applicable under job conditions so that there will be the minimum number of joints. The boards shall be installed with their edges parallel to studs or rafters, and all the joints shall be centered over a framing member and formed open approximately 1/8" wide.

No boards shall be forced into place, but they shall be fitted closely to all openings and to all intersecting surfaces.

Nailing:

The sheathing shall be secured at each framing member with galvanized roofing nails with 3/8" diameter heads and of a length sufficient to penetrate the framing members not less than 1". The nailing shall be placed first in the intermediate framing members at 6" centers and then 3/8" from all edges on 3" centers.

Stucco:

Self-furring reinforcement stucco bases, such as J-M Style C-216, shall be nailed directly through the Weathertite Sheathing into the wood framing, with nails of sufficient length to extend into the wood framing not less than 1".

Non-furring stucco bases shall be applied over 1" x 2" wood furring nailed vertically to each stud. Metal flashing shall be provided at all door and window frames. Stucco shall be applied according to Portland Cement Association specifications. It shall never be applied directly to J-M Weathertite Sheathing without some form of reinforcing.

Brick or Stone Veneer:

Masonry ties as required shall be provided and attached by nailing through the Weathertite Sheathing and penetrating the stud.

In all cases, except when J-M Style C-216 is used as a self-furring reinforcement, the masonry shall be kept not less than 1" from the external face of the Weathertite Sheathing.

Wood Siding (Clapboard, novelty siding, etc.):

Wood siding shall be nailed directly over the Weathertite Sheathing, with nails long enough to extend through the sheathing into the wood studs not less than 1-1/4". All joints in wood siding shall be formed over studs.

JOHNS-MANVILLE Building Materials

Application Directions for J-M Weathertite Sheathing
Comparison with Diagonal-Wood Sheathing in Percent Waste

DATE August, 1938
(Cancelling sheet dated June, 1936)

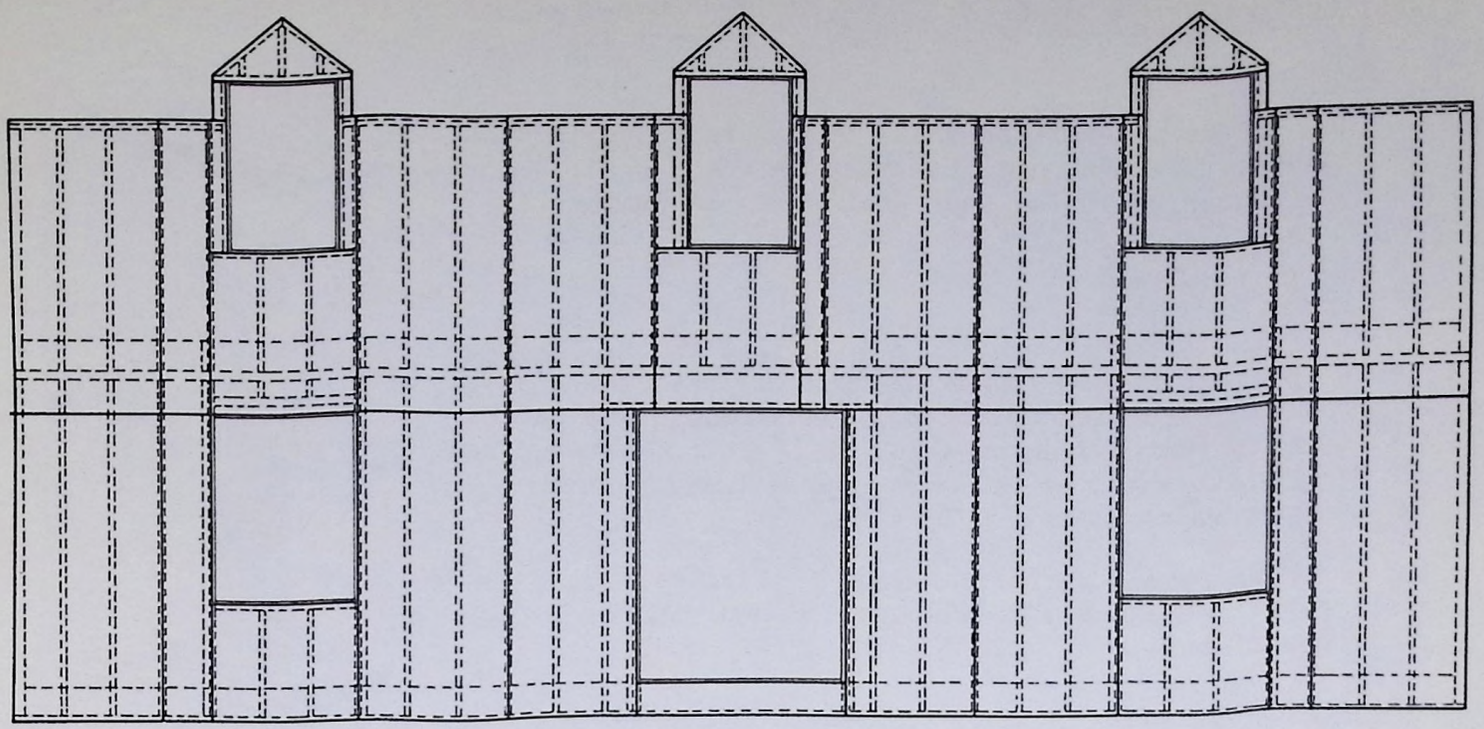
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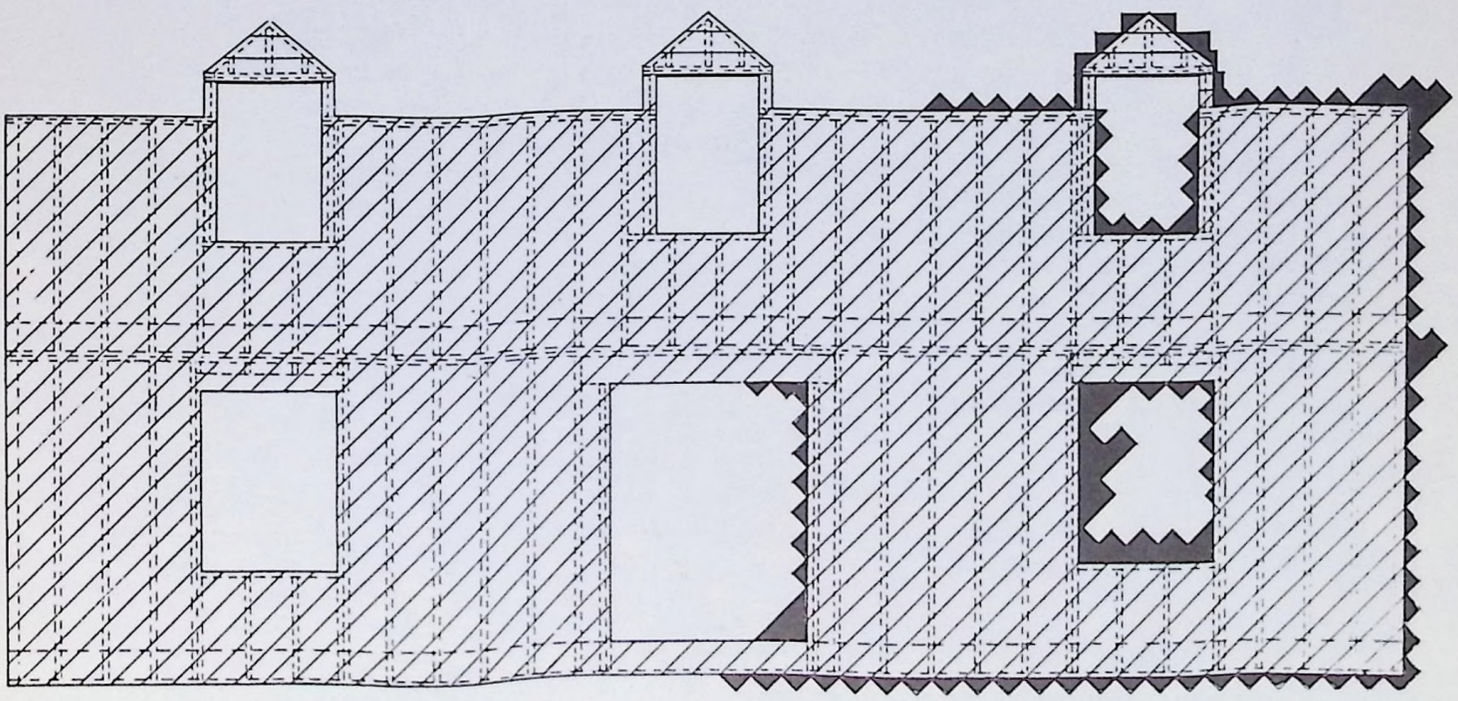
J-M Weathertite Sheathing
Comparison with Diagonal-Wood Sheathing in Percent Waste



Front of House sheathed with J-M Weathertite Sheathing

Gross area = 632 sq.ft.
(39 ft. 6" x 16 ft. 0")
Actual area = 500 sq.ft.

16 pieces, 4' x 8' = 512 sq.ft.
Waste = 12 sq.ft.
Percent waste = 2.4



Front of House sheathed with 1" x 8" diagonal-wood sheathing

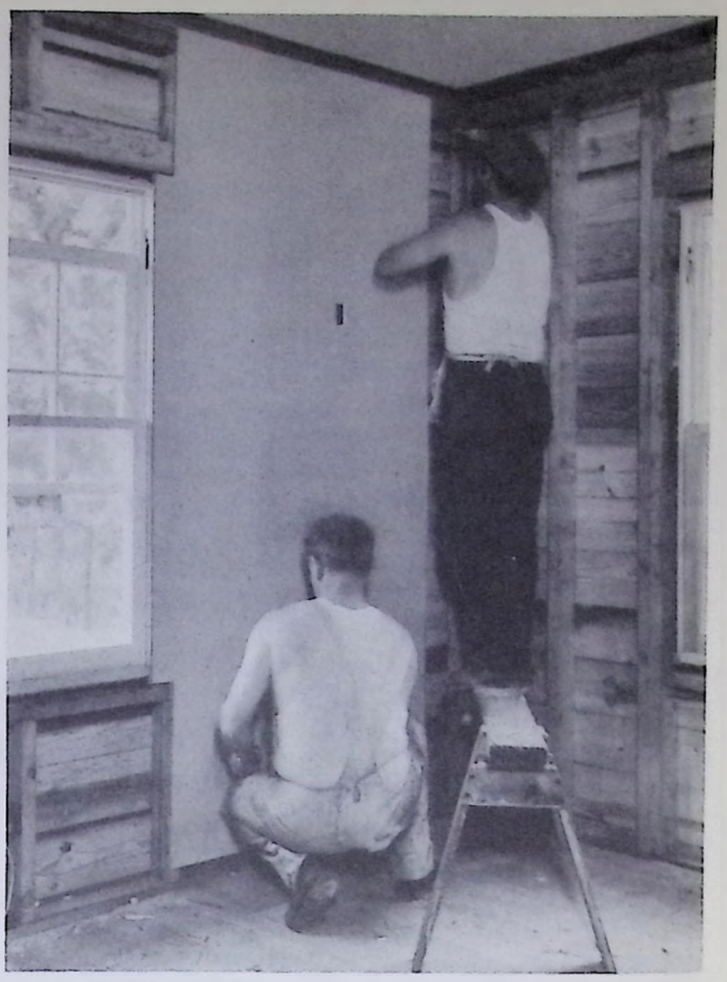
Gross area = 632 sq.ft.
Actual area = 500 sq.ft.
Waste -
end cuts = 65 sq.ft.

Waste - account
of material = 60 sq.ft.
Total B.M. = 625 sq.ft.
Percent waste = 25

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APPLICATION OF J-M INSULATING BOARD USED AS AN INTERIOR FINISH

While J-M Insulating Board for interior finish may be applied over wood framing, or continuous surfaces such as plaster, wood boarding, or other nailable surfaces, on either new or existing construction, wood furring is recommended.



J-M Insulating Board being applied over level wood framing without wood furring

Framing:

Framing members and furring shall be accurately spaced at not to exceed 16" centers. The furring strips on masonry walls shall be accurately shimmed to a level plane and substantially secured to the masonry or a stud partition shall be erected against the masonry wall. Additional framing members or furring shall be provided so that joints between the Insulating Board may be centered thereover and members placed at chair rail height and elsewhere to receive heavy mouldings.

Application:

The boards shall be installed with all joints centered over a framing member or furring. If the joints between the boards are to be covered, they shall be formed open approximately 3/16". If otherwise, the boards shall be brought to moderate contact. The boards shall never be forced into place.

Cutting:

All cutting and fitting shall be done in a neat, workmanlike manner. Where joints are not exposed, the sheets may be cut with a fine-tooth saw. Exposed joints should be cut with a sharp linoleum knife against a straight edge.

Nailing:

The boards shall be secured first at intermediate framing members with nails spaced at 6" centers, then at edges with nails spaced 3/8" therefrom at 3" centers. The nails shall be of a length sufficient to penetrate the framing members or furring not less than 1". If the nails are to be covered with battens or moulds, a nail with a large head, such as a galvanized shingle or box nail, shall be used. If otherwise, a nail with a small head, such as No. 4d finishing nails, shall be used.

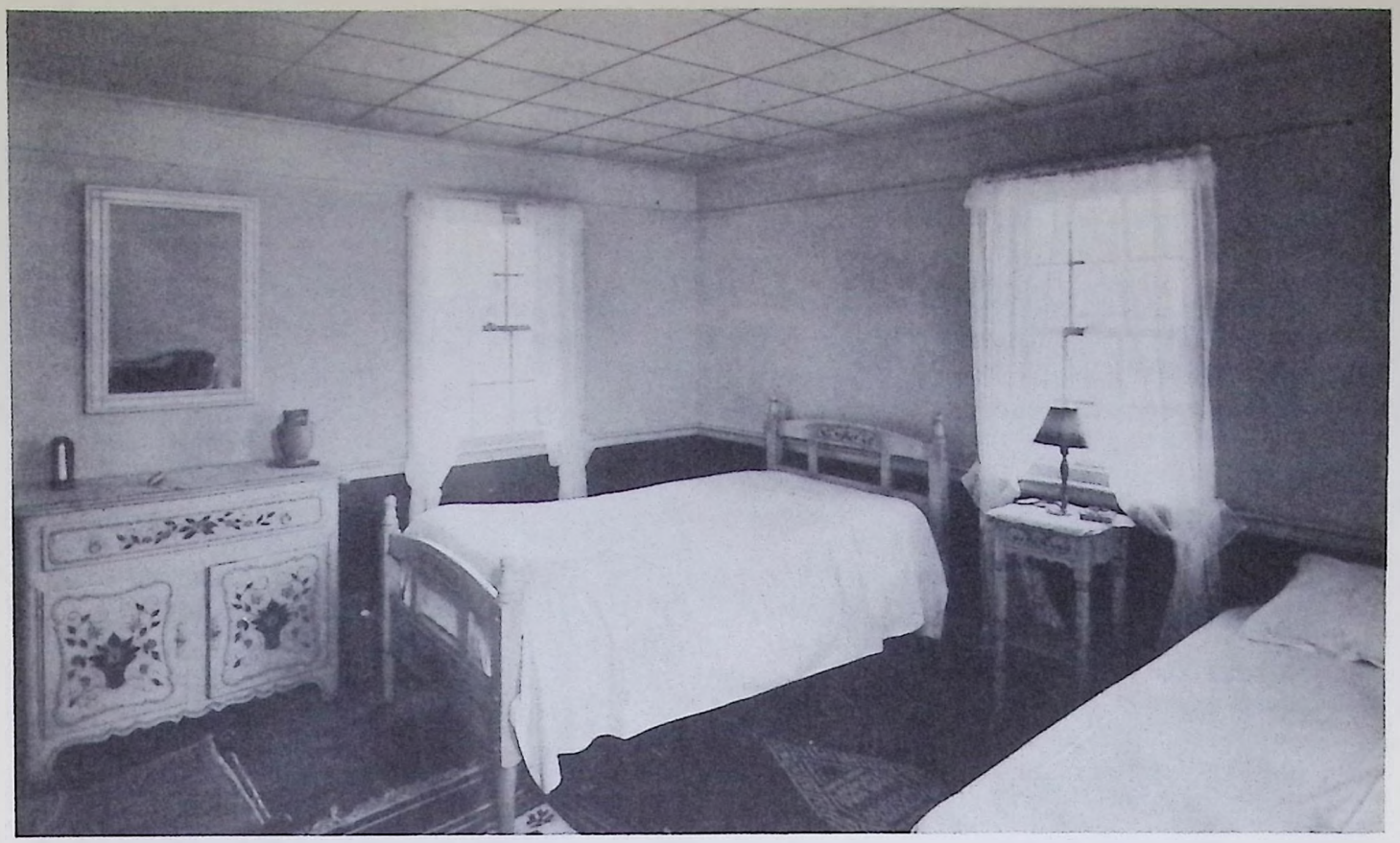
Special Decorative Designs:

Where it is desired to provide supplementary designs in the form of straight or curved bevels, it will be found practicable to use one of the following tools, which have been thoroughly tested and found satisfactory: Stanley Fibre Board Cutter No. 193-A, manufactured by Stanley Tools, New Britain, Conn., and Bevel Devil, manufactured by Kimball Mfg. Co., Royal Oak, Michigan.

There are other types of beveling devices on the market which are equally satisfactory.

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Above: J-M Insulating Board wall treatment with standard sheets laid horizontally so as to avoid vertical joints. J-M Bevel Panels on ceiling
Below: J-M Insulating Board wall treatment with J-M Bevel Plank used on ceilings



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DECORATIVE TREATMENT OF J-M INSULATING BOARD

J-M Insulating Board, supplied with a Glaze-Coat or Natural finish, provides an attractive appearance without further treatment. If additional effects are desired, the following procedure is recommended.

Painting:

Paints, varnishes, enamels, etc., must be applied to J-M Insulating Board in strict accordance with the paint manufacturer's specifications. In the application of oil paints or enamels, it is first necessary to seal the surface of the Natural finish with a primer. The Glaze-Coat finish does not require priming. While there are a number of primers on the market especially designed for application over Insulating Board, the material used should be carefully checked to see that it is definitely recommended and specified as a primer for this purpose.

Where a smooth surface finish is desired, the prime coat of filler should be used without thinning. If it is desired that the characteristic, Natural texture of the Insulating Board be preserved, the primer should be thinned. In either event, the prime coat shall be allowed to dry thoroughly before applying any paint finish.

The covering capacity of the average primer over Insulating Board with Natural finish is approximately 150 sq. ft. per gallon. Over Glaze-Coat finish, the average coverage is 450 sq. ft. per gallon. If battens are used, they should be painted before application and should not be set in place until after the Insulating Board has been painted.

Transparent Size:

If it is desired to coat the board without changing the original texture and color, one or, preferably, two coats of transparent wall paper size should be used directly over the board. It is important that the surface of Insulating Board be thoroughly clean, as this sizing, being transparent, will readily show dust or other spots.

Casein Cold Water Paints:

Casein cold water paints can be used satisfactorily over the various types of Insulating Board without a sealing or priming coat. Subsequent coats of oil base paints can be applied thereafter.

Staining and Tinting:

Any commercial wood stain may be used on J-M Insulating Board after sizing. On Insulating Board with Glaze-Coat finish a sizing is not needed. Effective tinting may be accomplished by applying oil colors mixed with varnish and wiping before it dries. Stencil effects can be applied over glue size, paint or kalsomine. Water stains may be mixed with glue size or paste. Paste, colored with water stains, dries slowly and other colors may therefore be mottled into them after they have been applied.

Kalsomine may be applied over either sized or unsized Insulating Board. Over the unsized board a small amount of glue should be added to the mixture.

Wall-Paper or One-Coat Plastic Paints:

The application of wall-paper or one-coat plastic paint over J-M Insulating Board is not recommended where such treatment is intended to include the concealment of the joints between the board units.

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JOHNS-MANVILLE Building Materials

Decorative Treatment of J-M Insulating Board

DATE February, 1938
(Cancelling BMM-157 dated June, 1937)
BMM-159

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Glaze-Coat Insulating Board:

Talc or whiting applied to the hands of the workmen will assist in preserving a clean finish. Should finger marks or other soiling occur on the finish of Glaze-Coat Insulating Board, such marks or soiling can be removed as follows: A rubber-bath sponge will remove light stains. For removal of oil and grease spots, organic-type solvents such as high-test gasoline, benzol or carbon tetrachloride, applied with a cloth, may be used without affecting the Glaze-Coat finish. No. 1 grade, or finer steel wool rubbed lightly across the board will also remove various stains. Penetration of the finish should be avoided, as this exposes the fibre.

Natural-Finish Insulating Board:

Dry dirt spots may be readily removed by rubbing with a clean block of Insulating Board, or with fine sandpaper or garnet paper.

Grease or oil stains may be removed as outlined above for Glaze-Coat finish.

Filler for Nail Holes:

To fill nail holes on all types of unpainted Insulating Board, water putty such as is obtainable for filling cracks in old wood floors, etc., may be used. Natural-color wood filler is also satisfactory.

Other Finishes:

Clear lacquer applied by brush or spray will harden the surface without appreciably changing the appearance. Waxing with a liquid or paste wax will give a slight gloss and tend to prevent water stains or dust collection. Do not use wax emulsion.

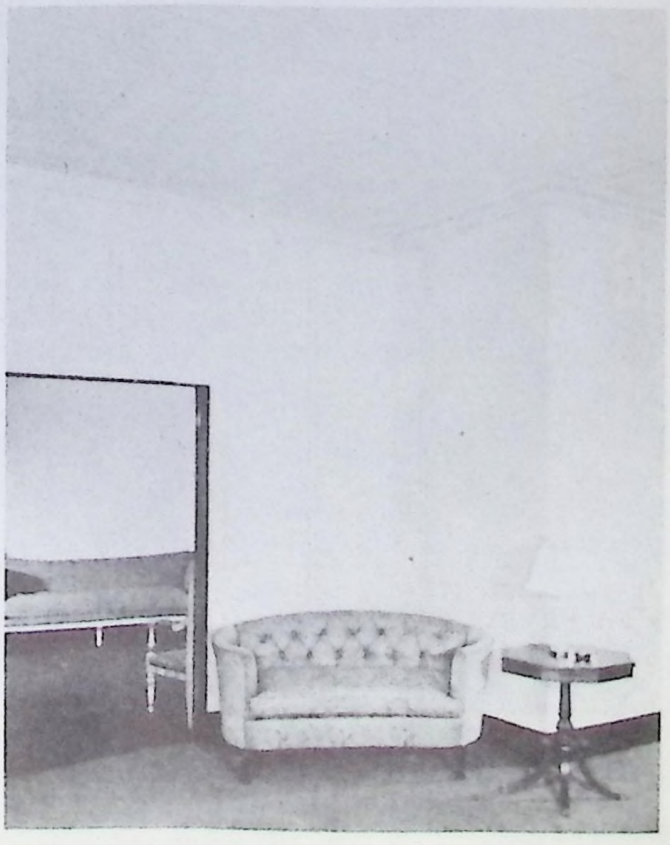
Special Decorative Designs:

Where it is desired to provide supplementary designs in the form of straight or curved bevels, it will be found practicable to use one of the following tools, which have been thoroughly tested and found satisfactory:

Stanley Fibre Board Cutter No. 193-A, manufactured by Stanley Tools, New Britain, Conn.

Bevel Devil, manufactured by Kimball Mfg. Co., Royal Oak, Michigan

There are other types of beveling devices on the market which are equally satisfactory.



The illustration shows a portion of a reception room finished with Grooved Glaze-Coat Insulating Board on the walls and Glaze-Coat Panels on the ceiling

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APPLICATION OF J-M INSULATING LATH

J-M Insulating Lath, in units of convenient size for easy application, provides a smooth, unbroken surface which results in a saving in plaster and labor.

FRAMING:

Studs, joists or rafters shall be spaced accurately at 16" centers.

FURRING:

Masonry walls shall be furred with 1" x 2" furring strips run vertically, spaced accurately at 16" centers, shimmed to a plane surface and firmly secured.

APPLICATION:

The lath shall be applied with the coarse-textured side exposed, with the long dimension at right angles to the framing members and with all end joints broken and centered over a framing member. The units shall be applied in such a manner that the upper edge of the sheet is the one which overlaps (the bottom edge of the sheet being the one which is overlapped). The ship-lapped joints along the long dimension shall be formed closed and the end joints shall be formed open approximately 1/4" wide. The lath shall be fitted closely to all openings and to all intersecting surfaces, but none shall be forced tightly into place. Moistening of the lath prior to application is not required.

NAILING:

The lath shall be secured at each framing member with a 4d box or blued fibreboard nail for 1/2" material and a 6d box nail for the 1" thickness. The nailing shall be placed first in the intermediate framing members and then 3/8" from ends at not more than 4 1/2" centers. The end nails at each framing member shall be placed not more than 1/2" from the ship-lapped edge. The lath shall be similarly nailed at sills, headers, and plates, 3/8" from edges at not more than 4 1/2" centers.

REINFORCING:

On all interior corners J-M Corner Reinforcing shall be applied, nailed securely to the framing members; and J-M Joint Reinforcing applied around all windows, doors and archways and other points where wood framing and masonry adjoin. At all exterior corners metal corner bead shall be applied over the lath and secured to the framing members. A solid backing shall be provided behind J-M Insulating Lath wherever necessary for trim, moulding, paneling, etc.

INSPECTION:

The nailing and reinforcement shall be carefully inspected and the contractor notified if any portion of the Insulating Lath is not adequately secured in accordance with standard recommendations. Commencement of plastering will be an acknowledgement by the plastering contractor of satisfactory lath application.

PLASTER:

The scratch, brown, and finish coats of plaster shall be accurately mixed and applied in exact accordance with the American Standards Association Specifications for application over fibre-board plaster bases. The minimum total thickness of the finished plaster job shall be 1/2"

VENTILATION:

Adequate ventilation shall be provided for the proper drying of the plaster according to the plaster manufacturer's specifications. In winter, sufficient heat shall be provided to prevent injury to plaster by frost. Care shall be taken to prevent too rapid drying and all outside openings shall be temporarily covered with cloth or sheets of J-M Insulating Lath.

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J-M Decorative Insulating Board

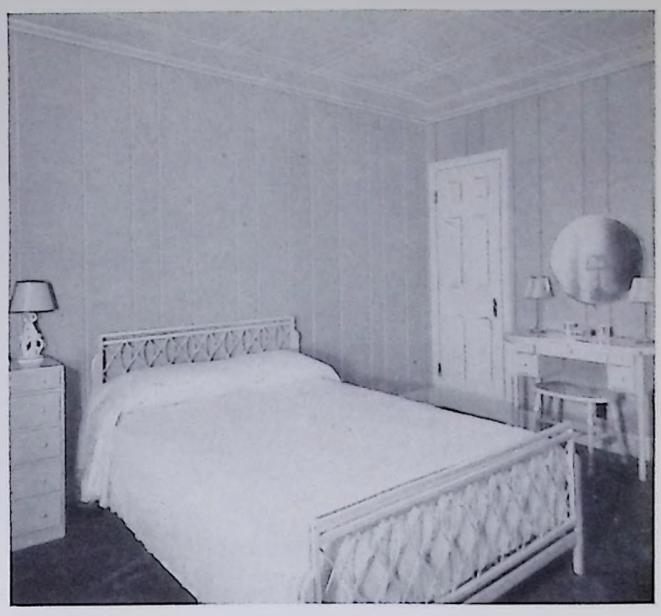
J-M Insulating Board is an all-wood fibre board that possesses the most desirable qualities demanded of building materials of this class. It combines structural strength with efficient insulation, and its composition of shredded wood fibres, interlaced and densely compacted into a strong, stiff board, can be easily cut, sawed and nailed. Because it is made in a wide variety of units and is so easily applied, it simplifies the construction, modernization, and decoration of all types of interiors.

The modifications of J-M Insulating Board for interior decoration include Bevel Panels, Multiple Bevel Panels, and Bevel Plank, with Border Strips, Batten Strips and Cap Moulding used for finishing.

All of these materials are cut from ½" standard J-M Insulating Board, the surface of which has been treated in accordance with the finish or texture desired. The resultant effects are described as Glaze-Coat, Variegated, Wicker, Medium Fabric and Coarse Fabric. The Fabric and Wicker textures are marked in a distinguishing tone of tan over a background of light buff. Glaze-Coat finish is obtained by an unusual coating process which, in addition to supplying a light sand color tone to the surface, provides a smooth, ironed finish which possesses the ability to reflect light. The term "Variegated" refers to the installed effect of four different color tones of board with the same type of finish as the Glaze-Coat. Each unit is a separate tone of color but when installed the patterned effect is a harmonious combination of four blended shades which range from buff to brown.



Modern office with Ceiling Panels and walls of Bevel Plank with J-M Hard Board dado



For the extra bedroom, Bevel Plank and Ceiling Panels, design C-3, provide a practical and effective interior

Packages of the Variegated finish contain approximately the same number of each of the four shades. All bevels and grooves in the coated finishes are left in the natural color of the board in order to provide a contrast. Two of the units, Border Strips and Cap Moulding, are available with a Sanded surface for use with Fabric panels.

Each of the Decorative Insulating Board materials are supplied in units of various economical sizes, planned for easy installation and attractive appearance. In general, Bevel and Multiple Bevel Panels are especially suitable for ceiling work, and Bevel Plank for wall treatment. However, the units are so diversified that it is possible to create any number of interesting decorative effects. For instance, Bevel Panels, available in all five surface finishes, is used for producing unusual decorative treatments for walls as well as for ceilings. Since all of the products can be supplied on furring strips over old plaster, as well as over new framing, they fill an essential need in the remodeling field.

If, in addition to the [redacted] plied, individual patterns are d[redacted]s can be decorated to sketch on t[redacted]tting tool available for this purpo[redacted]

J-M Bevel Plank: I[redacted] random plank effect for distinct[redacted]The Bevel Plank resembles wood plank with beveled edges, and

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Beaded Bevel Plank is similar to Bevel Plank except there are shallow grooves adjacent to the bevel which add to the decorative effect. Both Plain and Beaded Bevel Plank are furnished, in Glaze-Coat and Variegated finishes, with diagonal bevel joints on long edges. The bevels form V joints between the adjacent planks. They are furnished in random widths of 6″, 8″, 10″, and 12″ (16″ on special order), 8, 10, and 12 ft. long. Packed in cartons containing 72, 90 and 108 sq. ft., of the above lengths, respectively.

J-M Bevel Panels: These are designed for a wide variety of decorative treatments for walls and ceilings. The surface finishes are Glaze-Coat, Variegated, Medium Fabric, Coarse Fabric, and Wicker. All edges are beveled and shiplapped. The sizes are shown in the following packaging schedule—(Wicker finish available only in 12″ x 12″, 16″ x 16″ and 24″ x 24″):

Size of sheet	No. pieces per package	Size of sheet	No. pieces per package
12″x12″	60 (60 sq. ft.)	24″x24″	30 (120 sq. ft.)
12″x24″	30 (60 sq. ft.)	16″x32″	30 (106.6 sq. ft.)
16″x16″	60 (106.6 sq. ft.)	24″x48″	15 (120 sq. ft.)

J-M Ceiling Panels: These panel designs, C-1, C-2 and C-3, are furnished with a Glaze-Coat finish. C-1 and C-2 has square edges and C-3 is shiplapped. The units, 16″ x 16″, are packed as shown above.

J-M Cap Moulding: Designed for use with J-M Bevel Plank. Furnished in Sanded or Glaze-Coat finish 2½″ wide, 8 ft. long. Wrapped 36 pieces (288 lin. ft.) per package.

J-M Batten Strips: For use in covering joints in Insulating Board applications. Furnished with Glaze-Coat finish 2½″ wide, by 8, 10 and 12 ft. in length. Wrapped 36 pieces per package.

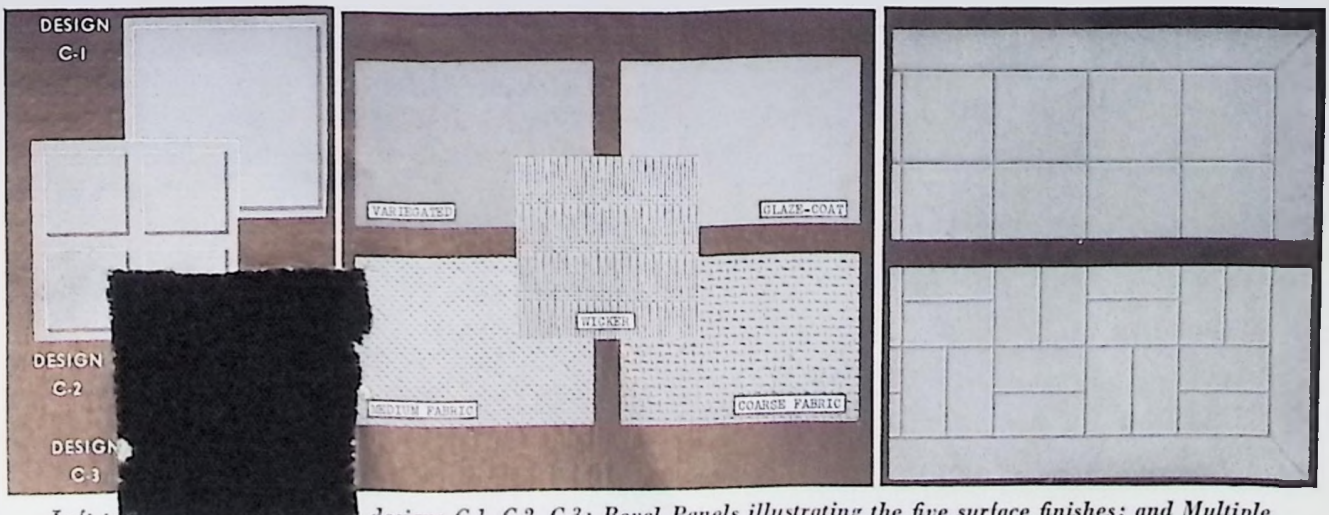


J-M Beaded Bevel Plank and Ceiling Panel design C-2 has transformed this attic into an attractive, all-purpose room

J-M Multiple Bevel Panels: Manufactured in easy-to-apply sheets, with a Glaze-Coat finish, grooved to simulate smaller units, providing an individual panel effect at greatly reduced application cost. All edges are beveled and shiplapped. The sizes are shown in the packaging schedule below:

Size of sheet	V grooved to form	No. pieces per package
24″x48″	8″x8″	15 (120 sq. ft.)
24″x48″	12″x12″	15 (120 sq. ft.)
24″x48″	12″x16″	15 (120 sq. ft.)
24″x24″	8″x8″	30 (120 sq. ft.)
24″x24″	12″x12″	30 (120 sq. ft.)
16″x32″	16″x16″	30 (106.6 sq. ft.)

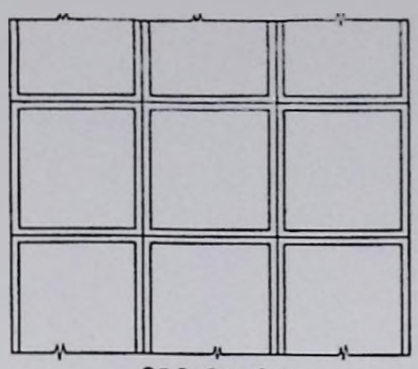
J-M Border Strips: A unit, 12″ by 8 ft., used for finishing off ceiling designs. The long edges are beveled and shiplapped. Furnished in Sanded, Glaze-Coat, and the darkest shade of Variegated for use with Fabric, Glaze-Coat, and Variegated Panels, respectively. Wrapped, 12 pieces (96 sq. ft.) per package.



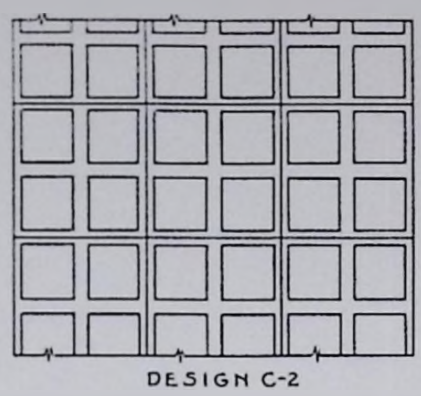
Left to right, designs C-1, C-2, C-3; Bevel Panels illustrating the five surface finishes; and Multiple Bevel Panels. These easily applied units create a modern effect which harmonizes with any decorative scheme

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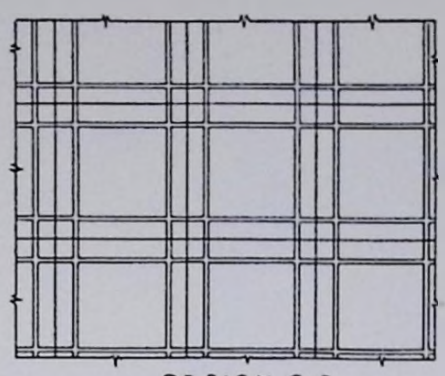
Decorative Insulating Board Designs



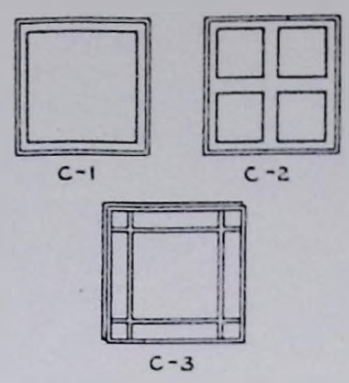
DESIGN C-1

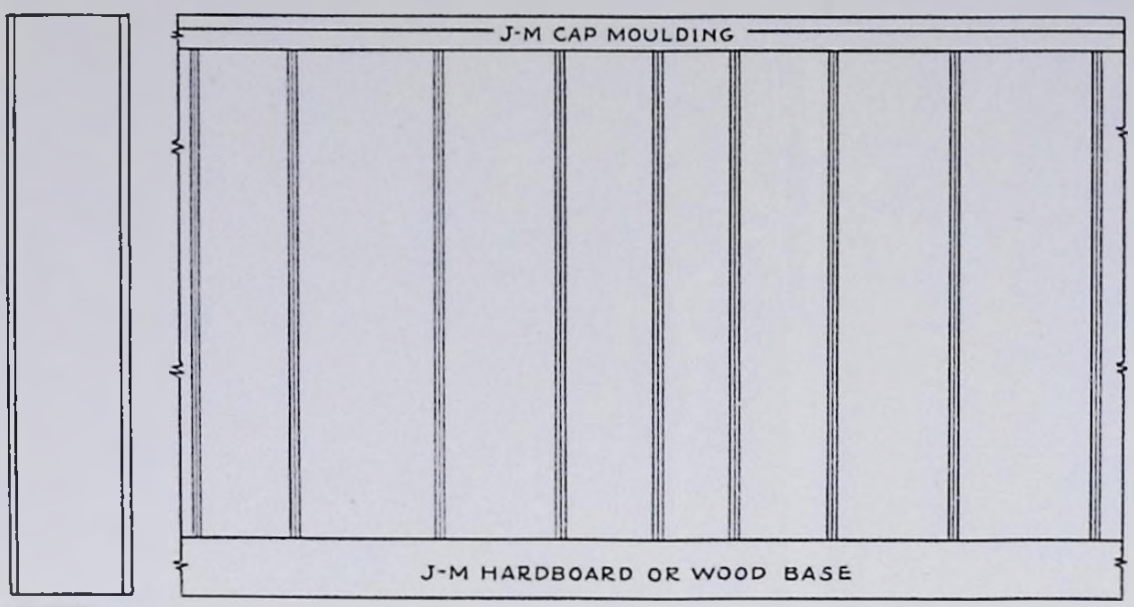


DESIGN C-2

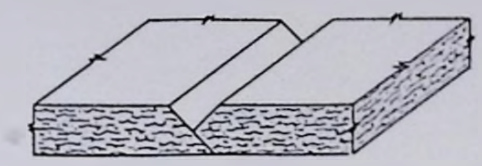


DESIGN C-3

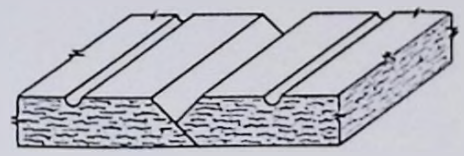




TYPICAL ELEVATION (RANDOM WIDTH PLANK DESIGN)

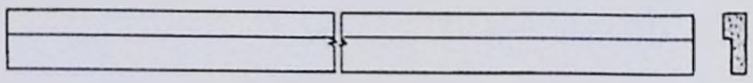


PLAIN PLANK

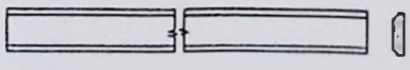


BEADED PLANK

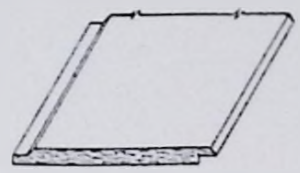
BEVEL PLANK JOINT SECTIONS
(ENLARGED SCALE)



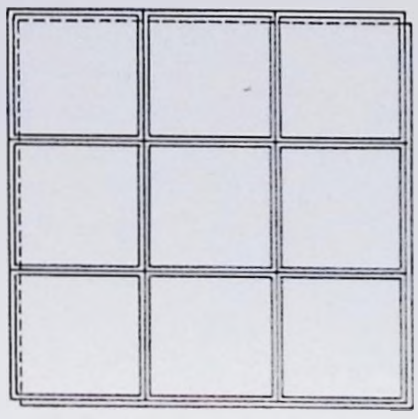
J-M CAP MOULDING
(ENLARGED SCALE)



J-M BATTEN STRIP

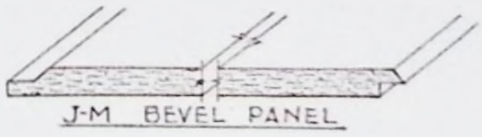


J-M BORDER STRIP

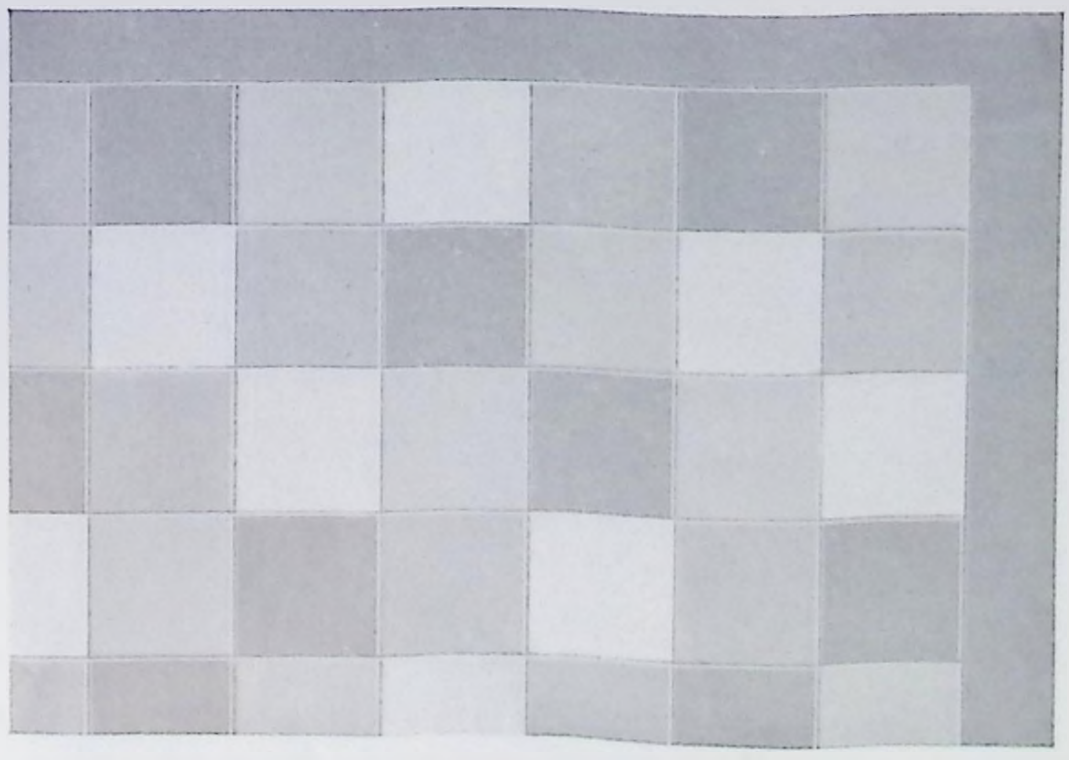




J-M MULTIPLE BEVEL PANEL



J-M BEVEL PANEL



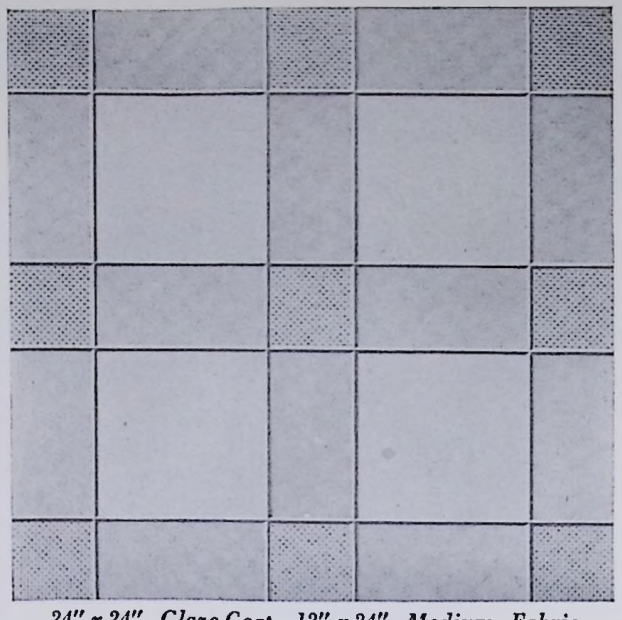
CEILING OF J-M VARIEGATED BEVEL PANELS

DECORATIVE INSULATING BOARD DESIGNS
February, 1938 (Cancelling sheet dated December, 1937) 4-L-14 [BMM-181]

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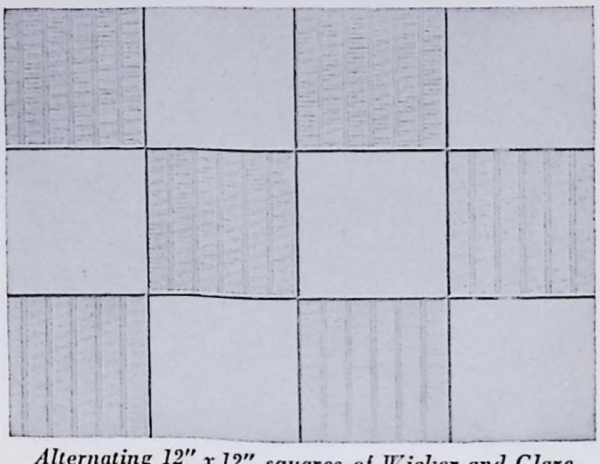
Typical Bevel Panel Ceiling Designs



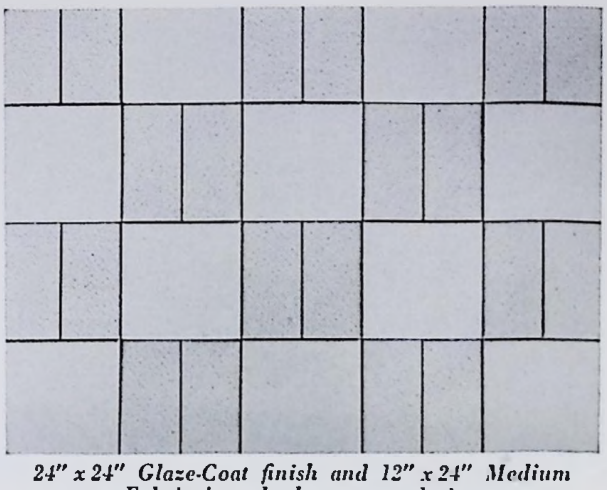
24" x 24" Glaze-Coat, 12" x 24" Medium Fabric, 12" x 12" Coarse Fabric, in a plaid design



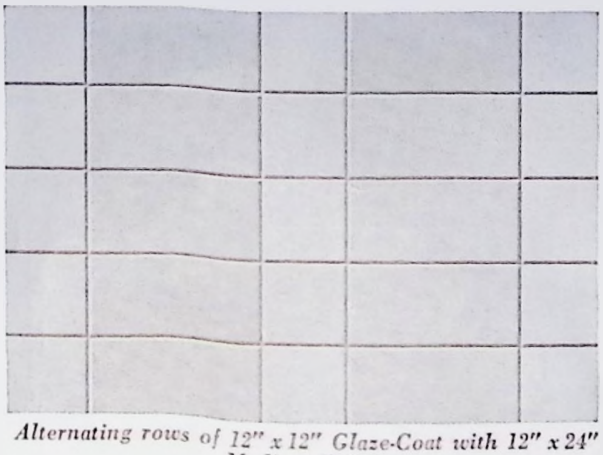
12" x 24" Bevel Panels, Glaze-Coat finish in an attractive design for large ceilings



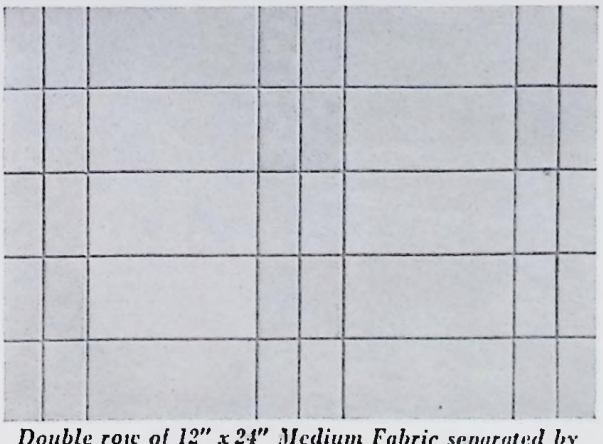
Alternating 12" x 12" squares of Wicker and Glaze-Coat in a checkerboard design



24" x 24" Glaze-Coat finish and 12" x 24" Medium Fabric in a basket weave design



Alternating rows of 12" x 12" Glaze-Coat with 12" x 24" Medium Fabric



Double row of 12" x 24" Medium Fabric separated by 24" x 48" Glaze-Coat

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GENERAL APPLICATION DIRECTIONS - J-M BEVEL PLANK

While J-M Bevel Plank may be applied over wood framing, furring or continuous surfaces such as plaster, wood boarding or other nailable surface, on either new or existing construction, wood furring is recommended.

Framing: Furring shall be provided horizontally, over framing members, spaced not to exceed 9" centers with certain such members placed accurately at chair-rail height and elsewhere to receive base and cap moulding, etc.

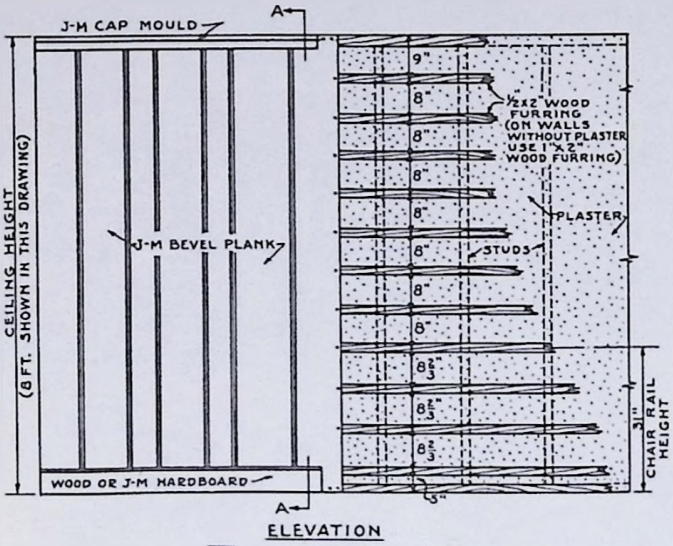
When a dado of J-M Hardboard is to be applied over Bevel Plank to chair-rail height, the furring in this area shall be spaced at not more than 12" centers.

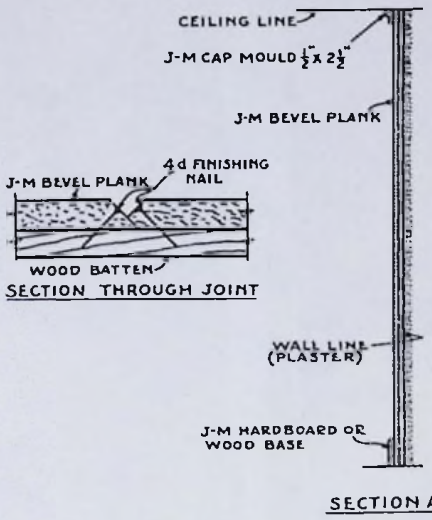
Application: The units shall be installed with the joints formed in moderate contact. They shall never be forced into place.

Nailing: Each unit shall be secured at each furring strip with nails driven in bevels at an angle using 4d finishing nails. When applied over solid wood surfaces nails shall be spaced at not more than 9" centers on both edges. Base and Cap moulding shall be nailed at 6" centers.

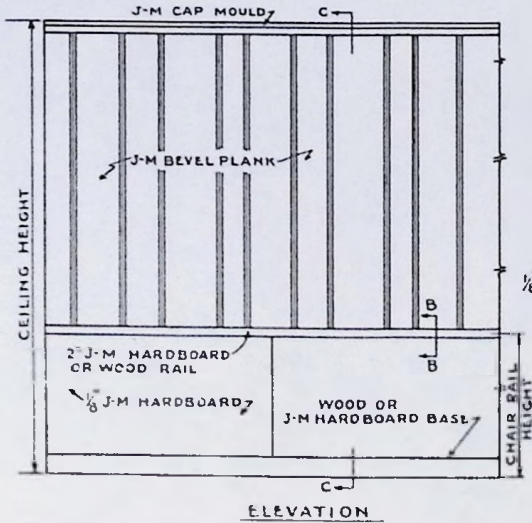
The hardboard dado shall be secured to the furring by button-head drive-screw nails, 1-1/2" long, spaced on 8" centers adjacent to edges, and on 16" centers in body of the sheet.

Painting or Other Finish: If other than the natural finish of the unit is desired, any of the methods described on the data sheet treating of Insulating Board finishes may be employed.

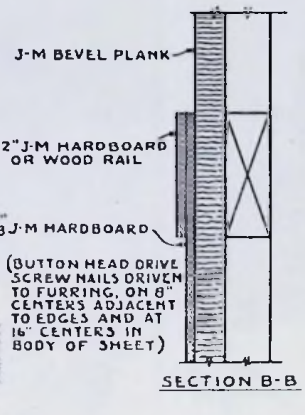


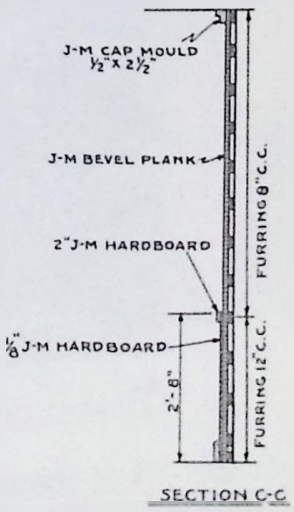


J-M Bevel Plank



J-M Bevel Plank with J-M Hardboard Dado





JOHNS-MANVILLE Building Materials, Miscellaneous

General Application Directions
J-M Bevel Plank

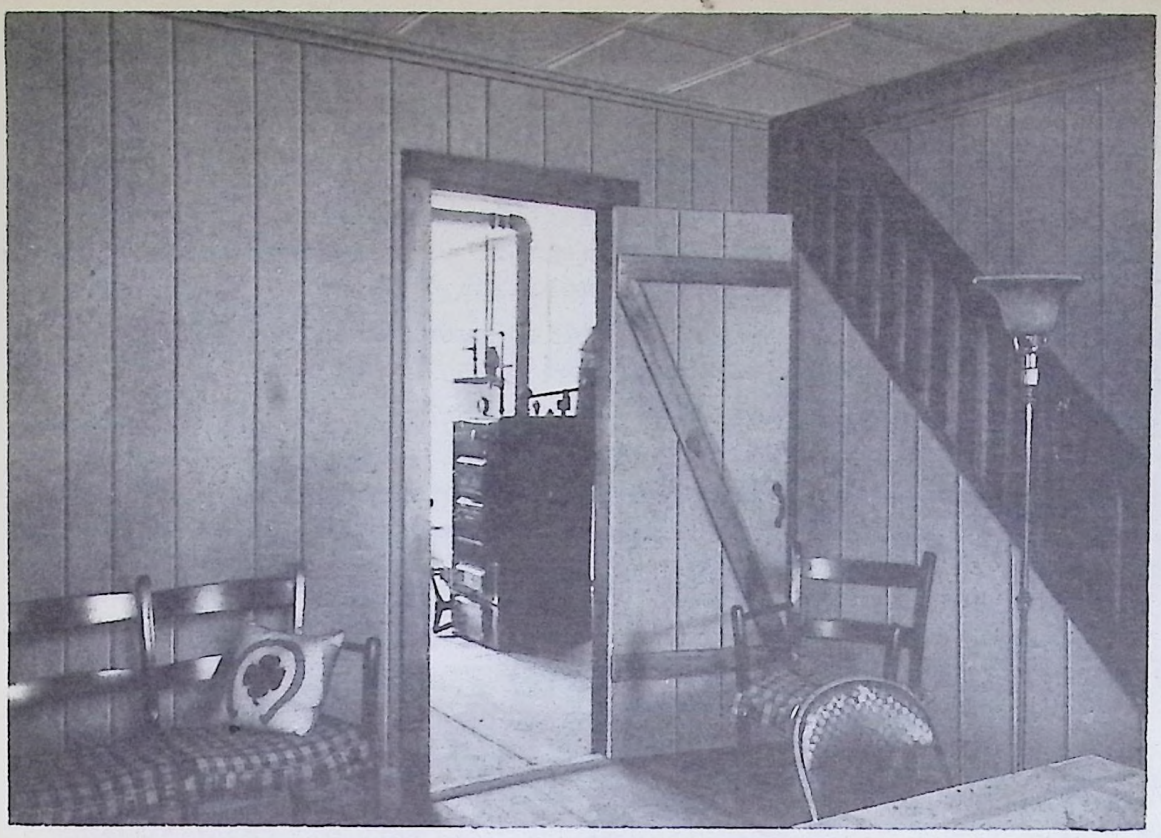
DATE March, 1938
(Cancelling sheet dated Nov., 1937

(BMM-183)

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TECHNICAL DATA SECTION

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A basement room made livable with walls of J-M Bevel Plank and a ceiling of J-M Ceiling Panels



Practical and effective interiors are easily and economically obtained by the use of J-M Bevel Plank and Ceiling Panels, as shown in this living room

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APPLICATION DIRECTIONS
J-M BEVEL PANELS, MULTIPLE BEVEL PANELS AND CEILING PANELS

J-M Bevel Panels, Multiple Bevel Panels and Ceiling Panels may be applied over wood framing, furring or continuous surfaces such as plaster, wood boarding, etc., on either new or existing construction.

Planning the Work:

The proper spacing of furring, as outlined below, should be laid off on the ceiling to be decorated, so that the finished appearance may be symmetrical and present an even border on opposite sides of the ceiling.

Framing:

Framing memb[redacted]ll be accurately spaced to center on the joints between the pane[redacted]enters for 12" and 24" units and not more than 16" centers for 1[redacted]mbers are required running in one direction only. Furring strips a[redacted]s than 1" x 2", secured with 8d common nails. Additional members shal[redacted]equired to receive border strips, mouldings, etc. (J-M Border Strip[redacted]t the ceiling dimensions to the panels, are furnished 12" wide and [redacted].

Application:

The work shall be carefully planned in advance of the actual application to provide the desired design which will preferably be symmetrical with an even width of border (where same is desired or necessary) at opposite ends of the space. Details of planning and construction are illustrated and described on the reverse of this sheet and on supplementary sheets.

The units shall be installed with the joints which parallel the direction of the framing members or furring centered thereon. They shall be brought to moderate contact and never forced into place.

Nailing:

Each unit shall be secured at each framing member or furring strip with nails placed adjacent to the edges of the unit, one in each corner and other intermediately at not to exceed 8" centers along the edges bearing on furring. The nails shall be of a length sufficient to penetrate the framing members or furring not less than 1" and shall preferably be of the small-headed type such as 4d finishing nails.

Cutting:

All cutting and fitting shall be done in a neat, workmanlike manner. Where joints are not exposed, the panels may be cut with a fine-tooth saw. Where joints are exposed, they should be cut with an insulating board cutting tool.

Border Trim:

In order to present a workmanlike finish where the ceiling meets the wall, a small moulding shall be installed, nailed into the wood furring.

Painting or other Finish:

If a different finish of the panels is desired, any of the methods described on the data sheet treating of Insulating Board finishes may be employed.

JOHNS-MANVILLE Building Materials

Application Directions
J-M Bevel Panels, Multiple Bevel Panels and Ceiling Panels

DATE May, 1938
(Cancelling sheet dated February, 1938)
BMM-186

PRINTED IN U. S. A.

TECHNICAL DATA SECTION

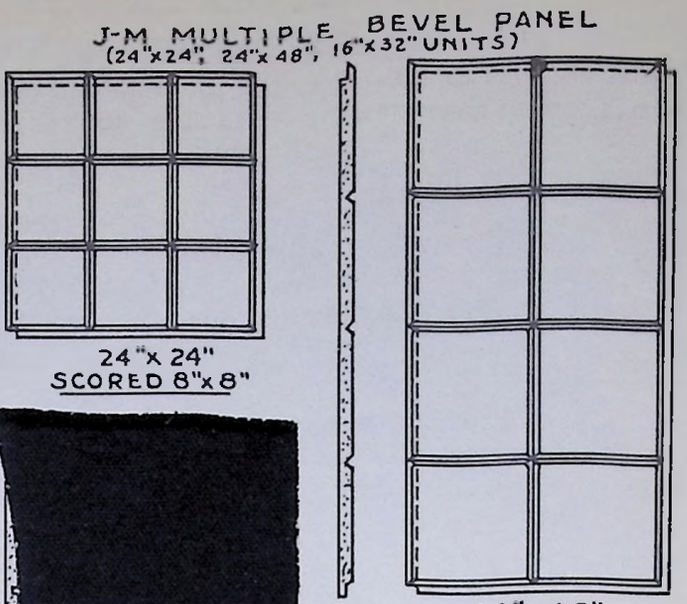
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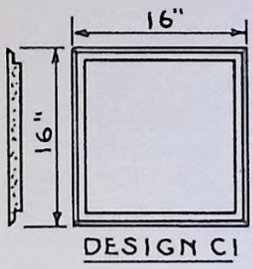
Panel Installation Details

Ceiling Panels, designs C-1, C-2 and C-3, are applied on cross furring, 16" c.c. Bevel and Multiple Bevel Panel designs are applied on 12" or 16" centers, depending upon whether the panel size is a multiple of 12 or 16. For 16"-unit panels the work should be planned by referring to Application Method Charts shown on a supplementary data sheet.

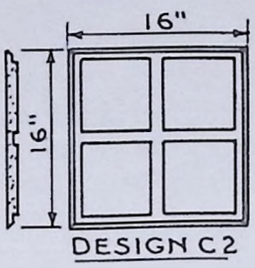
The 12" or 24"-unit panels are adjusted to ceiling dimensions by the J-M Border Strip. For example, a ceiling size of 15 ft. x 17 ft. would require a border strip cut 6" wide at all sides to reduce the area to be paneled to 14 ft. x 16 ft.

See, also, installation details discussed on the front of this sheet.

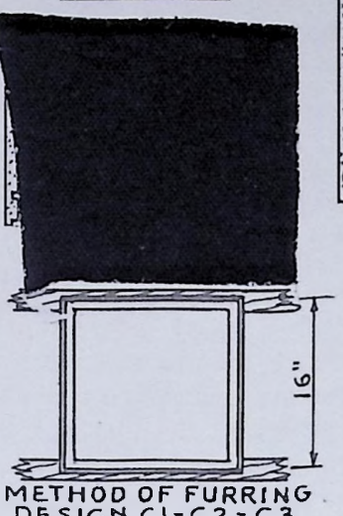




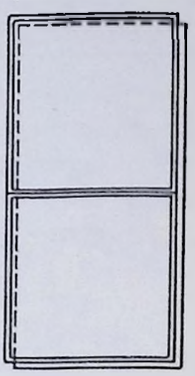
DESIGN C1

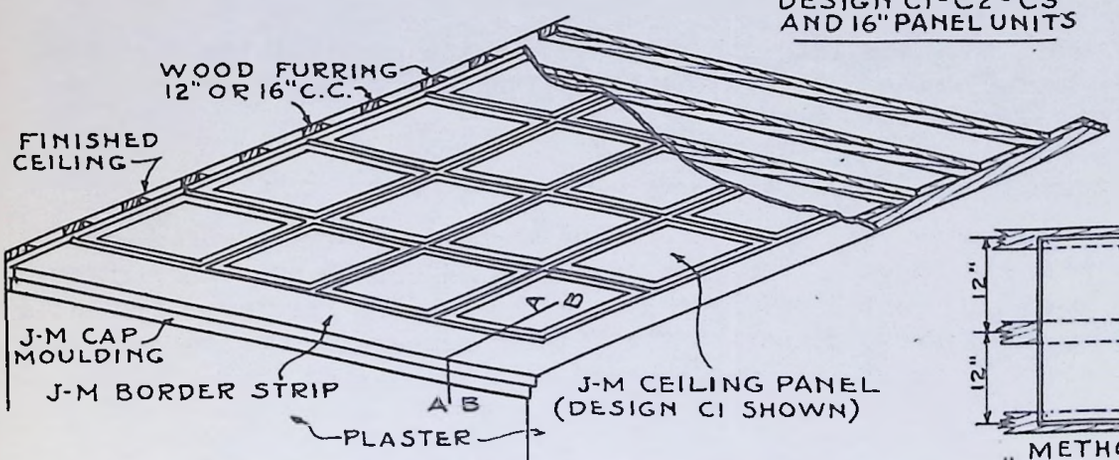


DESIGN C2

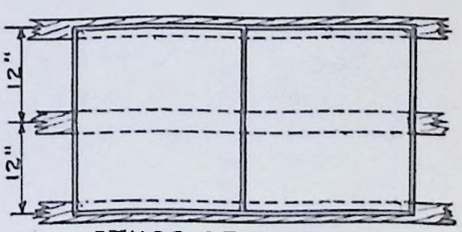


METHOD OF FURRING
DESIGN C1-C2-C3
AND 16" PANEL UNITS

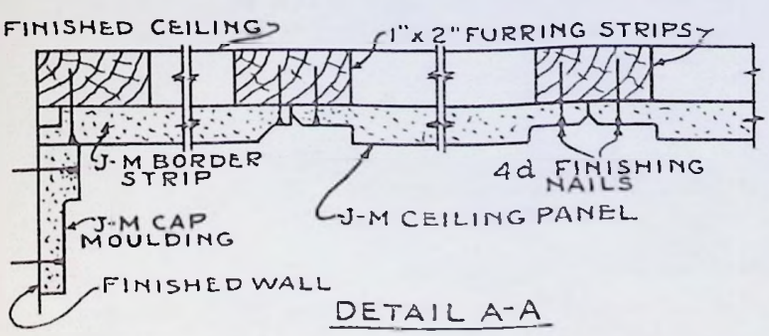

16"x 32"
SCORED 16"x16"



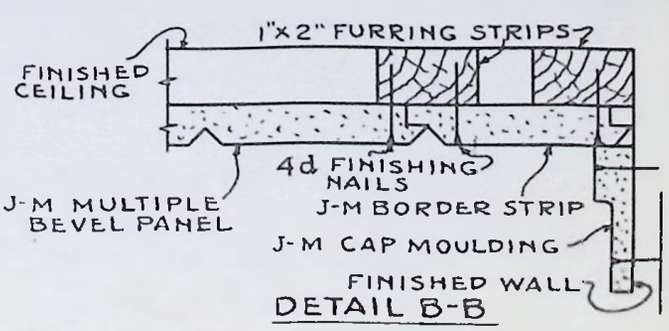
TYPICAL INSTALLATION OF J-M BEVEL PANELS



METHOD OF FURRING
12" & 24" BEVEL PANEL UNITS



DETAIL A-A



DETAIL B-B

Furring on 12" Centers: Bevel Panel units, 12" x 12", 12" x 24", 24" x 24", and 24" x 48"; and Multiple Bevel Panel units, 24" x 24" and 24" x 48".

Furring on 16" Centers: Bevel Panel units 16" x 16", 16" x 32"; and Multiple Bevel Panel unit, 16" x 32". Ceiling Panel Units, 16" x 16".

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3 gal per Sq. " Type B "

1 gal per Sq " Type C "

483 × 3 = 1449 gal

300
3 | 900
345

483

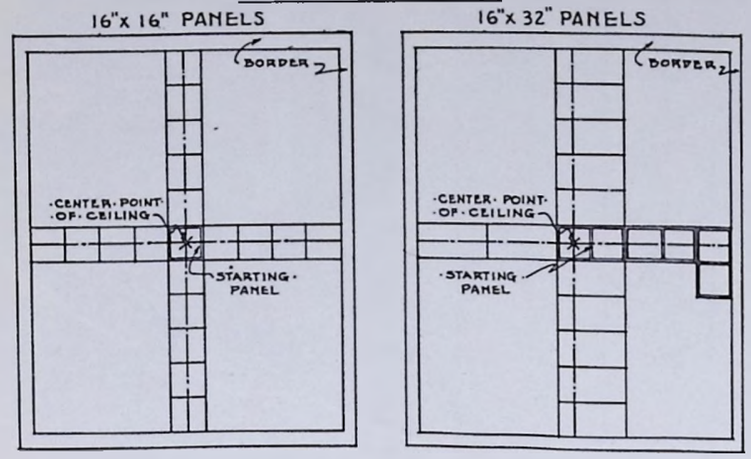
450
45

Plan of Work
For Panels of 16" Multiples

For Ceiling Panel designs C-1, C-2, C-3 and Bevel and Multiple Bevel Panels in 16" multiples, the work should be planned by referring to the chart of Panel Application Numbers as shown on the reverse of this sheet.

When the panel application number is determined from the room size, the correct position of the starting unit may be found by referring to this number in the sketches below.

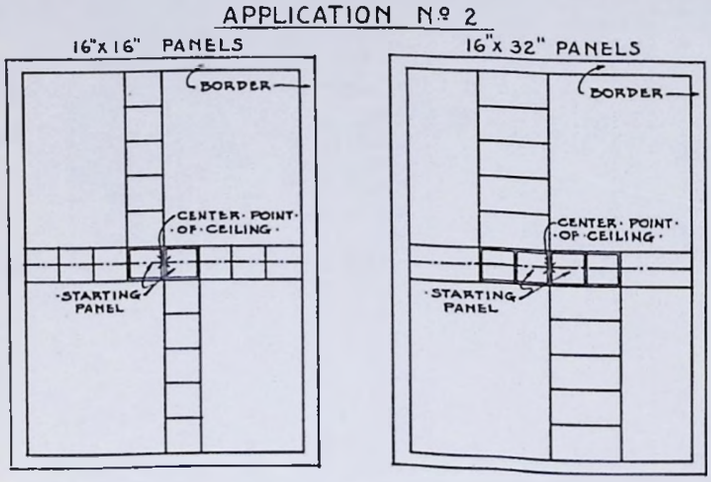
APPLICATION Nº 1



Place the center of the 16" x 16" panel over the center point of the ceiling.

Place the center of one of the 16" units of a 16" x 32" panel over the center point of the ceiling. This design results in one row of half panels, formed by turning the 16" x 32" panels sidewise.

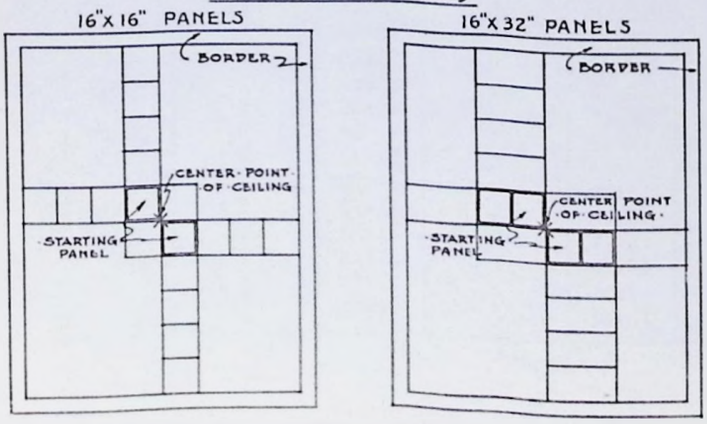
APPLICATION Nº 2



Place the center of one edge of a 16" x 16" panel at the center point of the ceiling.

Place the center of the short edge of a 16" x 32" panel at the center point of the ceiling. Whether the starting panel shall be laid the 16" or the 32" way with the width or length of the room is determined by actual layout from the center of the ceiling. Lay the panel the way that works out nearest to the 32" whole units.

APPLICATION Nº 3



Place the corner of either 16" x 16" or 16" x 32" panel at the center point of the ceiling.

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JOHNS-MANVILLE Building Materials

Plan of Work for Panels of 16" Multiples

DATE May, 1938
(Cancelling BMM-189 dated February, 1938)
BMM-187

PRINTED IN U.S.A.

TECHNICAL DATA SECTION

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Chart of Panel Application Numbers
For
Panels of 16" Multiples

Room Size	Application Number	Room Size	Application Number	Room Size	Application Number	Room Size	Application Number	Room Size	Application Number	Room Size	Application Number
2x 2	1	6x13	2	10x20	2	13x21	1	17x17	3	21x28	2
2x 3	2	6x14	3	10x21	1	13x22	2	17x18	2	21x29	1
2x 4	2	6x15	2	10x22	2	13x23	1	17x19	3	21x30	2
2x 5	1	6x16	2	10x23	1	13x24	1	17x20	3		
2x 6	2	6x17	3	10x24	1	13x25	2	17x21	2	22x22	3
2x 7	1	6x18	2	10x25	2	13x26	1	17x22	3	22x23	2
2x 8	1	6x19	3	10x26	1	13x27	2	17x23	2	22x24	2
2x 9	2	6x20	3	10x27	2	13x28	2	17x24	2	22x25	3
2x10	1			10x28	2	13x29	1	17x25	3	22x26	2
2x11	2	7x 7	1	10x29	1	13x30	2	17x26	2	22x27	3
2x12	2	7x 8	1	10x30	2			17x27	3	22x28	3
2x13	1	7x 9	2			14x14	3	17x28	3	22x29	2
2x14	2	7x10	1	11x11	3	14x15	2	17x29	2	22x30	3
2x15	1	7x11	2	11x12	3	14x16	2	17x30	3		
		7x12	2	11x13	2	14x17	3			23x23	1
3x 3	3	7x13	1	11x14	3	14x18	2	18x18	1	23x24	1
3x 4	3	7x14	2	11x15	2	14x19	3	18x19	2	23x25	2
3x 5	2	7x15	1	11x16	2	14x20	3	18x20	2	23x26	1
3x 6	3	7x16	1	11x17	3	14x21	2	18x21	1	23x27	2
3x 7	2	7x17	2	11x18	2	14x22	3	18x22	2	23x28	2
3x 8	2	7x18	1	11x19	3	14x23	2	18x23	1	23x29	1
3x 9	3	7x19	2	11x20	3	14x24	2	18x24	1	23x30	2
3x10	2	7x20	2	11x21	2	14x25	3	18x25	2		
3x11	3			11x22	3	14x26	2	18x26	1	24x24	1
3x12	3	8x 8	1	11x23	2	14x27	3	18x27	2	24x25	2
3x13	2	8x 9	2	11x24	2	14x28	3	18x28	2	24x26	1
3x14	3	8x10	1	11x25	3	14x29	2	18x29	1	24x27	2
3x15	2	8x11	2	11x26	2	14x30	3	18x30	2	24x28	2
		8x12	2	11x27	3					24x29	1
4x 4	3	8x13	1	11x28	3	15x15	1	19x19	3	24x30	2
4x 5	2	8x14	2	11x29	2	15x16	1	19x20	3		
4x 6	3	8x15	1	11x30	3	15x17	2	19x21	2	25x25	3
4x 7	2	8x16	1			15x18	1	19x22	3	25x26	2
4x 8	2	8x17	2	12x12	3	15x19	2	19x23	2	25x27	3
4x 9	3	8x18	1	12x13	2	15x20	2	19x24	2	25x28	3
4x10	2	8x19	2	12x14	3	15x21	1	19x25	3	25x29	2
4x11	3	8x20	2	12x15	2	15x22	2	19x26	2	25x30	3
4x12	3			12x16	2	15x23	1	19x27	3		
4x13	2	9x 9	3	12x17	3	15x24	1	19x28	3	26x26	1
4x14	3	9x10	2	12x18	2	15x25	2	19x29	2	26x27	2
4x15	2	9x11	3	12x19	3	15x26	1	19x30	3	26x28	2
		9x12	3	12x20	3	15x27	2			26x29	1
5x 5	1	9x13	2	12x21	2	15x28	2	20x20	3	26x30	2
5x 6	2	9x14	3	12x22	3	15x29	1	20x21	2		
5x 7	1	9x15	2	12x23	2	15x30	2	20x22	3	27x27	3
5x 8	1	9x16	2	12x24	2			20x23	2	27x28	3
5x 9	2	9x17	3	12x25	3	16x16	1	20x24	2	27x29	2
5x10	1	9x18	2	12x26	2	16x17	2	20x25	3	27x30	3
5x11	2	9x19	3	12x27	3	16x18	1	20x26	2		
5x12	2	9x20	3	12x28	3	16x19	2	20x27	3	28x28	3
5x13	1			12x29	2	16x20	2	20x28	3	28x29	2
5x14	2	10x10	1	12x30	3	16x21	1	20x29	2	28x30	3
5x15	1	10x11	2			16x22	2	20x30	3		
		10x12	2	13x13	1	16x23	1			29x29	1
6x 6	3	10x13	1	13x14	2	16x24	1	21x21	1	29x30	2
6x 7	2	10x14	2	13x15	1	16x25	2	21x22	2		
6x 8	2	10x15	1	13x16	1	16x26	1	21x23	1	30x30	3
6x 9	3	10x16	1	13x17	2	16x27	2	21x24	1		
6x10	2	10x17	2	13x18	1	16x28	2	21x25	2		
6x11	3	10x18	1	13x19	2	16x29	1	21x26	1		
6x12	3	10x19	2	13x20	2	16x30	2	21x27	2		

The room size determines the panel application number. This number is applied as shown on the front of this sheet. J-M Border Strips are used to adjust the ceiling dimensions to the panels.

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J-M INSULATING BOARD AND HARD BOARD FOOTAGE TABLE

The footage table shown below provides a means of determining quickly the number of sq. ft. of the various insulating and hard board products to order in the various sizes to obtain an even number of bundles.

This table should be used so that quantities are ordered which do not necessitate the breaking of bundles. Materials shipped should in no case be less than the quantity actually ordered. For instance, 5000 sq. ft. of 4 by 9 ft., 1/2" Insulating Board should be ordered as 5184 sq. ft. - 24 bundles; 1000 sq. ft. of 12" x 24" Bevel Panel as 1020 sq. ft. - 17 bundles.

1/2" Insulating Board, 1/4" Deluxe PanLBoard, 1/8" and 3/16" Hard Board, 1/4" Standard PanLBoard
(6 pieces per bundle when wrapped)

Bdls.	Pcs.	4x6	4x7	4x8	4x9	4x10	4x12
1	6	144	168	192	216	240	288
2	12	288	336	384	432	480	576
3	18	432	504	576	648	720	864
4	24	576	672	768	864	960	1152
5	30	720	840	960	1080	1200	1440
6	36	864	1008	1152	1296	1440	1728
7	42	1008	1176	1344	1512	1680	2016
8	48	1152	1344	1536	1728	1920	2304
9	54	1296	1512	1728	1944	2160	2592
10	60	1440	1680	1920	2160	2400	2880
11	66	1584	1848	2112	2376	2640	3168
12	72	1728	2016	2304	2592	2880	3456
13	78	1872	2184	2496	2808	3120	3744
14	84	2016	2352	2688	3024	3360	4032
15	90	2160	2520	2880	3240	3600	4320
16	96	2304	2688	3072	3456	3840	4608
17	102	2448	2856	3264	3672	4080	4896
18	108	2592	3024	3456	3888	4320	5184
19	114	2736	3192	3648	4104	4560	5472
20	120	2880	3360	3840	4320	4800	5760
21	126	3024	3528	4032	4536	5040	6048
22	132	3168	3696	4224	4752	5280	6336
23	138	3312	3864	4416	4968	5520	6624
24	144	3456	4032	4608	5184	5760	6912
25	150	3600	4200	4800	5400	6000	7200
26	156	3744	4368	4992	5616	6240	7488
27	162	3888	4536	5184	5832	6480	7776
28	168	4032	4704	5376	6048	6720	8064
29	174	4176	4872	5568	6264	6960	8352
30	180	4320	5040	5760	6480	7200	8640
31	186	4464	5208	5952	6696	7440	8928
32	192	4608	5376	6144	6912	7680	9216
33	198	4752	5544	6336	7128	7920	9504
34	204	4896	5712	6528	7344	8160	9792
35	210	5040	5880	6720	7560	8400	10080
36	216	5184	6048	6912	7776	8640	10368
37	222	5328	6216	7104	7992	8880	10656
38	228	5472	6384	7296	8208	9120	10944
39	234	5616	6552	7488	8424	9360	11232
40	240	5760	6720	7680	8640	9600	11520
41	246	5904	6888	7872	8856	9840	11808
42	252	6048	7056	8064	9072	10080	12096
43	258	6192	7224	8256	9288	10320	12384
44	264	6336	7392	8448	9504	10560	12672
45	270	6480	7560	8640	9720	10800	12960
46	276	6624	7728	8832	9936	11040	13248
47	282	6768	7896	9024	10152	11280	13536
48	288	6912	8064	9216	10368	11520	13824
49	294	7056	8232	9408	10584	11760	14112
50	300	7200	8400	9600	10800	12000	14400

J-M Insulating Lath—18" x 48"
1/2" thickness 16 pcs. per carton 96 sq. ft.
1" thickness 8 pcs. per carton 48 sq. ft.

J-M Roofinsul
From M & G—24" x 48"
From W—22" x 47"

		M & G	W
1/2" thick	12 pcs. per bdl.	96 sq. ft.	86.17 sq. ft.
1" thick	6 pcs. per bdl.	48 " "	43.09 " "
1 1/2" thick	4 pcs. per bdl.	32 " "	28.72 " "
2" thick	3 pcs. per bdl.	24 " "	21.54 " "

J-M Hard Board 1/4" and 5/16"
4' x 12' 3 pcs. per bdl. 144 sq. ft.

J-M Scored Hard Board 1/8"
4' x 12' 6 sheets per bdl. 288 sq. ft.

J-M Cap Moulding
36 pcs. per carton—288 lin. ft.

J-M Border Strips
12 pcs. per carton—96 sq. ft.

25/32" SHEATHING and 1" INSULATING BOARD
(4 pieces per bundle when wrapped)

Bdls.	Pcs.	4x6	4x7	4x8	4x9	4x10	4x12
1	4	96	112	128	144	160	192
2	8	192	224	256	288	320	384
3	12	288	336	384	432	480	576
4	16	384	448	512	576	640	768
5	20	480	560	640	720	800	960
6	24	576	672	768	864	960	1152
7	28	672	784	896	1008	1120	1344
8	32	768	896	1024	1152	1280	1536
9	36	864	1008	1152	1296	1440	1728
10	40	960	1120	1280	1440	1600	1920
11	44	1056	1232	1408	1584	1760	2112
12	48	1152	1344	1536	1728	1920	2304
13	52	1248	1456	1664	1872	2080	2496
14	56	1344	1568	1792	2016	2240	2688
15	60	1440	1680	1920	2160	2400	2880
16	64	1536	1792	2048	2304	2560	3072
17	68	1632	1904	2176	2448	2720	3264
18	72	1728	2016	2304	2592	2880	3456
19	76	1824	2128	2432	2736	3040	3648
20	80	1920	2240	2560	2880	3200	3840
21	84	2016	2352	2688	3024	3360	4032
22	88	2112	2464	2816	3168	3520	4224
23	92	2208	2576	2944	3312	3680	4416
24	96	2304	2688	3072	3456	3840	4608
25	100	2400	2800	3200	3600	4000	4800

Hard Board and Standard or DeLuxe PanLboard Shorts

Bdls.	Pcs.	1' x 4'	2' x 4'	3' x 4'	4' x 4'
1	10	40	80	120	160
2	20	80	160	240	320
3	30	120	240	360	480
4	40	160	320	480	640
5	50	200	400	600	800
6	60	240	480	720	960
7	70	280	560	840	1120
8	80	320	640	960	1280
9	90	360	720	1080	1440
10	100	400	800	1200	1600
11	110	440	880	1320	1760
12	120	480	960	1440	1920
13	130	520	1040	1560	2080
14	140	560	1120	1680	2240
15	150	600	1200	1800	2400

J-M Beaded or Bevel Plank (Random widths)
8' lengths 72 sq. ft. per carton
10' lengths 90 sq. ft. per carton
12' lengths 108 sq. ft. per carton

J-M Ceiling Panels Glaze-Coat
16" x 16" 60 pcs. per bdl. 106.6 sq. ft.

J-M Multiple Bevel Panels

Size	V-Grooved to	Pieces
24" x 48"	8" x 8"	15 (120 sq. ft.)
24" x 48"	12" x 12"	15 (120 sq. ft.)
24" x 48"	12" x 16"	15 (120 sq. ft.)
24" x 24"	8" x 8"	30 (120 sq. ft.)
24" x 24"	12" x 12"	30 (120 sq. ft.)
16" x 32"	16" x 16"	30 (106.6 sq. ft.)

J-M Batten Strips

2 1/2" x 8'	36 pcs.	288 lin. ft.
2 1/2" x 10'	36 pcs.	360 lin. ft.
2 1/2" x 12'	36 pcs.	432 lin. ft.

J-M Bevel Panels Glaze-Coat, Variegated, Medium, Coarse Fabric and Wicker*

SIZES	Pieces 1/2" thick	Footage per bundle 1/2" thick
12" x 12"	60	60
12" x 24"	30	60
16" x 16"	60	106.6
16" x 32"	30	106.6
24" x 24"	30	120
24" x 48"	15	120

*Wicker Panels in 12" x 12", 16" x 16" and 24" x 24" sizes only.

JOHNS-MANVILLE Building Materials, Miscellaneous

J-M Insulating Board and Hard Board Footage Table

DATE February, 1938
(Cancelling sheet dated April, 1937)
(BMM-199)

PRINTED IN U. S. A.

TECHNICAL DATA SECTION

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HH–I–521b

AUGUST 27, 1937

SUPERSEDING
Fed. Spec. HH–I–521a
August 19, 1936

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

INSULATION; BAT OR STRIP-FORM AND LOOSE-FILL

This specification was approved on the above date by the Director of Procurement, for the use of all departments and establishments of the Government, and shall become effective not later than April 1, 1938. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATION.

A–1. Federal Specification LLL–F–321, Fiberboard, insulating, of the issue in effect on date of invitation for bids, shall form a part of this specification.

B. TYPES AND CLASSES.

B–1. Insulation, in accordance with this specification, shall be furnished in the following types and classes, as specified:

Type I. Bat or strip form.
- Class (A) Light weight.
- Class (B) Medium weight.

Type II. Loose-fill form.
- Class (A) Light weight.
- Class (B) Medium weight.
- Class (C) Heavy weight.

C. MATERIALS.

C–1. *Materials.*—Insulation shall be composed of mineral matter in fibrous form, in granular form, in fibrous form granulated into nodules, in powdered form mixed with cellulose fiber, or in bat form, as specified.

D. GENERAL REQUIREMENTS.

D–1. *Sulphur.*—The sulphur content shall not exceed 0.75 percent.

D–2. *Oil content.*—When fibrous material is furnished, the material shall contain not less than 0.35 percent of mineral oil which shall be added while the material is being fiberized.

E. DETAIL REQUIREMENTS.

E–1. *Type I, bat or strip form.*—Bats or strips shall be composed of mineral wool fibers felted and bound together in such a manner as to

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produce a semirigid spongy block of uniform thickness. If a supporting member is required it shall be on one side only and shall be waterproof kraft paper unless a fireproof paper is specified. Bonding materials shall be of such character as to be practically insoluble in water.

E–2. *Thickness.*—The thickness of type I insulation shall not be more than ¼ inch less than the specified thickness. (See par. F–2c.)

E–3. *Type II, loose-fill form.*—This form shall be composed of mineral matter in fibrous form, in granular form or in fibrous form granulated into nodules, as specified. All particles except the fibrous form shall pass a 1-inch mesh screen and not more than 5 percent shall be retained on a ¾-inch screen.

E–4. *Class A, light weight.*—

E–4a. *Conductivity.*—The conductivity shall not exceed 0.30 B. t. u. per hour per square foot per degree F. per inch thickness at a mean temperature of 75° F.

E–4b. *Density.*—Type I material shall weigh not more than 8 pounds per cubic foot, type II material shall weigh not more than 12 pounds per cubic foot.

E–5. *Class B, medium weight.*—

E–5a. *Conductivity.*—The conductivity shall not exceed 0.50 B. t. u. per hour per square foot per degree F. per inch thickness at a mean temperature of 75° F.

E–5b. *Density.*—Type I material shall weigh not more than 12 pounds per cubic foot, type II material shall weigh not more than 15 pounds per cubic foot.

E–6. *Class C, heavy weight.*—

E–6a. *Conductivity.*—The conductivity shall not exceed 0.50 B. t. u. per hour per square foot per degree F. per inch thickness at a mean temperature of 75° F.

E–6b. *Density.*—Type II material shall not weigh more than 24 pounds per cubic foot.

E–6c. The cellulose fiber content of Class C type II material shall not exceed 15 percent by weight.

F. METHODS OF SAMPLING, INSPECTION, AND TESTS.

F–1. *Sampling.*—Samples shall be taken from unbroken packages.

F–1a. *Type I.*—Three pieces shall be taken at random from each lot of 1,000 pieces, or less.

F–1b. *Type II.*—At least three packages shall be selected at random from each lot of 2,000 pounds or less. The contents shall be dumped, thoroughly mixed and quartered down to provide a 25-pound sample.

F–2. *Inspection and tests.*—

F–2a. *Conductivity.*—This shall be made as described in paragraphs F–2b to F–2b (8) inclusive of Federal Specification LLL–F–321, referred to in section A.

F–2b. *Density.*—

F–2b (1). *Type I.*—Each of three bats or strips shall be measured and weighed separately. The average weight shall be reduced to pounds per cubic foot. (See par. F–2c.)

F–2b (2). *Type II.*—A cubical box of 1 cubic foot capacity and of known weight shall be filled loosely with the material which shall be screeded flush with the top of the box. The box shall be dropped

from a height of about 6 inches to the floor. This operation shall be repeated three times. The settled space shall be filled loosely with the material, after each drop, and again screeded flush with the top of the box. After the third drop, the box with its contents shall be weighed. The weight of the box and contents minus the weight of the box is the weight of the insulation in pounds per cubic foot.

F–2c. *Thickness.*—A full size bat or strip is laid face down on a flat surface and then covered with a lightweight cardboard or shipping carton top. A direct scale reading from the flat surface on which the bat or strip rests to the underside of the cardboard shall then be made at six points equally spaced around the periphery of the bat or strip. The average of these six readings is the thickness of the bat or strip.

G. PACKAGING, PACKING, AND MARKING.

G–1. *Packaging.*—Unless otherwise specified, commercial packages are acceptable under this specification.

G–2. *Packing.*—Unless otherwise specified, the subject commodity shall be delivered in standard commercial containers so constructed to insure acceptance by common or other carriers, for safe transportation at the lowest rate to the point of delivery.

G–3. *Marking.*—Unless otherwise specified, shipping containers shall be marked with the name of the material, class, and the quantity contained therein, as defined by the contract or order under which shipment is made, the name of the contractor, and the number of the contract or order.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS.

H–1. The following departmental specifications of the issue in effect on date of invitation for bids shall respectively form a part of this specification:

H–1a. *Army.*—United States Army Specification No. 100–2, Standard Specification for Marking Shipments.

United States Army Specification No. 22–42, Supplies Subsistence for United States Army, Conditions Governing the Purchase of.

H–1b. *Navy.*—Navy Department General Specifications for Inspection of Material, copies of which may be obtained without cost, upon application to the Bureau of Supplies and Accounts, Navy Department, Washington, D. C.

I. NOTES.

I–1. Purchasers should exercise all options desired and should specify type and class required. (See secs. B–1 and C–1.)

I–2. Insulation should be purchased by the square foot. Purchasers should specify the thickness required.

I–3. Commercial sizes are as follows:

Bats—15 by 18, 15 by 11½, and 15 by 23 inches.
Strips—15 by 8½, 15 by 9,23 by 9, and 23 by 36 inches.
Thicknesses—4, 3⅝, 3, and 2 inches.

I–4. It is believed that this specification adequately describes the characteristics necessary to secure the desired material and that normally samples will not be necessary prior to award to determine compliance with this specification.

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LLL-F-321a

MAY 21, 1935

SUPERSEDING
Fed. Spec. LLL-F-321
Sept. 20, 1932

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

FIBER-BOARD; INSULATING

This specification was approved by the Director of Procurement for use of all departments and establishments of the Government and shall become effective not later than November 15, 1935. It may be put into effect, however, at an earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A–1. There are no other Federal specifications applicable to this specification.

A–2. Any special requirements of the individual departments of the Government are noted under section H.

B. CLASSES AND USES

B–1. Fiber insulating board shall be furnished in three classes and in various thicknesses, as specified (see par. I–2).

Class A. Building board.
Class B. Lath (for plaster base).
Class C. Roof board.

C. MATERIALS

C–1. *Material.*—Boards shall be manufactured from wood or other vegetable fiber, by a felting or molding process, suitable sizing material being incorporated in the product to render it water-resistant. The material shall be subjected to such drying temperature as to effect complete destruction of rot-producing fungi (see par. D–5).

D. GENERAL REQUIREMENTS

D–1. *Construction.*—The finished board may be either single or multiple-ply. When multiple-ply boards are supplied, a suitable moisture-resistance cement shall be used to join the plies.

D–2. *Surfaces.*—For plaster base, roof boards, and similar applications surfaces shall be natural and shall be free from cracks, lumps,

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excessive departure from planeness, or other defects. For interior finish, partitions, and similar applications where the board is exposed, surfaces shall be finished and shall be smooth and flat and reasonably free from coarse or hairy fibers.

D–3. *Dimensions.*—Dimensions shall be as specified, subject to the following tolerances:

Length and width: Tolerance, minus ¼ inch, plus none.
Thickness: Tolerance, plus or minus 1/16 inch.

D–4. *Edge finish.*—

D–4a. *Class A.*—Edges shall be square.

D–4b. *Class B.*—Edges shall be either shiplapped, beveled-and-shiplapped, tongue-and-grooved, beveled-and-tongue-and-grooved, V-jointed, or shiplapped-and-grooved.

D–4c. *Class C.*—Edges shall be square unless shiplapped or offset are specified.

D–5. *Destruction of rot-producing fungi.*—Each bidder shall state in his proposal the temperature and humidity and the time insulating fiber-board is held at this condition during the process of manufacture. The temperature necessary to sterilize insulating board varies with the humidity during the heating process. For example, 10 minutes at 100° C. and 100 percent humidity will sterize, while at 90° C. and 70 percent humidity 1 hour is required. At lower temperatures a longer time is required.

E. DETAIL REQUIREMENTS

E–1. *Physical properties.*—Fiber insulating board shall have the properties shown in table I when tested according to methods hereinafter described:

TABLE I

	Class A	Class B	Class C
Maximum thermal conductivity B. t. u. per hour per square foot per degree F. per inch thickness (note 1)	0.36	0.36	0.36
Minimum transverse strength, pounds (Lengthwise (note 2)	14	14	7
Minimum transverse strength, pounds (Crosswise (note 2)	12	12	7
Minimum deflection at ultimate load, inches	0.25	0.25	0.25
Maximum deflection at ultimate load, inches	.85	.85	1.25
Minimum tensile strength, pounds per square inch (note 3)	175	175	100
Water absorption, percent	5	5	10
Maximum linear expansion, percent	½	½	----------

Note 1. No board of any class having a conductance greater than 0.72 B. t. u. per hour, per square foot per degree F. irrespective of thickness will be acceptable under this specification.

Note 2. This requirement is based upon specimens ½-inch thick. For specimens of other thicknesses the requirement shall be increased in direct proportion, that is, for a thickness of 1 inch, it shall be doubled, etc.

Note 3. Tensile strength requirements shall be applicable only on thicknesses up to and including 1 inch.

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LLL-F-321a

AMENDMENT—1
MAY 21, 1937

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

FIBER-BOARD; INSULATING

This Amendment was approved on the above date, by the Director of Procurement, for the use of all departments and establishments of the Government, and shall become effective not later than November 15, 1937. It may be put into effect, however, at any earlier date after promulgation.

The following corrections should be made in Federal Specification LLL-F-321a, dated May 21, 1935:

Page 1:

Paragraph **D-1.** Delete paragraph in its entirety and substitute:

D-1. *Construction.*—The finished board may be either single or multiple-ply. When multiple-ply boards ¾-inch or less in thickness are supplied, a suitable moisture-resistance cement shall be used to join the plies. Multiple-ply boards 1-inch and over in thickness may be stapled, stitched, or thoroughly cemented, as specified.

Page LLL–F–321a—12:

Paragraph **D-4c.** Delete paragraph in its entirety and substitute:

D-4c. *Class C.*—Edges shall be square unless shiplapped or offset are specified. When offset boards 1½ inches and over in thickness are specified the offset shall be one-half the thickness of the board.

Page LLL–F–321a—10:

Paragraph **I-1.** Delete paragraph in its entirety and substitute:

I-1. Purchasers should specify the class, purpose for which used, dimensions and kind of surface desired; also whether cemented, stapled, or stitched joining of plies is desired in boards 1-inch in thickness and over. Under class C when other than square-edge finish is desired the kind desired shall be specified. (See par. D–4c.)

Paragraph 1-2. Insert subparagraph 1-2 as follows:

1-2. The width and length dimensions listed in paragraphs 1-2a, 1-2b, and 1-2c are the overall dimensions of the finished board.

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F. METHOD OF SAMPLING, INSPECTION, AND TESTS

F–1. *Sampling.*—Samples shall be taken at random so as to give a fair representation of the entire shipment. Pieces from 5 boards of any carload, or one-half of 1 percent of the number of pieces in less than carload shipments, but not less than 3 boards of any shipment, shall constitute the test sample. From each, a specimen 24 by 30 inches shall be cut, the longer dimension being crosswise of the longer dimension of the board as it is usually obtained. When a shipment consists of more than 1 car or carrier load a sample shall be selected from each car or carrier.

F–2. *Inspection and tests.*—

F–2a. *Atmospheric conditions.*—Tests for tensile strength, transverse strength, and deflection shall be made under prevailing atmospheric conditions except in the case of disputes. These tests shall then be made on samples conditioned for at least 24 hours at a relative humidity of 65 percent and at a temperature of 70° to 75° F.

F–2b. *Thermal conductivity.*—The guarded hot plate shall be the standard method for determination of thermal conductivity. The temperature of the surfaces of the material shall be regarded as that of the plates on each side. The test specimen shall be at least 8 by 8 inches and the plates must be applied in such a manner that the density and other physical characteristics of the material under test is not altered. The standard method of making tests shall be at a mean temperature of 75° F. and upon dry material. The material shall be dried at a temperature of 160° F. for a sufficient time to eliminate all moisture before the test is made. The percentage of moisture driven off, together with the atmospheric conditions, and the density of the material, shall be reported with the test. The temperature of the surfaces of the material shall be regarded as that of the plates on each side. The construction of the apparatus, and the procedure recommended by the United States Bureau of Standards (Journal of the American Society of Heating and Ventilating Engineers, vol. 26, no. 7, Oct. 1920), are as follows:

F–2b (1). Figure 1 shows a diagrammatic sketch of the assembled apparatus. The copper plates, four in number, are suspended from the frame by means of small piano wires. The middle plates enclose an electric heating element, details of construction of the 12-inch square heating plates being shown in figure 2. The heating grid, having a resistance of about 20 ohms, is built of $\frac{1}{16}$-inch no. 36 constantan ribbon, wound diagonally on a sheet of fiber board, 11 inches square, so that the winding is distributed uniformly over the entire surface. It is insulated with micanite sheets and placed between two $\frac{1}{16}$-inch copper plates which are then held together tightly by means of a number of copper screws passing through holes in the fiber board. Each plate has a $\frac{3}{32}$-inch saw cut isolating an 8-inch square in the center, as shown in the figure. This arrangement tends to minimize the heat conduction between the center square and the outer guard ring. The two outer

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cold plates (fig. 3) are identical in construction and consist merely of ⅛-inch copper plates with water or brine circulating tubes soldered to the backs.

F–2b (2). Thermocouples are used to measure the difference in temperature between the hot and cold plates. A fine (no. 32 B. & S. gage) constantan wire is soldered directly to the center of the surface of each plate in contact with the insulating material, the outer

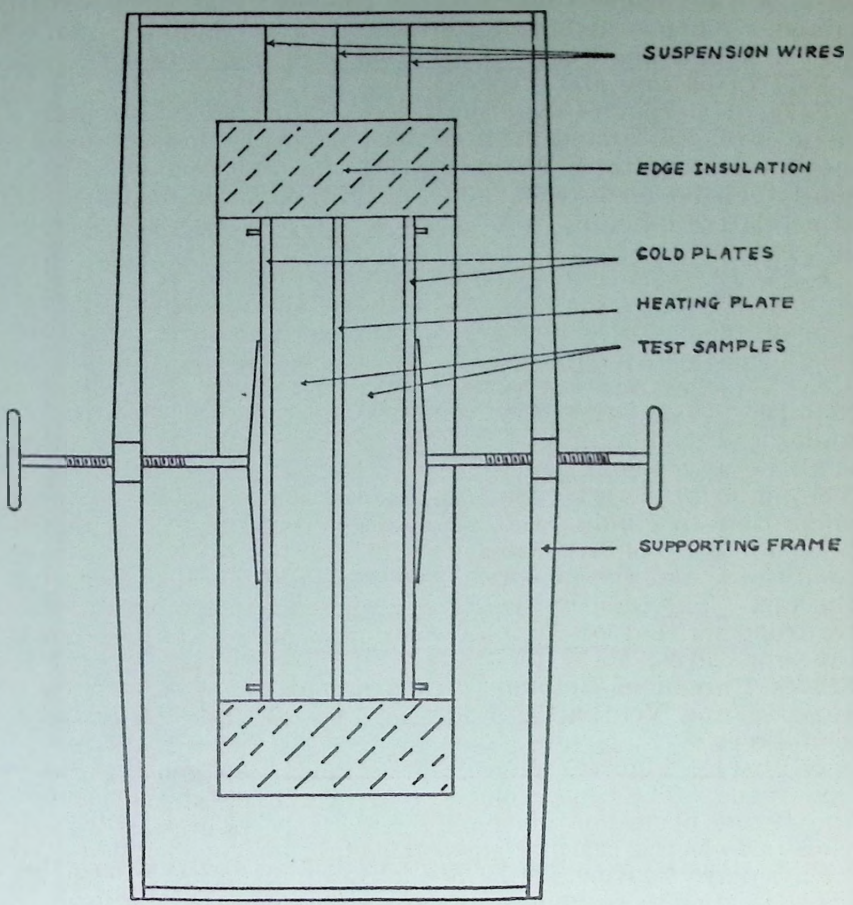


FIGURE 1.

plates serving as cold junctions and the two surfaces of the center plates as the corresponding hot junctions. The temperatures of the plates, as will be shown later, are sensibly the same as the temperatures of the surfaces of the test material in contact with them, providing the test material is not too good a conductor of heat. Each wire is led off from the center in a small groove cut in the surface of each plate. The copper leads to the measuring instrument are connected directly to the middle plates and to each of the outer

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plates as shown in figure 4. In this way the copper plates themselves form the thermojunctions with the constantan wires. Since no appreciable temperature gradient will be present in the heating plates, the junctions on those plates may be placed on the inside next to the heating grid. This eliminates the necessity of cutting grooves on the outside surfaces to accommodate the wires, but, on the other hand, the junctions are not conveniently accessible.

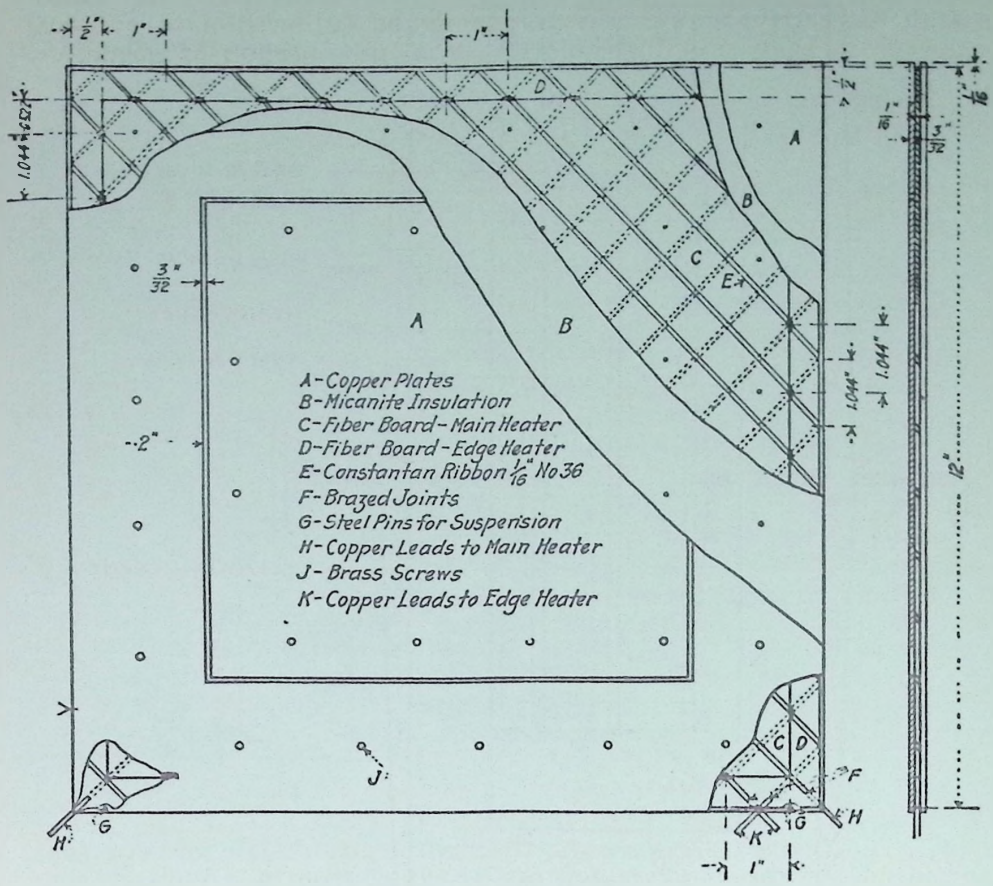


FIGURE 2.—Details of heating plate for thermal conductivity apparatus.

F–2b (3). To compensate for heat loss from the edges of the heating plate, an auxiliary heating element consisting of ribbon similar to the main heating grid is wound, as shown in figure 2 on a hollow square of fiber board ½-inch wide around the edges of the plates. A small auxiliary current can be regulated in this heater in order to maintain the guard ring at the temperature of the inner square. Auxiliary thermocouples, the junctions of which are placed on each side of the saw cut at the corners of the inner square, enable this adjustment to be effected. When the auxiliary thermocouples indicate a zero temperature difference across the saw cut no lateral

flow of heat can take place either in the central square or the hollow square surrounding it.

F–2b (4). Figure 4 gives a diagram of the electrical connections. A reliable ammeter is used to measure the current supplied to the main heating grid and some form of potentiometer outfit to measure the electromotive forces of the thermocouples. The galvanometer used with the potentiometer can also be used as a direct deflection instrument, but this requires that all the couples have the same resistance. Furthermore, the galvanometer calibration is subject to change so that it is desirable to use a nuli method of measure-

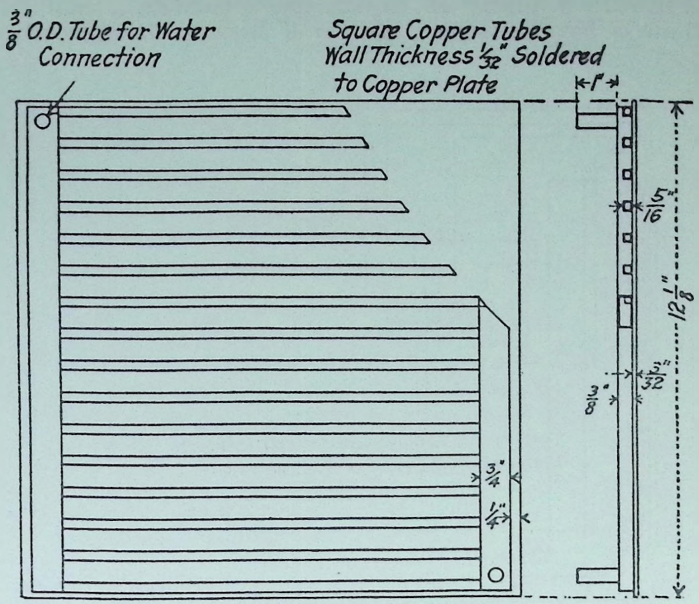


FIGURE 3.—Details of one of the outer cold plates.

ment. The relation between the thermal electromotive force of the thermocouples and the temperature is taken from a calibration of a thermocouple of the same material, i. e. no. 32 constantan wire against pure copper wire.

F–2b (5). To determine the actual rate of energy supply per unit area to the inner squares of the heating plates, the resistance per unit area of the heating grid in that region is computed from the measured resistance of the metallic ribbon per unit length, its width and spacing. This is equivalent to determining the length of ribbon over the center square and one-half the area of the saw cut, multiplying this length by the resistance of the ribbon per unit length, and dividing the product by the area of the center plus one-half the saw cut. The rate of electrical energy supply per unit area to each slab of test material is evidently equal to one-half the ordinary expression for power in electrical unit, viz I^2R, provided the effective

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insulation on each side of the heating plate is the same. The quantity R in this case is not the total resistance of the heating grid, but its resistance per unit area of surface covered. The temperature coefficient of resistance of the constantan ribbon used for the heating grid is so small that R remains practically constant throughout the range of temperature in which the apparatus can be used.

F–2b (6). The two outer cold plates are kept at constant temperature by allowing water of brine to flow through them in sufficient quantity to carry off all the heat supplied without becoming appreciably heated. The cooling liquid must be kept at a fairly constant temperature during an experiment otherwise a condition of equilibrium is never reached. If water is used an apparatus for

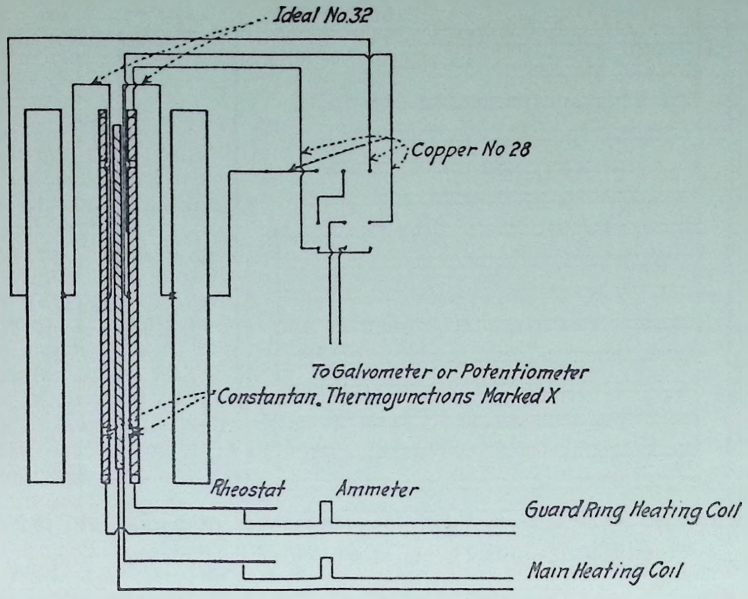


FIGURE 4.—Arrangement of electrical connections to thermojunctions.

automatically mixing hot and cold water in the proper proportions will be found convenient to furnish a constant temperature supply, but in a great many places the tap water has a fairly constant temperature and no thermostatic devices need be employed.

F–2b (7). Two identical flat samples of insulating material previously dried to constant weight (see par. F–2b) are placed in the apparatus, one on each side of the central heating plate. Enough pressure is applied to insure a good contact between the specimens and the copperplates, but not enough to cause an appreciable diminution in the thickness of the samples. The heating plates are then heated up rapidly with a fairly large current to a temperature somewhat above the final equilibrium temperature desired. The

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current is then reduced to a value which will maintain the hot plate at about the desired temperature. This value of the current is calculated from the estimated conductivity and the thickness of the samples being tested. When a condition of approximate equilibrium has been established a small current is regulated in the auxiliary guard-ring heating coil until the thermocouples between the inner squares and the guard-rings of the heating plate give no deflection of the galvanometer. This current must be adjusted from time to time during the experiment since the temperature of the hot plate is slowly changing as equilibrium is being approached.

F–2b (8). Under equilibrium conditions, the average thermal conductivity of the two specimens is given by the following expression:

$$K=\frac{I^2Rd}{JT}$$

where

K=thermal conductivity;
I=current;
R=resistance per unit area of surface;
d=average thickness of sample;
T=average temperature difference between hot and cold plates;
J=electrical equivalent of heat (4.183 joules=1 calorie).

F–2c. *Transverse strength.*—The transverse strength shall be determined as follows:

A specimen 3 inches wide and 18 inches long is taken for test. The transverse strength is determined by placing the specimen on horizontal parallel supports 12 inches apart and applying the load at midspan on a bearing parallel to the end supports, so that the deflection takes place at 12 inches plus or minus 2 inches per minute until the specimen breaks. The bearing and supports shall be rounded to a radius of approximately ⅜ inch to prevent injury to the specimen. Three specimens from the long direction of the board and three at right angles thereto shall be tested. The transverse strength in each direction is the average of three specimens taken from that direction.

NOTE.—See Miscellaneous Publication Bureau of Standards No. 132, issued Dec. 1, 1931.

F–2d. *Deflection test.*—Ultimate deflection shall be determined at the time each specimen breaks in the test under paragraph F–2c. Each specimen shall meet the minimum and maximum requirements of table I.

F–2e. *Tensile strength.*—The test for tensile strength shall be as follows: From each sample, specimens 2 inches wide and not less than 10 inches long shall be clean-cut parallel to the longest direction of the board and at right angles thereto. The distance between clamps shall be not less than 6 inches. Results on specimens under test that break within ½ inch of the jaws shall be disregarded. The machine speed shall be set for the openings between the clamps at the rate of 2 inches per minute.

The specimens before being placed in the testing machine shall be measured for width and thickness to the nearest 0.01 inch. The tensile strength shall be taken as the average of three specimens from each direction of the board.

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F–2f. *Water absorption.*—A specimen 12 by 12 inches shall be dried at 160° F. for 24 hours and cooled to room temperature in a dry atmosphere. The thickness of the sample shall be measured and the volume calculated therefrom. The sample shall then be carefully weighed and submerged horizontally under 1 inch of distilled water maintained at a temperature of 70° F. plus or minus 5° F. After 2 hours of submerision, the sample shall be stood on end to drain for 10 minutes at the end of which time the excess surface water shall be removed by hand with a blotting paper or paper towel and immediately weighed. The volume of absorbed water calculated, and the water absorption expressed in percent by volume based on the initial volume.

F–2g. *Linear expansion.*—The maximum linear expansion shall be determined in the following manner from a specimen 3 by 12 inches that has been cut parallel with the long direction of the board and from a like specimen cut at right angles thereto. At each of two points approximately 10 inches apart on the center line of each specimen a small area is coated by rubbing with a glass marking pencil (or a wax crayon). A fine cross mark is made with a razor blade on the center line in each of these two areas as reference points for the length measurements. The specimens are then conditioned for 24 hours at 50 percent relative humidity and measurements are then made of the distance between the two reference points. A scale graduated in hundredths of an inch is used and readings are made with a magnifying lens to the nearest 0.005 inch. The specimens are next conditioned for 24 hours at 97 percent relative humidity after which the distance between the two reference points is again measured. The measurements shall be made in the conditioned air specified in each case, or as quickly as possible after each specimen is removed therefrom. The linear expansion shall be reported as the increase in the lngeth between reference marks as a percentage of the length at 50 percent relative humidity. (In the absence of other facilities, a convenient means of conditioning the specimens at the specified humidity conditions is to expose them in an enclosed space immediately above saturated solutions of suitable salts—sodium dichromate ($Na_2Cr_2O_7$ 2 H_2O) for 50 percent relative humidity and potassium sulphate (K_2SO_4) for 97 percent relative humidity).

G. PACKAGING, PACKING, AND MARKING

G–1. *Packaging.*—Unless otherwise specified, commercial packages are acceptable under this specification.

G–2. *Packing.*—Unless otherwise specified, the subject commodity shall be delivered in standard commercial containers, so constructed as to insure acceptance by common or other carriers for safe transportation at the lowest rate to the point of delivery.

G–3. *Marking.*—Unless otherwise specified, shipping containers shall be marked with the name of the material, class size, and quantity contained therein, as defined by the contract or order under which shipment is made, the name of the contractor, and the number of the contract or order.

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H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H–1. The following departmental specifications of the issue in effect on date of invitation for bids shall, insofar as applicable, form a part of this specification, and contractors should provide themselves with the necessary copies when submitting bids to the respective departments.

H–1a. *Army.*—United States Army Specification No. 100–2, latest issue Standard Specifications for Marking Shipments.

H–1b. *Navy.*—Navy Department General Specification for Inspection of Material, copies of which may be obtained without cost upon application to the Bureau of Supplies and Accounts, Navy Department, Washington, D. C.

I. NOTES

I–1. Purchasers should specify the class, purpose for which used, dimensions and kind of surface desired. Under class C when other than square-edge finish is desired the kind desired shall be specified (see par. D–4c).

I–2. *Commercial sizes.*—

I–2a. *Class A.*—4 feet wide by 5, 6, 7, 8, 9, 10, or 12 feet long by ½ inch, ¾ inch, and multiples of ½ inch thick.

I–2b. *Class B.*—48 inches long by 16, 18, or 24 inches wide by ½ inch, ¾ inch, and multiples of ½ inch thick.

I–2c. *Class C.*—22 by 47 inches and 24 by 48 inches by ½ inch and multiples of ½ inch thick.

I–3. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If for any particular purpose, samples with bids are necessary they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid samples should be definitely stated, the specification to apply in all other respects.

I–4. Copies of this specification may be obtained upon application, accompanied by cash or money order, to the Superintendent of Documents, Government Printing Office, Washington, D. C. Price 5 cents.

I–5. The Index of Federal Specifications is obtainable upon application, accompanied by cash or money order, to the Superintendent of Documents, Government Printing Office, Washington, D. C. Price to be obtained from that office.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related governmental procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever, and the fact that the Government may have formulated or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or other person or corporation or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE: 1935

For sale by the Superintendent of Documents, Washington, D.C. - Price 5 cents.

Built-up Roofing

Standard-type competitive materials of proved merit

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Built-up Roofing

Built-up roofing materials and methods, developed to a high plane through many years of experience, have long been specified and used by various government bureaus and agencies.

For ready reference to the various standard built-up roofs, specifications have been tabulated in this section according to the use of insulation, kind and slope of roof deck, type of felt, finish, etc. Following the tabular matter, individual name specifications are given for all of the major types.

Johns-Manville recommends the smooth-surfaced asphalt roof. Included in this section, therefore, are specifications which are competitive for this type in weight, composition, materials and methods of application. If it is desired to specify slag-surface roofs the name specifications can be used simply by eliminating all reference to Johns-Manville.

Both smooth-surfaced roofs and slagged-in types are bonded for various periods depending upon the class of the roof which is selected.

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J-M Bonded Built-up Roofs



REALIZING that no one type of built-up roof can be acceptable or usable under all conditions, and recognizing the factor of individual preference, Johns-Manville has developed a number of different types of built-up roofs and is in a position to furnish a roof to meet practically any condition or personal preference.

SMOOTH-SURFACED ASBESTOS BUILT-UP ROOFS

While Johns-Manville furnishes built-up roofs of every type, the smooth-surfaced asbestos roof is recommended as the one best designed to stand up under all conditions and to give complete, trouble-free protection for the life of the building.

J-M Smooth-surfaced Asbestos Built-up Roofs are the outcome of several decades of study and experience in producing durable, fireproof, weatherproof, lightweight roofs at a moderate cost. They are suitable for practically every type of industrial building, warehouse, office building, hotel, hospital and apartment house.

They are built up of alternating layers of asphalt-saturated asbestos felt and roofing asphalt.

J-M Asbestos Felts, with which J-M Bonded Asbestos Roofs are built up, will not support combustion even when impregnated and coated with asphalt. The Underwriters' Laboratories, Inc., give Class A ratings to many different types of J-M Asbestos Roofs. They are fire-resistant to the highest degree.

J-M Bonded Roofing Asphalt—a relatively recent development in asphalt processing which has proved to be far superior to ordinary asphalts—is used on all J-M Bonded Asbestos Roofs. Tests at the Johns-Manville Research Laboratories at Manville, N. J., have demonstrated that the unusual ability of J-M Bonded Asphalt to stand up under all conditions of service will add years to the life of the roof.

ADDITIONAL J-M BONDED ROOFS

In addition to Asbestos Roofs, Johns-Manville also supplies Combination Roofs, composed of a rag base felt and asbestos finishing felts, and a complete line of Slag or Gravel-surfaced Roofs, using tar-saturated asbestos felts, tar-saturated rag felts, or asphalt-saturated rag felts. These types of J-M Bonded Roofs are also included in the tables following.

APPROVED ROOFING CONTRACTORS INSPECTION..BONDS..ENDORSEMENTS

As the best results are obtained only when the proper roofing is correctly laid, Johns-Manville has appointed Approved Roofing Contractors throughout the country, whose appointments have been based upon experience, integrity and financial responsibility.

J-M INSPECTIONS ARE AVAILABLE

Johns-Manville maintains a corps of inspectors whose services are available in connection with bonded built-up roofs. This service is required in connection with every roof which is to be bonded, both before, during and after application.

BOND BY NATIONAL SURETY CORP.

All Johns-Manville Built-up Roofs, except on the Pacific Coast, will, when desired, be covered by a bond of National Surety Corp., guaranteeing the performance of the particular roof for a period of from ten to twenty years, depending on the type of roof applied. This bond is issued only on roofs laid by Johns-Manville Approved Roofing Contractors and in connection with Johns-Manville inspection service.

10-YEAR FLASHING ENDORSEMENT

Where Johns-Manville Flashing Materials are used in conjunction with Johns-Manville Roofing, a ten-year flashing endorsement will be attached to and become part of the bond, under the same conditions as are imposed for the roof.

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Index and Condensed Specifications

Pitch of Roof per Foot, in Inches	Bond, Years (See Note)	J-M Specification Number	Surface	Number of Plies and Kind of Felt	Number of Moppings Asphalt [A] or Pitch [P]	Weight of Materials, in Pounds per Square: Sheathing Paper	Felts: Asbestos	Felts: Rag	Asphalt	Pitch	Roof Coating	Gravel	Slag	Total Weight per Square, in Pounds: Smooth Surface or Crushed Slate	Gravel Surface	Slag Surface	Underwriters' Rating
WITHOUT INSULATION																	
WOOD or PRE-CAST GYPSUM DECK																	
Smooth Surface																	
¼ to 9	20	100	Smooth	One 55-lb. Asphalt-Saturated Asbestos Felt Three 20-lb. Asphalt-Saturated Asbestos Felts	A-3	—	115	—	90	—	8	—	—	213	—	—	A
¼ to 9	15	103	Smooth	One 55-lb. Asphalt-Saturated Asbestos Felt Two 20-lb. Asphalt-Saturated Asbestos Felts	A-2	—	95	—	60	—	8	—	—	163	—	—	A
¼ to 9	15	200	Smooth	One No. 45 Asphalt-Saturated Rag Felt Two 20-lb. Asphalt-Saturated Asbestos Felts	A-2	—	40	50	60	—	8	—	—	158	—	—	—
¼ to 9	10	202	Smooth	One No. 30 Asphalt-Saturated Rag Felt Two 20-lb. Asphalt-Saturated Asbestos Felts	A-2	—	40	33½	60	—	8	—	—	141½	—	—	—
¼ to 9	20	205	Smooth	One No. 45 Asphalt-Saturated Rag Felt Three 20-lb. Asphalt-Saturated Asbestos Felts	A-3	—	60	50	90	—	8	—	—	208	—	—	—
Gravel or Slag Surface																	
¼ to 2	20	300	Gravel or Slag	Five 15-lb. Asphalt-Saturated Rag Felts	A-4	—	—	81	145	—	—	400	300	—	626	526	A
¼ to 2	15	304	Gravel or Slag	Four 15-lb. Asphalt-Saturated Rag Felts	A-3	—	—	65	115	—	—	400	300	—	580	480	A
2 to 4	10	301	Slag	Five 15-lb. Asphalt-Saturated Rag Felts	A-5	—	—	81	150	—	—	—	250	—	—	481	A*
¼ to 2	20	600	Gravel or Slag **	One ply Rosin-Sized Paper (over wood only) Five 15-lb. Tar-Saturated Asbestos Felts	P-4	5	—	81	—	150	—	400	300	—	636	536	A
¼ to 2	15	604	Gravel or Slag **	One ply Rosin-Sized Paper (over wood only) Four 15-lb. Tar-Saturated Asbestos Felts	P-3	5	—	65	—	125	—	400	300	—	595	495	A
2 to 6	10	601	Slag **	One ply Rosin-Sized Paper (over wood only) Five 15-lb. Tar-Saturated Asbestos Felts	P-4 A-1	5	—	81	45	60	—	—	250	—	—	441	A*
Crushed Slate Surface																	
1 to 4	10	402	Crushed Slate △	Three 15-lb. Asphalt-Saturated Rag Felts Two 50-lb. Asphalt-Saturated Slatekote Felts	A-4	—	—	149	120	—	—	—	—	269	—	—	C
4 to 9	10	400	Crushed Slate △	Two 15-lb. Asphalt-Saturated Rag Felts Two 50-lb. Asphalt-Saturated Slatekote Felts	A-2	—	—	133	60	—	—	—	—	193	—	—	C
NON-COMBUSTIBLE DECK (except Pre-cast Gypsum or Steel)																	
Smooth Surface																	
¼ to 9	20	101	Smooth	One 55-lb. Asphalt-Saturated Asbestos Felt Two 20-lb. Asphalt-Saturated Asbestos Felts	A-3	—	95	—	90	—	8	—	—	193	—	—	A
¼ to 9	15	201	Smooth	One No. 45 Asphalt-Saturated Rag Felt Two 20-lb. Asphalt-Saturated Asbestos Felts	A-3	—	40	50	90	—	8	—	—	188	—	—	—
¼ to 9	10	203	Smooth	One No. 30 Asphalt-Saturated Rag Felt Two 20-lb. Asphalt-Saturated Asbestos Felts	A-3	—	40	33⅓	90	—	8	—	—	171⅓	—	—	—
Smooth Surface under Promenade Tile																	
¼ to ½	20	112	Smooth △	Two plies Rosin-Sized Paper Four 20-lb. Asphalt-Saturated Asbestos Felts	A-5	10	80	—	160	—	—	—	—	—	250	—	—
¼ to 1	§	612	Smooth **	Five 15-lb. Tar-Saturated Asbestos Felts	P-6	—	81	—	—	200	—	—	—	—	281	—	—
Gravel or Slag Surface																	
¼ to 2	20	302	Gravel or Slag	Four 15-lb. Asphalt-Saturated Rag Felts	A-5	—	—	65	175	—	—	400	300	—	640	540	A
¼ to 2	15	305	Gravel or Slag	Three 15-lb. Asphalt-Saturated Rag Felts	A-4	—	—	49	145	—	—	400	300	—	594	494	A
2 to 4	10	303	Slag	Four 15-lb. Asphalt-Saturated Rag Felts	A-5	—	—	65	165	—	—	—	250	—	—	480	A*
¼ to 2†	20	602	Gravel or Slag **	Four 15-lb. Tar-Saturated Asbestos Felts	P-5	—	65	—	—	175	—	400	300	—	640	540	A
¼ to 2†	15	605	Gravel or Slag **	Three 15-lb. Tar-Saturated Asbestos Felts	P-4	—	49	—	—	150	—	400	300	—	599	499	A
2 to 6‡	10	603	Slag **	Four 15-lb. Tar-Saturated Asbestos Felts	P-4 A-1	—	65	—	45	65	—	—	250	—	—	425	A*
Crushed Slate Surface																	
1 to 4	10	403	Crushed Slate △	Three 15-lb. Asphalt-Saturated Rag Felts Two 50-lb. Asphalt-Saturated Slatekote Felts	A-5	—	—	149	150	—	—	—	—	299	—	—	C
4 to 9	10	401	Crushed Slate △	One 15-lb. Asphalt-Saturated Rag Felts Two 50-lb. Asphalt-Saturated Slatekote Felts	A-3	—	—	116	90	—	—	—	—	206	—	—	C

△ Complete specification not included in this catalog but furnished on request.
* Class A Underwriters' rating on pitches up to and including 3" per foot.
† ¼" to 2" over Poured Gypsum Decks; ¼" to 1" over Book Tile or Poured or Precast Concrete Decks.
‡ 2" to 6" over Poured Gypsum Decks; 1" to 6" over Poured Concrete Decks.
§ Bond term on application.

** Available, also, employing rag felt instead of asbestos felt. See note appended to the specification.

Note: No roof bonds are issued on the Pacific Coast.

October, 1938

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Index and Condensed Specifications

Pitch of Roof per Foot, in Inches	Bond, Years (See Note)	J-M Specification Number	Surface	Number of Plies and Kind of Felt	Number of Moppings Asphalt [A] or Pitch [P]	Weight of Materials, in Pounds per Square: Sheathing Paper	Felts: Asbestos	Felts: Rag	Asphalt	Pitch	Roof Coating	Gravel	Slag	Total Weight per Square, in Pounds: Smooth Surface or Crushed Slate	Gravel Surface	Slag Surface	Underwriters' Rating
WITH INSULATION																	
APPLICATION OF INSULATION																	
		500	Application of J-M Roofinsul Over Wood Decks														
		501	Application of J-M Roofinsul Over Non-Combustible Decks														
		502	Application of J-M Roofinsul Over Steel Decks														
WOOD or PRE-CAST GYPSUM DECK																	
Smooth Surface																	
¼ to 9	20	104	Smooth	Four 20-lb. Asphalt-Saturated Asbestos Felts	A-4	—	80	—	120	—	8	—	—	208	—	—	A
¼ to 9	15	106	Smooth	Three 20-lb. Asphalt-Saturated Asbestos Felts	A-3	—	60	—	90	—	8	—	—	158	—	—	B
Gravel or Slag Surface																	
¼ to 2	20	302	Gravel or Slag	Four 15-lb. Asphalt-Saturated Rag Felts	A-5	—	—	65	175	—	—	400	300	—	640	540	A
¼ to 2	15	305	Gravel or Slag	Three 15-lb. Asphalt-Saturated Rag Felts	A-4	—	—	49	145	—	—	400	300	—	594	494	A
2 to 4	10	303	Slag	Four 15-lb. Asphalt-Saturated Rag Felts	A-5	—	—	65	165	—	—	—	250	—	—	480	A*
¼ to 2	20	606	Gravel or Slag **	One Ply Rosin-Sized Paper (over wood only) Four 15-lb. Tar-Saturated Asbestos Felts	P-5	5	65	—	—	175	—	400	300	—	645	545	A
¼ to 2	15	608	Gravel or Slag **	One Ply Rosin-Sized Paper (over wood only) Three 15-lb. Tar-Saturated Asbestos Felts	P-4	5	49	—	—	150	—	400	300	—	604	504	B
2 to 6	10	610	Slag **	One Ply Rosin-Sized Paper (over wood only) Four 15-lb. Tar-Saturated Asbestos Felts	P-3 A-1	5	65	—	45	105	—	—	250	—	—	470	A*
NON-COMBUSTIBLE DECK (except Pre-cast Gypsum or Steel)																	
Smooth Surface																	
¼ to 9	20	105	Smooth	Four 20-lb. Asphalt-Saturated Asbestos Felts	A-4	—	80	—	120	—	8	—	—	208	—	—	A
¼ to 9	15	107	Smooth	Three 20-lb. Asphalt-Saturated Asbestos Felts	A-3	—	60	—	90	—	8	—	—	158	—	—	A
Gravel or Slag Surface																	
¼ to 2	20	302	Gravel or Slag	Four 15-lb. Asphalt-Saturated Rag Felts	A-5	—	—	65	175	—	—	400	300	—	640	540	A
¼ to 2	15	305	Gravel or Slag	Three 15-lb. Asphalt-Saturated Rag Felts	A-4	—	—	49	145	—	—	400	300	—	594	494	A
2 to 4	10	303	Slag	Four 15-lb. Asphalt-Saturated Rag Felts	A-5	—	—	65	165	—	—	—	250	—	—	480	A*
¼ to 2□	20	607	Gravel or Slag **	Four 15-lb. Tar-Saturated Asbestos Felts	P-5	—	65	—	—	175	—	400	300	—	640	540	A
¼ to 2□	15	609	Gravel or Slag **	Three 15-lb. Tar-Saturated Asbestos Felts	P-4	—	49	—	—	150	—	400	300	—	599	499	A
2 to 6‡	10	611	Slag **	Four 15-lb. Tar-Saturated Asbestos Felts	P-3 A-1	—	65	—	45	94	—	—	250	—	—	454	A*
STEEL DECK																	
Smooth Surface																	
½ to 9	20	108	Smooth	Four 20-lb. Asphalt-Saturated Asbestos Felts	A-4	—	80	—	120	—	8	—	—	208	—	—	A
½ to 9	15	109	Smooth	Three 20-lb. Asphalt-Saturated Asbestos Felts	A-3	—	60	—	90	—	8	—	—	158	—	—	—
Gravel or Slag Surface																	
¼ to 2	20	302	Gravel or Slag	Four 15-lb. Asphalt-Saturated Rag Felts	A-5	—	—	65	175	—	—	400	300	—	640	540	A
¼ to 2	15	305	Gravel or Slag	Three 15-lb. Asphalt-Saturated Rag Felts	A-4	—	—	49	145	—	—	400	300	—	594	494	A
¼ to 2□	20	607	Gravel or Slag **	Four 15-lb. Tar-Saturated Asbestos Felts	P-5	—	65	—	—	175	—	400	300	—	640	540	A
¼ to 2□	15	609	Gravel or Slag **	Three 15-lb. Tar-Saturated Asbestos Felts	P-4	—	49	—	—	150	—	400	300	—	599	499	A

* Class A Underwriters' rating on pitches up to and including 3" per foot.
□ ¼" to 2" over Poured Gypsum Decks; ¼" to 1" over Poured Concrete Decks.
‡ 2" to 6" over Poured Gypsum Decks; 1" to 6" over Poured Concrete Decks.

** Available, also, employing rag felt instead of asbestos felt. See note appended to the specification.

Note: No roof bonds are issued on the Pacific Coast

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SPECIFICATION No. 100

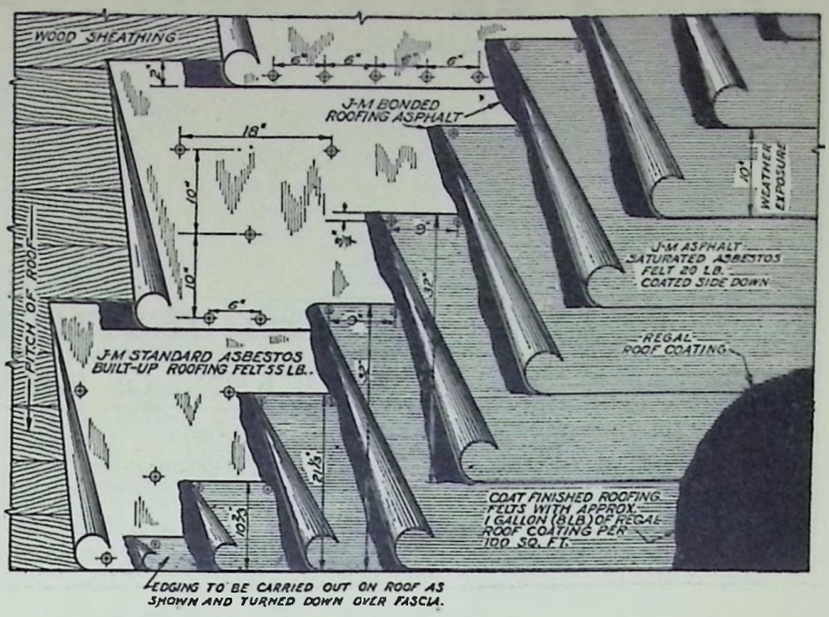
J-M 20-YEAR ROOF OVER WOOD DECKS

Surface: SMOOTH

Felts: ASBESTOS

Waterproofing: ASPHALT

Inclines: ¼ in. to 9 inches per foot



BILL OF MATERIALS PER 100 SQ. FT.

BASE FELT: 1 layer of J-M Standard Asbestos Built-up Roofing Felt.	55 lb.
FINISHING FELTS: 3 layers of J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt	60 lb.
ASPHALT: J-M Bonded Roofing Asphalt	90 lb.
ROOF COATING: J-M Regal Roof Coating (Black) (8 lb. per gal.)	1 gal.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—If the pitch of the roof is 3" to the foot or less, the 55-lb. asbestos felt may be laid either paralleling, or at right angles to, the pitch. The 20-lb. asbestos felts shall be laid at right angles to the pitch. If the pitch of the roof is over 3" to the foot, all felts shall be laid parallel to the pitch. All felts shall be turned up 2" on all vertical surfaces without being cemented thereto. All nails shall be driven through flat metal disks.

Roofing—Lay one thickness of the 55-lb. asbestos felt, lapping the sheets 2", sealing the laps with the asphalt and nailing at 6" centers through the laps and at 18" centers through the longitudinal center of each sheet, in two lines spaced 10" apart, the nails to be staggered.

Over the 55-lb. asbestos felt, lay three plies of the 20-lb. asbestos felt, with the coated side down, lapping each sheet 22" over the preceding one, mopping the full width under each with the asphalt and nailing at 9" centers adjacent to the back edge.

Coat the entire surface with the roof coating.

Flashing—*(Copy from J-M Standard Specification for Flashing)*

(If a bond is required, add the following:)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Twenty-Year Guaranty Bond.

SPECIFICATION No. 103

J-M 15-YEAR ROOF OVER WOOD DECKS

Surface: SMOOTH Waterproofing: ASPHALT

Felts: ASBESTOS Inclines: ¼ in. to 9 in. per ft.

BILL OF MATERIALS PER 100 SQ. FT.

BASE FELT: 1 layer of J-M Standard Asbestos Built-up Roofing Felt	55 lb.
FINISHING FELTS: 2 layers of J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt	40 lb.
ASPHALT: J-M Bonded Roofing Asphalt	60 lb.
ROOF COATING: J-M Regal Roof Coating (Black) (8 lb. per gal.)	1 gal.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—If the pitch of the roof is 3" to the foot or less, the 55-lb. asbestos felt may be laid either paralleling, or at right angles to, the pitch. The 20-lb. asbestos felts shall be laid at right angles to the pitch. If the pitch of the roof is over 3" to the foot all felts shall be laid parallel to the pitch. All felts shall be turned up 2" on all vertical surfaces without being cemented thereto. All nails shall be driven through flat metal disks.

Roofing—Lay one thickness of the 55-lb. asbestos felt, lapping the sheets 2", sealing the laps with the asphalt and nailing at 6" centers through the laps and at 18" centers through the longitudinal center of each sheet, in two lines spaced 10" apart, the nails to be staggered.

Over the 55-lb. asbestos felt, lay two plies of the 20-lb. asbestos felt, with the coated side down, lapping each sheet 17" over the preceding one, mopping the full width under each with the asphalt and nailing at 9" centers adjacent to the back edge.

Coat the entire surface with the roof coating.

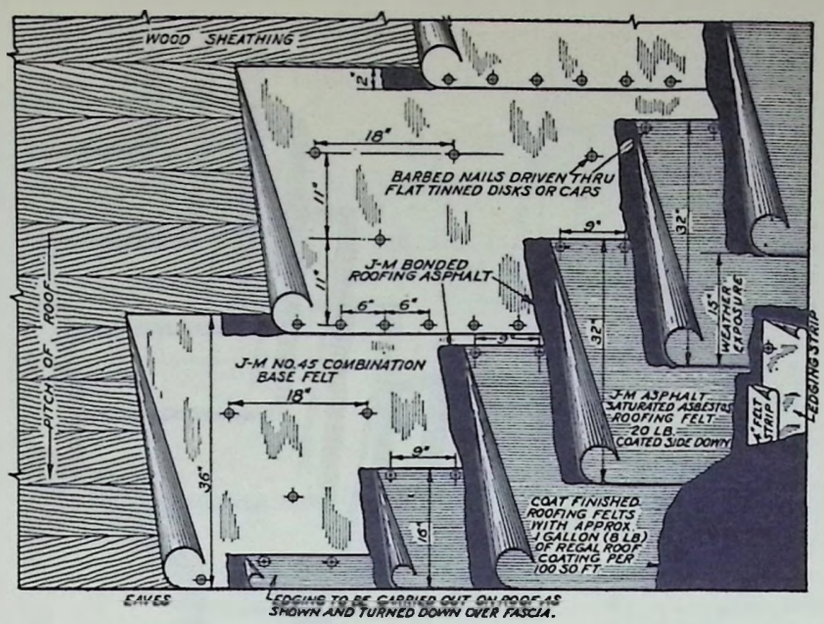
Flashing—*(Copy from J-M Standard Specification for Flashing)*

(If a bond is required, add the following:)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Fifteen-Year Guaranty Bond.

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SPECIFICATION No. 200

J-M 15-YEAR ROOF OVER WOOD DECKS

Surface: SMOOTH

Felts: ASBESTOS and RAG

Waterproofing: ASPHALT

Inclines: ¼ in. to 9 inches per foot

BILL OF MATERIALS PER 100 SQ. FT.

BASE FELT: 1 layer of J-M No. 45 Base Felt (Rag Felt, 50 lbs. per 108 sq. ft.)	50 lb.
FINISHING FELTS: 2 layers of J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt	40 lb.
ASPHALT: J-M Bonded Roofing Asphalt	60 lb.
ROOF COATING: J-M Regal Roof Coating (Black) (8 lb. per gal.)	1 gal.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—If the pitch of the roof is 3" to the foot or less, the 50-lb. rag felt may be laid either paralleling, or at right angles to, the pitch. The 20-lb. asbestos felts shall be laid at right angles to the pitch. If the pitch of the roof is over 3" to the foot, all felts shall be laid parallel to the pitch. All felts shall be turned up 2" on all vertical surfaces without being cemented thereto. All nails shall be driven through flat metal disks.

Roofing—Lay one thickness of the 50-lb. rag felt, lapping the sheets 2", sealing the laps with the asphalt and nailing at 6" centers through the laps and at 18" centers through the longitudinal center of each sheet in two lines spaced 11" apart, the nails to be staggered.

Over the 50-lb. rag felt, lay two plies of the 20-lb. asbestos felt, with the coated side down, lapping each sheet 17" over the preceding one, mopping the full width under each with the asphalt and nailing at 9" centers adjacent to the back edge.

Coat the entire surface with the roof coating.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Fifteen-Year Guaranty Bond.

SPECIFICATION No. 202

J-M 10-YEAR ROOF OVER WOOD DECKS

Surface: SMOOTH **Felts: ASBESTOS and RAG**

Waterproofing: ASPHALT

Inclines: ¼ in. to 9 inches per foot

BILL OF MATERIALS PER 100 SQ. FT.

BASE FELT: 1 layer of J-M No. 30 Combination Base Felt (Rag Felt, 33½ lbs. per 108 sq. ft.)	33½ lb.
FINISHING FELTS: 2 layers of J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt	40 lb.
ASPHALT: J-M Bonded Roofing Asphalt	60 lb.
ROOF COATING: J-M Regal Roof Coating (Black) (8 lb. per gal.)	1 gal.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—If the pitch of the roof is 3" to the foot or less, the 33½-lb. rag felt may be laid either paralleling, or at right angles to, the pitch. The 20-lb. asbestos felts shall be laid at right angles to the pitch. If the pitch of the roof is over 3" to the foot, all felts shall be laid parallel to the pitch. All felts shall be turned up 2" on all vertical surfaces without being cemented thereto. All nails shall be driven through flat metal disks.

Roofing—Lay one thickness of the 33½-lb. rag felt, lapping the sheets 2", sealing the laps with the asphalt and nailing at 6" centers through the laps and at 18" centers through the longitudinal center of each sheet in two lines spaced 11" apart, the nails to be staggered.

Over the 33½-lb. rag felt, lay two plies of the 20-lb. asbestos felt, with the coated side down, lapping each sheet 17" over the preceding one, mopping the full width under each with the asphalt and nailing at 9" centers adjacent to the back edge.

Coat the entire surface with the roof coating.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Ten-Year Guaranty Bond.

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SPECIFICATION No. 300

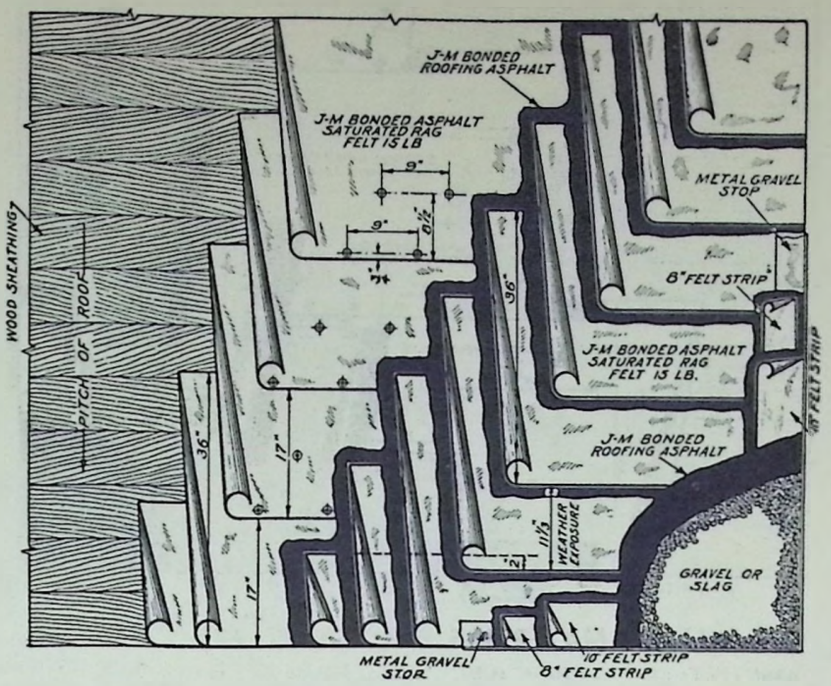
J-M 20-YEAR ROOF OVER WOOD OR PRE-CAST GYPSUM DECKS

Surface: SLAG or GRAVEL

Felts: RAG

Waterproofing: ASPHALT

Inclines: ¼ in. to 2 inches per foot



BILL OF MATERIALS PER 100 SQ. FT.

FELTS: 5 layers of J-M 15-lb. Bonded Asphalt-Saturated Rag Felt (16¼ lb. per 108 sq. ft.)	81 lb.
ASPHALT: J-M Bonded Roofing Asphalt	145 lb.
SURFACING: Gravel	400 lb.
or Slag	300 lb.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—All roofing felts shall be turned up 2" on all vertical surfaces without cementing thereto. All nails shall be driven through flat metal disks.

Roofing—Lay two plies of the 15-lb. rag felt, lapping each sheet 19" over the preceding one and nailing through the laps in two lines spaced 7¾" apart, the first line to adjoin the edge of the sheet, the nails to be spaced at 9" centers and staggered.

Over these felts lay three additional plies of the 15-lb. rag felt, lapping each sheet 24⅔" over the preceding one, mopping the full width under each with the asphalt.

Over the entire surface pour a uniform coating of the asphalt and embed therein, while hot, not less than 400 lbs. of gravel, or 300 lbs. of slag, for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Twenty-Year Guaranty Bond.

SPECIFICATION No. 304

J-M 15-YEAR ROOF OVER WOOD OR PRE-CAST GYPSUM DECKS

Surface: SLAG or GRAVEL **Felts: RAG**

Waterproofing: ASPHALT

Inclines: ¼ in. to 2 inches per foot

BILL OF MATERIALS PER 100 SQ. FT.

FELTS: 4 layers of J-M 15-lb. Bonded Asphalt-Saturated Rag Felt (16¼ lb. per 108 sq. ft.)	65 lb.
ASPHALT: J-M Bonded Roofing Asphalt	115 lb.
SURFACING: Gravel	400 lb.
or Slag	300 lb.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—All roofing felts shall be turned up 2" on all vertical surfaces without being cemented thereto. All nails shall be driven through flat metal disks.

Roofing—Lay two plies of the 15-lb. rag felt, lapping each sheet 19" over the preceding one and nailing through the laps in two lines spaced 7¾" apart, the first line to adjoin the edge of the sheet, the nails to be spaced at 9" centers and staggered.

Over these felts lay two additional plies of the 15-lb. rag felt, lapping each sheet 19" over the preceding one, mopping the full width under each with the asphalt.

Over the entire surface pour a uniform coating of the asphalt and embed therein, while hot, not less than 400 lbs. of gravel, or 300 lbs. of slag, for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Fifteen-Year Guaranty Bond.

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SPECIFICATION No. 301

J-M 10-YEAR ROOF OVER WOOD OR PRE-CAST GYPSUM DECKS

Surface: SLAG **Waterproofing: ASPHALT**

Felts: RAG **Inclines: 2 in. to 4 in. per ft.**

BILL OF MATERIALS PER 100 SQ. FT.

FELTS: 5 layers of J-M 15-lb. Bonded Asphalt-Saturated Rag Felt (16¼ lb. per 108 sq. ft.)	81 lb.
ASPHALT: J-M Bonded Roofing Asphalt	150 lb.
SURFACING: Slag	250 lb.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—All roofing felts shall be turned up 2″ on all vertical surfaces without being cemented thereto. All nails shall be driven through flat metal disks.

Roofing—Lay five plies of the 15-lb. rag felt, lapping each sheet 29 1/5″ over the preceding one, mopping between plies with the asphalt to within 4″ of the back edge of the underlying felt and nailing at 12″ centers, 10″ from the back edge.

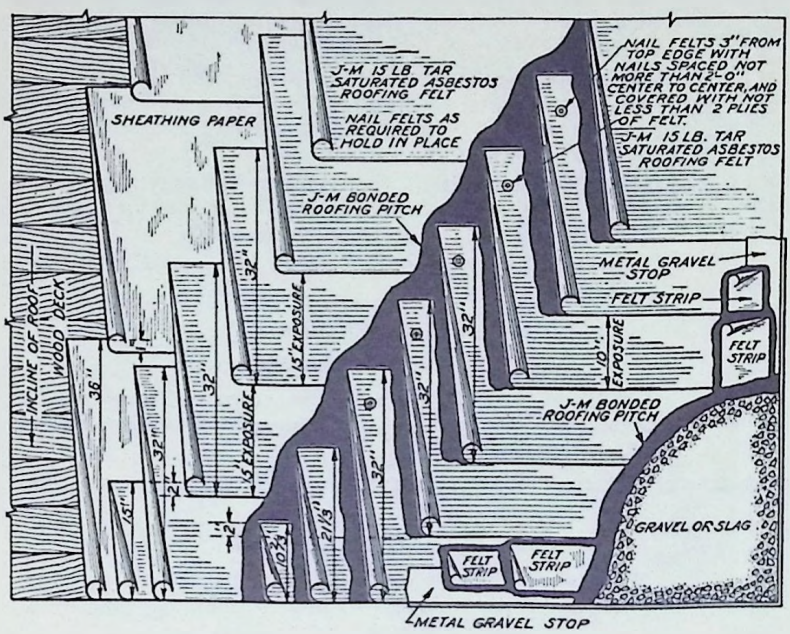
Over the entire surface pour a uniform coating of the asphalt and embed therein, while hot, not less than 250 lbs. of slag for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Ten-Year Guaranty Bond.



BILL OF MATERIALS PER 100 SQ. FT.

SHEATHING PAPER (used on wood deck only): 1 layer (5 lb. per 100 sq. ft.)	5 lb.
***FELTS:** 5 layers of J-M 15-lb. Tar-Saturated Asbestos Felt (16¼ lb. per 108 sq. ft.)	81 lb.
PITCH: J-M Bonded Roofing Pitch	150 lb.
SURFACING: Gravel	400 lb.
or Slag	300 lb.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—All roofing felts shall be turned up 2″ on all vertical masonry surfaces and 4″ on all vertical wood surfaces without being cemented thereto. All nails shall be driven through flat metal disks.

SPECIFICATION No. 600*

J-M 20-YEAR ROOF OVER WOOD OR PRE-CAST GYPSUM DECKS

Surface: SLAG or GRAVEL

Felts: ASBESTOS

Waterproofing: PITCH (TAR)

Inclines: ¼ in. to 2 inches per foot

*A built-up roof of this same construction is available, differing only in the use of "rag" instead of "asbestos" felt. To specify, make following changes:

SPECIFICATION NO. 700

Felts: (*Change name of felt to* "J-M 15-lb. Bonded Tar-Saturated Rag Felt.")

Roofing—If application is over wood sheathing, lay one thickness of sheathing paper, lapping the sheets not less than 1″.

Lay two plies of the 15-lb. tar-saturated roofing felt, lapping each sheet 17″ over the preceding one and nailing sufficiently to hold in place.

Over these felts lay three additional plies of the 15-lb. tar-saturated roofing felt, lapping each sheet 22″ over the preceding one, mopping the full width under each with the pitch and nailing at 24″ centers, 3″ from the back edge.

Over the entire surface pour a uniform coating of the pitch and embed therein, while hot, not less than 400 lbs. of gravel, or 300 lbs. of slag, for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Twenty-Year Guaranty Bond.

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SPECIFICATION No. 604*

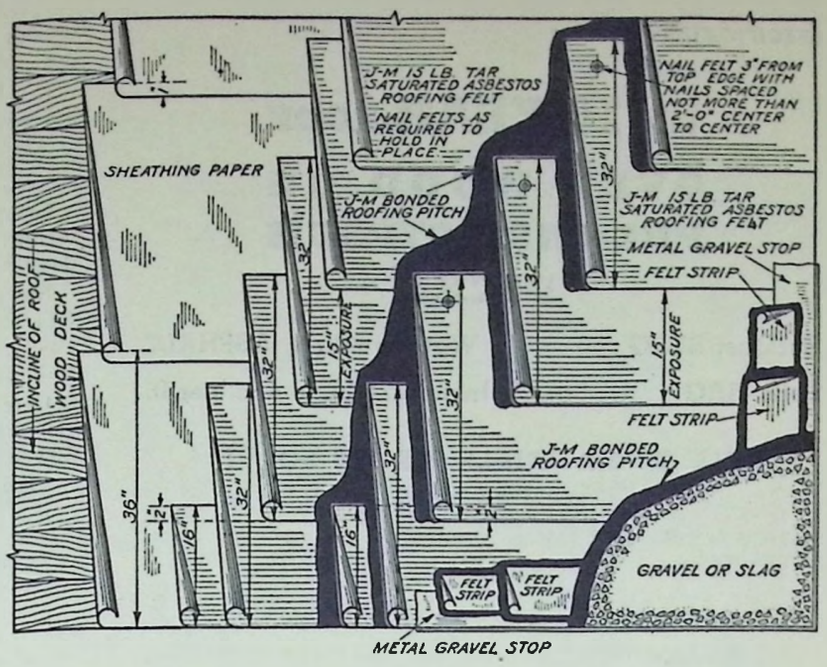
J-M 15-YEAR ROOF OVER WOOD OR PRE-CAST GYPSUM DECKS

Surface: SLAG or GRAVEL
Felts: ASBESTOS
Waterproofing: PITCH (TAR)
Inclines: ¼ in. to 2 inches per foot

*A built-up roof of this same construction is available, differing only in the use of "rag" instead of "asbestos" felt. To specify, make following changes:

SPECIFICATION NO. 704

FELTS: (*Change name of felt to* "J-M 15-lb. Bonded Tar-Saturated Rag Felt.")



BILL OF MATERIALS PER 100 SQ. FT.

SHEATHING PAPER (used on wood deck only): 1 layer (5 lb. per 100 sq. ft.)	5 lb.
***FELTS:** 4 layers of J-M 15-lb. Tar-Saturated Asbestos Felt (16¼ lb. per 108 sq. ft.)	65 lb.
PITCH: J-M Bonded Roofing Pitch	125 lb.
SURFACING: Gravel	400 lb.
or Slag	300 lb.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—All roofing felts shall be turned up 2" on all vertical masonry surfaces and 4" on all vertical wood surfaces without being cemented thereto. All nails shall be driven through flat metal disks.

Roofing—If application is over wood sheathing, lay one thickness of sheathing paper, lapping the sheets not less than 1".

Lay two plies of the 15-lb. tar-saturated roofing felt, lapping each sheet 17" over the preceding one and nailing sufficiently to hold in place.

Over these felts lay two additional plies of the 15-lb. tar-saturated roofing felt, lapping each sheet 17" over the preceding one, mopping the full width under each with the pitch and nailing at 24" centers, 3" from the back edge.

Over the entire surface pour a uniform coating of the pitch and embed therein, while hot, not less than 400 lbs. of gravel, or 300 lbs. of slag, for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Fifteen-Year Guaranty Bond.

SPECIFICATION No. 601*

J-M 10-YEAR ROOF OVER WOOD OR PRE-CAST GYPSUM DECKS

Surface: SLAG **Waterproofing: PITCH (TAR)**
Felts: ASBESTOS **Inclines: 2 in. to 6 in. per ft.**

BILL OF MATERIALS PER 100 SQ. FT.

SHEATHING PAPER (used on wood deck only): 1 layer (5 lb. per 100 sq. ft.)	5 lb.
***FELTS:** 5 layers of J-M 15-lb. Tar-Saturated Asbestos Felt (16¼ lb. per 108 sq. ft.)	81 lb.
PITCH: J-M Bonded Roofing Pitch (for mopping between felts)	60 lb.
ASPHALT: J-M Bonded Roofing Asphalt (for top surfacing)	45 lb.
SURFACING: Slag	250 lb.

ROOF DECK

(*Copy from Specification No. 604, above.*)

INSTALLATION

General—(*copy from Specification No. 604, above.*)

Roofing—If application is over wood sheathing, lay one thickness of sheathing paper, lapping the sheets not less than 1".

Lay five plies of the 15-lb. tar-saturated roofing felt, lapping each sheet 26" over the preceding one, mopping under each with the pitch to a width of 18" starting 2" from the exposed edge. Nail each sheet at 12" centers, 10" from the back edge.

Over the entire surface pour a uniform coating of the asphalt and embed therein, while hot, not less than 250 lbs. of slag for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

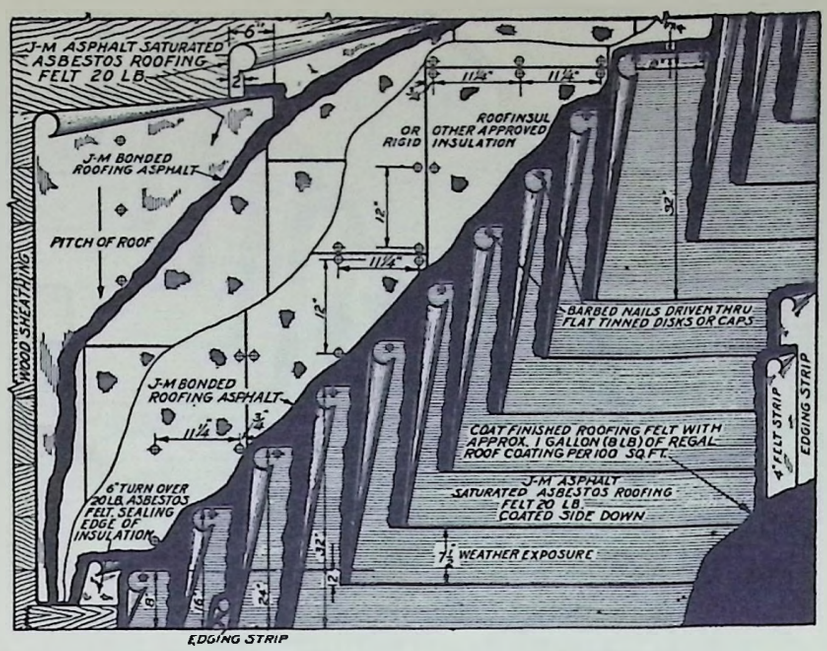
(*Copy from Specification No. 604, above, except change to* "Ten-Year.")

*A built-up roof of this same construction is available, differing only in the use of "rag" instead of "asbestos" felt. To specify, make following changes:

SPECIFICATION NO. 701

FELTS: (*Change name of felt to* "J-M 15-lb. Bonded Tar-Saturated Rag Felt.")

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SPECIFICATION No. 104

J-M 20-YEAR ROOF OVER INSULATION ON WOOD DECKS

Surface: SMOOTH

Felts: ASBESTOS

Waterproofing: ASPHALT

Insulation: ROOFINSUL

Inclines: ¼ in. to 9 inches per foot

BILL OF MATERIALS PER 100 SQ. FT.

FELTS: 4 layers of J-M 20-lb. Asbestos Asphalt-Saturated Felt.. (An additional ply of 20-lb. Asbestos Felt is specified for application under the insulation, in Specification No. 500. See page 31.)	80 lb.
ASPHALT: J-M Bonded Roofing Asphalt (for mopping between felts)	120 lb.
For mopping insulation over felt	30 lb.
For mopping each additional ply of insulation	30 lb.
INSULATION: J-M Roofinsul (0.8 lb. per sq. ft. ½" thick) For each layer of insulation	100 sq. ft.
ROOF COATING: J-M Regal Roof Coating (Black) (8 lb. per gal.)	1 gal.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—If the pitch of the roof is 3" to the foot or less, the felts shall be laid at right angles to the pitch. If the pitch of the roof is over 3" to the foot, the felts shall be laid parallel to the pitch. The roof felts shall be turned up 2" on all vertical surfaces without being cemented thereto. The felt applied under insulation shall be similarly turned up a distance 6" greater than the thickness of such insulation and shall overhang all roof edges a similar amount. All nails shall be driven through flat metal disks.

Insulation—(*Copy from J-M Standard Specification No. 500*)

Roofing—Lay four plies of the 20-lb. asbestos felt, with the coated side down, lapping each sheet 24½" over the preceding one, mopping the full width under each with the asphalt and, if pitch of roof exceeds 3" to the foot, nailing at 9" centers adjacent to the back edge.

Coat the entire surface with roof coating.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Twenty-Year Guaranty Bond.

SPECIFICATION No. 106

J-M 15-YEAR ROOF OVER INSULATION ON WOOD DECKS

Surface: SMOOTH **Waterproofing: ASPHALT**
Felts: ASBESTOS **Insulation: ROOFINSUL**
Inclines: ¼ in. to 9 inches per foot

BILL OF MATERIALS PER 100 SQ. FT.

FELTS: 3 layers of J-M 20-lb. Asbestos Roofing Felt..... (An additional ply of 20-lb. Asbestos Felt is specified for application under the insulation in Specification No. 500. See page 31.)	60 lb.
ASPHALT: J-M Bonded Roofing Asphalt (for mopping between felts)	90 lb.
For mopping insulation over felt	30 lb.
For mopping each additional ply of insulation	30 lb.
INSULATION: J-M Roofinsul (0.8 lb. per sq. ft. ½" thick) For each layer of insulation	100 sq. ft.
ROOF COATING: J-M Regal Roof Coating (Black) (8 lb. per gal.)	1 gal.

ROOF DECK

(*Copy from Specification No. 104, above.*)

INSTALLATION

General—(*Copy from Specification No. 104, above.*)

Insulation—(*Copy from J-M Standard Specification No. 500, page 31.*)

Roofing—Lay three plies of the 20-lb. asbestos felt, lapping each sheet 22" over the preceding one, mopping the full width under each with the asphalt and, if pitch of roof exceeds 3" to the foot, nailing at 9" centers adjacent to the back edge.

Coat the entire surface with the roof coating.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

(*Copy from Specification No. 104, above, except change to "Fifteen-Year".*)

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SPECIFICATION No. 606*

J-M 20-YEAR ROOF OVER INSULATION ON WOOD OR PRE-CAST GYPSUM DECKS

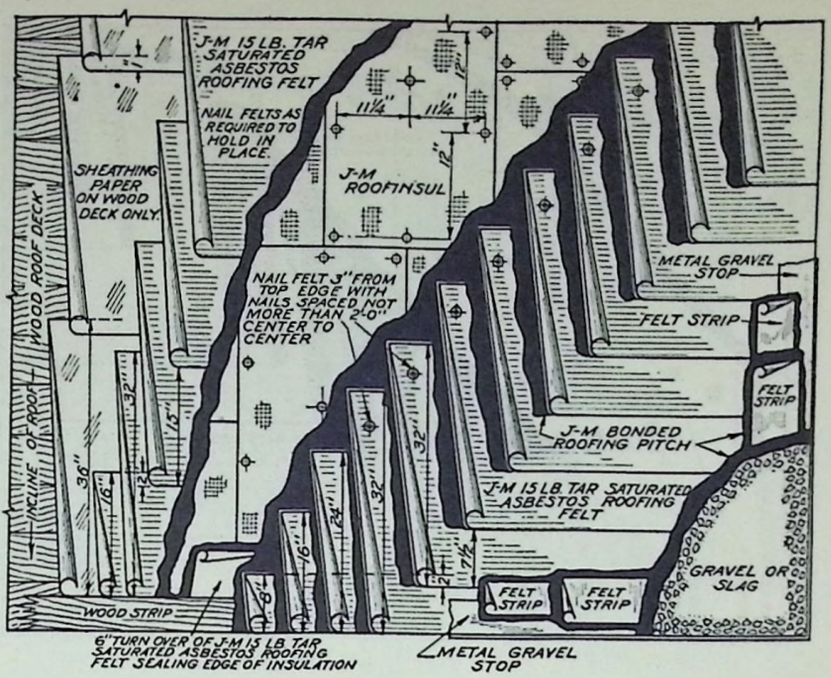
Surface: SLAG or GRAVEL

Felts: ASBESTOS

Waterproofing: PITCH (TAR)

Insulation: ROOFINSUL

Inclines: ¼ in. to 2 inches per foot



BILL OF MATERIALS PER 100 SQ. FT.

SHEATHING PAPER (used over wood deck only): 1 layer (5 lb. per 100 sq. ft.)	5 lb.
***FELTS: (Under Insulation)** 2 layers of J-M 15-lb. Tar-Saturated Asbestos Roofing Felt (16¼ lb. per 108 sq. ft.)	32½ lb.
***FELTS: (For Built-Up Roof)** 4 layers of J-M 15-lb. Tar-Saturated Asbestos Roofing Felt (16¼ lb. per 108 sq. ft.)	65 lb.
PITCH: J-M Bonded Roofing Pitch (for mopping between felts)	175 lb.
For mopping insulation over felt	30 lb.
For mopping each additional ply of insulation	30 lb.
INSULATION: J-M Roofinsul (0.8 lb. per sq. ft. ½" thick) For each layer of insulation	100 sq. ft.
SURFACING: Gravel	400 lb.
or Slag	300 lb.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in a satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—All felts applied over the insulation shall be turned up 2" on all vertical masonry surfaces and 4" on all vertical wood surfaces without being cemented thereto. All nails shall be driven through flat metal disks.

Felts Under Insulation—If application is over wood sheathing, lay one thickness of sheathing paper, lapping the sheets not less than 1".

Lay two plies of the 15-lb. tar-saturated felt, lapping each sheet 17" over the preceding one and nailing sufficiently to hold in place. These felts shall be turned up on, but not cemented to, all vertical surfaces to a height 6" greater than the thickness of the insulation and shall overhang all roof edges a similar amount.

Insulation—Lay the Roofinsul with the rough side down and with all end joints broken, mopping the full width under each sheet with the pitch. The edges of the sheets at the joints shall be thoroughly sealed with the pitch. The insulation shall be isolated into areas approximately 30' 0" square by path-strippings of one ply of the 15-lb. tar-saturated roofing felt, mopped the full width with the pitch, to extend not less than 4" over the edge of the insulation in place and not less than 4" under the adjoining insulation to be laid. Nail each sheet of the insulation at 12" centers adjacent to the longitudinal edges and staggered through the longitudinal center.

If the insulation is to be applied in more than one layer, succeeding layers shall be applied in the same manner as the first layer (*unless high humidity and condensation conditions do not exist, in which event the moppings between layers may be omitted*), the sheets of each layer to break joints with those of the preceding layer, wih all nailing done through the top layer.

The upturned felt at vertical surfaces and roof edges shall be turned down and mopped solidly to the insulation.

Insulation shall not be left exposed to the weather. No more insulation shall be laid down than can be completely covered with the roofing felts on the same day. At the end of the day's work, roofing felts shall be turned down over the exposed edges of the insulation and mopped solidly.

Roofing—Lay four plies of the 15-lb. tar-saturated roofing felt, lapping each sheet 24½" over the preceding one, mopping the full width under each with the pitch and nailing at 24" centers, 3" from the back edge.

Over the entire surface pour a uniform coating of the pitch and embed therein, while hot, not less than 400 lbs. of gravel, or 300 lbs. of slag, for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Twenty-Year Guaranty Bond.

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*A built-up roof of this same construction is available, differing only in the use of "rag" instead of "asbestos" felt. To specify, make following changes:

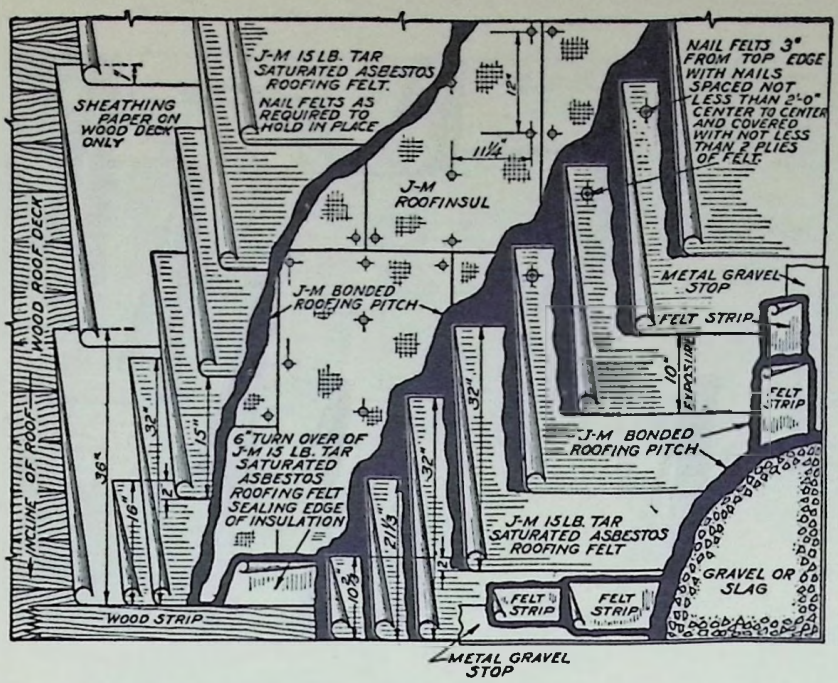
SPECIFICATION NO. 706

FELTS: (*Change name of felt to* "J-M 15-lb. Bonded Tar-Saturated Rag Felt.")

Built-up Roofing 10-14-38

October, 1938

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SPECIFICATION No. 608*

J-M 15-YEAR ROOF OVER INSULATION ON WOOD OR PRE-CAST GYPSUM DECKS

Surface: SLAG or GRAVEL

Felts: ASBESTOS

Waterproofing: PITCH (TAR)

Insulation: ROOFINSUL

Inclines: ¼ in. to 2 inches per foot

BILL OF MATERIALS PER 100 SQ. FT.

SHEATHING PAPER (used over wood deck only): 1 layer (5 lb. per 108 sq. ft.)	5 lb.
***FELTS: (Under Insulation)** 2 layers of J-M 15-lb. Tar-Saturated Asbestos Roofing Felt (16¼ lb. per 108 sq. ft.)	32½ lb.
***FELTS: (For Built-Up Roof)** 3 layers of J-M 15-lb. Tar-Saturated Asbestos Roofing Felt (16¼ lb. per 108 sq. ft.)	49 lb.
PITCH: J-M Bonded Roofing Pitch (for mopping between felts)	150 lb.
For mopping insulation over felt	30 lb.
For mopping each additional ply of insulation	30 lb.
INSULATION: J-M Roofinsul (0.8 lb. per sq. ft. ½" thick) For each layer of insulation	100 sq. ft.
SURFACING: Gravel	400 lb.
or Slag	300 lb.

ROOF DECK

(*Copy from Specification No. 606, opposite.*)

INSTALLATION

General—(*Copy from Specification No. 606, opposite.*)

Felts Under Insulation—(*Copy from Specification No. 606, opposite.*)

Insulation—(*Copy from Specification No. 606, opposite.*)

Roofing—Lay three plies of the 15-lb. tar-saturated roofing felt, lapping each sheet 22" over the preceding one, mopping the full width under each with the pitch and nailing at 24" centers, 3" from the back edge.

Over the entire surface pour a uniform coating of the pitch and embed therein, while hot, not less than 400 lbs. of gravel, or 300 lbs. of slag, for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

(*Copy from Specification No. 606, opposite, except change to* "Fifteen-Year.")

*A built-up roof of this same construction is available, differing only in the use of "rag" instead of "asbestos" felt. To specify, make following changes:

SPECIFICATION NO. 708

FELTS: (*Change name of felt to* "J-M 15-lb. Bonded Tar-Saturated Rag Felt.")

SPECIFICATION No. 610*

J-M 10-YEAR ROOF OVER INSULATION ON WOOD OR PRE-CAST GYPSUM DECKS

Surface: SLAG **Waterproofing: PITCH (TAR)**

Felts: ASBESTOS **Insulation: ROOFINSUL**

Inclines: 2 in. to 6 inches per foot

BILL OF MATERIALS PER 100 SQ. FT.

SHEATHING PAPER (used over wood deck only): 1 layer (5 lb. per 108 sq. ft.)	5 lb.
***FELTS: (Under Insulation)** 2 layers of J-M 15-lb. Tar-Saturated Asbestos Roofing Felt (16¼ lb. per 108 sq. ft.)	32½ lb.
***FELTS: (For Built-Up Roofs)** 4 layers of J-M 15-lb. Tar-Saturated Asbestos Roofing Felt (16¼ lb. per 108 sq. ft.)	65 lb.
PITCH: J-M Bonded Roofing Pitch (for mopping between felts)	105 lb.
For mopping insulation over felt	30 lb.
For mopping each additional ply of insulation	30 lb.
ASPHALT: J-M Bonded Roofing Asphalt (for top surfacing)	45 lb.
INSULATION: J-M Roofinsul (0.8 lb. per sq. ft. ½" thick) For each layer of insulation	100 sq. ft.
SURFACING: Slag	250 lb.

ROOF DECK

(*Copy from Specification No. 606, opposite.*)

INSTALLATION

General—(*Copy from Specification No. 606, opposite.*)

Felts Under Insulation—(*Copy from Specification No. 606, opposite.*)

Insulation—(*Copy from Specification No. 606, opposite.*)

Roofing—Lay four plies of the 15-lb. tar-saturated felt, lapping each sheet 24½" over the preceding one, mopping under each with the pitch to a width of 30" starting 2" from the exposed edge. Nail each sheet at 12" centers, 10" from the back edge.

Over the entire surface pour a uniform coating of the asphalt and embed therein, while hot, not less than 250 lbs. of slag for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

(*Copy from Specification No. 606, opposite, except change to* "Ten-Year".)

*A built-up roof of this same construction is available, differing only in the use of "rag" instead of "asbestos" felt. To specify, make following changes:

SPECIFICATION NO. 710

FELTS: (*Change name of felt to* "J-M 15-lb. Bonded Tar-Saturated Rag Felt.")

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SPECIFICATION No. 101

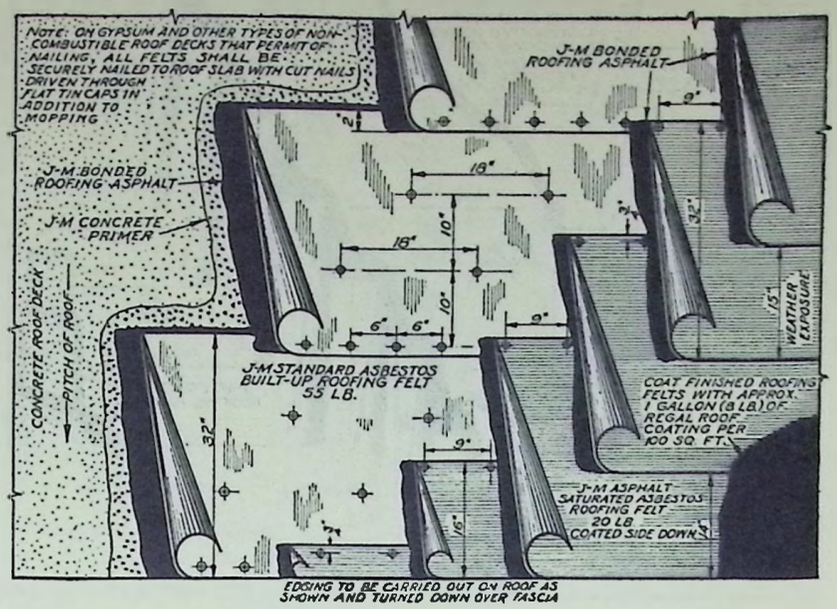
J-M 20-YEAR ROOF OVER NON-COMBUSTIBLE DECKS

Surface: SMOOTH

Felts: ASBESTOS

Waterproofing: ASPHALT

Inclines: ¼ in. to 9 inches per foot



BILL OF MATERIALS PER 100 SQ. FT.

BASE FELT: 1 layer of J-M Standard Asbestos Built-Up Roofing Felt	55 lb.
FINISHING FELTS: 2 layers of J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt	40 lb.
PRIMER: J-M Concrete Primer (8 lb. per gal.):	
Over Concrete	1 gal.
Over Gypsum	1½ to 2 gal.
ASPHALT: J-M Bonded Roofing Asphalt	90 lb.
ROOF COATING: J-M Regal Roof Coating (Black) (8 lb. per gal.)	1 gal.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—If the pitch of the roof is 3" to the foot or less, the 55-lb. asbestos felt may be laid either paralleling, or at right angles to, the pitch. The 20-lb. asbestos felts shall be laid at right angles to the pitch. If the pitch of the roof is over 3" to the foot, all felts shall be laid parallel to the pitch. All felts shall be turned up 2" on all vertical surfaces without being cemented thereto. All nails shall be driven through flat metal disks.

Roofing—Coat all surfaces, which are to receive the roofing, with the primer and allow to dry.

Lay one thickness of the 55-lb. asbestos felt, lapping the sheets 2", mopping the full width under each with the asphalt and, if roof construction permits, nailing at 6" centers through the laps and at 18" centers through the longitudinal center of each sheet in two lines spaced 10" apart, the nails to be staggered.

Over the 55-lb. asbestos felt, lay two plies of the 20-lb. asbestos felt, with the coated side down, lapping each sheet 17" over the preceding one, mopping the full width under each with the asphalt and, if roof construction permits, nailing at 9" centers adjacent to the back edge.

With nailing strips provided as required, nail each sheet of the 55-lb. asbestos felt at 6" centers at each nailing strip. Nail each sheet of the 20-lb. asbestos felt at each nailing strip ¾" from the back edge.

Coat the entire surface with the roof coating.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Twenty-Year Guaranty Bond.

SPECIFICATION No. 201

J-M 15-YEAR ROOF OVER NON-COMBUSTIBLE DECKS

Surface: SMOOTH **Waterproofing: ASPHALT**

Felts: RAG **Inclines: ¼ in. to 9 ins. per ft.**

BILL OF MATERIALS PER 100 SQ. FT.

BASE FELT: 1 layer of J-M No. 45 Base Felt (Rag Felt, 50 lb. per 108 sq. ft.)	50 lb.
FINISHING FELTS: 2 layers of J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt	40 lb.
PRIMER: J-M Concrete Primer (8 lb. per gal.):	
Over Concrete	1 gal.
Over Gypsum	1½ to 2 gal.
ASPHALT: J-M Bonded Roofing Asphalt	90 lb.
ROOF COATING: J-M Regal Roof Coating (Black) (8 lb. per gal.)	1 gal.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—(*Copy from Specification No. 101, above, except change* "55-lb. asbestos felt" *to* "50-lb. rag felt.")

Roofing—(*Copy from Specification No. 101, above, changing* "55-lb. asbestos felt" *to* "50-lb. rag felt," *and changing the spacing of the nails from* 10" *to* 11".)

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Fifteen-Year Guaranty Bond.

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SPECIFICATION No. 203

J-M 10-YEAR ROOF OVER NON-COMBUSTIBLE DECKS

Surface: SMOOTH **Felts: ASBESTOS and RAG**

Waterproofing: ASPHALT

Inclines: ¼ in. to 9 inches per foot

BILL OF MATERIALS PER 100 SQ. FT.

BASE FELT: 1 layer of J-M No. 30 Combination Base Felt) Rag Felt, 33½ lb. per 108 sq. ft.)	33½ lb.
FINISHING FELTS: 2 layers of J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt	40 lb.
PRIMER: J-M Concrete Primer (8 lb. per gal.):	
Over Concrete	1 gal.
Over Gypsum	1½ to 2 gal.
ASPHALT: J-M Bonded Roofing Asphalt	90 lb.
ROOF COATING: J-M Regal Roof Coating (Black) (8 lb. per gal.)	1 gal.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—(*Copy from Specification No. 101, opposite, except change* "55-lb. asbestos felt" *to* "33½-lb. rag felt.")

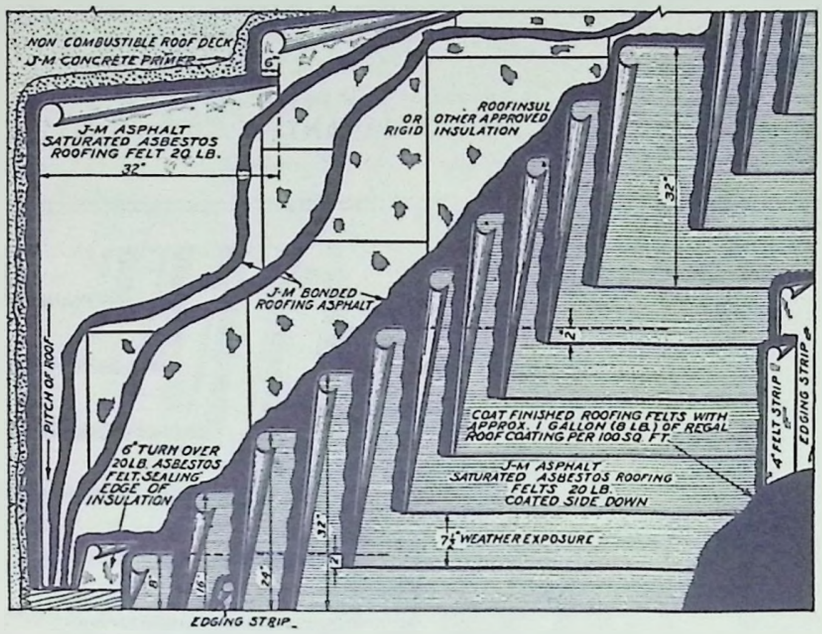
Roofing—(*Copy from Specification No. 101, opposite, changing* "55-lb. asbestos felt" *to* "33½-lb. rag felt," *and changing the spacing of the nails from* 10" *to* 11".)

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(If a bond is required, add the following:)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Ten-Year Bond.



SPECIFICATION No. 105

J-M 20-YEAR ROOF OVER INSULATION ON NON-COMBUSTIBLE DECKS

Surface: SMOOTH

Felts: ASBESTOS

Waterproofing: ASPHALT

Insulation: ROOFINSUL

Inclines: ¼ in. to 9 inches per foot

BILL OF MATERIALS PER 100 SQ. FT.

FELTS: 4 layers of J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt	80 lb.
(An additional ply of 20-lb. Asbestos Felt is specified for application under the insulation, in Specification No. 501. See page 32.)	
ASPHALT: J-M Bonded Roofing Asphalt (for mopping between felts)	120 lb.
For mopping felt to deck	30 lb.
For mopping insulation over felt	30 lb.
For mopping each additional ply of insulation	30 lb.
PRIMER: J-M Concrete Primer (8 lb. per gal.):	
Over Concrete	1 gal.
Over Gypsum	1½ to 2 gal.
INSULATION: J-M Roofinsul (0.8 lb. per sq. ft. ½" thick)	
For each layer of insulation	100 sq. ft.
ROOF COATING: J-M Regal Roof Coating (Black) (8 lb. per gal.)	1 gal.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—If the pitch of the roof is 3" to the foot or less, the felts shall be laid at right angles to the pitch. If the pitch of the roof is over 3" to the foot, the felts shall be laid parallel to the pitch. The roof felts shall be turned up 2" on all vertical surfaces without being cemented thereto. The felt applied under insulation shall be similarly turned up a distance 6" greater than the thickness of such insulation and shall overhang all roof edges a similar amount. All nails shall be driven through flat metal disks.

Insulation—(*Copy from J-M Standard Specification No. 501, page 32.*)

Roofing—Lay four plies of the 20-lb. asbestos felt, with the coated side down, lapping each sheet 24½" over the preceding one, mopping the full width under each with the asphalt or, if job conditions make it desirable to apply the roofing in two operations, lay two plies of the 20-lb. asbestos felt, with the coated side down, lapping each sheet 17" over the preceding one, mopping the full width under each with the asphalt, and over these felts lay two additional plies of the 20-lb. asbestos felt, with the coated side down, lapping each sheet 17" over the preceding one, mopping the full width under each with the asphalt.

If pitch of roof exceeds 3" to the foot, and roof construction permits, each sheet shall be nailed at 9" centers adjacent to the back edge. With nailing strips provided as required, nail each sheet at each nailing strip, all nails to be placed so as to be covered by not less than two plies of felt.

Coat the entire surface with the roof coating.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(If a bond is required, add the following:)

GUARANTEE

(*Copy from Specification No. 101, opposite.*)

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SPECIFICATION No. 107

J-M 15-YEAR ROOF OVER INSULATION ON NON-COMBUSTIBLE DECKS

Surface: SMOOTH **Waterproofing: ASPHALT**
Felts: ASBESTOS **Insulation: ROOFINSUL**
Inclines: ¼ in. to 9 inches per foot

BILL OF MATERIALS PER 100 SQ. FT.

FELTS: 3 layers of J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt	60 lb.
(An additional ply of 20-lb. Asbestos Felt is specified for application under the insulation, in Specification No. 501. See page 32.)	
ASPHALT: J-M Bonded Roofing Asphalt (for mopping between felts)	90 lb.
For mopping felt to deck	30 lb.
For mopping insulation over felt	30 lb.
For mopping each additional ply of insulation	30 lb.
PRIMER: J-M Concrete Primer (8 lb. per gal.):	
Over Concrete	1 gal.
Over Gypsum	1½ to 2 gal.
INSULATION: J-M Roofinsul (0.8 lb. per sq. ft. ½" thick)	
For each layer of insulation	100 sq. ft.
ROOF COATING: J-M Regal Roof Coating (Black) (8 lb. per gal.)	1 gal.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—If the pitch of the roof is 3" to the foot or less, the felts shall be laid at right angles to the pitch. If the pitch of the roof is over 3" to the foot, the felts shall be laid parallel to the pitch. The roof felts shall be turned up 2" on all vertical surfaces without being cemented thereto. The felt applied under insulation shall be similarly turned up a distance 6" greater than the thickness of such insulation and shall overhang all roof edges a similar amount. All nails shall be driven through flat metal disks.

Insulation—(*Copy from J-M Specification No. 501*)

Roofing—Lay three plies of the 20-lb. asbestos felt, with the coated side down, lapping each sheet 22" over the preceding one, mopping the full width under each with the asphalt.

If pitch of roof exceeds 3" to the foot, and roof construction permits, each sheet shall be nailed at 9" centers adjacent to the back edge. With nailing strips provided as required, nail each sheet at each nailing strip, all nails to be so placed as to be covered by not less than two plies of felt.

Coat the entire surface with the roof coating.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(If a bond is required, add the following:)

GUARANTEE

(*Copy from Specification No. 305, opposite.*)

SPECIFICATION No. 302

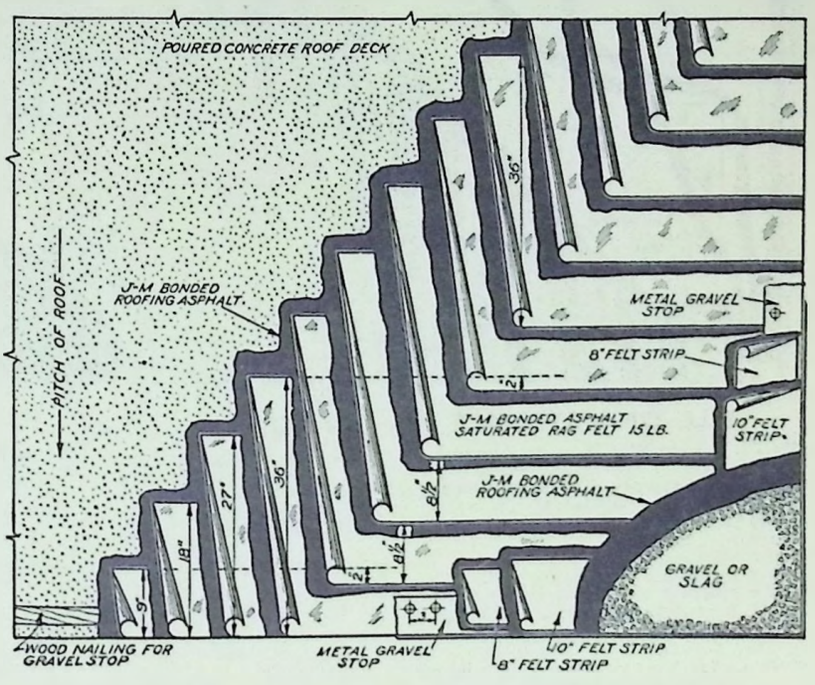
J-M 20-YEAR ROOF OVER BOOK TILE, POURED OR PRECAST CONCRETE OR POURED GYPSUM DECKS

Surface: SLAG or GRAVEL

Felts: RAG

Waterproofing: ASPHALT

Inclines: ¼ in. to 2 inches per foot



BILL OF MATERIALS PER 100 SQ. FT.

FELTS: 4 layers of J-M 15-lb. Bonded Asphalt-Saturated Rag Felt (16¼ lb. per 108 sq. ft.)	65 lb.
PRIMER: J-M Concrete Primer (8 lb. per gal.):	
Over Concrete	1 gal.
Over Gypsum	1½ to 2 gal.
ASPHALT: J-M Bonded Roofing Asphalt	175 lb.
SURFACING: Gravel	400 lb.
or Slag	300 lb.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—All roofing felts shall be turned up 2" on all vertical surfaces without being cemented thereto. All nails shall be driven through flat metal disks.

Roofing—If application is over gypsum, coat all surfaces, which are to receive the roofing, with the primer and allow to dry.

Lay four plies of the 15-lb. rag felt, lapping each sheet 27½" over the preceding one, mopping the full width under each with the asphalt and, if roof construction permits, nailing at 12" centers, 3" from the back edge.

If roof construction is of precast concrete, the asphalt applied to the roof surface shall be omitted for a width of 4" each side of all joints between the slabs.

Over the entire surface pour a uniform coating of the asphalt and

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embed therein, while hot, not less than 400 lbs. of gravel, or 300 lbs. of slag, for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Twenty-Year Guaranty Bond.

SPECIFICATION No. 305

J-M 15-YEAR ROOF OVER BOOK TILE, POURED OR PRECAST CONCRETE OR POURED GYPSUM DECKS

Surface: SLAG and GRAVEL **Felts: RAG**

Waterproofing: ASPHALT

Inclines: ¼ in. to 2 in. per foot

BILL OF MATERIALS PER 100 SQ. FT.

FELTS: 3 layers of J-M 15-lb. Bonded Asphalt-Saturated Rag Felt (16¼ lb. per 108 sq. ft.)	49 lb.
PRIMER: J-M Concrete Primer (8 lb. per gal.):	
Over Concrete	1 gal.
Over Gypsum	1½ to 2 gal.
ASPHALT: J-M Bonded Roofing Asphalt	145 lb.
SURFACING: Gravel	400 lb.
or Slag	300 lb.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General— All roofing felts shall be turned up 2″ on all vertical surfaces without being cemented thereto. All nails shall be driven through flat metal disks.

Roofing—If application is over gypsum, coat all surfaces, which are to receive the roofing, with the primer and allow to dry.

Lay three plies of the 15-lb. rag felt, lapping each sheet 24⅔″ over the preceding one, mopping the full width under each with the asphalt and, if roof construction permits, nailing at 12″ centers, 3″ from the back edge.

If roof construction is of precast concrete, the asphalt applied to the roof surface shall be omitted for a width of 4″ each side of all joints between the slabs.

Over the entire surface pour a uniform coating of the asphalt and embed therein, while hot, not less than 400 lbs. of gravel, or 300 lbs. of slag, for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Fifteen-Year Guaranty Bond.

SPECIFICATION No. 303

J-M 10-YEAR ROOF OVER POURED OR PRECAST CONCRETE OR POURED GYPSUM DECKS

Surface: SLAG **Waterproofing: ASPHALT**

Felts: RAG **Inclines: 2 in. to 4 in. per ft.**

BILL OF MATERIALS PER 100 SQ. FT.

FELTS: 4 layers of J-M 15-lb. Bonded Asphalt-Saturated Rag Felt (16¼ lb. per 108 sq. ft.)	65 lb.
PRIMER: J-M Concrete Primer (8 lbs. per gal.):	
Over Concrete	1 gal.
Over Gypsum	1½ to 2 gal.
ASPHALT: J-M Bonded Roofing Asphalt	165 lb.
SURFACING: Slag	250 lb.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—All roofing felts shall be turned up 2″ on all vertical surfaces without being cemented thereto. All nails shall be driven through flat metal disks.

Roofing—If application is over gypsum, coat all surfaces, which are to receive the roofing, with the primer and allow to dry.

Lay four plies of the 15-lb. rag felt, lapping each sheet 27½″ over the preceding one, mopping the full width under each with the asphalt and, if roof construction permits, nailing at 12″ centers, 3″ from the back edge.

If roof construction is of precast concrete, the asphalt applied to the roof surface shall be omitted for a width of 4″ each side of all joints between the slabs.

With nailing strips provided as required, nail each sheet at each nailing strip with two nails spaced 8″ and 10″ respectively from the back edge.

Over the entire surface pour a uniform coating of the asphalt and embed therein, while hot, not less than 250 lbs. of slag for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Ten-Year Guaranty Bond.

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SPECIFICATION No. 602*

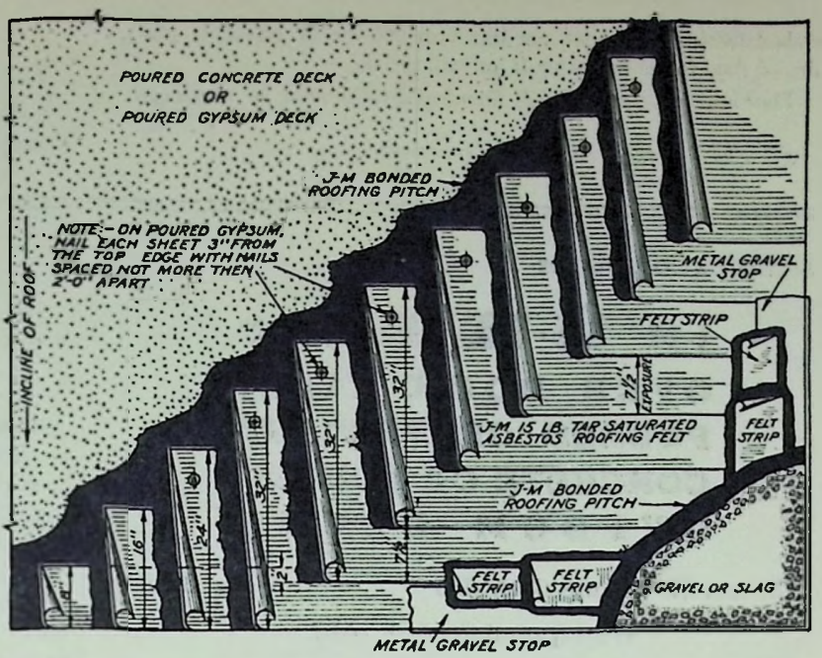
J-M 20-YEAR ROOF OVER BOOK TILE, POURED OR PRECAST CONCRETE DECKS

Inclines: ¼ in. to 1 inch per foot

OVER POURED GYPSUM DECKS

Inclines: ¼ in. to 2 inches per foot

Surface: SLAG or GRAVEL
Felts: ASBESTOS
Waterproofing: PITCH (TAR)



BILL OF MATERIALS PER 100 SQ. FT.

*FELTS: 4 layers of J-M 15-lb. Tar-Saturated Asbestos Roofing Felt (16¼ lb. per 108 sq. ft.)	65 lb.
PITCH: J-M Bonded Roofing Pitch	175 lb.
SURFACING: Gravel	400 lb.
or Slag	300 lb.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—All roofing felts shall be turned up 2" on all vertical surfaces without being cemented thereto. All nails shall be driven through flat metal disks.

Roofing—Lay four plies of the 15-lb. tar-saturated roofing felt, lapping each sheet 24½" over the preceding one, mopping the full width under each with the pitch. If roof construction is of poured gypsum, nail each sheet at 24" centers, 3" from the back edge.

If roof construction is of precast concrete, the pitch applied to the roof surface shall be omitted for a width of 4" each side of all joints between the slabs.

Over the entire surface pour a uniform coating of the pitch and embed therein, while hot, not less than 400 lbs. of gravel, or 300 lbs. of slag, for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(If a bond is required, add the following:)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Twenty-Year Guaranty Bond.

*A built-up roof of this same construction is available, differing only in the use of "rag" instead of "asbestos" felt. To specify, make following changes:

SPECIFICATION NO. 702

Felts: (*Change name of felt to* "J-M 15-lb. Bonded Tar-Saturated Rag Felt.")

SPECIFICATION No. 605*

J-M 15-YEAR ROOF OVER BOOK TILE, POURED OR PRECAST CONCRETE DECKS

Inclines: ¼ in. to 1 inch per foot

OVER POURED GYPSUM DECKS

Inclines: ¼ in. to 2 inches per foot

Surface: SLAG or GRAVEL
Felts: ASBESTOS
Waterproofing: PITCH (TAR)

BILL OF MATERIALS PER 100 SQ. FT.

*FELTS: 3 layers of J-M 15-lb. Tar-Saturated Asbestos Roofing Felt (16¼ lb. per 108 sq. ft.)	49 lb.
PITCH: J-M Bonded Roofing Pitch	150 lb.
SURFACING: Gravel	400 lb.
or Slag	300 lb.

ROOF DECK

(*Copy from Specification No. 602, above.*)

INSTALLATION

General—(*Copy from Specification No. 602, above*).

Roofing—Lay three plies of the 15-lb. tar-saturated roofing felt, lapping each sheet 22" over the preceding one, mopping the full width under each with the pitch. If roof construction is of poured gypsum, nail each sheet at 24" centers, 3" from the back edge.

If roof construction is of precast concrete, the pitch applied to the roof surface shall be omitted for a width of 4" each side of all joints between the slabs.

Over the entire surface pour a uniform coating of the pitch and embed therein, while hot, not less than 400 lbs. of gravel, or 300 lbs. of slag, for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(If a bond is required, add the following:)

GUARANTEE

(*Copy from Specification No. 602, above, except change to* "Fifteen-Year.")

*A built-up roof of this same construction is available, differing only in the use of "rag" instead of "asbestos" felt. To specify, make following changes:

SPECIFICATION NO. 705

Felts: (*Change name of felt to* "J-M 15-lb. Bonded Tar-Saturated Rag Felt.")

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SPECIFICATION No. 603*

J-M 10-YEAR ROOF OVER POURED CONCRETE DECKS

Inclines: 1 in. to 6 inches per foot

OVER POURED GYPSUM DECKS

Inclines: 2 ins. to 6 inches per foot

Surface: SLAG

Felts: ASBESTOS

Waterproofing: PITCH (TAR)

BILL OF MATERIALS PER 100 SQ. FT.

*FELTS: 4 layers of J-M 15-lb. Tar-Saturated Asbestos Roofing Felt (16¼ lb. per 108 sq. ft.)	65 lb.
PITCH: J-M Bonded Roofing Pitch (for mopping between felts)	65 lb.
ASPHALT: J-M Bonded Roofing Asphalt (for top surfacing)	45 lb.
SURFACING: Slag	250 lb.

ROOF DECK

(*Copy from Specification No. 602, opposite.*)

INSTALLATION

General—(*Copy from Specification No. 602, opposite.*)

Roofing—Lay four plies of the 15-lb. tar-saturated roofing felt, lapping each sheet 24½" over the preceding one. These felts shall be cemented to the roof by path-moppings of the pitch, such moppings to be run parallel to the incline, to be not less than 12" nor more than 18" wide, the distance between to be not more than twice the width of such moppings. These felts shall also be cemented to each other continuously by mopping under each with the pitch to a width of 18", starting 2" from the exposed edge. If roof construction permits, nail each sheet at 12" centers, 10" from the back edge .

With nailing strips provided as required, nail each sheet at each nailing strip with two nails spaced 8" and 10" respectively from the back edge.

Over the entire surface pour a uniform coating of the asphalt and embed therein, while hot, not less than 250 lbs. of slag for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

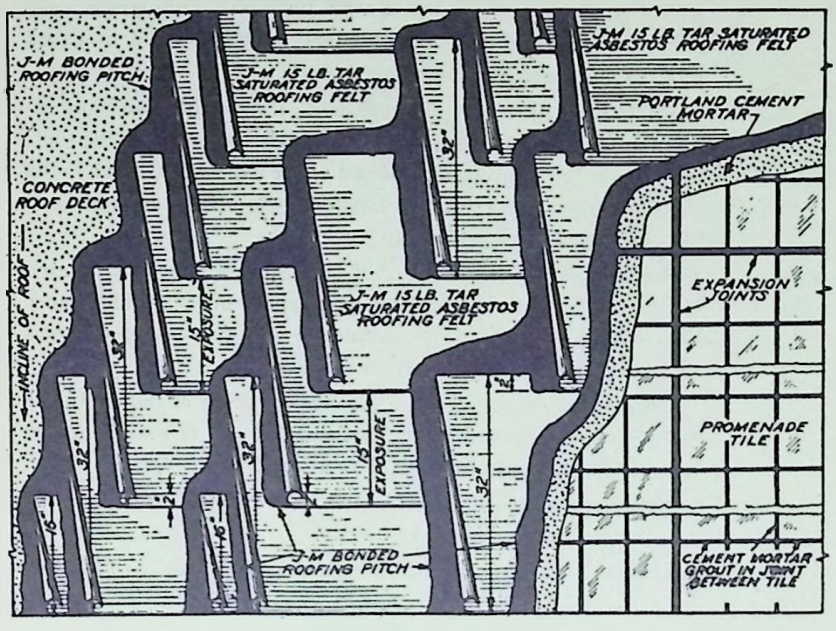
GUARANTEE

(*Copy from Specification No. 602, opposite, except change to* "Ten-Year".)

*A built-up roof of this same construction is available, differing only in the use of "rag" instead of "asbestos" felt. To specify, make following changes:

SPECIFICATION NO. 703

FELTS: (*Change name of felt to* "J-M 15-lb. Bonded Tar-Saturated Rag Felt.")



SPECIFICATION No. 612*

J-M BUILT-UP ROOF UNDER PROMENADE TILE OVER CONCRETE DECKS

Surface: SMOOTH

Felts: ASBESTOS

Waterproofing: PITCH (TAR)

Inclines: ¼ in. to 1 inch per foot

BILL OF MATERIALS PER 100 SQ. FT.

*FELTS: 5 layers of J-M 15-lb. Tar-Saturated Asbestos Roofing Felt (16¼ lb. per 108 sq. ft.)	81 lb.
PITCH: J-M Bonded Roofing Pitch	200 lb.
FLASHING: Copper.	
SURFACING: 6" x 9" x 1" Promenade Tile.	

ROOF DECK

General—(*Copy from Specification No. 602, opposite.*)

INSTALLATION

General—(*Copy from Specification No. 602, opposite.*)

Roofing—Coat the roof deck with bonded pitch and lay two plies of the 15-lb. tar-saturated roofing felt, lapping each sheet 17" over the preceding one and mopping the full width under each with the pitch. Then apply two additional layers of the 15-lb. tar-saturated felts, cementing them to the roof surface and to each other in the same manner as the first two plies, and again coat the entire roof surface with the pitch.

Immediately preceding the laying of the tile, thoroughly clean the roof surface and mop with bonded pitch into which, while hot, embed one additional layer of the 15-lb. tar-saturated felt, lapping each sheet 2" over the previously laid sheet. Then coat the entire surface with bonded pitch.

Promenade Tile—On top of the Built-up Roof, lay the promenade tile in a bedding of portland cement mortar not less than 1" thick, with expansion joints in both directions on 20 ft. centers, and also at all walls, curbs and other vertical surfaces. Expansion joints shall be not less than 1" wide and shall extend through the tile and cement bed to the Built-up Roof, and shall be filled with J-M Expansion Joint Filler, poured while hot. All joints between the tile, other than expansion joints, shall be grouted with portland cement mortar.

(*If a bond is required, consult Johns-Manville.*)

*A built-up roof of this same construction is available, differing only in the use of "rag" instead of "asbestos" felt. To specify, make following changes:

SPECIFICATION NO. 712

FELTS: (*Change name of felt to* "J-M 15-lb. Bonded Tar-Saturated Rag Felt.")

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SPECIFICATION No. 607*

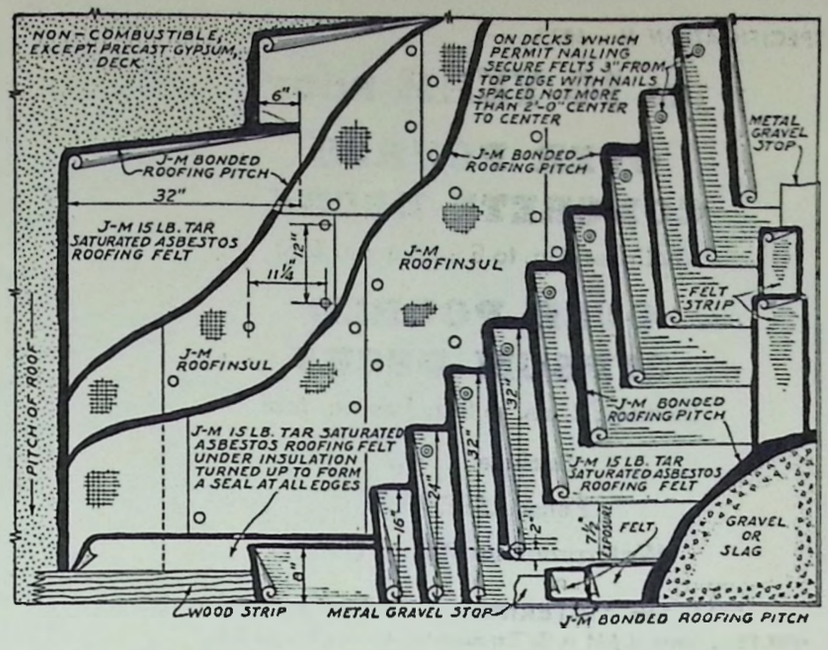
J-M 20-YEAR ROOF OVER INSULATION ON POURED CONCRETE DECKS

Inclines: ¼ in. to 1 inch per foot

ON POURED GYPSUM DECKS

Inclines: ¼ in. to 2 inches per foot

Surface: SLAG or GRAVEL
Felts: ASBESTOS
Waterproofing: PITCH (TAR)
Insulation: ROOFINSUL



BILL OF MATERIALS PER 100 SQ. FT.

*FELTS: (Under Insulation) 1 layer of J-M 15-lb. Tar-Saturated Asbestos Felt (16¼ lb. per 108 sq. ft.)	16¼ lb.
*FELTS: (In Built-Up Roof) 4 layers of J-M 15-lb. Tar-Saturated Asbestos Felt (16¼ lb. per 108 sq. ft.)	65 lb.
PITCH: J-M Bonded Roofing Pitch (for mopping between felts)	175 lb.
For mopping insulation over felt	30 lb.
For mopping each additional ply of insulation	30 lb.
INSULATION: J-M Roofinsul (0.8 lb. per sq. ft. ½" thick) For each layer of insulation	100 sq. ft.
SURFACING: Gravel	400 lb.
or Slag	300 lb.

ROOF DECK

(a) Roof construction, including cants, coves or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—All felts applied over the insulation shall be turned up 2" on all vertical masonry surfaces and 4" on all vertical wood surfaces, without being cemented thereto. All nails shall be driven through flat metal disks.

Felt Under Insulation—Lay one ply of the 15-lb. tar-saturated felt, lapping the sheets 6", mopping the full width under each with the pitch. This felt shall be turned up on, but not cemented to, all vertical surfaces to a height 6" greater than the thickness of the insulation and shall overhang all roof edges a similar amount.

Insulation—Lay the Roofinsul with the rough side down and with all end joints broken, mopping the full width under each sheet with the pitch. The edges of the sheets at the joints shall be thoroughly sealed with the pitch. The insulation shall be isolated into areas approximately 30' 0" square by path-strippings of one ply of the 15-lb. tar-saturated felt, mopped the full width with the pitch, to extend not less than 4" over the edge of the insulation in place and not less than 4" under the adjoining insulation to be laid.

If the roof construction is of poured gypsum, nail each sheet of the insulation at 12" centers, adjacent to the longitudinal edges and staggered through the longitudinal center.

If the insulation is to be applied in more than one layer, succeeding layers shall be applied and cemented in the same manner as the first layer, the sheets of each layer to break joints with those of the preceding layer, with all nailing done through the top layer.

The overhanging felt at roof edges shall be turned over and mopped solidly to the insulation.

Insulation shall not be left exposed to the weather. No more insulation shall be laid than can be completely covered with the roofing felts on the same day. At the end of the day's work, roofing felts shall be turned down over the exposed edges of the insulation and mopped solidly to the insulation.

Roofing—Lay four plies of 15-lb. tar-saturated felt, lapping each sheet 24½" over the preceding one, mopping the full width under each with the pitch. If roof construction is of poured gypsum, nail each sheet at 24" centers, 3" from the back edge.

Over the entire surface pour a uniform coating of the pitch and embed therein, while hot, not less than 400 lbs. of gravel, or 300 lbs. of slag, for each 100 sq. ft. of roof surface.

Not less than 230 lbs. of the pitch shall be used per 100 sq. ft. of completed roof.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Twenty-Year Guaranty Bond.

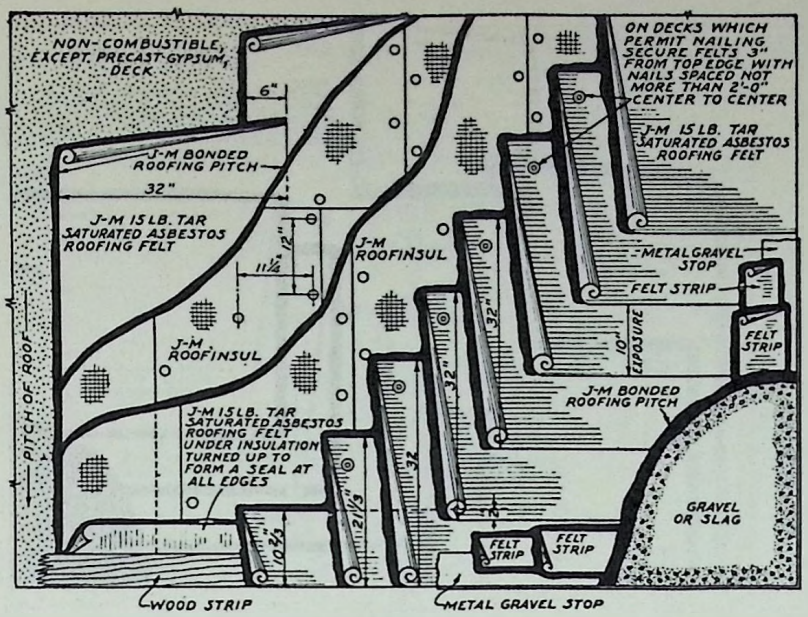
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*A built-up roof of this same construction is available, differing only in the use of "rag" instead of "asbestos" felt. To specify, make following changes:

SPECIFICATION NO. 707

FELTS: (*Change name of felt to* "J-M 15-lb. Bonded Tar-Saturated Rag Felt.")

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SPECIFICATION No. 609*

J-M 15-YEAR ROOF OVER INSULATION

ON POURED CONCRETE DECKS

Inclines: ¼ in. to 1 inch per foot

ON POURED GYPSUM DECKS

Inclines: ¼ in. to 2 inches per foot

Surface: SLAG or GRAVEL
Felts: ASBESTOS
Waterproofing: PITCH (TAR)
Insulation: ROOFINSUL

BILL OF MATERIALS PER 100 SQ. FT.

*FELT: (Under Insulation) 1 layer of J-M 15-lb. Tar-Saturated Asbestos Roofing Felts (16¼ lb. per 108 sq. ft.)	16¼ lb.
*FELTS: (In Built-Up Roof) 3 layers of J-M 15-lb. Tar-Saturated Asbestos Roofing Felt (16¼ lb. per sq. ft.)	49 lb.
PITCH: J-M Bonded Roofing Pitch (for mopping between felts)	150 lb.
For mopping insulation over felt	30 lb.
For mopping each additional ply of insulation	30 lb.
INSULATION: J-M Roofinsul (0.8 lb. per sq. ft. ½" thick) For each layer of insulation	100 sq. ft.
SURFACING: Gravel	400 lb.
or Slag	300 lb.

ROOF DECK

(*Copy from Specification No. 607, opposite.*)

INSTALLATION

Insulation—(*Copy from Specification No. 607, opposite.*)

Felt Under Insulation—(*Copy from Specification No. 607. opposite.*)

Insulation—(*Copy from Specification No. 607, opposite.*)

Roofing—Lay three plies of the 15-lb. tar-saturated roofing felt, lapping each sheet 22" over the preceding one, mopping the full width under each with the pitch. If roof construction is of poured gypsum, nail each sheet at 24" centers, 3" from the back edge.

Over the entire surface pour a uniform coating of the pitch and embed therein, while hot, not less than 400 lbs. of gravel, or 300 lbs. of slag, for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

(*Copy from Specification No. 607, opposite, except change to* "Fifteen-Year.")

*A built-up roof of this same construction is available, differing only in the use of "rag" instead of "asbestos" felt. To specify, make following changes:

SPECIFICATION NO. 709

FELTS: (*Change name of felt to* "J-M 15-lb. Bonded Tar-Saturated Rag Felt.")

SPECIFICATION No. 611*

J-M 10-YEAR ROOF OVER INSULATION

on Poured Concrete Decks

Inclines: 1 in to 6 inches per foot

on Poured Gypsum Decks

Inclines: 2 ins. to 6 inches per foot

Surface: SLAG
Felts: ASBESTOS
Waterproofing: PITCH (TAR)
Insulation: ROOFINSUL

BILL OF MATERIALS PER 100 SQ. FT.

*FELT: (Under Insulation) 1 layer of J-M 15-lb. Tar-Saturated Asbestos Roofing Felt (16¼ lb. per 108 sq. ft.)	16¼ lb.
*FELTS: (In Built-Up Roof) 4 layers of J-M 15-lb Tar-Saturated Asbestos Roofing Felt (16¼ lb. per 108 sq. ft.)	65 lb.
PITCH: J-M Bonded Roofing Pitch (for mopping between felts)	94 lb.
For mopping insulation over felt	30 lb.
For mopping each additional ply of insulation	30 lb.
ASPHALT: J-M Bonded Roofing Asphalt (for top surfacing)	45 lb.
INSULATION: J-M Roofinsul (0.8 lb. per sq. ft. ½" thick) For each layer of insulation	100 sq. ft.
SURFACING: Slag	250 lb.

ROOF DECK

(*Copy from Specification No. 607, opposite.*)

INSTALLATION

General—(*Copy from Specification No. 607, opposite.*)

Felts Under Insulation—(*Copy from Specification No. 607, opposite.*)

Insulation—(*Copy from Specification No. 607, opposite.*)

Roofing—Lay four plies of the 15-lb. tar-saturated roofing felt, lapping each sheet 24½" over the preceding one, mopping under each with the pitch to a width of 30" starting 2" from the exposed edge.

With nailing strips provided as required, nail each sheet at each nailing strip with two nails spaced 8" and 10" respectively from the back edge.

Over the entire surface pour a uniform coating of the asphalt and embed therein, while hot, not less than 250 lbs. of slag for each 100 sq. ft. of roof surface.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

(*Copy from Specification No. 607, opposite, except change to* Ten-Year".)

*A built-up roof of this same construction is available, differing only in the use of "rag" instead of "asbestos" felt. To specify, make following changes:

SPECIFICATION NO. 711

FELTS: (*Change name of felt to* "J-M 15-lb. Bonded Tar-Saturated Rag Felt.")

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SPECIFICATION No. 108

J-M 20-YEAR ROOF OVER INSULATION ON STEEL DECKS

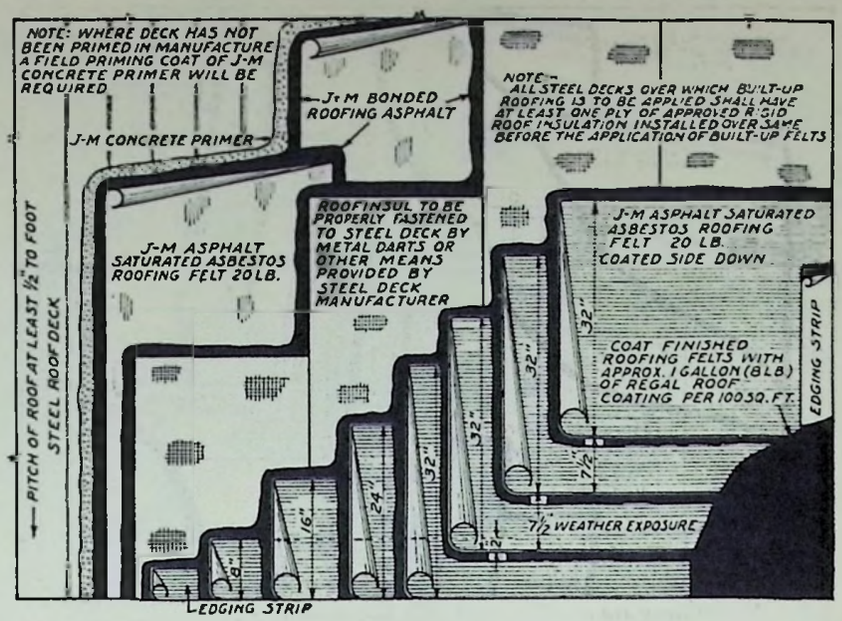
Surface: SMOOTH

Felts: ASBESTOS

Waterproofing: ASPHALT

Insulation: ROOFINSUL

Inclines: ½ in. to 9 inches per foot



BILL OF MATERIALS PER 100 SQ. FT.

FELTS: 4 layers of J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt	80 lb.
(An additional ply of 20-lb. asbestos felt is specified for application under the insulation, in Specification No. 502. See page 32.)	
PRIMER (unless steel deck has been shop-coated): J-M Concrete Primer (8 lb. per gal.)	1 gal.
ASPHALT: J-M Bonded Roofing Asphalt (for mopping between felts)	120 lb.
For mopping felt to deck	30 lb.
For mopping insulation over felt	30 lb.
For mopping each additional ply of insulation	30 lb.
INSULATION: J-M Roofinsul (0.8 lb. per sq. ft. ½" thick) For each layer of insulation	100 sq. ft.
ROOF COATING: J-M Regal Roof Coating (Black) (8 lb. per gal.)	1 gal.

ROOF DECK

(a) Roof construction, including cants, covers or fillets, shall be properly graded to gutters and roof drains, leaving all surfaces smooth, clean, sound and dry, in satisfactory condition to receive the roofing.

(b) Nailing strips shall be furnished by others, as required, embedded in the wall structure, to which to secure the flashing.

INSTALLATION

General—If the pitch of the roof is 3" to the foot or less, the felts shall be laid at right angles to the pitch. If the pitch of the roof is over 3" to the foot, the felts shall be laid parallel to the pitch. The roof felts shall be turned up 2" on all vertical surfaces without being cemented thereto.

Insulation—(*Copy from J-M Standard Specification No. 502*)

Roofing—Lay four plies of the 20-lb. asbestos felt, with the coated side down, lapping each sheet 24½" over the preceding one, mopping the full width under each with the asphalt or, if job conditions make it desirable to apply the roofing in two operations, lay two plies of the 20-lb. asbestos felt, with the coated side down, lapping each sheet 17" over the preceding one, mopping the full width under each with the asphalt. Over these felts, lay two additional plies, applied in the same manner as the first two.

Coat the entire surface with the roof coating.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Twenty-Year Guaranty Bond.

SPECIFICATION No. 109

J-M 15-YEAR ROOF OVER INSULATION ON STEEL DECKS

Surface: SMOOTH **Waterproofing: ASPHALT**

Felts: ASBESTOS **Insulation: ROOFINSUL**

Inclines: ½ in. to 9 ins. per foot

BILL OF MATERIALS PER 100 SQ. FT.

FELTS: 3 layers of J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt	60 lb.
(An additional ply of 20-lb. asbestos felt is specified for application under the insulation, in Specification No. 502)	
PRIMER (unless steel deck has been shop-coated): J-M Concrete Primer (8 lb. per gal.)	1 gal.
ASPHALT: J-M Bonded Roofing Asphalt (for mopping between felts)	90 lb.
For mopping felt to deck	30 lb.
For mopping insulation over felt	30 lb.
For mopping each additional ply of insulation	30 lb.
INSULATION: J-M Roofinsul (0.8 lb. per sq. ft. ½" thick) For each layer of insulation	100 sq. ft.
ROOF COATING: J-M Regal Roof Coating (Black) (8 lb. per gal.)	1 gal.

ROOF DECK

(*Copy from Specification No. 108, above.*)

INSTALLATION

General—(*Copy from Specification No. 108, above.*)

Insulation—(*Copy from J-M Standard Specification No. 502*)

Roofing—Lay three plies of the 20-lb. asbestos felt, with the coated side down, lapping each sheet 22" over the preceding one, mopping the full width under each with the asphalt.

Coat the entire surface with the roof coating.

Flashing—(*Copy from J-M Standard Specification for Flashing*)

(*If a bond is required, add the following:*)

GUARANTEE

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish a Johns-Manville Fifteen-Year Guaranty Bond.

Built-up Roofing 10-19-38 October, 1938

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Protecting Insulated Roofs Against Humidity

For many years it has been generally recognized that wherever humid conditions may be encountered, it is essential that roof insulation be protected on the underside against the absorption of moisture. Specifications of architects and roofing manufacturers nave, therefore, called for a membrane waterproofing course under the insulation wherever it was known at the time the roof was designed that the insulation would be subjected to such conditions.

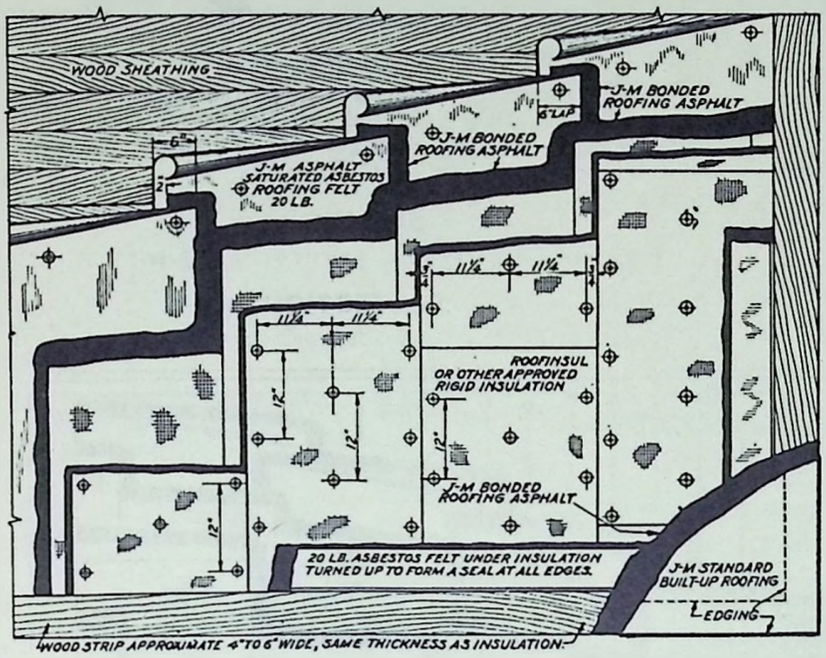
But there are occasions, after a relatively few years, where there is a change in the use to which a building is put. From an operation not in the least humid, the condition may change almost overnight into one which exposes the insulation to severe moisture conditions.

All types of roof insulation will absorb moisture. The very factor that makes the material effective as an insulation—porosity—is, of course, responsible for its absorption of moisture. When insulation on a roof becomes water-soaked, the results are:

(a) A serious reduction in insulating efficiency.
(b) Destruction of bond between insulation and roofing felts.
(c) Disintegration of the insulating material.
(d) Almost certain damage to the roof deck itself.
(e) Possible damage to the building contents.
(f) An expensive re-roofing and re-insulating job.

All Johns-Manville Roof Insulation Specifications call for the application of a layer of waterproofing roofing felt under the insulation.

JOHNS-MANVILLE ROOF INSULATION



SPECIFICATION No. 500

J-M ROOFINSUL
ON WOOD DECKS
TO BE OVERLAID WITH A J-M ASPHALT BUILT-UP ROOF

BILL OF MATERIALS PER 100 SQ. FT.

FELT (under insulation): 1 layer of J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt..... 20 lb.

INSULATION: J-M Roofinsul (0.8 lb. per sq. ft., ½" thick) For each layer of insulation .....100 sq. ft.

ASPHALT: J-M Bonded Roofing Asphalt For mopping each layer of insulation ..... 30 lb.

ROOF DECK

As J-M Roofinsul (rigid roof insulation) requires, and is designed to receive, built-up roofing directly over it, the following specification has been prepared to be appended to certain Standard Specifications for J-M Asphalt Built-Up Roofs. The specifications for such roofs, designed particularly for application over approved rigid insulation on wood decks are given on previous pages. The roof deck, before being considered satisfactory to receive the insulation, shall be in the condition outlined in the built-up roof specification.

INSULATION

(a) Lay one ply of the 20-lb. asbestos felt, lapping the sheets 6", mopping in the laps with the asphalt and nailing sufficiently to hold in place. This felt shall be turned up on, but not cemented to, all vertical surfaces to a height 6" greater than the thickness of the insulation and shall overhang all roof edges a similar amount.

(b) Lay the Roofinsul with the rough side down and with all end joints broken, mopping the full width under each sheet with the asphalt. The edges of the sheets at the joints shall be thoroughly sealed with the asphalt.

(c) The insulation shall be isolated into areas approximately 30 ft. square by path-strippings of one ply of the 20-lb. asbestos felt, mopped the full width with the asphalt, to extend not less than 4" over the edge of the insulation in place and not less than 4" under the adjoining insulation to be laid.

NAILING

Each sheet of the insulation shall be nailed at 12" centers, adjacent to the longitudinal edges and staggered through the longitudinal center. If it be applied in more than one layer, succeeding layers shall be applied in the same manner as the first layer, the sheets of each layer to break joints with those of the preceding layer, with all nailing done through the top layer.

SEALING

The upturned felt at vertical surfaces and roof edges shall be turned down and mopped solidly to the insulation.

PROTECTION

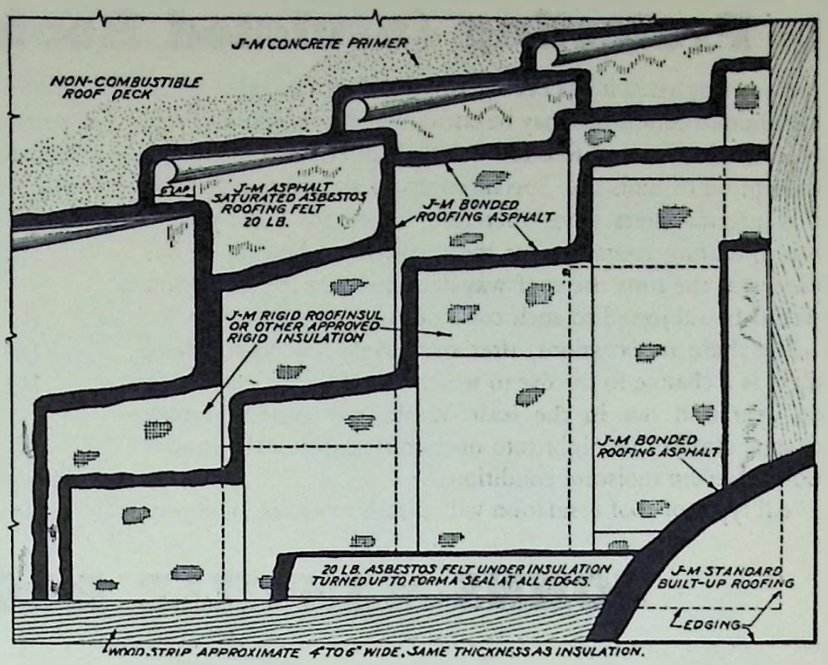
Insulation shall not be left exposed to the weather. No more insulation shall be laid than can be completely covered with the roofing felts on the same day. At the end of the day's work, roofing felts shall be turned down over the exposed edges of the insulation and mopped solidly.

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SPECIFICATION No. 501

J-M ROOFINSUL
ON NON-COMBUSTIBLE DECKS
TO BE OVERLAID WITH A J-M ASPHALT BUILT-UP ROOF



BILL OF MATERIALS PER 100 SQ. FT.

FELT: 1 layer of J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt ..... 20 lb.
INSULATION: J-M Roofinsul (0.8 lb. per sq. ft., ½" thick) For each layer of insulation ..... 100 sq. ft.
PRIMER: J-M Concrete Primer (8 lb. per gal.):
Over Concrete ..... 1 gal.
Over Gypsum ..... 1½ to 2 gal.
ASPHALT: J-M Bonded Roofing Asphalt
For mopping each layer of insulation ..... 30 lb.

ROOF DECK

(Copy from Specification No. 500, on previous page.)

INSULATION

(a) Coat all surfaces which are to receive the insulation with the asphalt primer and allow to dry.

(b) Lay one ply of the 20-lb. asbestos felt, lapping the sheets 6", mopping the full width under each with the asphalt. This felt shall be turned up on . . . *(Balance, same as paragraph (a) of Specification No. 500, on previous page.)*

(c) *(Copy paragraph (b) of Specification No. 500.)*

(d) *(Copy paragraph (c) of Specification No. 500.)*

NAILING

If roof construction permits, nail each sheet at 12" centers adjacent to the longitudinal edges and staggered through the longitudinal center. With nailing strips provided as required, each sheet shall be nailed at each strip at 12" centers.

SEALING

(Copy from Specification No. 500, on previous page.)

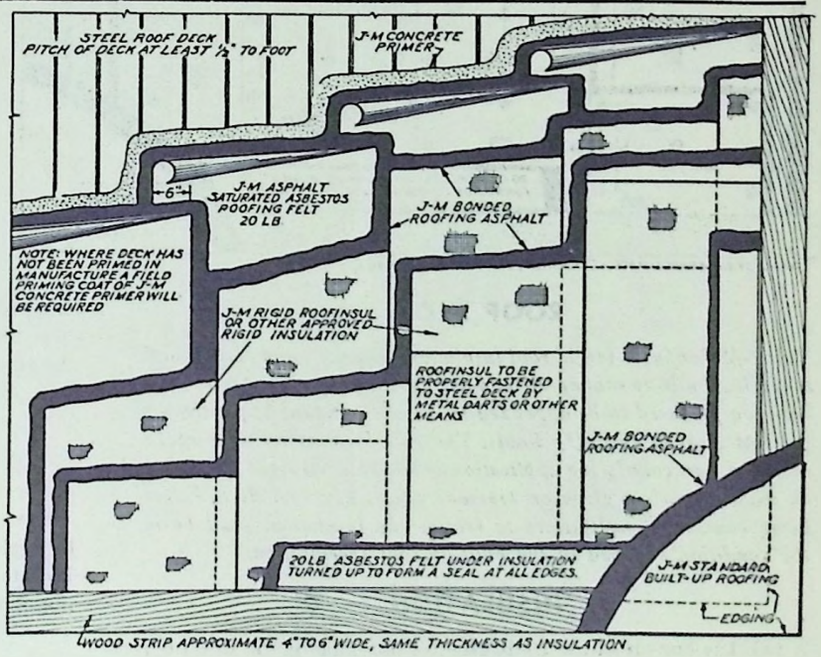
PROTECTION

(Copy from Specification No. 500, on previous page.)

SPECIFICATION No. 502

J-M ROOFINSUL
ON STEEL DECKS
TO BE OVERLAID WITH A J-M ASPHALT BUILT-UP ROOF

Minimum Pitch: ½ inch per foot



BILL OF MATERIALS PER 100 SQ. FT.

FELT (under insulation): 1 layer of J-M 20-lb. Asphalt-Saturated Asbestos Roofing Felt ..... 20 lb.
INSULATION: J-M Roofinsul (0.8 lb. per sq. ft., ½" thick) For each layer of insulation ..... 100 sq. ft.
PRIMER (unless steel deck has been shop-coated): J-M Concrete Primer (8 lb. per gal.) ..... 1 gal.
ASPHALT: J-M Bonded Roofing Asphalt
For mopping each layer of insulation ..... 30 lb.

ROOF DECK

(Copy from Specification No. 500, on previous page.)

INSULATION

(a) If the steel deck has not been shop-coated with asphalt paint, or if such coating is incomplete or has been damaged, the entire deck or such uncoated areas shall be painted with the primer and allowed to dry.

(b) *(Copy paragraph (b) of Specification No. 501, above.)*

(c) *(Copy paragraph (b) of Specification No. 500.)*

(d) *(Copy paragraph (c) of Specification No. 500.)*

SECURING OF INSULATION

If the pitch of the roof deck is 3" per foot or greater, the insulation shall be secured by means of steel darts or other approved device. *(Follow with the second sentence under "Nailing" in Specification 500, changing word "nailing" to "fastening."*

SEALING AND PROTECTION

(Copy from Specification No. 500, on previous page.)

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J-M ASBESTILE FLASHING SYSTEM (10-YEAR BOND)

Johns-Manville Flashing is constructed of the same basic materials as Johns-Manville Built-Up Roofs—asbestos felts, asphalt and Asbestile, a plastic asbestos-asphalt composition, being the main component parts. It may be installed to cover completely the top and inside face of parapet walls, to extend through walls, or to extend not less than 8″ high on the inside face only. J-M Flashing may also be used with a sheet metal cap flashing built into the walls, or it may be used in conjunction with raggle blocks. As Johns-Manville Flashing is used only in connection with Johns-Manville Built-Up Roofing, the following specification has been prepared to be appended to the Standard Specifications for such Built-Up Roofs:

The height of flashing on parapet walls shall be *state whether* (*"not less than* 8″) *or* (*"so as to cover completely entire inside face of wall and top of wall under coping to within* 2″ *of outside face"*) *or* (*"not less than* 8″ *with cap flashing built into and extended through wall to form a dampproof course."*) *If flashing is to be carried into raggle block, so state.*

The height of flashing on high walls shall be (*state whether "same height as on adjoining parapet walls"*) *or* (*"Not less than* 8″, *with cap flashing built into and extended through wall to form a dampproof course."*)

All masonry surfaces which are to receive the base or cap flashing shall be coated with J-M Concrete Primer and allowed to dry.

BASE FLASHING

(*See drawings on next page.*)

Lay one thickness of the 15-lb., or 20-lb. roofing felt to extend not less than 6″ high on the vertical surface to be flashed, and not less than 4″ on the roof, lapping the sheets 3″, mopping the full width under each with the asphalt, or, if applied with roofs employing pitch, either such pitch or asphalt may be used.

A base flashing composed of J-M Asbestos Base Flashing Material shall be applied directly over and entirely covering the 15-lb. or 20-lb. roofing felt, cemented to it with the asphalt or pitch.

The base flashing shall be nailed, adjacent to its upper and end edges, with large head nails spaced at 8″ centers driven into the brick joints or the nailing strip.

The edge of the base flashing on the roof shall be covered with a 4″ wide strip of 15-lb. Asbestos Felt, embedded in and coated over with asphalt or, if applied in connection with roofs employing pitch, such pitch shall be used.

The end joints shall be covered with Asbestile, as specified under "Cap Flashing."

On skylight curbs, etc., the flashing shall extend the full height, and turn over on top the full width, of the curb.

If no nailing facilities have been provided for securing the upper edge of the base flashing, a five-course cap and base flashing will be acceptable, constructed of alternating layers of Asbestile and 15-*lb. Asbestos Felt. Such flashing shall be applied in a manner similar to that specified later for the application of cap flashing to full height of wall, repeating the operations described to provide three layers of Asbestile and two layers of felt. Such flashing shall extend on the vertical surfaces and on the roof the same distance as specified for the flashing method it displaces.*

BASE FLASHING WITH RAGGLE BLOCK

(*See drawing following*)

The groove in the raggle block shall be coated with J-M Concrete Primer and allowed to dry.

One thickness of the 15-lb. or 20-lb. roofing felt shall be applied to extend not less than 4″ on the roof, to cover the cant entirely, and to extend to the full depth of the groove in the raggle block. This felt shall be embedded in asphalt, (or, if applied with roofs employing pitch, either such pitch or asphalt may be used) on the roof and cant, and in a layer of Asbestile, approximately ⅛″ thick, in the groove in the raggle block.

One thickness of J-M Asbestos Base Flashing Material shall be applied directly over and entirely covering the 15-lb. or 20-lb. felt and similarly cemented to it with the asphalt or pitch and the Asbestile. The base flashing shall be nailed adjacent to the groove, into the joints between raggle blocks. At all joints of the base flashing material, and at 12″ centers between, wood wedges, primed and coated with Asbestile, shall be driven into the groove to prevent slippage of the flashing. Any remaining voids in the grooves shall be caulked with Asbestile and oakum. A layer of Asbestile, approximately ⅛″ thick, shall be troweled in place to extend not less than 3″ on the cant and 2″ on the face of the raggle block to cover entirely the groove in the raggle block.

A strip of the 15-lb. or 20-lb. felt not less than 4″ wide shall be embedded therein and a second layer of Asbestile, of the same thickness as the first, troweled over and finished to a feather edge and to a straight line at the upper and lower edges.

The edge of the base flashing on the roof shall be covered with a 4″ wide strip of the 15-lb. felt embedded in and coated over with asphalt or pitch.

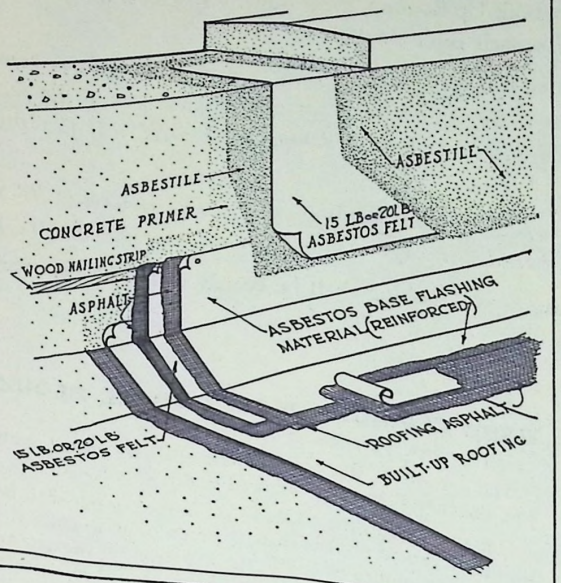
The end joints of the base flashing shall be covered with Asbestile as specified under "Cap Flashing."

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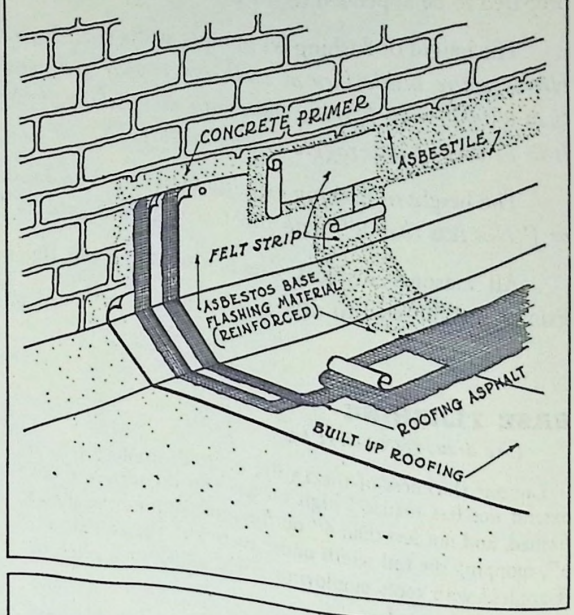
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Details Showing Various Methods of Flashing Johns-Manville Bonded Built-up Roofs

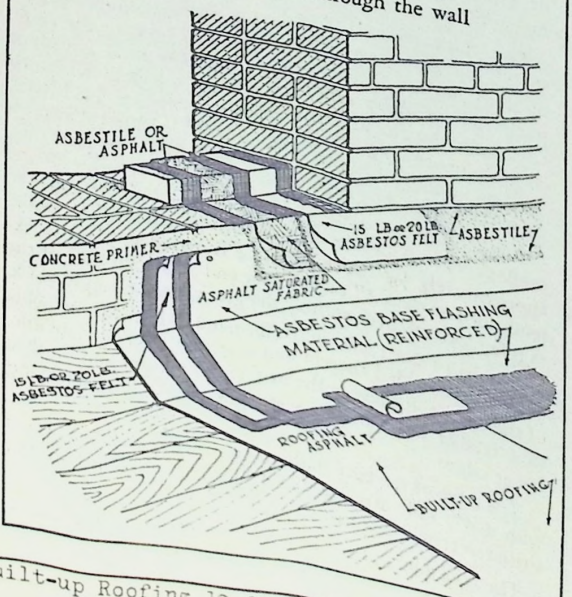
J-M Base and Cap Flashing
Full height of wall and under coping



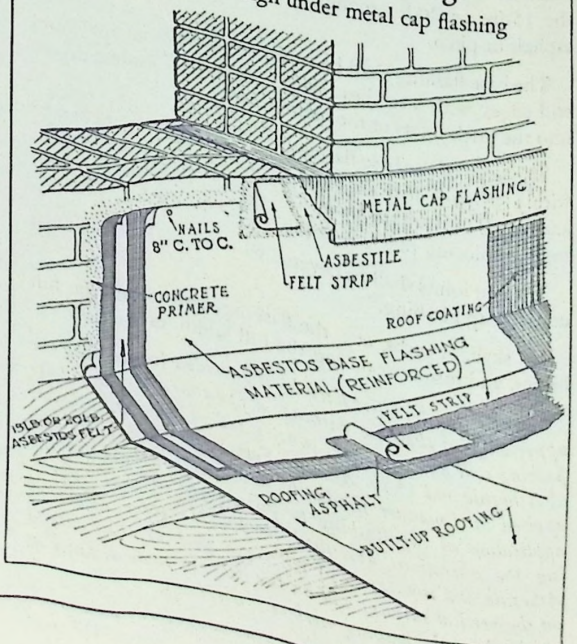
J-M Base and Cap Flashing
Not less than 8" high



J-M Base and Cap Flashing
Cap flashing extended through the wall



J-M Base and Cap Flashing
Not less than 8" high under metal cap flashing

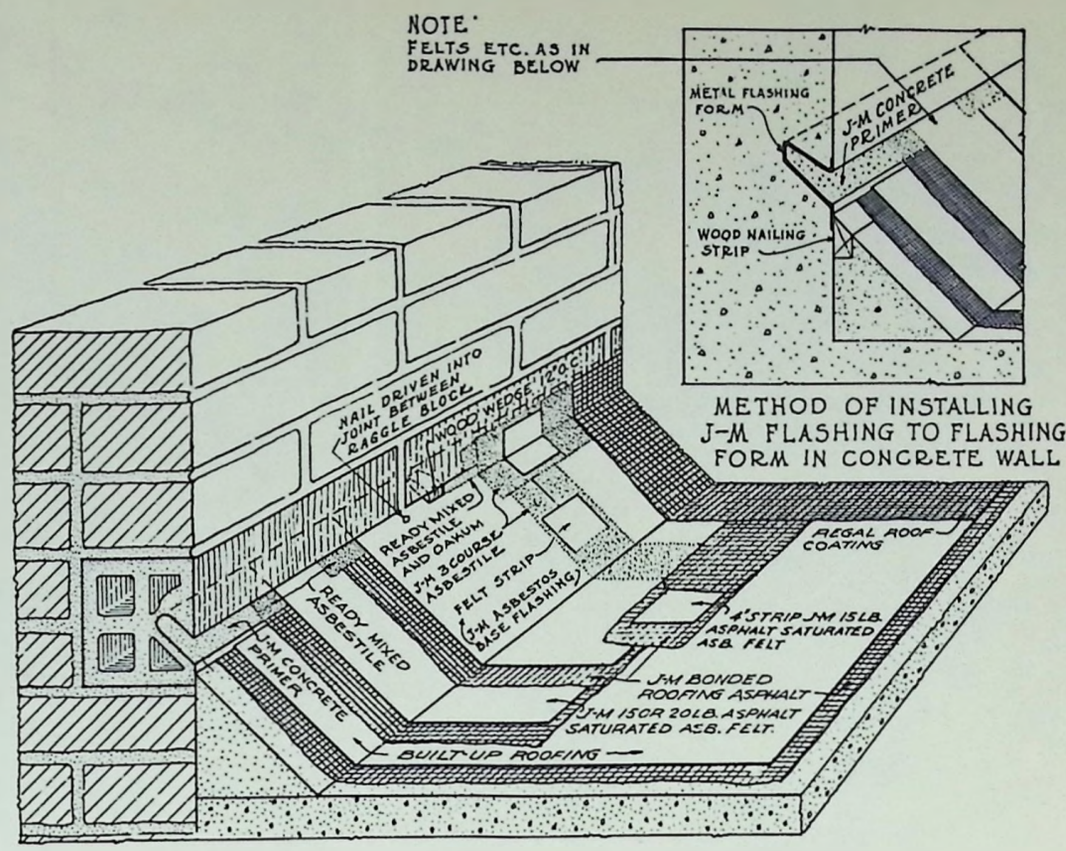


Built-up Roofing 10-21-38

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BASE FLASHING WITH RAGGLE BLOCK



METHOD OF INSTALLING J-M FLASHING TO FLASHING FORM IN CONCRETE WALL

CAP FLASHINGS (See drawings on opposite page)

When J-M Flashing is specified to be not less than 8 ins. high or when sheet metal cap flashing is to be used with J-M Flashing

A layer of Asbestile, approximately 1/8" thick and not less than 5" wide, shall be troweled in place to cover the nail heads, the upper edge of the base flashing and the adjoining surface of the wall. A strip of 15-lb. Asphalt-saturated Asbestos Felt not less than 4" wide shall be embedded therein and a second layer of Asbestile, of the same thickness as the first, troweled over and finished to a feather edge and to a straight line at the upper and lower edges. If a sheet metal cap flashing is specified, the Asbestile cap flashing shall extend to the point where such metal flashing protrudes from the wall.

End laps in base flashing shall be similarly covered.

When J-M Flashing is specified to extend full height of wall under coping to within 2 ins. of outside face.

A layer of Asbestile, approximately 1/8" thick, shall be troweled in place to cover the nail heads and the upper edge of the base flashing not less than 4" and the entire inside face and top of the wall (under the coping) to within 2" of the outside face. One thickness of 15-lb. Asphalt-saturated Asbestos Felt shall be embedded therein, with the sheets lapped 3" and sealed with Asbestile, and a second layer of Asbestile, of the same thickness as the first, troweled over and finished to a feather edge and to a straight line at the lower edge.

When J-M Flashing is specified to be not less than 8 ins. high with cap flashing extended through wall

One ply of J-M Type B Asphalt-saturated Fabric shall be applied to the temporary top of the wall, to extend from within 2" of the outside face to the inside face and project so as to cover the base flashing not less than 4". This fabric shall be cemented to the top of the wall with the asphalt or Asbestile. One ply of 15-lb. Asphalt-saturated Asbestos Felt shall be applied directly over and entirely covering the fabric, cemented to it, and coated over, with the asphalt or Asbestile. The projecting felts shall be temporarily covered for protection during the completion of the wall. After the wall has been completed and the roofing and base flashing installed, the temporary protection shall be removed and a layer of Asbestile, approximately 1/8" thick, shall be troweled in place to cover the nail heads and the upper edge of the base flashing and the inside face of the wall to the underside of the projecting fabric and felt. The projecting fabric shall be embedded therein, over which shall be troweled a second layer of Asbestile, of the same thickness as the first, in which shall be embedded the projecting felt, over which shall be troweled a final layer of Asbestile of the same thickness as the preceding layers, finished to a feather edge and to a straight line at the lower edge and to the line of the projecting fabric and felt at the upper edge.

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PREPARATION OF DECKS AND DESCRIPTION OF MATERIALS USED IN ASBESTOS BUILT-UP ROOFING

PREPARATION OF ROOF DECKS:

(a) All roof surfaces, before being considered satisfactory for laying of built-up roofing shall be finished smooth and hard, containing no depressions or projections and must be thoroughly set, air dry and free from frost. Precast slabs shall be firmly set, well pointed, and free from any unevenness which might injure the roofing. Sheathing boards shall be dry, well seasoned and of uniform thickness, laid closely (tongue and grooved sheathing preferred). Ends of all sheathing boards shall rest on and be secured with at least two nails to joists and purlins. Roof surfaces shall be graded to drain water freely into gutters and downspouts. All drainage connections shall be set to permit free flow of water.

(b) At the angle of roof deck and abutting walls provide a securely fastened cant, at least one inch thick on wood sheathing, a cant of gypsum on gypsum roofs and of nailing concrete on concrete roofs. The face of the cant shall have an incline of 45 deg. with the roof surface and shall intersect the roof surface approximately 5" from face of wall. Where the roof deck does not permit nailing, wood nailing strips installed flush with the surface shall be provided at gables and eaves. On non-combustible deck where pitch is over 3" to the foot, provision shall be made by general contractor for nailing felts by setting wood nailing strips run horizontally and installed flush with the deck on not more than 4-ft. centers.

All rubbish shall be removed and the deck made and maintained perfectly free of all obstructions other than tools and appliances of the roofer.

MATERIALS:

The roofing materials used in application of the asbestos built-up roofing shall be of weight and characteristics as listed below.

ASBESTOS BUILT-UP ROOFING FELT 55 LB.:

An extra heavy asbestos roofing felt, double coated with asphalt and sanded both sides at the factory. It shall be 32" wide, and shall be composed of not less than 85 percent of asbestos fibre and contain no fibrous material such as wood pulp, old newspapers or refuse rags. The asbestos felt when impregnated shall weigh not less than 27 lb. per 108 sq. ft. and when finished, with a coating on both sides and sanded, shall weigh not less than 54 lb. per 108 sq. ft. and shall measure not less than 0.085" in thickness.

ASBESTOS ROOFING FELT 20 lb.:

An asphalt-impregnated asbestos roofing felt, 32" wide, shall contain not less than 85 percent pure asbestos fibre, and shall weigh not less than 18-3/4 lb. per 108 sq. ft. It shall be coated one side.

COMBINATION BASE FELT NO. 45:

Asphalt-saturated rag base felt to be double coated with asphalt and sanded one side at the factory. It shall be 36" wide and, when finished with a coating on both sides and sanded, shall weigh approximately 45 lb. per 108 sq. ft.

COMBINATION BASE FELT NO. 30:

Asphalt-saturated rag base felt shall be 36" wide and weigh approximately 30 lb. per 108 sq. ft.

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ASBESTOS BASE FLASHING AND EDGING (REINFORCED):

Flashing material consisting of an outer layer of heavy asbestos waterproofing felt and a layer of fabric, cemented together at the factory. Flashing material to be installed in width specified and shall weigh approximately 65 lb. per 108 sq. ft.

CONCRETE PRIMER:

For priming concrete and gypsum decks. Shall weigh not less than 7 lb. per gallon and shall be made from asphalt of proper base and fluxed down to a liquid state to permit application and form affinity with subsequent moppings of asphalt.

BONDED ROOFING ASPHALTS:

The roofing asphalts used for cementing together the asbestos felts, shall be of type recommended by the manufacturer applying the roofing and shall possess the proper physical and chemical characteristics for the particular built-up roofing specified.

NAILS AND FLAT TINNED DISKS OR CAPS:

Barbed, bright roofing nails, 7/8" or 1", shall be used for roofing and 1" large head, thick-shank galvanized nails for flashing and edging. For gypsum roofs, 1-1/2" cut nails shall be used. Flat tinned disks shall be approximately 1-3/8" diameter. Bell or cup-shaped caps shall not be used.

READY-MIXED ASBESTILE:

A heavy-bodied plastic cement composed of asbestos fibre, asphalt and other mineral ingredients, designed to afford thorough water-tightness over base flashings where used in conjunction with asphalt-saturated asbestos felt.

ROOF COATING:

A high grade asphaltic roof coating applied cold as the surface finish on smooth surfaced asbestos built-up roofing. One gallon required per 100 sq. ft. of roof area.

RIGID ROOF INSULATION:

A strong, rigid board of high insulating value, made of felted wood fibres. Shall have a thermal conductivity in B.t.u. per hour of approximately 0.36 per sq. ft. per inch of thickness per degree fahrenheit difference in temperature and shall comply with requirements of Federal Specification LLL-F-321-A.

Furnished in boards 1/2" thick, 2 ft. wide and 4 ft. long. Weight approximately 0.8 lb. per sq. ft., 1/2" thick. Where more than 1/2" thickness is required it can be furnished in two, three or four thicknesses stapled together at factory, with a 3/4" shiplap joint on all four sides. Sheets of rigid insulation larger than the above sizes are not allowable for roof insulation.

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SPECIFICATION FOR 20-YEAR SMOOTH SURFACE ROOF COVERING APPLIED TO WOOD SHEATHING OR PRECAST GYPSUM DECKS

SCOPE:

(State areas to be included)

MATERIAL:

Roof covering is to be a 4-ply smooth surface asphalt-saturated asbestos felt roof guaranteed for twenty years. The base sheet shall be an asphalt-saturated asbestos felt weighing 55 lb. per 100 sq. ft. It shall be thoroughly saturated, coated on both sides with natural asphalt and sanded. The felt is to be 32" wide.

Finishing felts shall be 3 layers of asphalt-saturated asbestos felt, coated one side with asphalt. It shall be 32" wide and weigh 20 lb. per 100 sq.ft.

Cementing agent shall be a bonded roofing asphalt approved by the manufacturer of the roofing felt.

Roof coating shall be a hot or cold asphalt as approved by the manufacturer of the roofing felt.

APPLICATION:

If the pitch of the roof is 3" to the foot or less, the 55-lb. felt may be laid either paralleling or at right angles to the pitch. The 20-lb. asbestos felts shall be laid at right angles to the pitch. If the pitch of the roof is over 3" to the foot, all felts shall be laid parallel to the pitch. All felts shall be turned up 2" on all vertical surfaces without being cemented thereto. All nails shall be 1" barbed roofing nails driven through flat tin discs. When roofing is applied to precast gypsum deck substitute 1-1/2" cut nails instead of the barbed type.

If the roof covering is applied to gypsum, coat all surfaces which are to receive the roofing with asphalt primer except an area 4" wide on each side of all joints between the precast units, allow to dry, then mop such primed areas with the asphalt and embed the 55-lb. felt therein.

Lay one thickness of the 55-lb. asbestos felt, lapping the sheets 2", sealing the laps with asphalt and nailing at 6" centers through the laps and at 18" centers through the longitudinal center of each sheet, in two lines spaced 10" apart, the nails to be staggered.

Over the 55-lb. asbestos felt lay three plies of the 20-lb. felt, with the coated side down, lapping each sheet 22" over the preceding one, mopping the full width under each sheet with asphalt and nailing at 9" centers adjacent to the back edge. On completion coat the entire surface with cold asphalt coating using 1 gallon per 100 sq. ft.

GUARANTEE:

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish the manufacturer's 20-Year Guaranty Bond.

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SPECIFICATION FOR 20-YEAR SMOOTH SURFACE ROOF COVERING APPLIED TO POURED CONCRETE, PRECAST CONCRETE OR POURED GYPSUM DECKS

SCOPE:

(State area to be included)

MATERIAL:

Roof covering is to be a 3-ply smooth surface asphalt-saturated asbestos felt roof guaranteed for 20 years. The base sheet shall be an asphalt-saturated asbestos felt weighing 55 lb. per 100 sq. ft. It shall be thoroughly saturated, coated on both sides with natural asphalt and sanded. The felt is to be 32" wide.

The two finishing felts shall be an asphalt-saturated asbestos felt, coated one side, with asphalt. It shall be 32" wide and weigh 20 lb. per 100 sq. ft.

Concrete primer shall be liquid cut-back asphalt, a material specially manufactured for this purpose.

Cementing agent shall be a bonded roofing asphalt approved by the manufacturer of the roofing felts.

Roof Coating shall be a cold asphalt coating as approved by the manufacturer of the roofing felts.

APPLICATION:

If the pitch of the roof is 3" to the foot or less, the 55-lb. asbestos felt may be laid either paralleling or at right angles to the pitch. The 20-lb. asbestos felts shall be laid at right angles to the pitch. If the pitch of the roof is over 3" to the foot all felts shall be laid to parallel the pitch. All felts shall be turned up 2" on all vertical surfaces without being cemented thereto.

Coat all surfaces which are to receive the roofing with the concrete primer and allow to dry. Lay one thickness of the 55-lb. asbestos felt, lapping the sheets 2", mopping the full width under each with hot asphalt and, if roof construction permits, nail at 6" centers through the laps and at 18" centers through the longitudinal center of each sheet in two lines spaced 10" apart, the nails to be staggered.

On roof pitches in excess of 3" to the foot, wood-nailing strips shall be provided by others embedded in the deck and spaced not to exceed 4-ft. centers. Roofing felts to be secured thereto by nailing.

When roofing is applied over precast concrete decks, primer and mopping of asphalt for application of 55-lb. asbestos base felt shall be held back 4" from edges of each roof slab.

Over the 55-lb. asbestos felt lay two plies of the 20-lb. asbestos felt, with the coated side down, lapping each sheet 17" over the preceding one, mopping the full width under each with asphalt and if roof construction permits, nailing at 9" centers adjacent to the back edge.

All nails shall be 1" barbed roofing nails driven through flat tin discs. For poured gypsum use 1-1/2" cut nails driven through flat tin discs.

On completion coat the entire surface with roof coating using 1 gallon per 100 sq. ft.

GUARANTEE:

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish the manufacturer's 20-Year Guaranty Bond.

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SPECIFICATION FOR 20-YEAR SMOOTH SURFACE ROOF COVERING APPLIED TO RIGID ROOF INSULATION

SCOPE:

(State areas to be included)

MATERIAL:

Roof covering is to be a 4-ply smooth surface asphalt-saturated asbestos felt guaranteed for 20 years. It shall consist of 4 layers of asphalt-saturated asbestos felt weighing 20 lb. per 100 sq. ft. per layer. The felt shall be 32" wide throroughly saturated and coated one side with asphalt.

Cementing agent shall be a bonded roofing asphalt approved by the manufacturer of the felts.

Roof ccating shall be a cold asphalt as approved by the manufacturer of the felts.

APPLICATION:

If the pitch of the roof is 3" to the foot or less, the felts shall be laid at right angles to the pitch. If the pitch of the roof is over 3" to the foot, the felts shall be laid to parallel the pitch. The roof felts shall be turned up 2" on all vertical surfaces without being cemented thereto.

Lay four plies of the 20-lb. asbestos felt, with the coated side down, lapping each sheet 24-1/2" over the preceding one, mopping the full width under each with asphalt.

If the pitch of the roof exceeds 3" to the foot and roof construction permits, each sheet shall be nailed at 9" centers adjacent to the back edge.

On roofs which do not permit nailing and where the roof pitch is in excess of 3" to the foot, wood-nailing strips shall be provided by others embedded in the deck and spaced not to exceed 4-ft. centers. The roofing felts and the insulation to be secured thereto by nailing.

Coat the entire surface with hot or cold asphalt using 1 gallon per 100 sq. ft.

GUARANTEE:

The work shall be done by a roofing contractor approved by the manufacturer. The roofing contractor shall furnish the manufacturer's 20-year Guaranty Bond.

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SPECIFICATION FOR 5-PLY BUILT-UP ROOFING UNDER PROMENADE TILE TO BE APPLIED ON CONCRETE SLAB

SCOPE:

All roof areas indicated on plans as promenade tile shall be underlaid with a 5-ply 20-year roof.

MATERIALS:

All felts referred to in these specifications shall be 15-lb. tar-saturated asbestos felt. The felt shall be 32" wide, weighing approximately 16-1/4 lb. per 108 sq. ft. The cementing agent shall be a bonded roofing pitch. Pitch of the roof shall be a minimum of 1/2" and maximum of 1".

APPLICATION:

The felt shall be laid at right angles to the pitch and shall be finished against all vertical surfaces without turn-up. Lay 2 plies of the 15-lb. tar-saturated asbestos felt, lapping each sheet 17" over the preceding one, mopping the full width under each with pitch. Lay 2 plies of the 15-lb. tar-saturated asbestos felt to extend not less than 8" high on vertical surfaces and not less than 8" on the roof, mopping the full width under each with pitch. The sheet metal base flashing shall be rounded, not sharply bent, into the proper shape and set against the felt. The flange of the base flashing on the roof shall be covered with two strips of the 15-lb. tar-saturated asbestos felt, the first to be 4" wide, the second 6" wide, mopping the full width under each with hot pitch. Coat the entire surface of the roof with pitch.

Over these felts lay two plies of the 15-lb. tar-saturated asbestos felt, lapping each sheet 17" over the preceding one, mopping the full width under each and finishing the exposed surface with hot pitch.

Immediately preceding the laying of the tile, thoroughly clean the surface of the roof and lay one additional ply of the 15-lb. tar-saturated asbestos felt, lapping each sheet 2", mopping the full width under each and finishing the exposed surface with the pitch.

GUARANTEE:

The work shall be done by a roofing contractor approved by the manufacturer of the roofing felt. The roofing contractor shall furnish the manufacturer's 20-year Guaranty Bond to cover the roofing only.

SUGGESTED SPECIFICATIONS FOR APPLICATION OF PROMENADE TILE WHEN LAID IN CEMENT MORTAR:

Over the roofing lay promenade tile, 6" x 9" x 1" set in a full bed of portland cement mortar not less than 1" thick. Expansion joints not less than 1" wide extending through the tile and the mortar bed to the roofing shall be provided adjoining all vertical surfaces and also longitudinally and across the roof at intervals not exceeding 20 ft. They shall be thoroughly cleaned and filled with expansion joint filler applied hot. All other joints between the tiles shall be grouted with portland cement mortar.

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FLASHING:

Flashings at all parapet walls shall be of the built-up membrane type extending up and over the parapet walls.

All roofing felts shall be laid before flashing is applied and shall be turned up 2" on, but not cemented to, all vertical surfaces to be flashed. Roofing felts shall be cemented to each other.

After the built-up roofing felts have been properly laid, prime the top and inside face of the parapet wall to be flashed with asphalt primer and allow same to dry thoroughly. Then mop to the wall and to the roof deck one ply of 15 or 20-lb. asbestos felt, lapping all edges 3". This felt shall be brought to the same height as the base flashing and shall extend out on the roof deck at least 4" and up the vertical face of the wall at least 8".

Mop the 15 or 20-lb. asbestos felt with hot roofing asphalt. An asbestos base flashing material with a reinforced fabric backing shall then be mopped on the fabric side with hot roofing asphalt and pressed immediately into place, nailing the top of flashing into brick joints in a horizontal line on 4" centers. Side laps shall be 3" carefully cemented together and nailed on vertical joints 2" center to center where possible. Cover the vertical laps in the following manner: first, trowel a strip of mastic consisting of asphalt, portland cement and asbestos fibre over the end lap and embed therein a 4" wide strip of 15-lb. asbestos felt. Cover this felt with another 1/8" trowelling of the mastic.

The counter-flashing is to be constructed as follows: At the inner top corner of the parapet wall embed in the above specified mastic an 8" strip of waterproof fabric extending 4" on top of the wall and 4" on the face of the wall. A 1/8" layer of mastic described herein shall then be troweled over the inside face of the wall extending down to a point 4" below the top edge of the base flashing and continued up over the top of wall to within 2" of outside face. A single ply of 15 or 20-lb. asbestos felt shall be embedded therein, with sheets lapped 3" and sealed with the mastic. Over this felt, apply a second 1/3" layer of the mastic. A second ply of 15 or 20-lb. asbestos felt shall be embedded therein, but shall terminate on top of wall at a point half-way between the inner and outer face of wall. Sheets shall be lapped 3" and sealed with the mastic. Over this felt, apply a third 1/8" layer of mastic, troweled over and finished to a feather edge and to a straight line at the lower edge extending below top of base flashing at least 4".

GUARANTEE:

On completion the roofing contractor shall furnish the manufacturer's 20-year Endorsement attached to the 20-Year Roofing Bond. The work shall be done by a roofer approved by the manufacturer of the flashing material and roofing felts.

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SPECIFICATION FOR APPLICATION OF 1" RIGID ROOF INSULATION APPLIED TO CONCRETE SLAB

SCOPE:

(State area to be included).

MATERIAL:

Roof areas to be insulated shall have applied to the top surface of the concrete deck 1" of rigid roof insulation consisting of felted wood fibres. Boards may be either 1" homogeneous or built-up of two layers of 1/2" sheets stapled together at the factory, with a 3/4" ship-lap joint on all four sides. The insulation board shall have a heat loss coefficient of not more than 0.36 B.t.u's. per sq. ft. per hour per deg. F. difference in temperature per 1" thickness. It shall comply with requirements of Federal Specification LLL-F-321 A.

The boards shall be in sizes approximately 2 ft. wide and 4 ft. long. The weight shall be approximately 0.8 lb. per sq. ft. 1/2" thick.

APPLICATION:

Coat all surfaces which are to receive the insulation with a cutback asphalt primer and allow to dry. Lay one ply of 20-lb. asphalt-saturated asbestos felt lapping the sheets 6" mopping the full width under each with hot asphalt. This felt shall be turned up on, but not cemented to, all vertical surfaces to a height 6" greater than the thickness of the insulation and shall overhang all roof edges a similar amount. Lay the roof insulation with the rough side down and with all end joints broken, mopping the full width under each sheet with hot asphalt. The edges of the sheets at the joints shall be thoroughly sealed with hot asphalt.

The insulation shall be isolated into areas approximately 30 ft. square by means of path-strippings of one ply of the 20-lb. asbestos felt, mopped the full width with hot asphalt, to extend not less than 4" over the edge of the insulation in place and not less than 4" under the adjoining insulation to be laid.

The upturned felt at vertical surfaces and roof edges shall be turned down and mopped solidly to the roof insulation

Insulation shall not be left exposed to the weather. No more insulation shall be laid than can be completely covered with the roofing felts on the same day. At the end of the day's work, roofing felts shall be turned down over the exposed edges of insulation and mopped solidly.

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SPECIFICATION FOR APPLICATION OF 1" RIGID ROOF INSULATION APPLIED TO WOOD SHEATHING

SCOPE:

(State areas to be included)

MATERIAL:

Roof areas to be insulated shall have applied to the top surface thereof 1" of rigid roof insulation consisting of felted wood fibres. Boards may be either 1" homogeneous or built-up of two layers of 1/2" sheets stapled together at the factory, with a 3/4" ship-lap joint on all four sides. The insulation board shall have a heat loss coefficient of not more than 0.36 B.t.u.'s per sq. ft. per hour per deg. F. difference in temperature per 1" thickness. It shall comply with requirements of Federal Specification LLL-F-321 A.

The boards shall be in sizes approximately 2 ft. wide and 4 ft. long. The weight shall be approximately 0.8 lb. per sq. ft. 1/2" thick.

APPLICATION:

Lay one ply of 20-lb. asphalt-saturated asbestos felt lapping the sheets 6", mopping in the laps with hot asphalt and nailing sufficient to hold the sheets in place. This felt shall be turned up on but not cemented to all vertical surfaces to a height 6" greater than the thickness of the insulation and shall overhang all roof edges a similar amount.

Lay the roof insulation with the rough side down and with all end joints broken, mopping the full width under each sheet with hot asphalt. The edges of the sheet at the joints shall be thoroughly sealed with hot asphalt.

The insulation shall be isolated into areas approximately 30 ft. square by path-strippings of one ply of the 20-lb. asbestos felt, mopped the full width with asphalt to extend not less than 4" over the edge of the insulation in place and not less than 4" under the adjoining insulation to be laid.

Each sheet of the insulation shall be nailed at 12" centers adjacent to edges and through the longitudinal center.

The upturned felt at vertical surfaces and roof edges shall be turned down and mopped solidly to the insulation.

Insulation shall not be left exposed to the weather. No more insulation shall be laid than can be completely covered with the roofing felts on the same day. At the end of the day's work, roofing felts shall be turned down over the exposed edges of insulation and mopped solidly.

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SPECIFICATION FOR APPLICATION OF 1" RIGID ROOF INSULATION APPLIED TO STEEL DECK

SCOPE:

(State areas to be included)

MATERIAL:

Roof areas to be insulated shall have applied to the top surface of the deck 1" of rigid roof insulation consisting of felted wood fibres. Boards may be either 1" homogeneous or built-up of two layers of 1/2" sheets stapled together at the factory, with a 3/4" ship-lap joint on all four sides. The insulation board shall have a heat loss coefficient of not more than 0.36 B.t.u.'s per sq. ft. per hour per deg. F. difference in temperature per 1" thickness. It shall comply with requirements of Federal Specification LLL-F-321A.

The boards shall be in sizes approximately 2 ft. wide and 4 ft. long. The weight shall be approximately 0.8 lb. per sq. ft., 1/2" thick.

APPLICATION:

If the steel deck has not been shop-coated with asphalt paint, the entire deck shall be painted with an asphalt primer and allowed to dry. Lay one ply of 20-lb. asphalt-saturated asbestos felt lapping the sheets 6" and mopping the full width under each with hot asphalt. This felt shall be turned up on but not cemented to, all vertical surfaces to a height 6" greater than the thickness of the insulation and shall overhang all roof edges a similar amount.

Lay the roof insulation with the rough side down and with all end joints broken, mopping the full width under each sheet with the hot asphalt. The edges of the sheets shall be thoroughly sealed with the asphalt.

If the pitch of the roof deck is 3" per foot or greater the insulation shall be secured by means of steel darts or other approved device. Each sheet of the insulation shall be fastened at 12" centers adjacent to the longitudinal edges and staggered through the longitudinal center.

The insulation shall be isolated into areas approximately 30 ft. square by path strippings of one ply of the 20-lb. asbestos felt, mopped the full width with asphalt to extend not less than 4" over the edge of the insulation in place and not less than 4" under the adjoining insulation to be laid.

The upturned felt at vertical surfaces and roof edges shall be turned down and mopped solidly to the roof insulation.

Insulation shall not be left exposed to the weather. No more insulation shall be laid than can be completely covered with the roofing felts on the same day.

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SPECIFICATION FOR APPLICATION OF 1/2" RIGID ROOF INSULATION APPLIED TO CONCRETE SLAB

SCOPE:

(State area to be included)

MATERIAL:

Roof areas to be insulated shall have applied to the top surface of the concrete deck 1/2" of rigid roof insulation consisting of felted wood fibres. The insulation board shall have a heat loss coefficient of not more than 0.36 B.t.u's per sq. ft. per hour per deg. F. difference in temperature for 1" thickness. It shall comply with requirements of Federal Specification LLL-F-321A..

The boards shall be in sizes approximately 2 ft. wide and 4 ft. long. The weight shall be approximately 0.8 lb. per sq. ft., 1/2" thick.

APPLICATION:

Coat all surfaces which are to receive the insulation with a cut-back asphalt primer and allow to dry. Lay one ply of 20-lb. asphalt-saturated asbestos felt lapping the sheets 6" and mopping the full width under each with hot asphalt. This felt shall be turned up on, but not cemented to, all vertical surfaces to a height 6" greater than the thickness of the insulation and shall overhang all roof edges a similar amount. Lay the roof insulation with the rough side down and with all end joints broken, mopping the full width under each sheet with hot asphalt. The edges of the sheets at the joints shall be thoroughly sealed with hot asphalt.

The insulation shall be isolated into areas approximately 30 ft. square by means of path-strippings of one ply of the 20-lb. asbestos felt, mopped the full width with hot asphalt, to extend not less than 4" over the edge of the insulation in place and not less than 4" under the adjoining insulation to be laid.

The upturned felt at vertical surfaces and roof edges shall be turned down and mopped solidly to the roof insulation.

Insulation shall not be left exposed to the weather. No more insulation shall be laid than can be completely covered with the roofing felts on the same day. At the end of the day's work, roofing felts shall be turned down over the exposed edges of insulation and mopped solidly.

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SPECIFICATION FOR APPLICATION OF 1/2" RIGID ROOF INSULATION APPLIED TO WOOD SHEATHING

SCOPE:

(State areas to be included)

MATERIAL:

Roof areas to be insulated shall have applied to the top surface thereof 1/2" of rigid roof insulation consisting of felted wood fibres. The insulation board shall have a heat loss coefficient of not more than 0.36 B.t.u.'s per sq. ft. per hour per deg. F. difference in temperature for 1" thickness. It shall comply with requirements of Federal Specification LLL-F-321A.

The boards shall be in sizes approximately 2 ft. wide and 4 ft. long. The weight shall be approximately 0.8 lb. per sq. ft. 1/2" thick.

APPLICATION:

Lay one ply of the 20-lb. asphalt-saturated asbestos felt lapping the sheets 6", mopping in the laps with hot asphalt and nailing sufficient to hold the sheets in place. This felt shall be turned up on, but not cemented to, all vertical surfaces to a height 6" greater than the thickness of the insulation and shall overhang all roof edges a similar amount.

Lay the roof insulation with the rough side down and with all end joints broken, mopping the full width under each sheet with hot asphalt. The edges of the sheet at the joints shall be thoroughly sealed with hot asphalt.

The insulation shall be isolated into areas approximately 30-ft. square by path-strippings of one ply of the 20-lb. asbestos felt mopped the full width with asphalt to extend not less than 4" over the edge of the insulation in place and not less than 4" under the adjoining insulation to be laid.

Each sheet of the insulation shall be nailed at 12" centers adjacent to the edges and through the longitudinal center.

The upturned felt at vertical surfaces and roof edges shall be turned down and mopped solidly to the insulation.

Insulation shall not be left exposed to the weather. No more insulation shall be laid than can be completely covered with the roofing felts on the same day. At the end of the day's work, roofing felts shall be turned down over the exposed edges of insulation and mopped solidly.

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SPECIFICATION FOR APPLICATION OF 1/2" RIGID ROOF INSULATION APPLIED TO STEEL DECK

SCOPE:

(State areas to be included).

MATERIAL:

Roof areas to be insulated shall have applied to the top surface of the concrete deck 1/2" of rigid roof insulation consisting of felted wood fibres. The insulation board shall have a heat loss coefficient of not more than 0.36 B.t.u.'s per sq. ft. per hour per deg. F. difference in temperature for 1" thickness. It shall comply with requirements of Federal Specification LLL-F-321A.

The boards shall be in sizes approximately 2 ft. wide and 4 ft. long. The weight shall be approximately 0.8 lb. per sq. ft. 1/2" thick.

APPLICATION:

If the steel deck has not been shop-coated with asphalt paint, the entire deck shall be painted with an asphalt primer and allowed to dry.

Lay one ply of 20-lb. asphalt-saturated asbestos felt lapping the sheets 6", mopping the full width under each with hot asphalt. This felt shall be turned up on, but not cemented to, all vertical surfaces to a height 6" greater than the thickness of the insulation and shall overhang all roof edges a similar amount.

Lay the roof insulation with the rough side down and with all end joints broken, mopping the full width under each sheet with the hot asphalt. The edges of the sheets shall be thoroughly sealed with the asphalt.

If the pitch of the roof deck is 3" per ft. or greater the insulation shall be secured by means of steel darts or other approved device.

Each sheet of the insulation shall be fastened at 12" centers adjacent to the longitudinal edges and staggered thru the longitudinal center.

The insulation shall be isolated into areas approximately 30 ft. square by path-strippings of one ply of the 20-lb. asbestos felt, mopped the full width with asphalt to extend not less than 4" over the edge of the insulation in place and not less than 4" under the adjoining insulation to be laid.

The upturned felt at vertical surfaces and roof edges shall be turned down and mopped solidly to the roof insulation.

Insulation shall not be left exposed to the weather. No more insulation shall be laid than can be completely covered with the roofing felts on the same day.

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J-M Waterproofing and Damp-proofing

J-M Waterproofing is a treatment designed to render concrete and masonry structures impervious to water, more commonly where hydrostatic pressure exists. Damp-proofing is a protection against the penetration of moisture by absorption and capillary action.

Method of Damp-proofing:

Damp-proofing is ordinarily accomplished by the application of bituminous surface coatings for the purpose of protecting masonry superstructures from damage and to prevent the infiltration of moisture. The protection is effective both above and below ground level as long as no hydrostatic pressure exists.

Methods of Waterproofing:

Experience indicates that positive waterproofing is best accomplished by the membrane method in which a protective envelope is applied to the surface to be waterproofed. The membrane is usually composed of impregnated felts or fabrics bonded together and to the concrete with hot-mopped bitumen. The treatment is usually applied on the outside of the structure so that the water pressure will tend to hold the membrane in place. If applied on the inside, it is usually necessary to overlay the treatment with concrete.

Practice varies as to the use of felts and fabrics. Johns-Manville recommends the use, wherever possible, of asbestos felts and fabrics in combination. The felts are used primarily for water resistance and the fabrics for tensile strength. When fabric is used, it should be placed in the center of the membrane where it is protected from mold and bacterial action. When J-M Asbestos Waterproofing Felts are specified, the theory that the introduction of reinforcing materials other than fabrics supplies a cleavage line in the membrane does not apply, because of thorough asphalt impregnation of the felts. However, standard specifications have been developed calling for the use of saturated fabrics without felts in railroad bridge waterproofing and some other types of work where this practice is well established.

The success of membrane waterproofing depends upon the design of the membrane structure, the selection of the proper bituminous materials and careful workmanship in application. The qualities of permanence, strength and flexibility are essential in the felts and fabrics used in the membranes. The most commonly used bituminous material is asphalt.



J-M Waterproofing on the Niagara River bridge of the Michigan Central R.R.

As a matter of expediency, J-M Asphalt Mastic Waterproofing is used in subway construction where abrasion during the progress of the work makes a membrane impractical. This mastic waterproofing is a properly proportioned combination of asphalt and selected mineral filler, thoroughly mixed at a temperature of 450 deg. F. and applied to the concrete hot. Sometimes mastic is applied as a cement for brick used to protect the membrane. Often the mastic serves merely as a roof to deflect water to drains. The mastic method is not recommended where the use of a membrane is at all feasible.

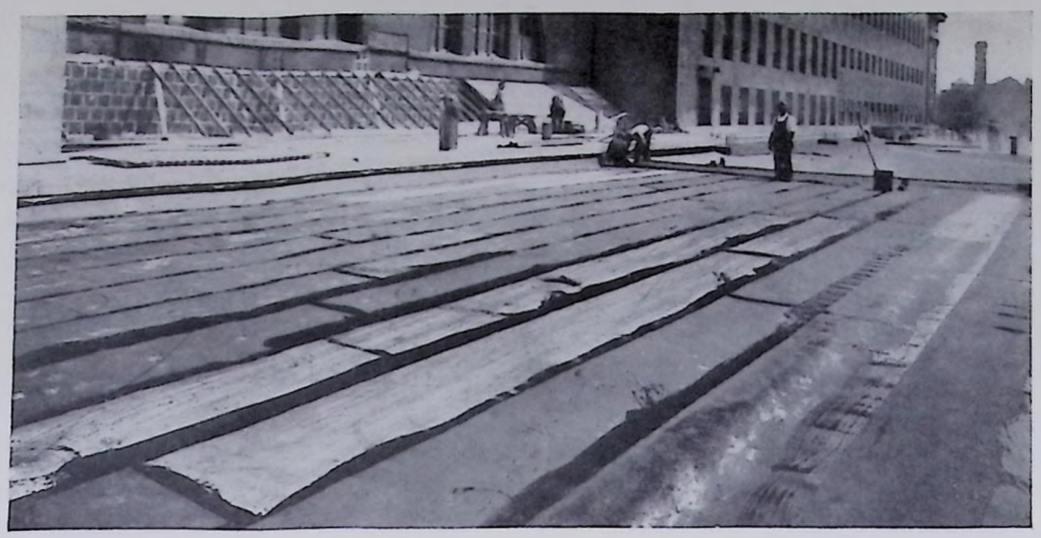
General Recommendations:

No definite recommendation can be made to cover any character of construction until the individual requirements of the particular job are analyzed. The condensed specifications on next page serve merely as a guide in waterproofing and damp-proofing work.

If the concrete is dry, the installation should ordinarily be started with an application of J-M Concrete Primer. In cases where the concrete cannot be dried, a J-M No. 50 Asbestos Waterproofing Felt should be used as a base upon which to build the specified membrane. When 5-ply protection is required, the introduction of this sheet results in a 6-ply membrane.

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First layer of J-M Asbestos Waterproofing Felt on the York St. viaduct of the New Union Terminal, Toronto, Canada

Specifications for J-M Waterproofing and Damp-proofing

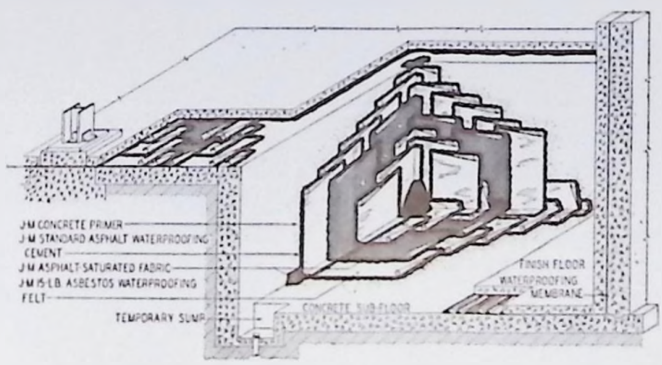
The following condensed specifications for various purposes are representative of those in common use:

Specification No. 1—Waterproofing: Two plies of J-M No. 50 Asbestos Waterproofing Felt laid in J-M Standard Asphalt Waterproofing Cement. Used in waterproofing concrete railroad bridges, bridge abutments, viaducts, and in other locations where no hydrostatic pressure exists.

Specification No. 2—Waterproofing: Two plies of J-M Asphalt-Saturated Waterproofing Fabric laid in J-M Standard Asphalt Waterproofing Cement. Used as an alternate to No. 1 when fabric only is specified.

Specification No. 3—Waterproofing: Three plies of J-M 15-lb. Asbestos Waterproofing Felt laid in J-M Standard Asphalt Waterproofing Cement. Used for floors, walls and sidewalks, where no pressure exists.

Specification No. 4—Waterproofing: Three plies of J-M 15-lb. Asbestos Waterproofing Felt laid in J-M Self-Healing Cement. Used between wood floors.



Waterproofing specification No. 7 applied to basement foundation and elevator or boiler pit. Pumps on the sump relieve ground water hydrostatic pressure until the sub-floor is set, waterproofing applied, and the finish floor completed, after which the sump is closed and similarly waterproofed. Concrete reinforcing is not shown

Specification No. 5—Waterproofing: Two plies of J-M No. 50 Asbestos Waterproofing Felt and one central ply of J-M Asphalt-Saturated Waterproofing Fabric, all laid in J-M Standard Asphalt Waterproofing Cement. This specification is as light as should be used in floors and walls where surface seepage may set up hydrostatic pressure. Also used on elevated concrete highways.

Specification No. 6—Waterproofing: Three plies of J-M Asphalt-Saturated Waterproofing Fabric laid in J-M Standard Asphalt Waterproofing Cement. Used as an alternate to No. 5 where fabric only is specified. Sometimes used in preference to No. 2 where greater strength is required.

Specification No. 7—Waterproofing: Four plies of J-M 15-lb. Asbestos Waterproofing Felt with one central ply of J-M Asphalt-Saturated Waterproofing Fabric, all laid in J-M Standard Asphalt Waterproofing Cement. Used on floors and walls of foundation work, where hydrostatic pressure will not exceed 10 ft. of water. As the grade line is approached, it may be shingled off to 3-ply. Deep foundation work requires special attention.

Specification No. 8—Damp-proofing: Two coats of Aquadam applied 24 hours apart. No primer is necessary where Aquadam is to be applied. This specification is used on the inside surface of exterior walls above grade, before plastering.

Specification No. 9—Damp-proofing: One mopping of J-M Standard Asphalt Waterproofing Cement. Used on the exterior of foundation walls below grade where conditions are mild.

Specification No. 10—Damp-proofing: One ply of J-M 15-lb. Asbestos Waterproofing Felt laid in J-M Standard Asphalt Waterproofing Cement. Used on the exterior of foundation walls below grade.

Johns-Manville waterproofing and damp-proofing materials are supplied to contractors with full directions for application. As to the materials themselves, Johns-Manville assumes full responsibility for quality and fitness for use.

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J-M Waterproofing and Damp-proofing Materials

J-M Waterproofing Felts

J-M No. 50 Asbestos Waterproofing Felt is a strong, asphalt-impregnated felt with enough stretch to bridge ordinary expansion cracks without fracture. It is approximately 0.045″ thick. Furnished in two-square rolls (216 sq. ft.), 32″ wide, weighing about 70 lb. per roll.

J-M 15-lb. Asbestos Waterproofing Felt is similar to No. 50 but lighter in weight. It is most often used in connection with fabrics or No. 50 felt in membrane waterproofing. The felt is furnished in three-square rolls (324 sq. ft.), 32″ wide, weighing approximately 45 lb. per roll.

J-M No. 1 Acid-Resisting Felt is an asphalt-saturated and coated rag felt used with J-M Industrial Flooring over concrete or wood sub-base where liquids, particularly acids, are present in volume. Felts are laid dry; the heat of the flooring, when applied, bonding them together. Furnished in one-square rolls (108 sq. ft.), 36″ wide.

Each ply will run square for square with the work.

J-M Waterproofing Fabric

J-M Asphalt-Saturated Waterproofing Fabric is a woven cotton fabric that meets the specification of the American Society of Testing Materials, the American Railway Engineering Association, the Federal Specification Board and the U. S. Bureau of Standards.

Two types are manufactured. Type A weighs 4 oz. per sq. yd., before saturation and Type B, 5 oz. per sq. yd. After saturation, Type A weighs about 12 oz. and Type B, 14 oz. per sq. yd. Their respective strengths by the grab method are 50 x 50 and 70 x 70, though Type B can be furnished with a strength of 80 x 80 on special order. Standard rolls, about 36″ wide, contain approximately 522 sq. ft. Each ply will run 1.1 squares per 100 sq. ft. of surface.

Cements, Primers and Coatings

Aquadam is a black, elastic, tacky material for cold application on masonry or hollow tile to exclude dampness. Used on the inside of exterior walls, before the plaster is applied, it provides a damp-proof film and to prevent air infiltration. After the Aquadam has set for 24 hours, it is recommended that the usual furring and lathing be installed.

Aquadam should be applied in two coats, the first being allowed to set 24 hours before the second is applied. Covering capacity depends upon porosity and unevenness of the surface, but generally 1 gal. of Aquadam will cover 75 sq. ft. of surface, the first coat, and 125 sq. ft., the second. Furnished in 5, 25 and 50-gal. containers; also 1-gal. cans (6 per case).

J-M Standard Asphalt Waterproofing Cement is an exceptionally pure, solid asphaltic compound, generally useful in waterproofing work over a wide range of temperature. It is remarkably immune to the action of acids, alkali, brine and water. Penetration ranges from 50 to 55.

The cement is heated to a temperature of 450 deg. F. and mopped on while hot. One ton will cover approximately 3,000 sq. ft. of surface, ⅛″ thick. Shipped in drums averaging about 500 lb.

J-M Self-Healing Cement is an asphaltic compound which moves readily under high temperatures, but is ideal for membrane waterproofing work on brine decks and between wood floors. Furnished regularly with a melting point of 120 deg. F., but also supplied, on special order, with a melting point of 90 deg. F. It is shipped in barrels containing about 500 lb. Self-Healing Cement has about the same coverage as Standard Asphalt Waterproofing Cement.



J-M Waterproofing on sidewalk vault, Media County Court House, Media, Pa.

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Mopping-in J-M Asbestos Waterproofing Felt

J-M Waterproofing Asphalt No. 6 is a solid asphaltic compound sometimes used in waterproofing work. Its melting point ranges from 150 to 160 deg. F. and its penetration, from 25 to 30. Shipped in drums averaging about 500 lb.

J-M Concrete Primer is a thin, scientifically compounded, asphalt primer for non-combustible surfaces to counteract the dust film, to prevent moisture absorption and to afford anchorage for subsequent bituminous applications. Gypsum or other porous surfaces require two coats to assure positive results.

J-M Concrete Primer weighs approximately 9 lb. per gal. Its covering capacity, varying with the surface porosity, averages about 100 sq. ft. per gallon. It is furnished in 1, 5, 25 and 50-gal. containers.

J-M Bitumen Solution is a quick-drying asphaltic liquid, used as a primer for Bitumen Enamel or any other asphaltic material which is to be applied to metal and concrete surfaces. It is made to comply with U. S. Navy Specification 52 B-10 and has a covering capacity of approximately 200 sq. ft. per gal. Furnished in 25 and 50-gal. drums.

Surfaces to be coated should be thoroughly clean and dry. Steel should be sand blasted or hammer-scaled, if necessary, and a wire brush used for final cleaning. One coat of Bitumen Solution is applied cold with brush or spray.

J-M Bitumen Enamel is an acid and alkali-resisting solid asphaltic material, with a high resistance to temperature and to shock, for the protection of metal and concrete surfaces which are subject to corrosion from air or aqueous solutions. It is made to comply with U. S. Navy Specification 52 B-10 and is used over a priming coat of Bitumen Solution. The covering capacity is approximately 200 sq. ft. per 100 lb., applied 1/16″ thick. Furnished in 635-lb. drums.

After the Bitumen Solution has dried 36 to 48 hours, Bitumen Enamel is heated to 450 deg. F. and applied with Bituminous Daubers, Type No. 175. When the fumes become too strong in enclosed places, it may be necessary to alternate the work.

J-M Asbestos Fibrous Roof Coating is a black, asphaltic-asbestos compound used to form a weather-resisting protective coating that is both durable and elastic under varied weather conditions.

The coating is applied in two coats to clean dry surfaces. In cold weather, it should be placed in a room and warmed to 70 deg. F. prior to use.

Asbestos Fibrous Roof Coating is furnished in two consistencies—ground, with a covering capacity of about 150 sq. ft. per gal., and unground, covering approximately 90 to 100 sq. ft. Shipped in 1, 5, 30 and 55-gal. containers. One-gal. cans are packed 6 per case.

J-M Pickling Tank Cement is an asphaltic compound used in lining wood and concrete tanks where an acid-resisting coat is necessary. On wood tanks, the tongues and grooves are coated before joining and after the tank has been erected, it is primed and given from two to four coats of Pickling Tank Cement.

To apply, the cement is heated to not more than 450 deg. F., and mopped on the surface while hot. When heating, it should be stirred constantly. Furnished, regularly, with a melting point of 150 deg. F. in 635-lb. drums. A harder material can also be supplied with a melting point of 212 deg. F.

J-M Bituminous Putty is an asphalt-asbestos compound that forms an elastic bond which is but little affected by temperature change and vibration. It is used as a filler and flashing to prevent water infiltration in recesses where a permanent seal is difficult to maintain. Furnished in 10-lb. cans (12 per case), 50-lb. cans and 500-lb. drums.

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Cement-Asbestos Sheets

Standard-type competitive materials of proved merit

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Cement-Asbestos Sheets

Cement-asbestos sheet materials, for both interior and exterior use, offer definite advantages in appearance, durability, low-maintenance and fire resistance.

For decorative purposes, these materials are available in a variety of colors, either plain, scored in 4″ squares, or in marbleized finishes. Unfinished sheets, flat and corrugated, are used extensively for roofing and siding.

While these products have been specified and used on many government projects, there exists no Federal Specifications for such types of material. In the following section, therefore, are descriptive specifications which permit competitive bidding.

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J-M Asbestos Flexboard

The demand for an asbestos board product that is easily workable, durable and also attractive is met, for the first time, by J-M Asbestos Flexboard.

Asbestos Flexboard is a wall-surfacing material formed into sheets of economical size from asbestos fibre and portland cement. It is fire-resisting, and permanent, and can be installed at a low cost. Due to its cement content, the surface is smooth and tough, and resists blows and abrasion to a remarkable degree. Yet Flexboard is readily workable. It may be bent over curved surfaces, sawed with a carpenter's saw and nailed close to the edge without cracking.

Flexboard is available in two styles: Standard, to fill a wide range of utilitarian uses for both interiors and exteriors; and Decorative, to provide colorful, sanitary wall finishes for homes, offices, stores and public buildings.

Standard Asbestos Flexboard

Standard Flexboard is furnished in unpolished sheets of a pleasing gray color. The combination of durability and workability makes it the economical and highly practical material for the usual applications of wall board, while its fire-resisting quality places it far ahead of any wood-fibre board. The rot- and weather-resisting qualities of Standard Flexboard make it highly serviceable for exterior surfaces as well as for interior walls. It is ideal for many interior uses such as partitions, wall finishes, laundries, storage rooms, furnace rooms, or wherever any possibility of fire hazard exists. It also serves as a siding for out-buildings, such as boat houses and garages.

Standard Flexboard is furnished 1/8" and 3/16" thick, in sheets, 4 ft. x 8 ft., with a smooth plain finish. Sheets are wrapped for shipping unless specifically ordered loose or crated. Packages are as follows:

Thickness, inches	No. of sheets per package	Sq. ft. per package	Approx. wt., lb. wrapped	Approx. wt., lb. crated
1/8	4	128	152	170
3/16	3	96	167	185

Standard Flexboard is also available grooved in 4" squares. Scored Standard Flexboard lends itself to varied decorative treatments. The tile-design squares may be painted in one or more colors and the grooves, in gray or a contrasting color. Scored sheets are supplied 4 ft. x 4 ft. x 1/8". Packages contain 6 sheets (96 sq. ft.) and weigh about 125 lb. crated.



Decorative Flexboard provides a durable modern wall treatment which is attractive and economical

Painting: The smoothness and color of Standard Flexboard make it an attractive finishing board when used without further treatment. However, it may be painted as readily as plaster, if another color is desired. The surface should be clean and dry before painting is started. For interior use, the primer coat should be applied in accordance with the primer manufacturer's directions. This should be followed by one or more coats of a good grade interior paint.

For the painting of exteriors and for interiors where severe moisture conditions prevail, a heavy brush coat of boiled linseed oil should be used as a primer and permitted to dry at least 24 hours before applying paint. If outdoor work is to be painted, three coats of a good exterior oil paint should be applied.

Decorative Asbestos Flexboard

Decorative Flexboard is an attractive wall finishing material combining the qualities of Standard Flexboard with durable color. Because the coloring is an integral part of the material itself, there is nothing on the surface to chip, crack or craze. The sheets are sanded and given a fine, lustrous finish. A distinctive.

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permanent wall finish can be secured by simply applying the large sheets over old plaster walls.

Decorative Flexboard has a wide range of application for interior walls and partitions. Under ordinary conditions, the lustrous finish will last indefinitely. If it is accidentally damaged, it may be renewed by applying polishing wax. For exteriors, Standard, rather than Decorative Flexboard, is recommended.

On walls around shower stalls, bath tubs and other places where excessive water, scouring powders, grease or steam will attack the finish of the Flexboard, it is important that the surface of the sheets be protected and maintained by periodic coatings of a good quality paste wax.

Decorative Asbestos Flexboard is supplied in both plain and scored sheets in five colors: rose, green, gray, slate and buff, in ⅛″ thickness only. The plain sheets are supplied 4 ft. x 8 ft. in packages containing 4 sheets and weighing about 175 lb., crated.

Scored Decorative Flexboard, except in gray color, is grooved with gray lines in 4″ squares, to simulate tile; gray sheets are grooved in white. The material is supplied 4 ft. x 4 ft., in packages containing 6 sheets and weighing approximately 125 lb., crated.

Each package of Flexboard is made up of one type and one color only.

Methods of Application

The large sheets of Asbestos Flexboard can be easily and quickly applied. The 3/16″ thickness may be nailed directly to studding or rafters. For ceilings, the ⅛″ thickness may be applied in the same manner, although for wall applications, a solid backing of ⅜″ plywood is recommended.

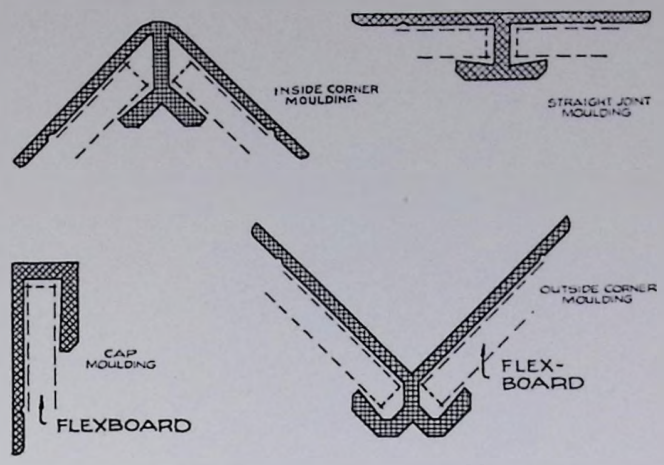
Asbestos Flexboard can be applied to curved surfaces with the following limitations:

Thickness of sheets	Longitudinal radius	Transverse radius
⅛″	30″	36″
3/16″	36″	48″

Joints between the sheets may be either square or beveled. The location and desired finished appearance determine the method of fastening the sheets. Either nails with or without battens, or aluminum moulding and nails may be used. Complete directions for applying Flexboard appear on other data sheets.

Aluminum Mouldings and Battens:

Where the decorative effect of metal trim is desired, J-M Aluminum Mouldings are recommended. Their



J-M ALUMINUM MOULDINGS

exposed faces are polished to combine attractive appearance with unusual resistance to corrosion. The extruded aluminum is easily workable. At intersections, mouldings can be coped and mitered with a hacksaw. Nails can be driven through the flanges, a shallow groove in the aluminum mouldings ¼″ from the edge of each flange acting as a guide.

The aluminum mouldings, in 8-ft. lengths, are furnished in four forms: J-M Cap Moulding, J-M Outside Corner Moulding, J-M Inside Corner Moulding and J-M Straight Joint Moulding. The cap moulding may be applied first and the Flexboard slipped into it. When applying an inside or outside corner moulding, both flanges should be nailed. However, in the application of straight joint moulding, it is permissible to nail one flange only.

Decorative Flexboard Battens are available in the five colors, to match the Decorative Flexboard. They are supplied 4 ft. long in three widths, 1¼″, 2″ and 4″. Black battens are also available for special decorative effects. Battens are shipped 25 per package.

If desired, battens may be carefully cut from the Flexboard sheets. Pre-painted wood strips are sometimes used in applying Standard Flexboard.

Nailing Sheets:

For Standard and Decorative Flexboard sheets ⅛″ thick, No. 1 x 1″ polished, button-head drive-screw nails are recommended and for 3/16″ thick Standard sheets, No. 1 x 1″ polished, casing-head drive-screw nails. All sheets are nailed on not over 16″ centers, vertically and horizontally. The centers of the sheets are nailed first, the edges last. Edges are nailed on 6″ centers except scored sheets which, if button-head nails are used, may be nailed on 8″ centers in the grooves of the scored Asbestos Flexboard.

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APPLYING J-M ASBESTOS FLEXBOARD

Standard Flexboard is furnished with a smooth plain finish in 1/8" and 3/16" thicknesses, or a "scored" (tile design) finish 1/8" thick.

Decorative Flexboard is obtainable in 1/8" thickness, plain or "scored", in various integral colors.



This attractive basement room has walls of green Decorative Flexboard, backed with J-M Insulating Board. Note the curved bar front, which is also of Flexboard.

ACCESSORIES:

In the application of J-M Standard or J-M Decorative Flexboard it is essential that the following accessories be used to provide for proper erection and appearance.

Fasteners:

Fasteners are not furnished with J-M Asbestos Flexboard, but the drive-screw nails mentioned are carried in stock by Johns-Manville.

Nails: Standard or Decorative Flexboard sheets 1/8" thick are applied with No. 1 x 1" polished, button-head drive-screw nails.

Standard Flexboard sheets 3/16" thick are preferably applied with No. 1 x 1" polished, casing-head drive-screw nails set very slightly below the surface of the sheet.

Screws: Flat-head wood screws, No. 2 x 3/4", may also be used for applying Standard or Decorative Flexboard.

Aluminum Mouldings:

J-M Aluminum Mouldings are used for fastening sheets at the edges and to form and cover joints. There are four types obtainable: cap, straight joint, inside corner and outside corner.

Battens:

Battens of Decorative Flexboard are obtainable in colors to match the sheets and in black.

USAGE:

J-M Asbestos Flexboard, in addition to being a wall and ceiling finish material, is used for many purposes. However, for exteriors, Standard Flexboard is recommended rather than Decorative Flexboard.

LAYOUT:

The work should be carefully planned in advance so that the most symmetrical design is obtained with the minimum of waste. This is particularly important where aluminum mouldings are employed. It is to be noted that the "flower" (mottling) of the material is directional, and this should be considered when placing the sheets.

Flexboard can be applied with joints butted and pointed up; with joints covered with metal mouldings; with joints covered with battens of Flexboard or wood; or with edges of sheets beveled and butted to form "V" joints.

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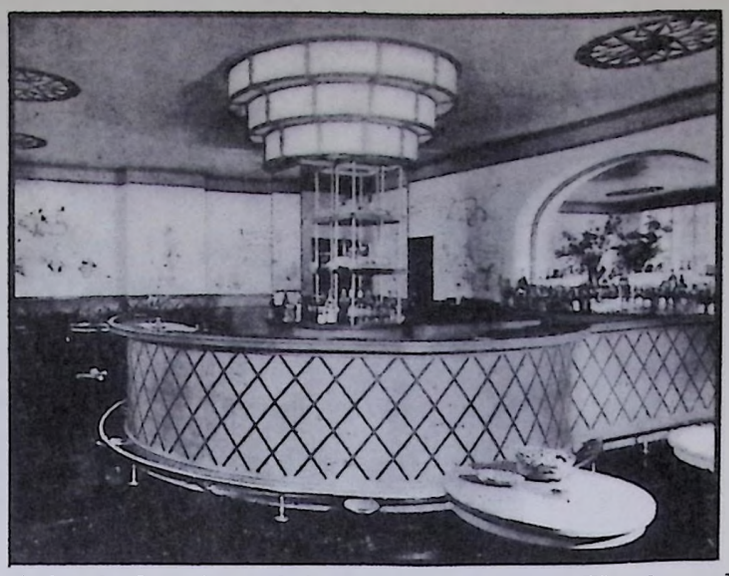
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PREPARATORY WORK:

All studs, joists, furring, ground, etc. are to be set plumb or level and to a true and even plane.

Surfaces to be covered with Flexboard are to be prepared to receive it by being (a) closely boarded with 3/4" wood sheathing, (b) covered with plywood not less than 3/8" thick, or (c) provided with grounds or furring strips (not less than 3/4" x 2") spaced at not to exceed 16" centers with similar grounds placed to center behind all joints. If application is over existing plaster, the plaster may be chased to receive the grounds, which in this case may be but 1/2" thick.



A keyhole-shaped bar of Asbestos Flexboard

An exception is made in the requirement for backing under the body of the sheets in the case of the 3/16" material; and 1/8" material on ceilings. In these instances, application may be made directly to studs, rafters and joists.

APPLICATION:

General:

Flexboard is a finished product and care must be taken in handling not to scratch or mar the surface or to break corners or edges.

In cutting Flexboard use a fine-point cross-cut saw. Always cut from the finished face. Remove saw burr from the unfinished side with a wood rasp before applying the sheet. Bevels may be formed and edges smoothed with a block plane, a file, or sandpaper. Cut the aluminum mouldings with a hack saw, preferably in a mitre box, and remove burr with a file.

Start the work by establishing a horizontal, level line to serve as a guide in laying the sheets. This line may be measured up from the low point of the floor and the work planned so that inequalities in the floor may be cared for by scribing the sheets or the baseboard thereto or covering with a quarter-round moulding.

Where holes are to be made in Flexboard to receive built-in fixtures, it is recommended that the back of the Flexboard around openings be primed with shellac before applying the sheet in place. This prevents any possible staining from the material used to set the fixtures.

Waterproofing and Treatment:

Around bathtubs or shower stalls, J-M 15-lb. Asphalt-Saturated Asbestos Felt is to be applied over the entire area which is to receive the Flexboard. The felt to be lapped 3" horizontally and 6" vertically, and the bottom edge allowed to flash over rim of tub or shower curb. Before setting, in addition to buttering the edges, apply joint cement on the back of the sheet for 1/2" along the bottom edge. The sheet is to be firmly set in the cement before fastening, and the excess cement removed before it dries.

Spacing of Fasteners:

The 1/8"-thick material may be nailed directly. However, for 3/16"-thick sheets, holes to receive the fasteners are made with a drill or an awl. All sheets are nailed on not over 16" centers, vertically and horizontally. The centers of the sheets are nailed first, the edges last. Edges are nailed on 6" centers except scored sheets which, if button-head nails are used, may be nailed on 8" centers in the grooves of the scored Flexboard.

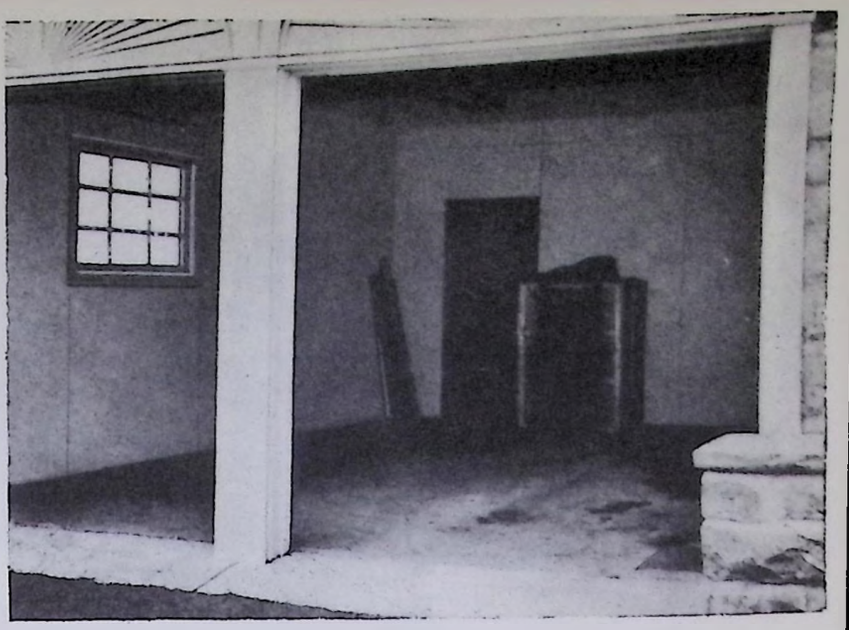
Battens of Flexboard are to be secured with fasteners adjacent to each edge, spaced on no greater than 6" centers. The aluminum mouldings are secured with common nails, driven through the exposed flange on no greater than 8" centers.

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Using Aluminum Mouldings:

Start application at an inside corner by applying a length of cap moulding and securing it in place. Cut an inside corner moulding to fit snugly against the cap moulding and secure in place. Slip first sheet of Flexboard under the cap moulding and slide into corner moulding, securing it temporarily. Cut a straight joint moulding to fit the next vertical joint. Slip one flange under sheet in place and secure through exposed flange. When approaching another inside corner, slip an inside corner moulding over the edge of the sheet and slide sheet into place, flexing it to fit into the mouldings already applied. Secure the corner moulding through the exposed flange.

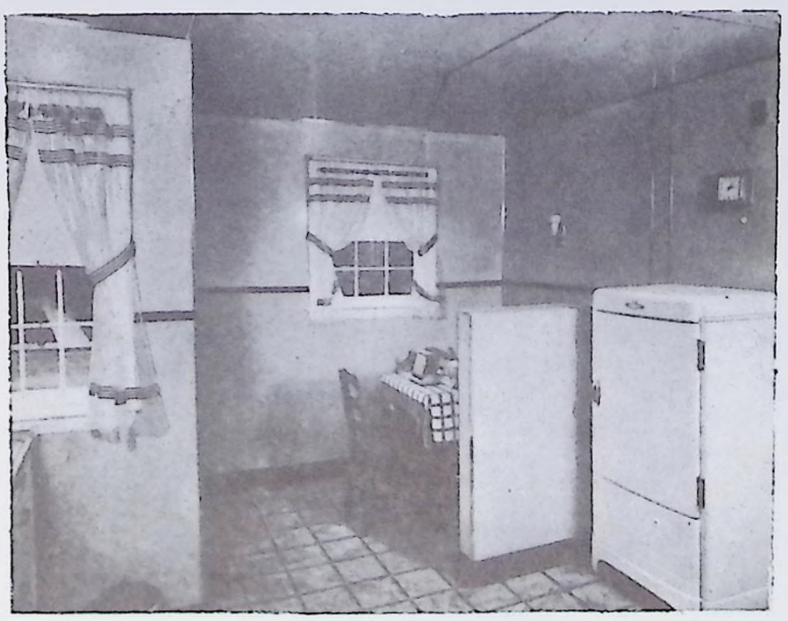


J-M Flexboard provides a clean, fire-resisting lining for garages

To secure moulding at the last corner or to secure cap in ceiling height installations, fasteners must be placed from the face of the finished work through the Flexboard and the underlying flange.

Another method is to apply the cap moulding after sheets are erected. Take a length of cap, cut and fitted, set it to line, and start the nails so that flange is marked to show where nails will occur. With a pair of tin snips cut slots in the flange up to the nail hole markings. Replace the mould and drive the nails until heads are in light contact with the flange. Lift off the cap and erect the sheets as described in the foregoing. Reset the cap moulding by sliding the flange down behind the sheets to engage the nails in the slots cut therein. Drive the nails home by placing a block of wood on the face of the sheet over the nail locations and hammering.

Place intermediate nailing on 12" centers in both directions in the body of the sheets.



An attractive treatment of kitchen, using Decorative Flexboard with metal joint strips and black battens

Without Aluminum Mouldings:

If the joints between the sheets are to be left uncovered, cuts must be carefully made and the sheets fitted before being secured. Joints at inside corners are to be formed by placing the sheets on one side to extend full into the corner, the sheets on the other side to be scribed to abut. At outside corners the joint is to be similarly formed, butted, the exposed corner of the overlapping sheet to be planed or filed slightly bull-nosed.

Base and Cap:

Base and cap may be of wood or other material ordinarily used.

Painting and Finishing:

Flexboard may be painted as described on other data sheets.

JOHNS-MANVILLE Building Materials, Miscellaneous

DATE April, 1938

Applying J-M Asbestos Flexboard

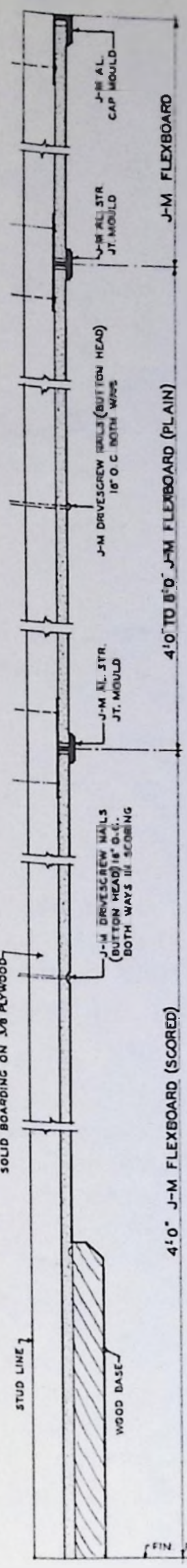
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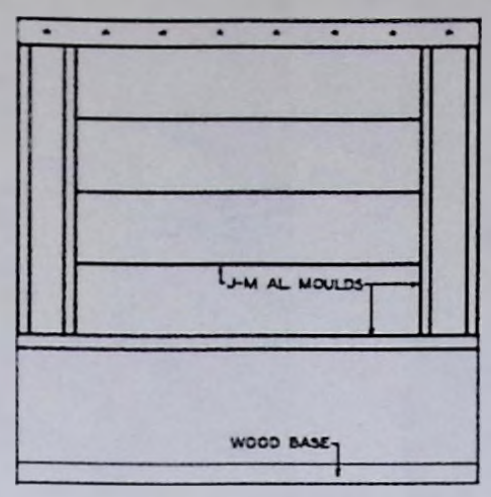
TECHNICAL DATA SECTION

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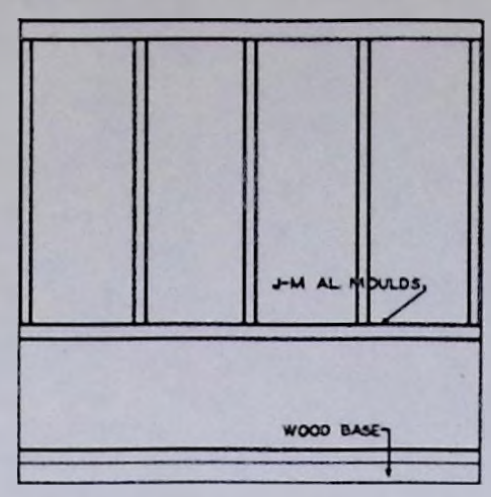
TYPICAL SECTIONS AND ELEVATIONS OF J-M ASBESTOS FLEXBOARD



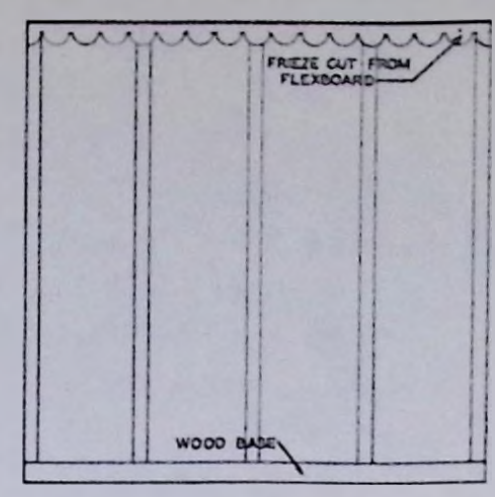
SECTION THRU FLEXBOARD WALL
CEILING HEIGHT - SCORED WAINSCOTING WITH PLAIN SHEETS ABOVE AND J-M ALUMINUM MOULDS
(NEW WORK)



DECORATIVE FLEXBOARD AND J-M ALUMINUM MOULDS

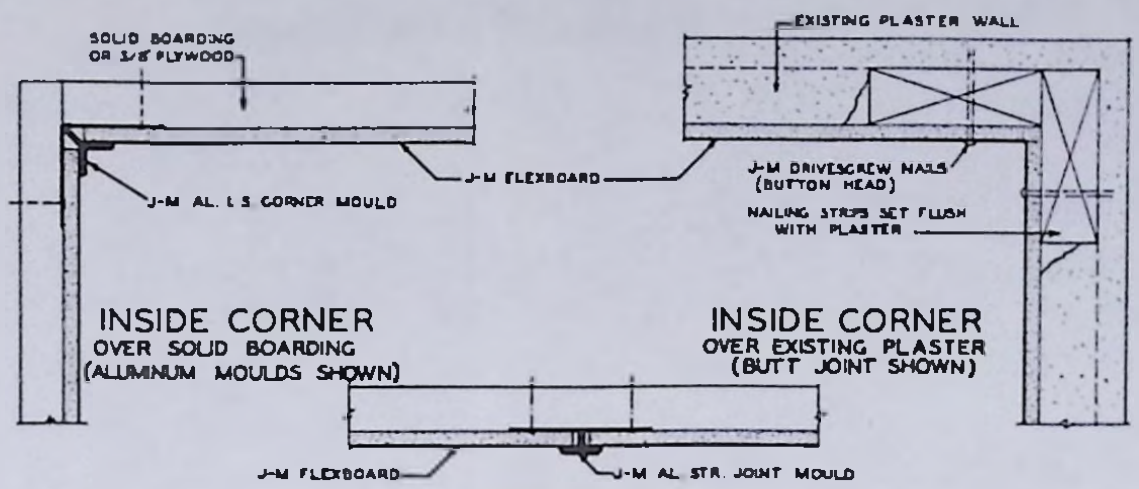


DECORATIVE FLEXBOARD AND J-M ALUMINUM MOULDS

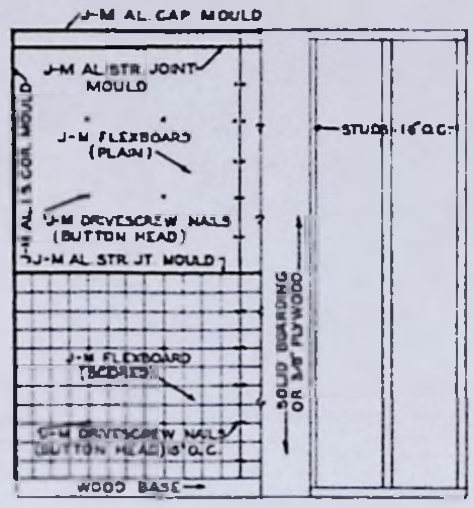


DECORATIVE FLEXBOARD USING "V" JOINTS

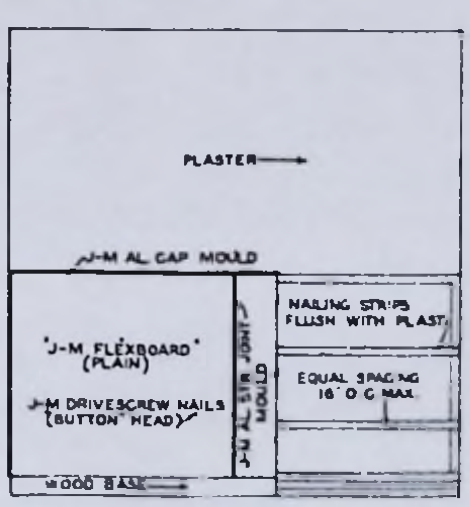
THREE OF MANY POSSIBLE FLEXBOARD WALL TREATMENTS



STRAIGHT JOINT
ALUMINUM MOULD

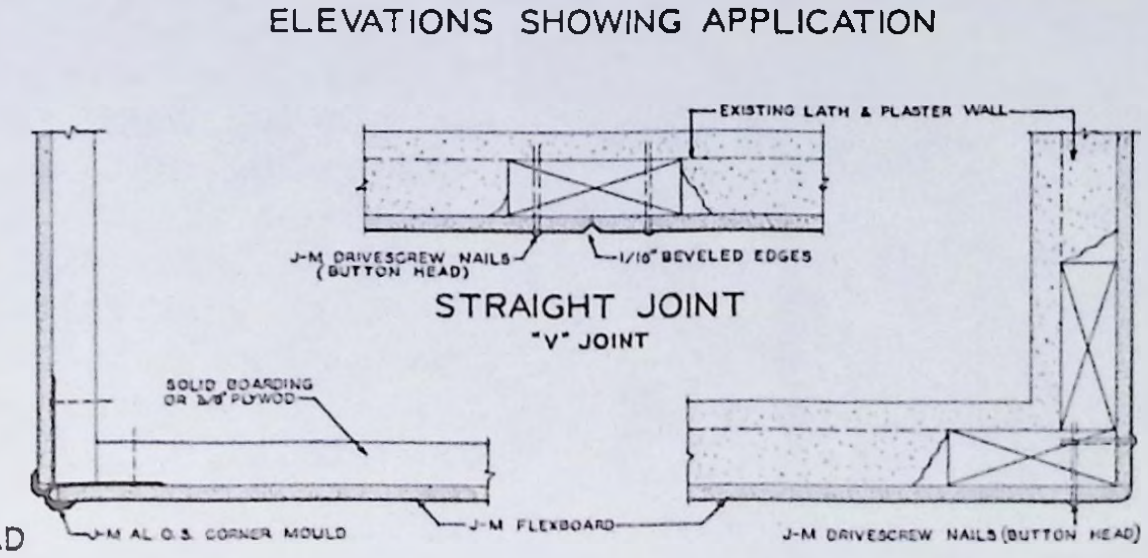


FULL HEIGHT FLEXBOARD WALL OVER SOLID BOARDING



FLEXBOARD WAINSCOTING OVER EXISTING PLASTER WALL

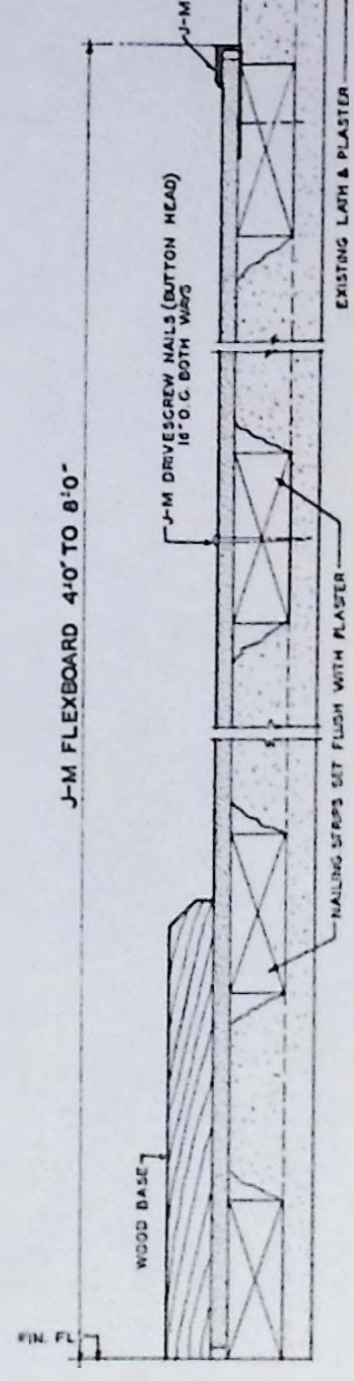
ELEVATIONS SHOWING APPLICATION



STRAIGHT JOINT
"V" JOINT

OUTSIDE CORNER
OVER SOLID BOARDING
(ALUMINUM MOULD SHOWN)

OUTSIDE CORNER
OVER EXISTING PLASTER
(BUTT JOINT SHOWN)



SECTION THRU FLEXBOARD WAINSCOTING
OVER EXISTING PLASTER WALL
J-M ALUMINUM MOULDS USED
(OLD WORK)

SPECIFICATION FOR CEMENT-ASBESTOS SHEETS

The sheets shall be made of cement and asbestos fibre formed into dense, tough, structurally-strong sheets, of uniform thickness throughout. They shall have straight, true edges, square corners, and at least one plane, smooth surface. The product shall not warp, crack or peel under the normal conditions for which it is recommended.

GENERAL REQUIREMENTS:

The size of the board shall be 48" x 96" for unscored and 48" x 48" for scored material as specified. The maximum variation of sheets for size shall be plus or minus 1/16" in length and width. The thickness of the sheets shall be 1/8" or 3/16" as specified. The maximum variation in thickness of sheets shall be plus or minus 1/32". The color shall be natural light gray.

DETAIL REQUIREMENTS:

The average normal density shall be 95 lb. per cu. ft. The normal moisture content shall be from 5 to 8 percent by weight. The average modulus of rupture of sheets broken in both directions shall be 5000 lb. per sq. in. as tested dry, based on unscored material. Sheets shall be capable of being bent to a minimum radius as follows:

Thickness of sheets	Longitudinal* radius	Transverse** radius
1/8"	30"	36"
3/16"	36"	54"

* 8-ft. dimension forming arc of circle.

** 4-ft. dimension forming arc of circle.

SAMPLE AND TESTS:

The manufacturer shall supply with his bid 3 sq. ft. of board representative of what is proposed to be supplied. Tests will be made of these samples for acceptance of the bid. Further tests will be made of the material as delivered.

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SPECIFICATION FOR CEMENT-ASBESTOS SHEETS

The sheets shall be made of cement and asbestos fibre and formed into dense, tough, structurally-strong sheets of uniform thickness throughout. They shall have straight, true edges, square corners, and one plane, smooth surface which shall be polished and processed to produce a water-resisting, transparent film. The product shall not warp, crack or peel under the normal conditions of usage for which it is recommended.

GENERAL REQUIREMENTS:

The size of the board shall be 4 ft. x 8 ft. for the plain sheets and 4 ft. x 4 ft. for the scored sheets. Scoring shall be on 4" centers in both directions.

Maximum variation of sheets for size shall be plus or minus 1/32". The thickness of the sheets shall be 1/8". The maximum variation in thickness of sheets shall be plus or minus 1/64". The available colors shall be buff, gray, rose, slate and green. Scored material shall be grooved with score marks in light gray; except color gray which is scored in white.

DETAIL REQUIREMENTS:

The average normal density shall be 90 lb. per cu. ft. The normal moisture content shall be from 5 to 8 percent by weight. The average modulus of rupture of sheets broken in both directions shall be 5500 lb. per sq. in. based on dry, unscored material. The 1/8"-thick sheets shall be capable of being bent to a minimum radius as follows:

Longitudinal, 30" (8-ft. dimension forming arc of circle)

Transverse, 36" (4-ft. dimension forming arc of circle)

SAMPLE AND TESTS:

The manufacturer shall supply with his bid 3 sq. ft. of the board representative of what is proposed to be supplied. Tests will be made of these samples for acceptance of the bid. Further tests will be made on samples of the material as delivered.

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J-M Asbestos Wainscoting

Tile effects and decorative panels, so desirable in modern interiors, were formerly available only at great expense. Now, using Asbestos Wainscoting, it is possible to accomplish even better results at very moderate cost.

J-M Asbestos Wainscoting is composed of asbestos fibre and portland cement, moulded under pressure, into strong, rigid, fireproof sheets. The wear-resisting, baked-on finish provides a colorful surface that will not crack or craze and will endure any normal conditions of use without damage.

Asbestos Wainscoting offers a colorful, sanitary wall surface that is durable and waterproof. The large sheets can be quickly and economically installed either in new construction or over existing walls. They can be shaped, to fit odd corners, with the ordinary tool equipment. Furthermore, there is complete freedom from maintenance costs involved in replacement of broken pieces as when some other materials are used. There is no possibility of cracks, shrinkage or buckling. The surface can be kept bright and clean with a minimum of effort. This material is ideal for interiors where a wall combining beauty and utility is desired at a relatively low cost.

A wide range of treatments is made possible by the variety of colors and designs in which Asbestos Wainscoting is available. It is equally suitable for modernizing in homes, restaurants, hotels, office buildings, hospitals and laundries where cleanliness, beauty and durability are desired. The waterproof quality of Asbestos Wainscoting makes it a logical material for use in shower stalls, bathrooms and around sinks and tubs in the kitchen. It is available in marbleized designs and in scored tile designs of various colors. It is also supplied in plain color panel designs on special order.

Marbleized Wainscoting

The same rich and luxurious interior effects formerly obtained through the use of the most expensive marbles, can now be had at only a fraction of the cost by using J-M Marbleized Wainscoting.

From four of the finest quarries, Johns-Manville selected the most perfect marble specimens obtainable in color and in marking, and has reproduced their surface appearance in such identical detail that it is practically impossible to distinguish J-M Marbleized Wainscoting from the actual marbles themselves. The four most popular marbles for interior use—Breche Rose, Jaune Fleuri, Verde Antique and Black and Gold, are now available in J-M Asbestos Wainscoting.



J-M Marbleized Wainscoting now creates the luxurious effects formerly secured only through the use of expensive marbles

J-M Marbleized Wainscoting is furnished in sheets 32″ x 48″, ¼″ thick. It is packed in crates containing 6 sheets each and weighing approximately 185 lb. The contents of a crate may be of any design assortment desired. With each crate are packed one drill, one 1-oz. can of touch-up lacquer and approximately 120 polished casing-head drive-screw nails.

Marbleized Wainscoting is held in place at the bottom with J-M Marbleized Base, which is rabbeted to receive the sheets. At the top it is held by a similarly constructed J-M Marbleized Cap. Both are furnished in designs to match the Marbleized Wainscoting in strips 48″ long and ½″ thick. The J-M Cap is 3″ wide and J-M Base, 6″ wide. They weigh 1.1 lb. and 2.3 lb., respectively, per lin. ft.

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An 11-point saw is recommended for cutting Asbestos Wainscoting



Asbestos Wainscoting sheets, cap and base are drilled to receive nails



Nails are driven in grooves only and countersunk slightly with a nailset

Tile and Plain Designs

Where the style of wall treatment requires a tile pattern, J-M Asbestos Wainscoting—Tile Design—meets every requirement of color and durability. The design is deeply scored into the sheets in 4″ squares to give the effect of individual units. The Tile Design Asbestos Wainscoting is furnished in green, blue, ivory, white and, on special order, in black. The scoring on white sheets is finished with gray and on colored sheets, with white.

Tile Design is furnished in sheets, 48″ x 48″, ¼″ thick and is packed in crates containing 4 sheets each and weighing about 180 lb. Crates are packed with any color assortment desired.

Plain Color Panel Designs (unscored sheets) are supplied in the same size, weight and colors as the Tile Design sheets; also, 48″ x 96″ on special order.

J-M Cap and J-M Base for Tile Design is available in 48″ strips, in two types, Standard and Flush.

The Standard Type Cap has an exposed width of 1½″ and the Standard Type Base 5″. Both cap and base have a rounded top edge and are scored on 8″ centers. They are 7/16″ thick and are rabbeted ¼″ on reverse side to receive top and bottom of sheet.

J-M Flush Type Cap and Base are rabbeted on the front side of strip so that the faces are on the same plane as the edge of the sheet. Flush Type Cap and Base are scored on 8″ centers and are supplied in the same exposed widths as the Standard Type. The strips are ½″ thick; the ¼″ face leaving approximately ¼″ in back of the sheet for furring strips.

Both Standard and Flush Types for Plain Design are supplied, unscored on special order only.

J-M Cap and Base are available in black and in colors to match the Tile and Plain Design sheets.

The improved outside corner strip, ¼″ thick, 7¾″ wide and 48″ long, of the same material and colors as the Wainscoting, is provided with one edge curved, making possible a flush, rounded corner.

Each crate of Tile Design contains one drill, one 1-oz. can of touch-up lacquer and two 2-oz. cans of joint cement to match scoring, and approximately 120 polished, casing-head drive-screw nails, all furnished without charge. The crates of Plain Design contain one drill, one 1-oz. can of touch-up lacquer the same color as the sheets, two 2-oz. cans of joint cement, and about 120 polished, button-head drive-screw nails.

Application

Complete application directions for J-M Asbestos Wainscoting designs appear on other data sheets. Instruction forms are also included with every shipment made from the factory. For applying Wainscoting, it is merely necessary to provide a suitable wood base for nailing.

The sheets, cap and base are securely fastened to walls with nails. Marbleized and Tile Design sheets are fastened with 1½″ polished, casing-head drive-screw nails, and Plain Design, with 1½″ polished, button-head drive-screw nails. The cap and base are secured with ordinary finishing nails. All fasteners are countersunk slightly and finished with joint cement. Nails are driven in the grooves of Tile Design sheets.

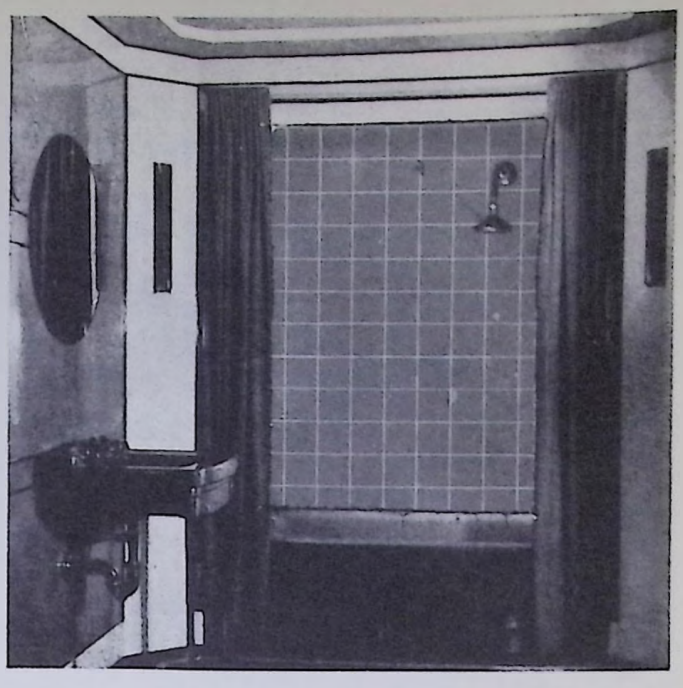
When Wainscoting is applied in shower stalls and around bath tubs, the joints are waterproofed with J-M 15-lb. Asphalt-Saturated Asbestos Felt applied over the entire area covered by the Wainscoting. The felt is lapped 3″ horizontally and 6″ vertically, and the bottom edge allowed to flash over rim of tub or shower curb. Joint cement is applied to the edges of the Wainscoting sheets and on the backs for ½″ along the bottom edges. The sheets must be firmly set in the cement before fastening, and the excess cement removed before it dries.

Slum Clearance Program: Specifications and Data on Various Building Materials (1938)
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APPLYING J-M ASBESTOS WAINSCOTING

In order to obtain fully the advantages offered by J-M Asbestos Wainscoting, it is important that particular attention be paid to the following detailed directions for application over either new or old work.



J-M Asbestos Wainscoting is especially suited for bathrooms

GENERAL:

Marbleized Wainscoting is supplied in sheets 1/4" thick with Cap and Base to match the sheets.

Tile and Plain Design Wainscoting are furnished in sheets 1/4" thick of various colors, with Standard or Flush Cap and Base to match the sheets. or in black.

Plain Design (unscored sheets) are furnished 1/4" thick with unscored Cap and Base to match.

Outside corner strips (bull-nosed) are supplied to match the Tile Design sheets. Corner strips for Plain Design sheets are also supplied.

The colored and black Tile Design sheets have white scoring, and the white Tile Design sheets are scored in gray. Standard or Flush Cap and Base are scored in white.

Each crate of Wainscoting contains a drill of proper size for nails and sufficient nails. Touch-up lacquer of the same color as the sheets is supplied with Plain Design. With Tile Design, touch-up lacquer is supplied to match the white or gray scoring. The touch-up lacquer supplied with Marbleized sheets matches the field or base color.

Joint Cement is furnished with Tile Design sheets in gray or white to match the scoring.

It is essential for the proper application of J-M Wainscoting that the accessories mentioned above be used as directed.

FASTENERS:

Nails: Two types of polished 1½" drive-screw nails are furnished: the button-head drive-screw nail for securing Plain Design sheets and the casing-head drive-screw nail for nailing the Marbleized and Tile Design sheets.

Screws: Flat-head wood screws No. 2 x 1" may be used for applying Tile Design sheets and round-head chromium-plated wood screws No. 6 x 1" for applying Plain or Marbleized sheets.

JOINT CEMENT:

The Joint Cement provided is used to fill the joints between sheets of Tile Design and to cover the heads of fasteners.

JOHNS-MANVILLE Building Materials, Miscellaneous

Applying J-M Asbestos Wainscoting

DATE April, 1938
(Cancelling BMM-305 & 306 dated Nov., 1937)
BMM-305

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TECHNICAL DATA SECTION

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USAGE:

J-M Asbestos Wainscoting in addition to the usual interior wall treatment may be used for bathroom walls, around tubs and showers, in kitchens and laundries, or wherever a water-resisting material is required.

It is not recommended for exterior use or in places subjected to live steam, extreme heat or continued refrigerating temperatures.



J-M Asbestos Wainscoting is effectively used for paneling in barber shops

LAYOUT:

The work should be carefully planned in advance so that the most symmetrical design is obtained with a minimum of waste. This is particularly important in some instances where metal mouldings are to be used. Marbleized sheets should be so planned that the veining which runs lengthwise is vertical.

PREPARATORY WORK:

General:

All furring or grounds in old and new work and studs or joists in new work, are to be set plumb or level and to a true and even plane.

Surfaces to be covered with the Wainscoting are to be prepared by being (a) boarded with 3/4" tongue and groove sheathing, or (b) covered with Plywood not less than 3/8" thick, or (c) provided with grounds or furring strips (1" x 3") run horizontally and spaced not to exceed 12" centers, with additional grounds behind all joints, edges of openings and fixtures.

New Work:

If the wall above the Wainscoting is to be plastered, the backing or grounds for the Wainscoting should be installed before plastering to serve as a screed.

If the wall above the Wainscoting is to be covered with J-M Flexboard, 3/4" tongue and groove sheathing or 3/8" Plywood is applied over the entire area.

If grounds are to be used instead of solid backing, J-M PanLboard or Insulating Board may be applied solidly in back of Flexboard and either solidly or in narrow waste strips nailed to grounds in back of Wainscoting.

Construction details are shown on a following data sheet.

Old Work:

All wall fixtures and, when possible, radiators and plumbing fixtures, except bathtubs, are to be removed. If application is over existing plaster, the plaster may be chased to receive the grounds which in such cases may be but 1/2" thick.

The use of Flush Type Cap and Base is suggested for application of the Wainscoting over existing plaster. In this construction, 1/4" x 2" dressed grounds are necessary for Cap and Base and 1/2" x 2" dressed grounds must be applied horizontally on 12" centers behind the Wainscoting with additional grounds behind all joints, edges of openings and fixtures.

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All grounds must be installed in a manner as to permit the Asbestos Wainscoting to be applied plumb and level and to a true plane. In order to obtain such a surface, it may be necessary to trim the plaster slightly in some places and shim out in others.

APPLICATION:

General:

J-M Asbestos Wainscoting is a highly finished product. Care must be used in unpacking and handling to keep the finish from being scratched or marred. Do not remove wrapper until sheets are ready for use.

Start work by establishing a level line (for top of sheets) to serve as a guide in applying the sheets. This line should be measured up from the high point of the floor and the work planned so that inequalities in the floor level may be covered with a quarter round moulding.

Cutting:

Wainscoting Sheets of all types must be cut with the finished side up, using a 9, 10 or 11 point cross cut saw and the burr removed from the unfinished side with a rasp before applying the sheets. A heavy duty power hacksaw blade may also be used for cutting. All cuts should be planned carefully. To provide for outlet boxes and flush fixtures, the area should be outlined and a hole drilled in each corner. An 11 point Keyhole saw is used for cutting between holes and a cardboard template for laying plumbing outlet cuts. Large openings may be cut by drilling small holes close together along the line of cut and removing the piece with a sharp chisel.

All cut or mitred edges are painted with touch-up lacquer and allowed to dry. Trimming can be done with a rasp, always working away from the finished surface.

Fastening:

The drill packed with the fasteners is to be used for drilling all holes to receive nails in sheets, Cap and Base. Nails should be driven with a nail set to avoid hammer marks.



Note neatness with which workmen have cut grille opening and three pipe holes through the wainscoting



The wainscoting is fastened with 1½" drive-screw nails spaced uniformly around the edge of each sheet

JOHNS-MANVILLE Building Materials, Miscellaneous

DATE April, 1938

Applying J-M Asbestos Wainscoting

BMM-306

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TECHNICAL DATA SECTION

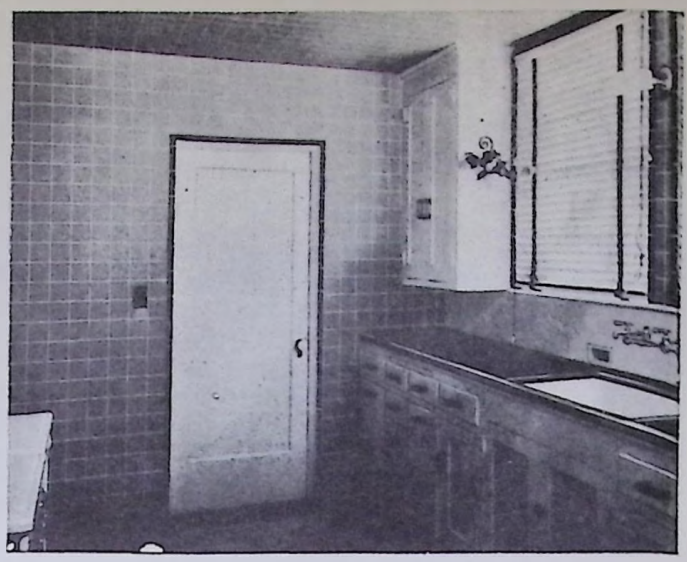
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Tile Design: Sheets are to be fastened in the score marks, spaced 12" vertically and horizontally. The casing-head drive-screw type of nail is used, the nails slightly set and hole filled with joint cement.

Plain Design: Fasteners are to be spaced 12" vertically and horizontally, and approximately 1/2" from all edges. The button-head drive-screw type of nail is used.

Marbleized Design: In this design the fasteners are to be spaced 12" vertically and 16" horizontally, and approximately 1/2" from all edges. The casing-head drive-screw nails are used. In setting Marbleized sheets reverse every other one to obtain variation.

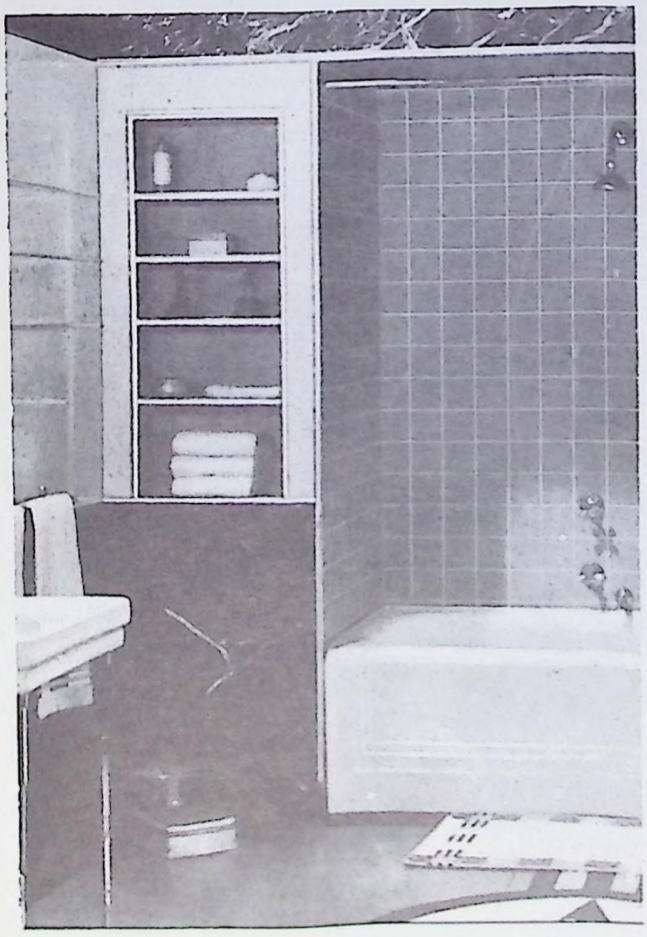


J-M Asbestos Wainscoting provides attractive sanitary kitchen walls

Aligning: The nailing in both Plain and Marbleized sheets should be carefully aligned.

Cap and Base: Fasteners for Cap and Base are to be spaced about 12" on centers or on the studs. The nails should be set and the holes filled with joint cement and touched-up.

Corner and Joint Construction: Cuts at joints must be carefully made. At inside corners butt joints are made by applying the sheets on one wall with the edges butted tightly against the corner. The sheets on the adjacent wall are to be buttered with joint cement before setting and the sheets worked tightly together. The excess cement is to be wiped off before it dries.



Tile Design in tub alcove; Plain Design shown above wainscot of Marbleized Design

Outside Corners of Tile and Plain Design are formed with the corner strips which have a slight "bull-nose". With the Marbleized Design outside corners are to be quirked 1/8", made in the same manner as in marble work.

Metal Mouldings: Several types of polished metal mouldings are available from various manufacturers.

WATERPROOFING:

Around bathtubs or shower stalls, J-M 15-lb. Asphalt-Saturated Asbestos Felt is to be applied over the entire area which is to receive the Wainscoting. The felt to be lapped 3" horizontally and 6" vertically, and the bottom edge allowed to flash over rim of tub or shower curb. Before setting, in addition to buttering the edges, apply joint cement on the back of the sheet for 1/2" along the bottom edge. The sheet is to be firmly set in the cement before fastening, and the excess cement removed before it dries.

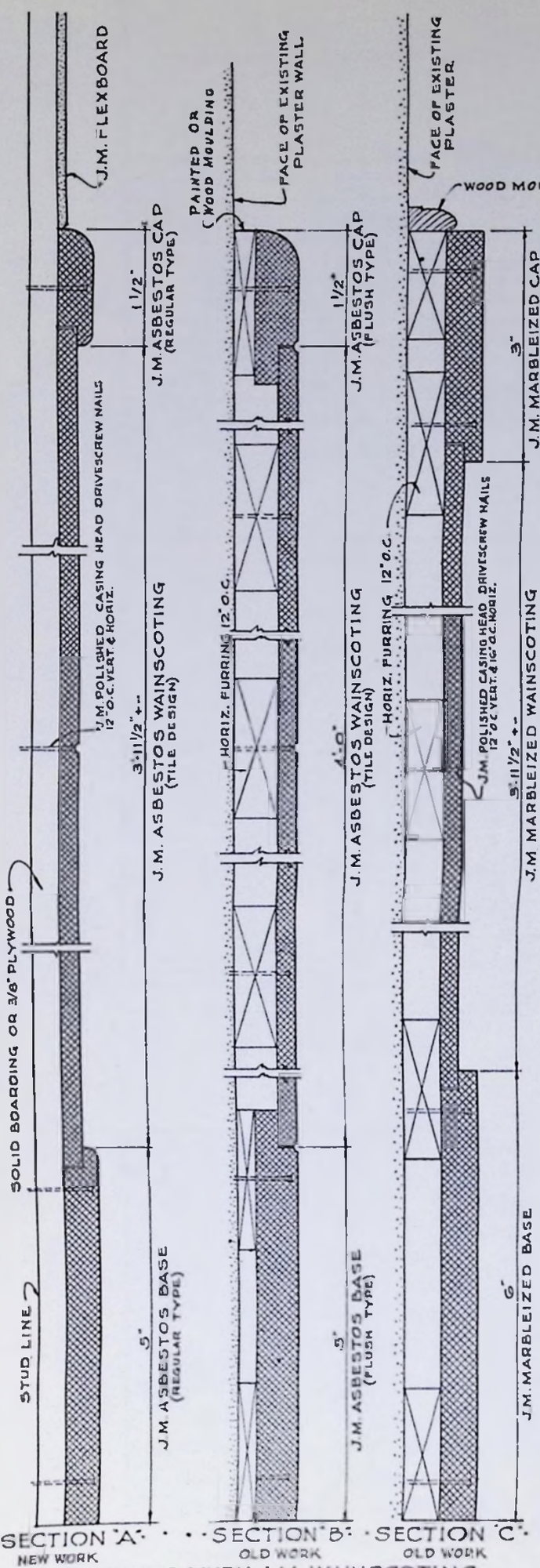
FINISHING AND CLEANING:

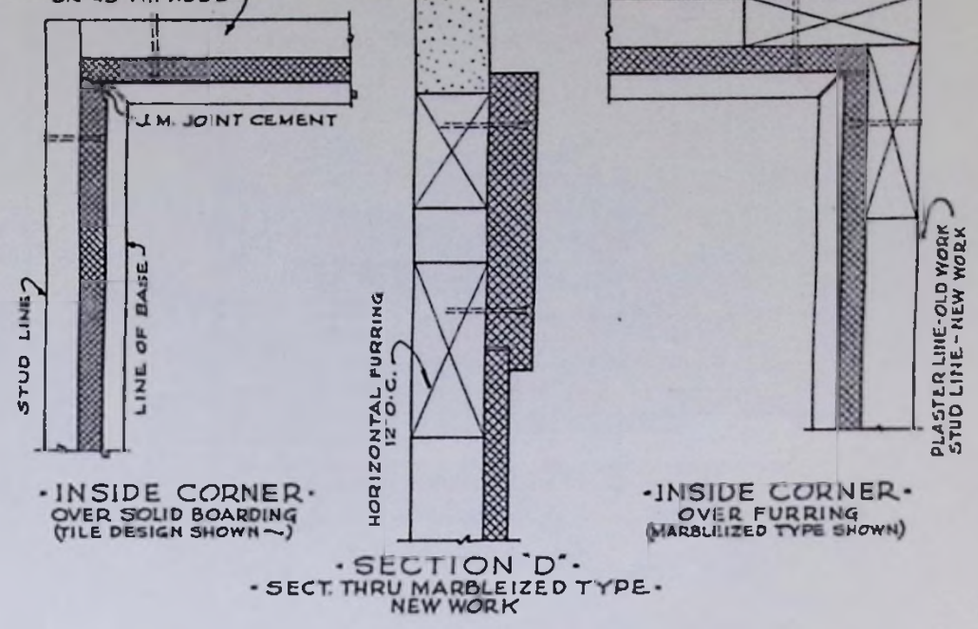
Any raw edges and marks in the Wainscoting should be treated with the touch-up lacquer, and all nail heads covered with the joint cement. After the job has been completed and the touch-up lacquer has entirely dried, the surface should be cleaned with luke-warm water and Ivory soap.

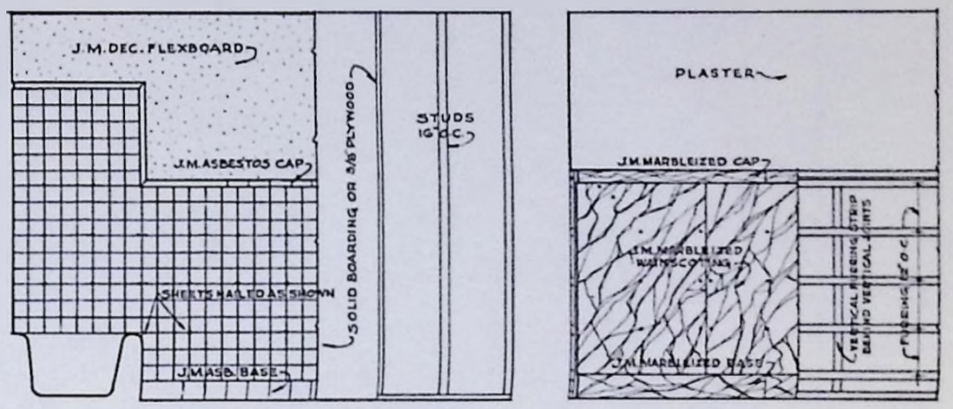
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TYPICAL SECTIONS AND ELEVATIONS OF J-M ASBESTOS WAINSCOTING

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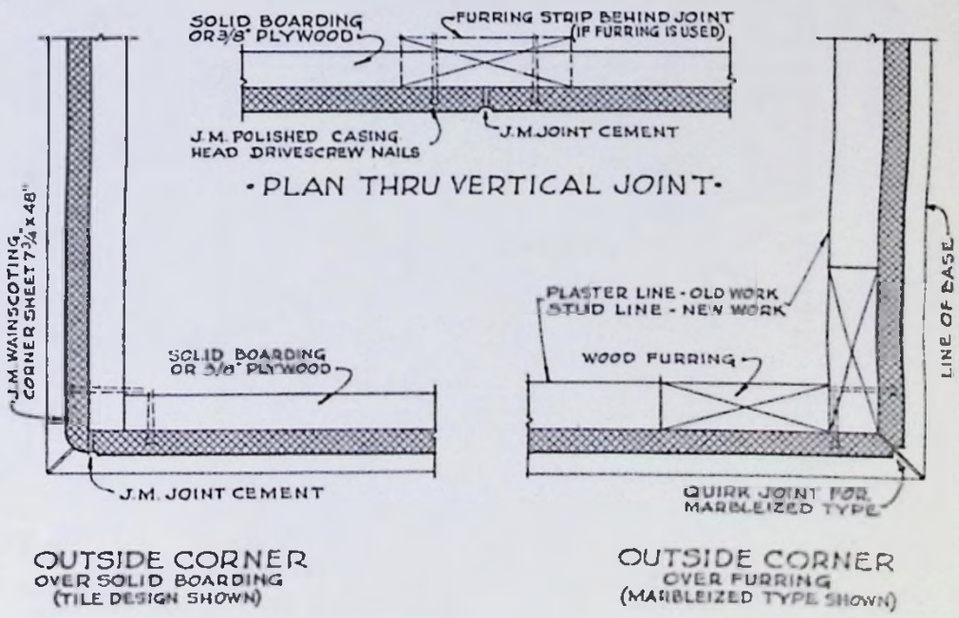




J.M. ASBESTOS WAINSCOTING WITH J.M. FLEXBOARD ABOVE
(TILE DESIGN SHOWN)

J.M. ASBESTOS WAINSCOTING PLASTER ABOVE
(MARBLEIZED TYPE SHOWN)

·ELEVATIONS·



OUTSIDE CORNER
OVER SOLID BOARDING
(TILE DESIGN SHOWN)

OUTSIDE CORNER
OVER FURRING
(MARBLEIZED TYPE SHOWN)

JOHNS-MANVILLE Building Materials, Miscellaneous

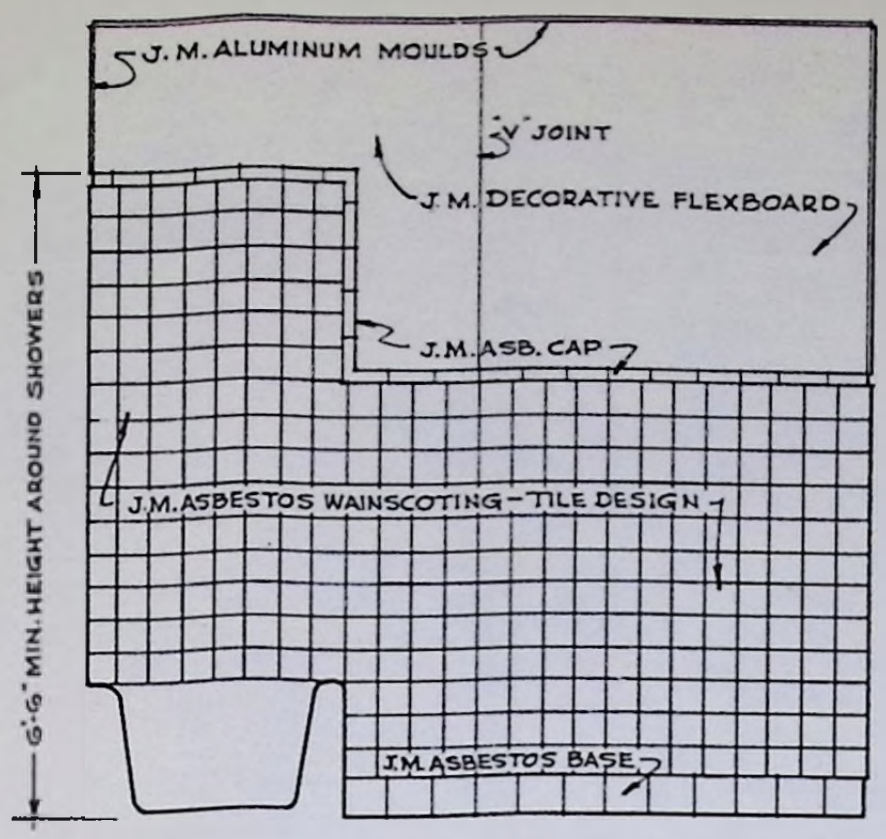
Applying J-M Asbestos Wainscoting
Typical Sections and Elevations

DATE April, 1938
(Cancelling sheet dated Apr., 1937)
BMM-307

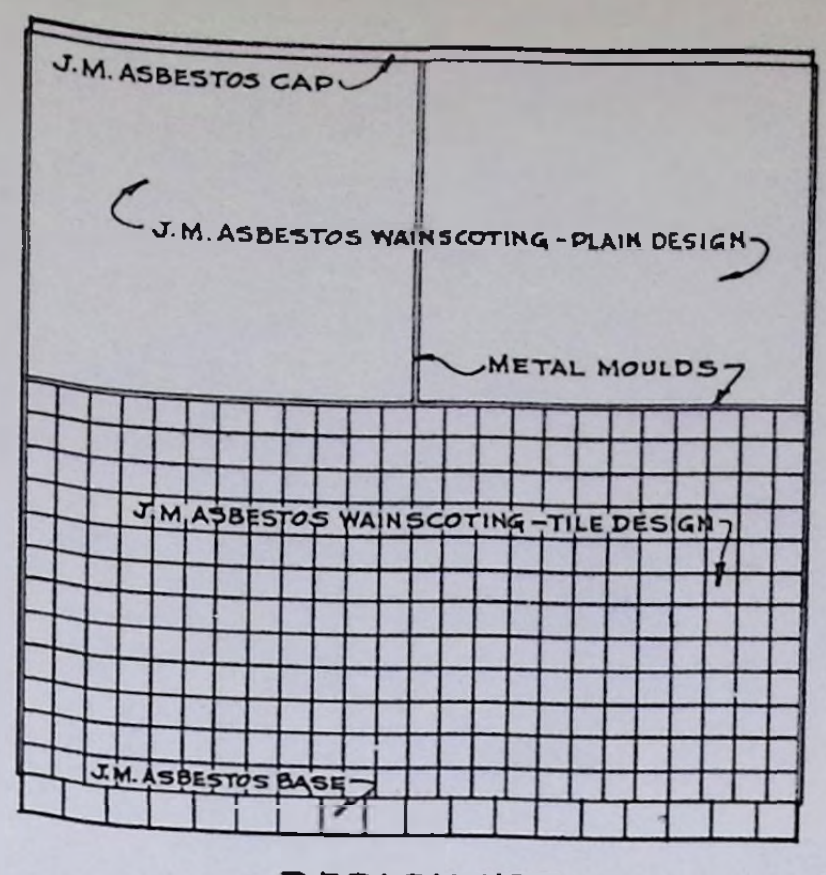
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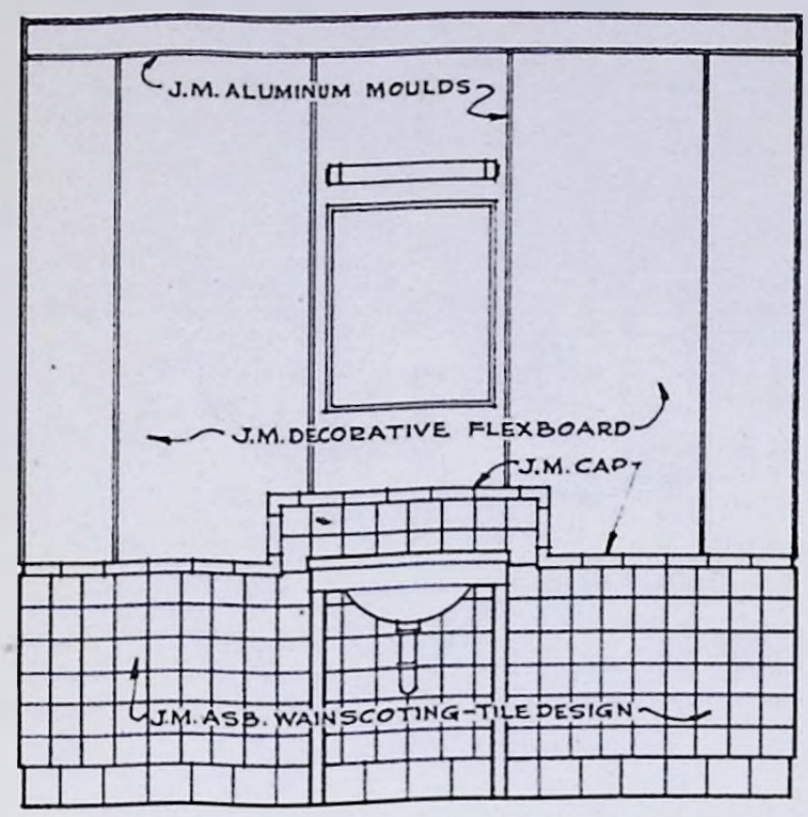
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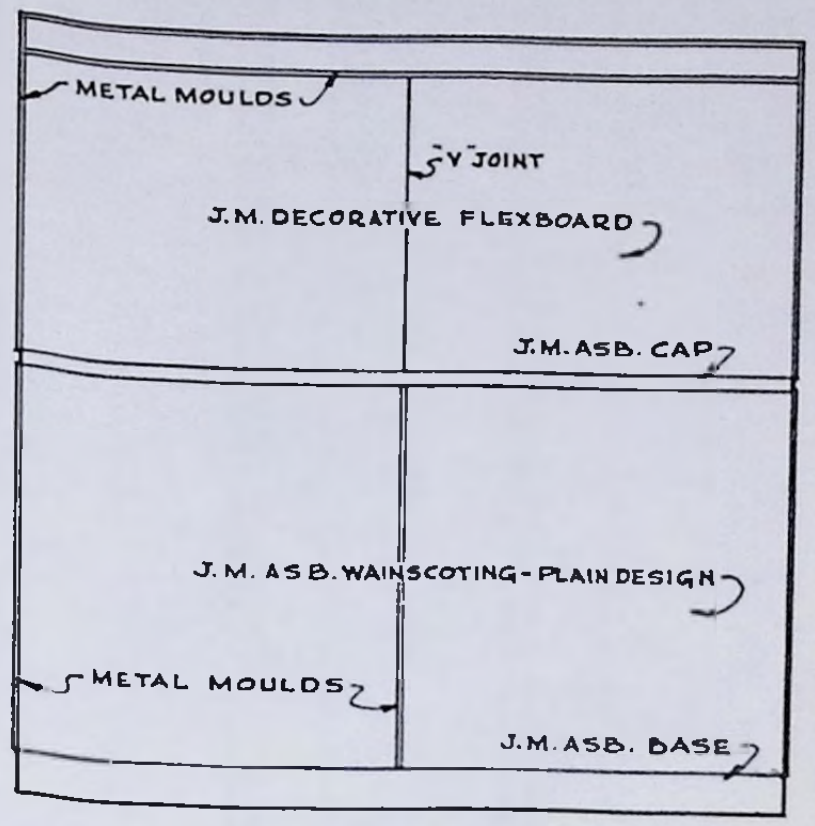
- DESIGN Nº1 -



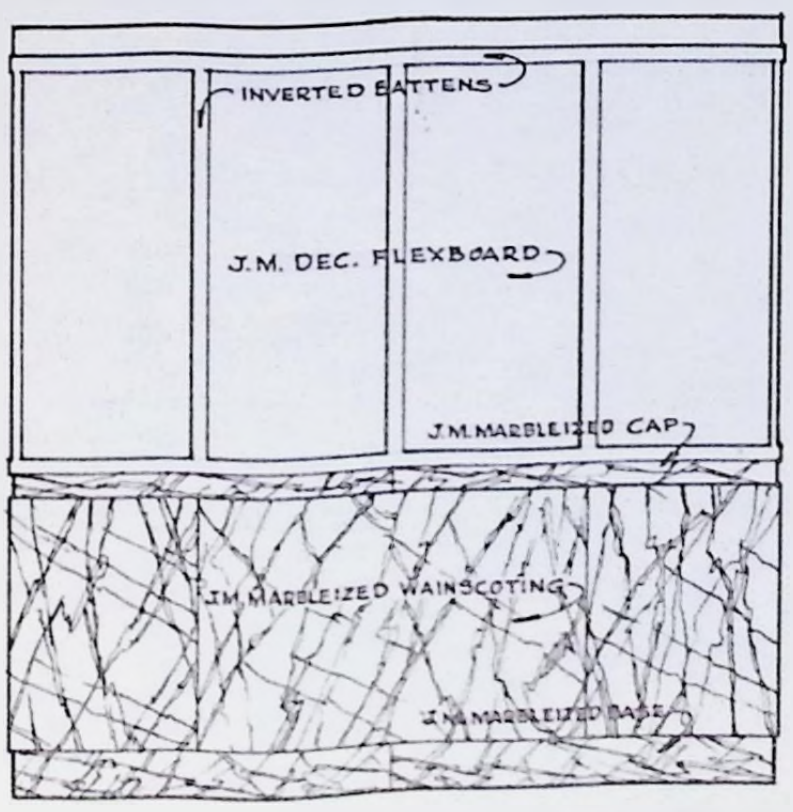
- DESIGN Nº2 -



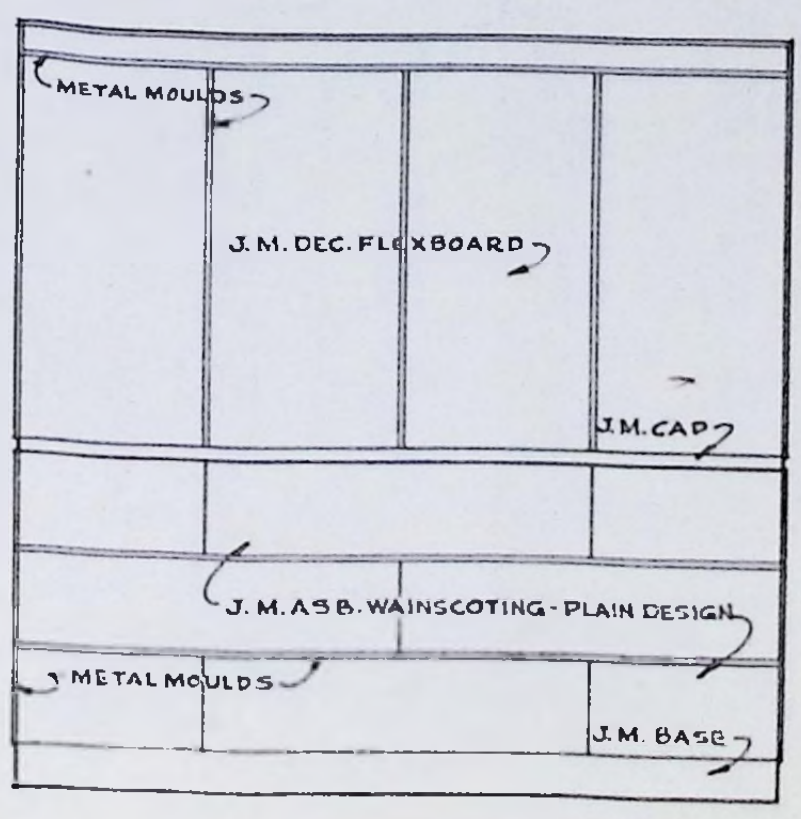
- DESIGN Nº3 -



- DESIGN Nº4 -



- DESIGN Nº5 -



- DESIGN Nº6 -

- SUGGESTED COLOR COMBINATIONS -

DEC. FLEXBOARD ABOVE —	GREEN	BUFF	ROSE	BUFF	GRAY	GREEN	GRAY	GREEN	BUFF	GRAY	ROSE
WAINSCOTG. (TILE OR PLAIN) BELOW	WHITE	WHITE	WHITE	GREEN	GREEN	IVORY	BLUE	BLACK	BLACK	BLACK	BLACK
(PLAIN) WAINSCOTING ABOVE —	IVORY	WHITE	GREEN	WHITE	IVORY	WHITE	WHITE	IVORY	OR THE SAME		
(TILE) WAINSCOTING BELOW —	GREEN	GREEN	BLACK	BLACK	BLACK	IVORY	BLUE	BLUE	COLOR FOR BOTH		
DEC. FLEXBOARD ABOVE —	GREEN		GREEN	BUFF		GREEN		BUFF			
MARBLEIZED WAINSCTG BELOW	VERDE ANTIQUE		BLACK & GOLD	BLACK & GOLD		JAUNE FLEURI		BRECHE ROSE			

- BLACK CAP AND BASE EXCEPT FOR MARBLEIZED WAINSCOTING -

BATHROOM WALL DESIGNS

0 1 2 3 4 5

SCALE IN FEET

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SPECIFICATION FOR CEMENT-ASBESTOS SHEETS

The sheets shall be made of portland cement and asbestos fibre formed into dense, tough, structurally-strong sheets, of uniform thickness throughout. They shall have straight, true edges, square corners, and at least one plane, smooth, colored surface specially treated to produce a hard moisture-resisting, easily-maintained surface. The product shall not warp, crack or peel under the normal conditions of usage for which it is recommended. The product shall be either plain, tile or marbleized design. (Indicate type).

GENERAL REQUIREMENTS:

The size of the sheets shall be 4 ft. x 4 ft. for the tile design, 4 ft. x 4 ft. and 4 ft. x 8 ft. for the plain design and 32" x 48" for the marbleized design. Accessories in the form of drills, touch-up lacquer, joint cement and nails shall be furnished. The maximum variation of sheets for size shall be plus or minus 1/32". The thickness of sheets shall be plus or minus 1/64". Color of scored and plain design sheets shall be green, white, ivory, blue and black as specified. The type of marbleized sheets shall be Verde Antique, Breche Rose, Jaune Fleuri, and Black and Gold, as specified.

DETAIL REQUIREMENTS:

The average density shall be 100 lb. per cu. ft.

Normal moisture content shall be 1 to 3 percent.

The average modulus or rupture shall be 4000 lb. per sq. in. for unscored material.

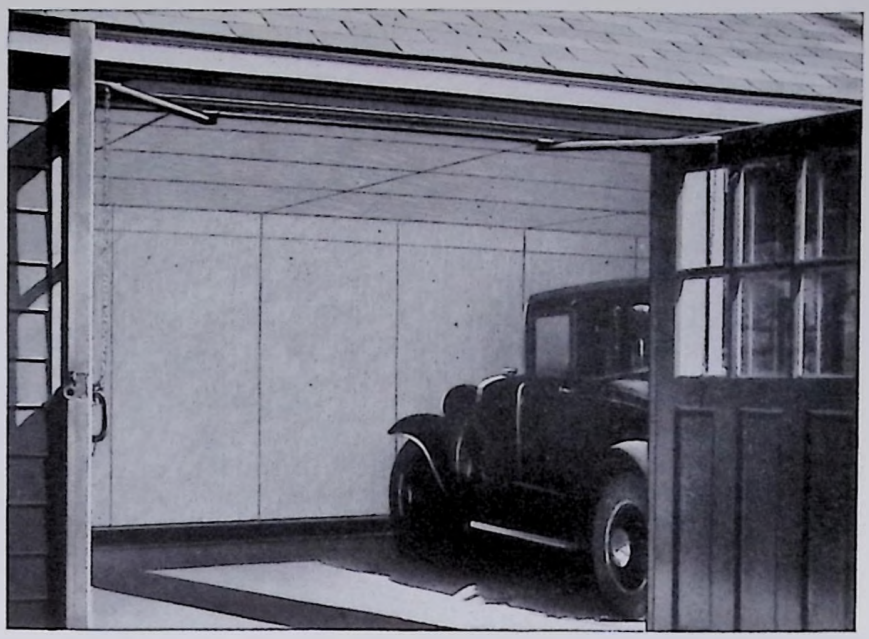
SAMPLES AND TESTS:

The manufacturer shall supply with his bid 3 sq. ft. of board representative of what is proposed to be supplied. Tests will be made of these samples for acceptance of the bid. Further tests will be made on samples of the material as delivered.

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J-M Asbestos Wall Board



J-M Asbestos Wall Board affords a neat, fireproof and easily erected inside finish for garages and other interiors

J-M Asbestos Wall Board is a laminated sheet building material formed of asbestos fibre and portland cement subjected to hydraulic pressure. It weighs approximately 120 lb. per cu. ft. The material is buff in color and provides a pleasing and easily erected wall interior. In strength, durability and fireproof qualities this flat, rigid, mineral product is second only to Flat Transite. Transite has a monolithic structure which is of great advantage under severe service conditions. For resistance to heat, acid or alkali vapors and exposure to weather, nothing can equal Transite. Under less severe conditions, J-M Asbestos Wall Board serves an excellent purpose, replacing wood, plaster, or sheet metal.

For use as a fire-stop partition between domestic garages and dwellings, as an unburnable lining for detached garages, for ceilings and walls, sorting table tops, bath house partition walls and similar applications, Asbestos Wall Board will satisfactorily meet all requirements. It is essentially a material for inside use where its strength, durability, fireproof qualities and low cost make an ideal combination.

It will not rot or rust and does not chip, buckle or deteriorate. The quality of lasting indefinitely finds wide application for Asbestos Wall Board in industrial plants, public buildings, office buildings, machine shops, garages and residences.

Extremes of temperatures from the hottest to the coldest weather will not affect the strength of Asbestos Wall Board. The passage of time hardens and toughens it. Its weight, as compared to heavier and bulkier materials, is much in its favor. The supporting framework can be lighter, resulting in greater interior space and lower cost.

J-M Asbestos Wall Board never needs paint or other surface protection, thus eliminating all maintenance expense. However, if desired, after a thorough priming with boiled linseed oil, it can be painted or grained for architectural effects. In its natural color, Asbestos Wall Board is well adapted to interior walls, ceilings, window casings, partitions, cabinets, baseboards, and other trim.

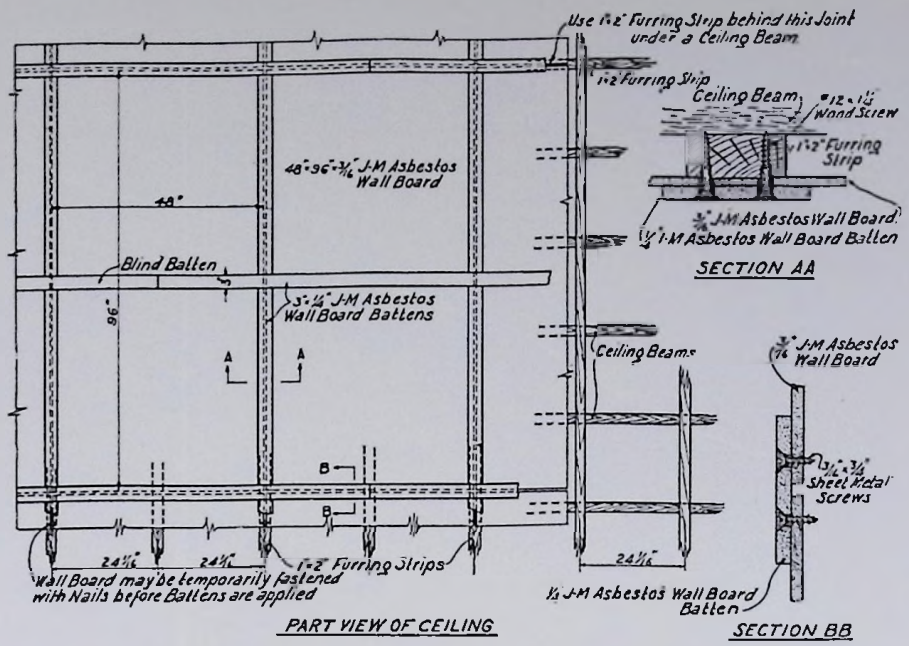
It can be drilled with twist drills, punched, fastened with nails or screws and sawed with a hand saw, though a portable power saw should be used if much sawing is to be done.

Asbestos Wall Board is furnished in flat sheets, 48″ x 48″ and 48″ x 96″ (plus or minus 1/16″), and in 3/16″, 1/4″ and 3/8″ thicknesses. Smaller size sheets are supplied on special order.

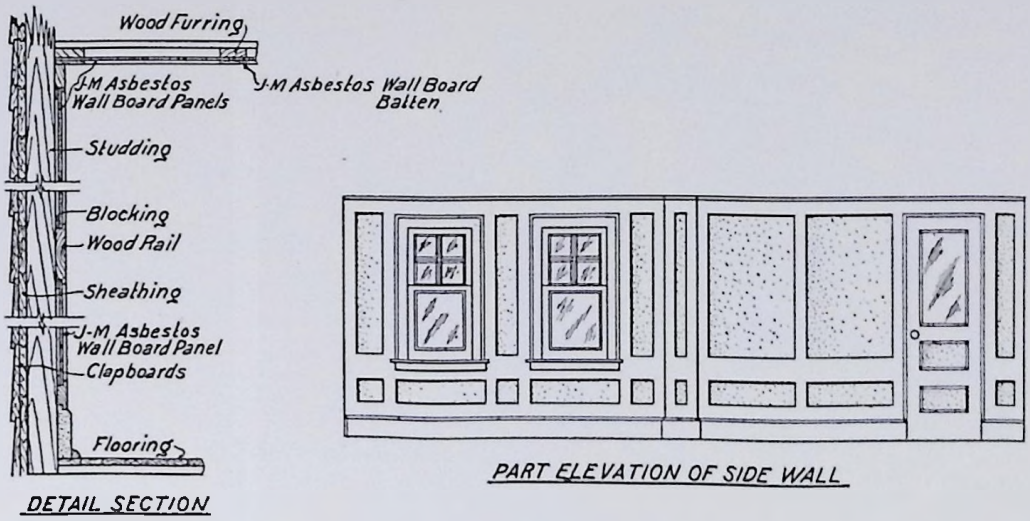
J-M ASBESTOS WALL BOARD
October, 1936 (Cancelling sheet dated July, 1935) 4-G-1 [BMM-250]

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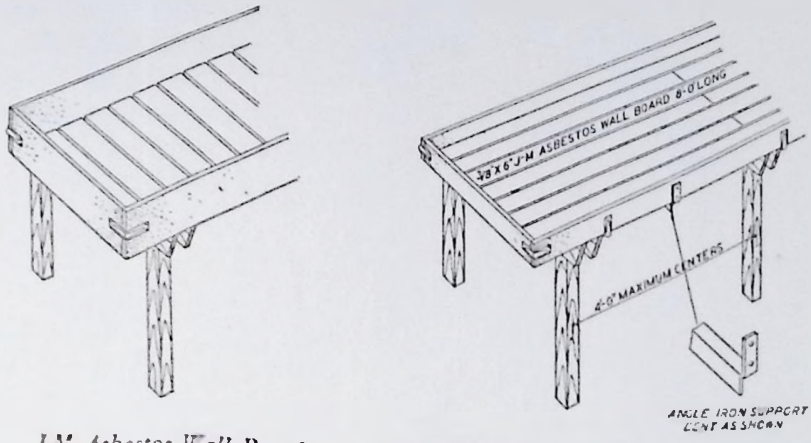
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Under-side ceiling construction details for J-M Asbestos Wall Board



One type of side-wall interior using J-M Asbestos Wall Board



J-M Asbestos Wall Board makes ideal flower benches for greenhouses

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SPECIFICATION FOR CEMENT-ASBESTOS SHEETS

The sheets shall be made of cement and asbestos fibre formed into dense, tough, structurally-strong sheets of uniform thickness throughout. They shall have straight, true edges, square corners, and at least one plane, smooth surface. The product shall not warp, crack or peel under the normal conditions for which it is recommended.

GENERAL REQUIREMENTS:

The size of the sheets shall be 48" x 48", or 48" x 96", as specified. The maximum variation of sheets for size shall be plus or minus 1/16" in length and width. The thickness of the sheets shall be 3/16", 1/4" and 3/8" as specified. The maximum variation in thickness of sheets shall be plus or minus 1/32". The color shall be uniform light buff, obtained by adding mineral pigment to the cement and asbestos materials.

DETAIL REQUIREMENTS:

The average normal density shall be 100 lb. per cu. ft. Normal moisture content shall be from 5 to 8 percent by weight. The average modulus of rupture of the sheets tested in both directions shall be 4500 lb. per sq. in., tested dry.

SAMPLES AND TESTS:

The manufacturer shall supply with his bid 3 sq. ft. of board representative of what is proposed to be supplied. Tests will be made of these samples for acceptance of the bid. Further tests will be made on samples of the material as delivered.

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Corrugated Transite



Laying J-M Corrugated Transite Roofing. The cut corner construction permits a tight joint with straight lap lines, and results in a durable, attractive roof

A material for industrial roofing and siding construction must, in addition to possessing structural efficiency, withstand the many forms of destructive action which are common in chemical and metallurgical processes. For over twenty years Transite has continually proved its value as such a material, not only because of its durability and fire-resisting qualities but also because of its ease of application and freedom from painting or other maintenance.

Transite is made of asbestos fibre and portland cement, formed under great pressure into dense, unlaminated, monolithic sheets possessing unusual strength, rigidity and durability. Corrugated Transite sheets are designed for use as roofing, siding and partitioning, particularly over skeleton frame construction. This material has been extensively used by railroads, public utilities and industrial plants because of its exceptionally high resistance to acid fumes, alkaline vapors, adverse atmospheric conditions and extreme and sudden temperature changes.

In the thousands of installations which have been made, every detail of construction has been thoroughly worked out to assure rapid, economical erection. Special fasteners have been designed, accessories made available in the form of ridge rolls, corner rolls and louvres, and ventilators manufactured of Transite to meet a wide variety of requirements.

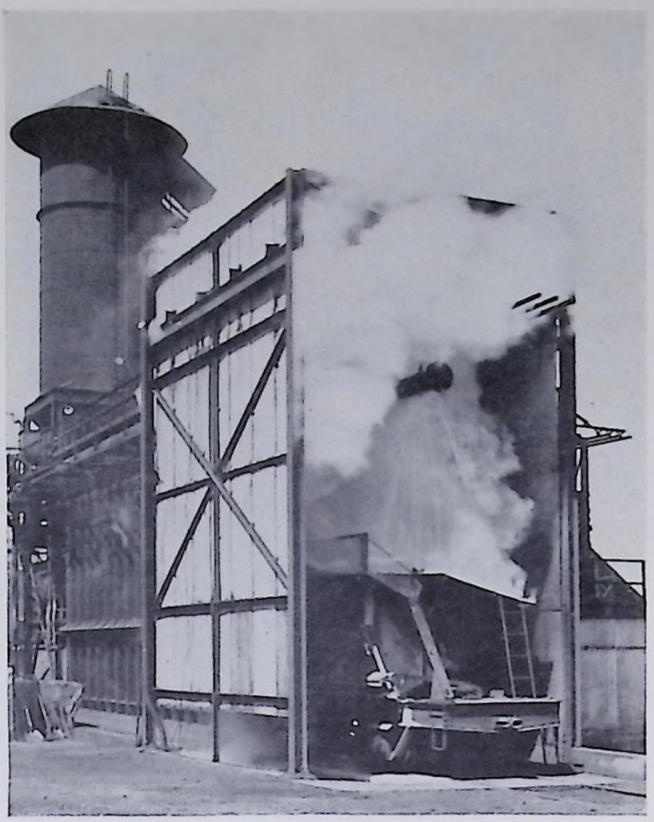
Characteristics of Transite

Resistance to Fire:

Transite, in addition to being non-combustible, will withstand considerable temperature without cracking or buckling. This resistance to destructive agencies, while desirable under all conditions, is essential where combustible products are manufactured. In the event of a fire in one of a closely related group of buildings, Transite prevents the destruction of the entire plant by confining the fire to its source. This is well illustrated by the large use of the material as a roofing over stills in oil refineries where it has proved effective in preventing the spread of fire from one unit to another. No other material, so adaptable to general building construction, surpasses Transite in resistance to fire.

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Transite used on a coke-quencher station

Resistance to Weather and Corrosion:

In chemical industries, Corrugated Transite roofing and siding provide resistance to the corrosive attacks of practically all the common acid fumes and gases, such as the vapors around gas plants, coke ovens, smelters and other metallurgical equipment. Where roofing and siding previously had to be replaced frequently, Transite has been in use for many years without the necessity for maintenance or replacement.

Similarly, the extremes of climatic conditions do not deteriorate Transite. Neither is it affected by rain and salt corrosion even where the atmosphere is heavily charged with chemical vapors and dust which is dissolved in the rain to form acid.

Resistance to Temperatures and Steam:

Alternate dry and wet conditions or high and low temperatures, common to many industrial operations, do not harm Corrugated Transite. It may be used over open vats, in boiler rooms and wherever steam, irrespective of its temperature or condition, is likely to come into contact with the roofing and siding.

The coke-quencher offers an outstanding example of this "shock-proof" quality. A car loaded with glowing coke, radiating heat at a temperature of about 1700 deg. F. against the Transite, is run into the quencher, and the cold water is turned on. Some of this water strikes the Transite, the rest hits the glowing coke and is promptly converted into steam. This steam strikes the water-cooled siding, and escapes to the atmosphere. This process is repeated in frequent cycles during the working day. Transite is the only corrugated material which has satisfactorily withstood the rigors of this unusual service.

Durability and Economy:

Like many other portland cement products, Transite actually becomes tougher and stronger with age and stands up for years under conditions which destroy other forms of roofing and siding. Since it requires no protective painting or other maintenance expense and because it reduces fire risks to a minimum, Corrugated Transite is decidedly economical. Accurate records of users indicate that Transite assures the longest life and lowest per annum cost.

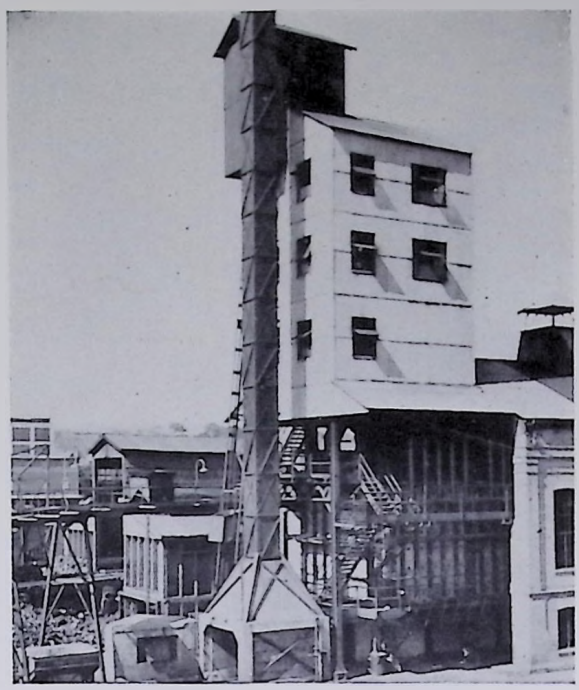
Physical and Structural Properties:

Strength: The great pressures used in combining the asbestos fibre and portland cement, together with the reinforcing action of the asbestos fibres, produce a surprisingly strong sheet. However, while Transite possesses ample strength for the purpose intended, it should not be subjected to overloading or undue shocks. Workmen should use "chicken ladders" on



Transite is used on water-side coal handling equipment of this large East coast public utility

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Corrugated Transite on U. G. I. Intermittent Ovens, Dubuque, Iowa

all roofing work. For the standard Corrugated Transite sheets with 4.2″ pitch, the maximum spacing of framing members for roofing is 54″ center to center; for siding, 66″ center to center.

Appearance: Transite, a light gray in color and uniform in texture, presents an attractive appearance. Its light-reflecting properties are often of advantage not only for interiors but also for exteriors in reflecting the heat of the sun. Transite can be painted if desired for architectural effect by first priming the clean and dry material with boiled linseed oil. Detailed directions for the special treatment of cement-asbestos products appear on another data sheet.

Ease of Application: Transite requires no special tools for application and it can be installed as rapidly, in the same general way, as any other corrugated material. The material can be drilled with twist drills, punched, fastened with nails and screws and sawed with a hand saw, though a portable power saw should be used if much sawing is to be done. Special fasteners, which are supplied on order, further facilitate erection over various types of framework.

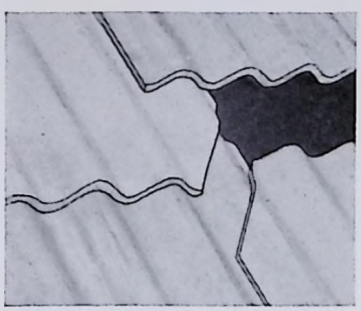
Perfect Nesting of Corrugations: An important feature of Corrugated Transite is the cut-corner construction of the sheets, shown on the drawings, which permits sheets to be laid with side laps forming straight lines. Furthermore, the inside and outside radii of the corrugations are the same, insuring perfect nesting at laps and a water-tight and wind-tight construction. If desired, the sheets can also be furnished with all corners square for staggered joint construction.

Where Corrugated Transite Is Used

In the following brief outline, a few of the many interesting and widely varying applications of Corrugated Transite are reviewed.

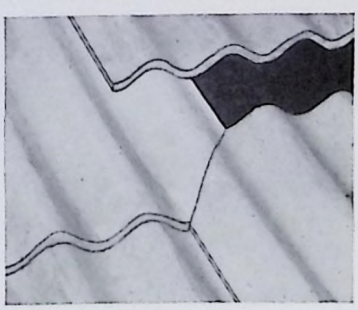
Oil Refineries: Corrugated Transite serves for fireproof aprons and roofs over stills, housings of various types, and for "flare-back" walls around tanks to prevent spread of burning oil to adjacent tanks in case a fire develops.

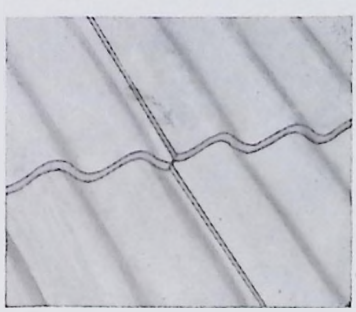
Railroads: Transite is used for switch towers, freight houses, way stations, and relay, battery and tool sheds, pedestrian overpasses, smoke baffles, round houses and car shops. Transite Smoke Jacks, Smoke Ducts and Ventilators, described on other data sheets, are widely used in round houses.



Sheets in position for closing joints

Underlying sheets with joints closed



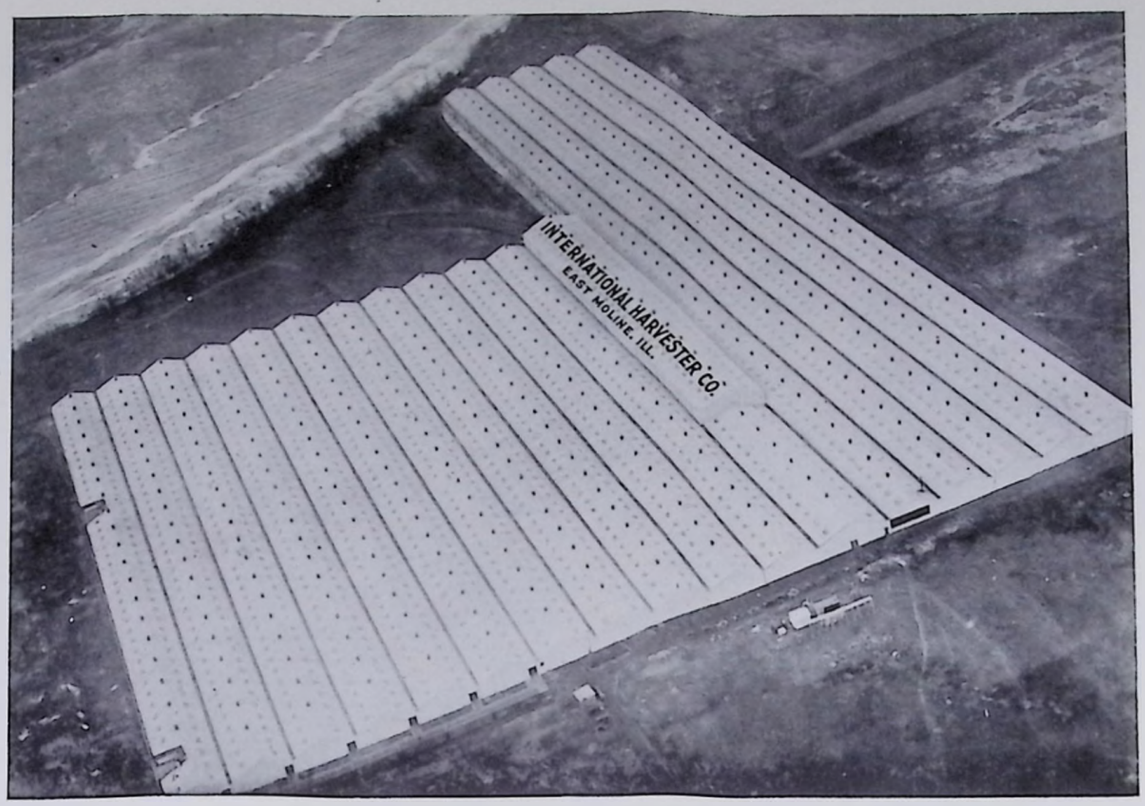


Top sheet completes "perfect nesting"

Illustrating the effectiveness of the cut-corner construction in forming closed joints with straight lap lines

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A million and a half square feet of Corrugated Transite on the roof and sides of the International Harvester Co. plant at East Moline, Ill.

Chemical and Metallurgical Industries: For these industries Transite solves some of the most aggravating building problems, due to its resistance to the majority of commercial acid fumes. Whether used in gas and coke plants, electro-chemical industries, smelters, refineries, or in any other location, Transite affords continual protection. Where especially corrosive or humid conditions are encountered, W.R. Transite should be used. This product is impregnated with an acid-resisting compound.

Mines and Quarries: The material is applied as roofing and siding on hoist houses, loader and crusher sheds, storehouses and similar structures.

Coal Conveyor Housings: Transite housings are employed in many public utilities and industrial plants where large quantities of coal are handled.

Warehouses and Docks: Due to the unusual fire hazards, Transite is widely used.

Garages and Hangars: Fire resistance, light-reflection, easy erection, low cost and appearance are essential qualities fulfilled by Transite for garages, hangars, terminals and similar buildings.

Fair and Exposition Buildings: Transite is especially adapted to this type of construction, which is used only intermittently and represents a large investment, both in first cost and in re-conditioning. With Transite, erection costs are held to a minimum, and maintenance costs are practically eliminated.

Corrugated and Flat Transite

Corrugated Transite is often used in combination with Flat Transite, especially for the smaller types of buildings, such as employees' houses, sheds, tool houses and similar structures. In such case, corrugated is used for roofing and flat material for siding. Battens, also made of Transite, are placed over the butt joints on the siding, providing an effective seal against wind and rain. Corrugated and Flat Transite are also used in combination for the building of cell structures in the electrical industry. Architects and decorators employ flat and corrugated sheets to work out unique, modern designs in stores and exhibits.

Employee Housing: Companies operating in locations which require the maintenance of employee housing facilities use Transite very effectively to produce economical, fire-resisting houses of attractive appearance. The possibility of practically complete salvage, when panel wall construction is used, increases the advantages of Transite for this type of building.

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Corrugated Transite Dimensions and Weights

Corrugated Transite sheets have corrugations with a 4.2″ pitch* and a depth of 1½″. The thickness is approximately 7/16″ at ridge and valley of corrugations and approximately 5/16″ on tangent, an average thickness of ⅜″. Sheets are furnished 42″, or ten corrugations, wide. Standard lengths and square foot areas of sheets are listed below:

Length	Sq. Ft. Area	Length	Sq. Ft. Area
3′0″	10.5	7′6″	26.25
3′6″	12.25	8′0″	28.0
4′0″	14.0	8′6″	29.75
4′6″	15.75	9′0″	31.50
5′0″	17.5	9′6″	33.25
5′6″	19.25	10′0″	35.0
6′0″	21.0	10′6″	36.75
6′6″	22.75	11′0″	38.50
7′0″	24.5		

Weights: Uncrated, approximately 4.1 lb. per sq. ft. Crated, approximately 4.75 lb. per sq. ft. A small additional charge is made for crating.

Sized Sheets: The dimensions listed above are approximate. Sheets cut to accurate size can be furnished, if required, at a slight extra charge for sizing. Unless otherwise specified, standard sheets will be shipped.

Cut Sheets: Sheets can be furnished any desired width or length that can be cut from standard sizes. Such special size sheets will be charged for on the basis of the next larger standard size. For example a sheet 42″ wide and 6′ 3″ long would be billed on the basis of a 42″ x 6′ 6″ sheet.

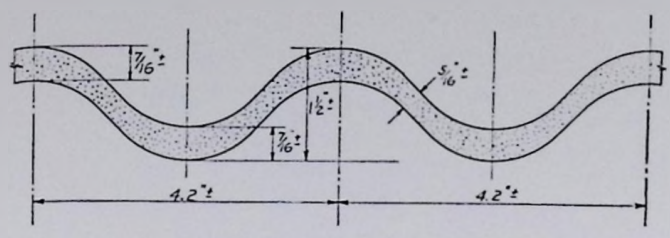
Curved Sheets: Curved sheets are manufactured to order. The minimum radius when curved lengthwise, with the arc parallel to the length of sheets, is 60″. When curved crosswise, with the arc parallel to the width of sheets, the minimum radius is 24″. Sheets may be curved either way, but not lengthwise and crosswise together.

Cut-Corner Construction:

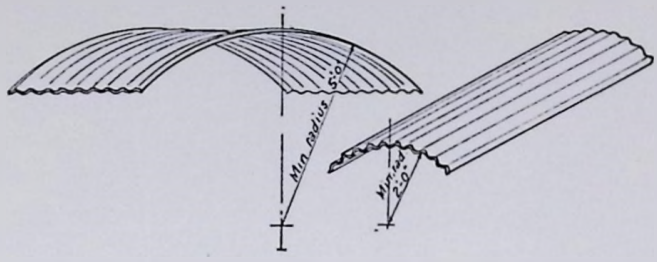
Corrugated Transite sheets are furnished in three types: Type X with all corners square; Type Y with one corner cut; and Type Z with two diagonal corners cut. These three types are shown in an accompanying illustration. The cut corners enable Transite to be laid with straight horizontal and vertical lap lines which further improve the appearance of the job.

If desired, the sheets can also be furnished with all corners square for staggered joint construction.

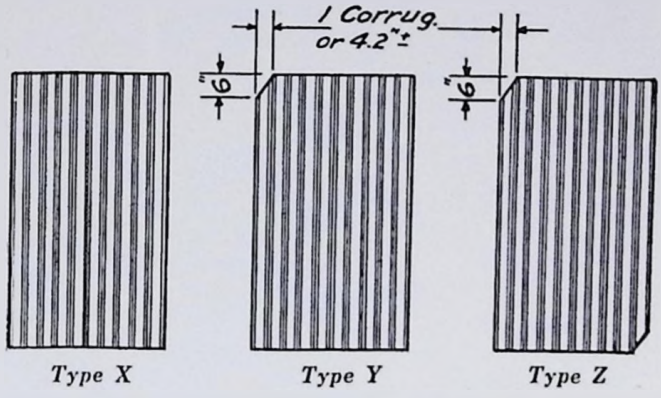
*Corrugated Transite also may be obtained with corrugations of 2⅝″ pitch and 1⅛″ depth, in 42″-wide sheets up to and including 8 ft. 6″ long. Consult Johns-Manville regarding specifications and application methods when 2⅝″ Transite is desired.



Corrugated Transite sheet dimensions



Curved Corrugated sheets



Types of cut-corner sheets

Accessories:

Transite is furnished pre-shaped as ridge and corner rolls and louvre blades. It is also furnished in flat sheets, as described elsewhere. Special Transite ventilators are also described in other data sheets.

J-M Black Asbestos Roof Putty is used for cementing laps of roofing sheets. The same putty, in gray, is used to cover exposed fasteners other than the lead-head type. This material is described in the "Roofing and Shingles" Section.

Corrosion-resisting bolts, Transfalt strips, drive-screws, washers and clips of various types have been designed especially for use with Corrugated Transite.

The special Corrugated Transite shapes and fasteners are shown in detail on another data sheet.

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Erection:

Skilled labor is not needed for the proper erection of Corrugated Transite. Because of the convenient sheet sizes and the accessories available, this material can be speedily applied by the average workman.

As with any other corrugated material, Transite should not be laid on roofs having a pitch of less than 2″ per foot. J-M Black Asbestos Roof Putty should be used in all laps of roofing sheets. The same putty, in gray, is used to cover all exposed fasteners other than the lead-head type.

Corrugated Transite should be laid with a side lap of one corrugation, 4.2″, to give a weather exposure of approximately 37.8″. End laps should always be specified 6″, and should occur over purlins or girts. Purlins should not be spaced on greater than 54″ centers, and side-girts on centers not greater than 66″. This applies to standard 4.2″ pitch sheets.

Complete directions for the erection of Corrugated Transite are available in other data sheets.

W. R. Corrugated Transite

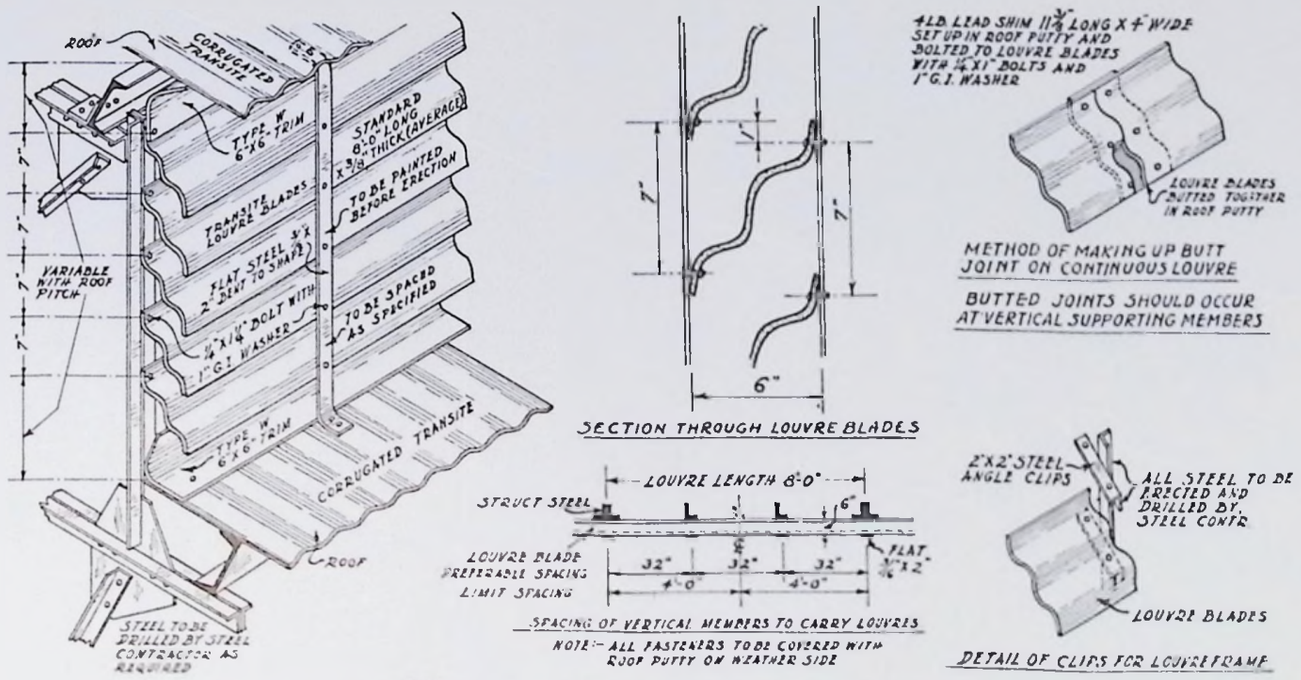
Corrugated Transite sheets can also be furnished with a special bituminous impregnation to afford maximum impermeability. The impregnated product, called W. R. Transite, is used to great advantage where the material will be subjected to extreme and sustained moisture or acid conditions. W. R. Transite is also available in flat sheets.

The durability of W. R. Transite makes it an ideal deck for the J-M Insulated Rot-proof Roof which is especially designed to withstand the severe conditions encountered over the machine room in paper mills and in similar industrial building roofs. The Insulated Rot-proof Roof consists of cork mastic, corkboard (or approved alternate) and a J-M Asbestos Built-up Roof, all laid over the W. R. Transite deck.

W. R. Corrugated Transite is furnished in the same sizes as standard Corrugated Transite in lengths up to and including 8′ 6″. Sized, cut or curved sheets can be supplied as described for the standard material. Ridge rolls, corner rolls and louvre blades are also available in the same design as standard Transite.

The weight of W. R. Corrugated Transite is approximately 4.2 lb. per sq. ft. uncrated; or about 4.85 lb. per sq. ft. crated.

In the erection of W. R. Transite particular care should be exercised in the selection of fasteners that will withstand the conditions to be encountered. Double-thick clips with bolts not less than 3/8″ diameter, made of black iron, are recommended. All clips, bolts, washers and nuts should first be cleaned and heated and then dipped in asphalt while hot. Any abraded portions of fasteners should be touched up with asphalt or bituminous paint after erection. When sheets are cut in the field all unimpregnated edges should also be coated. Other erection details are the same as for standard Corrugated Transite.

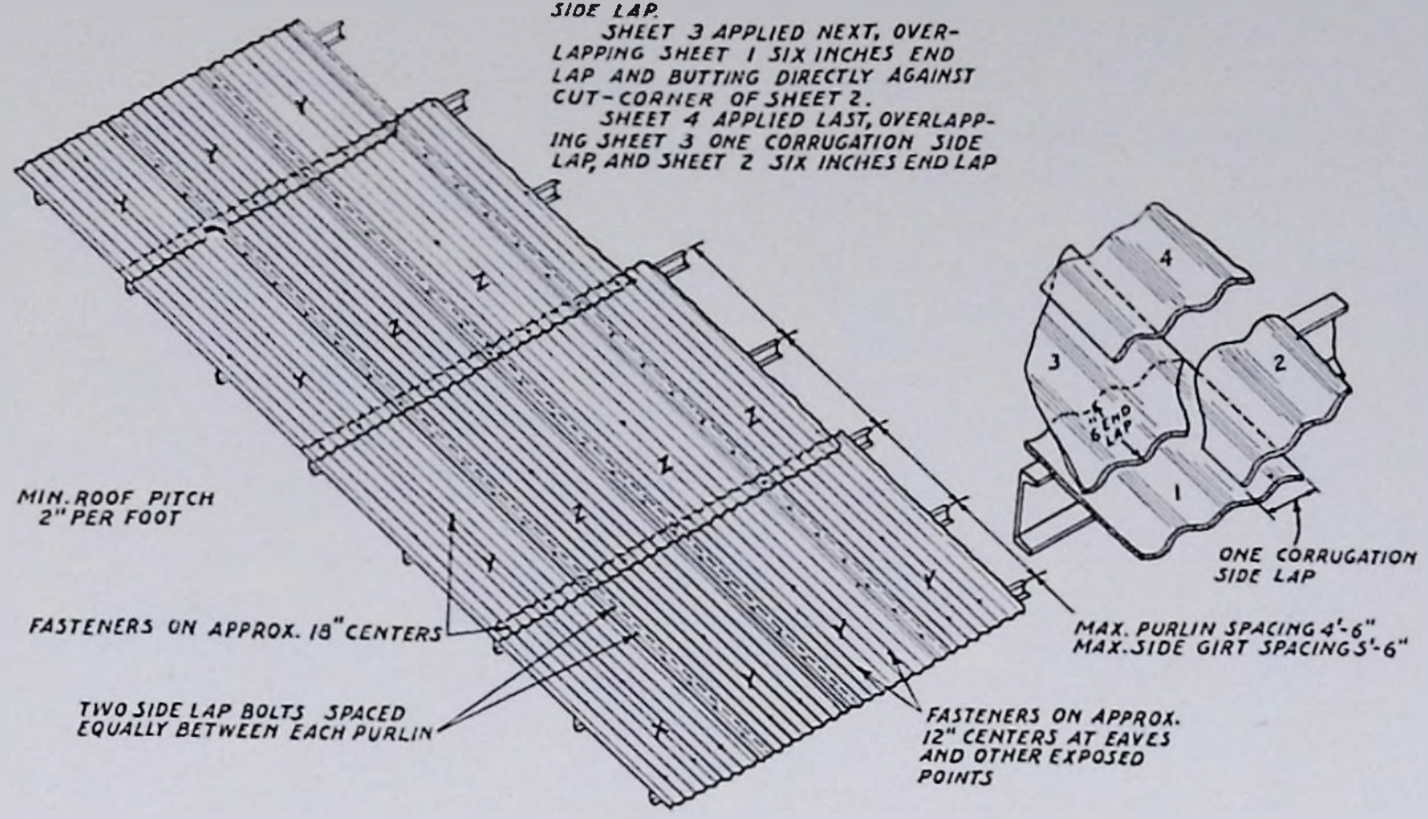


J-M Corrugated Transite Louvre Blade details

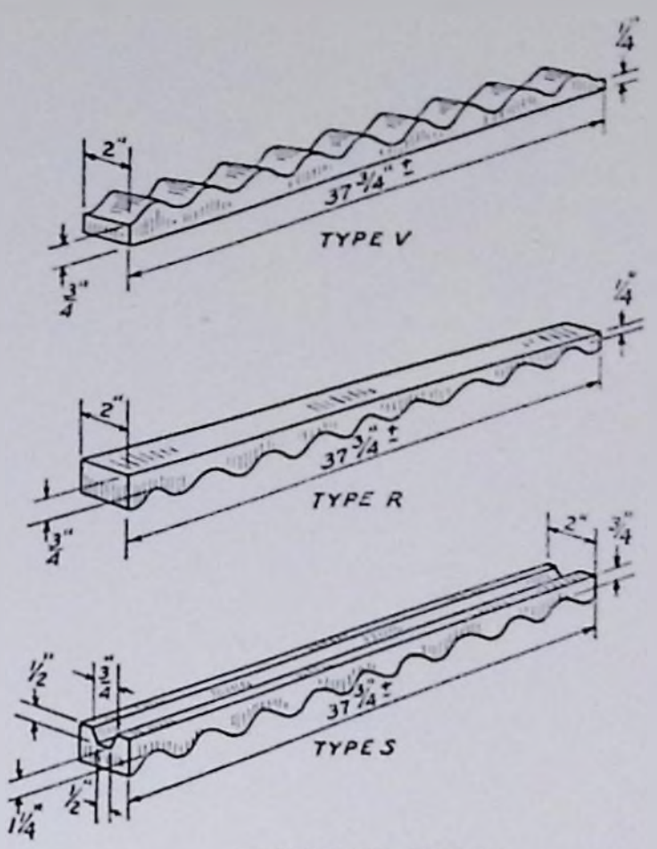
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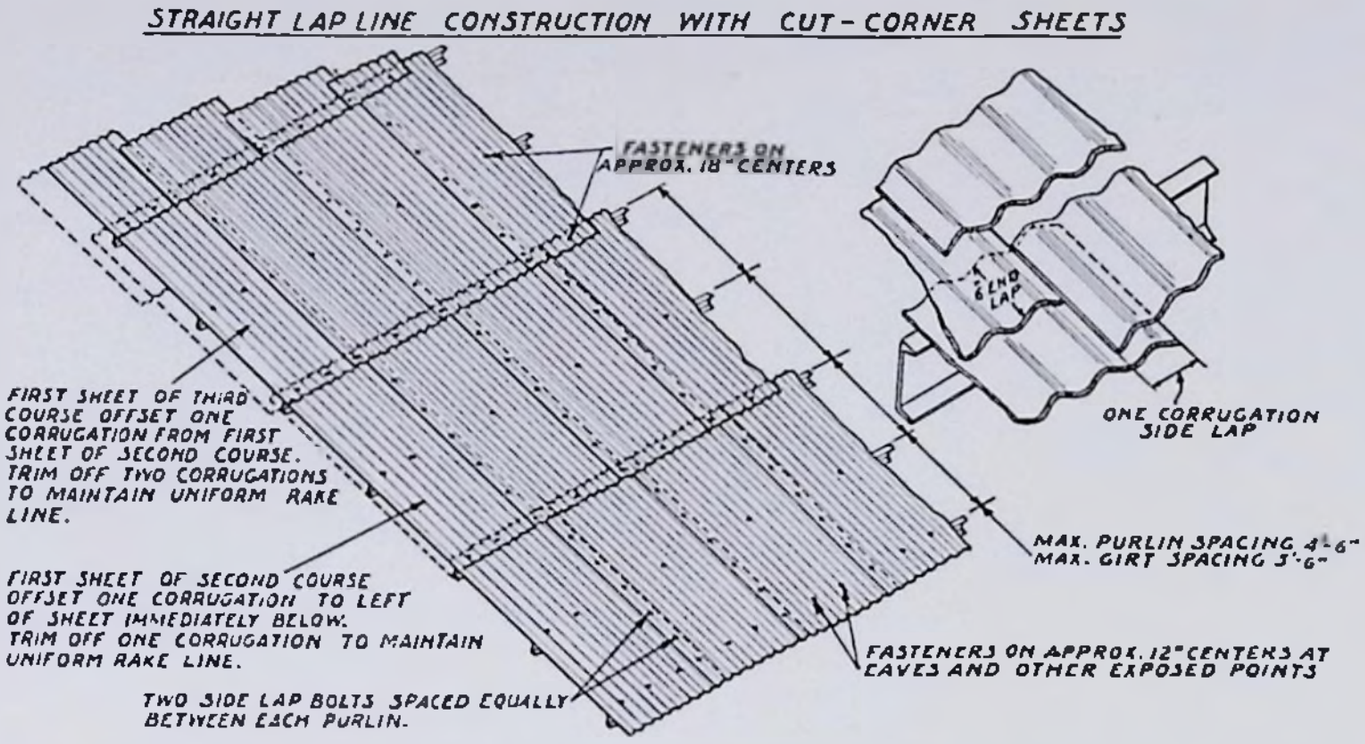
Construction details for 4.2″ Corrugated Transite



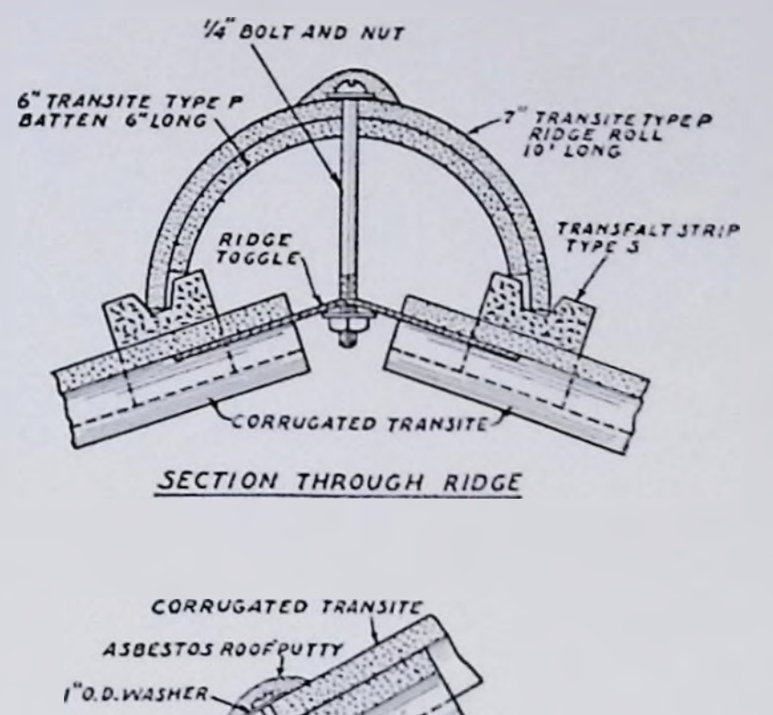
STRAIGHT LAP LINE CONSTRUCTION WITH CUT-CORNER SHEETS



TRANSFALT STRIPS



STAGGERED JOINT CONSTRUCTION WITH SQUARE-CORNER SHEETS

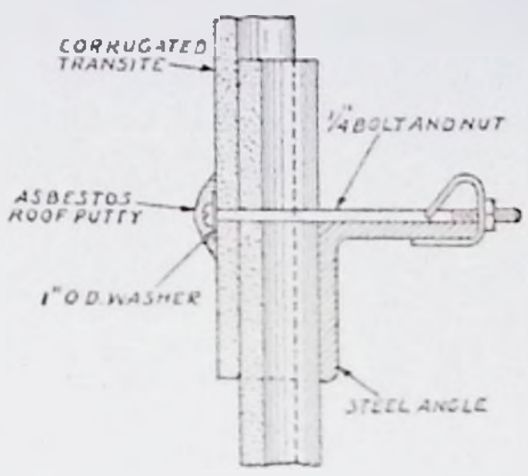


SECTION THROUGH RIDGE

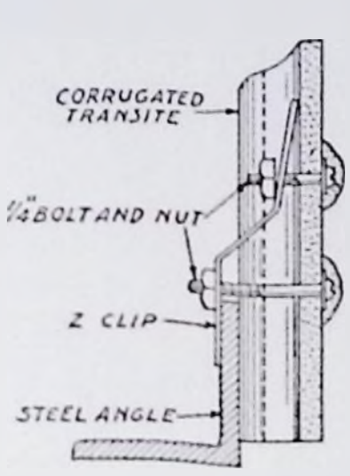
SECTION SHOWING CORNER ROLL

ALTERNATE TYPE, FASTENER BOLT

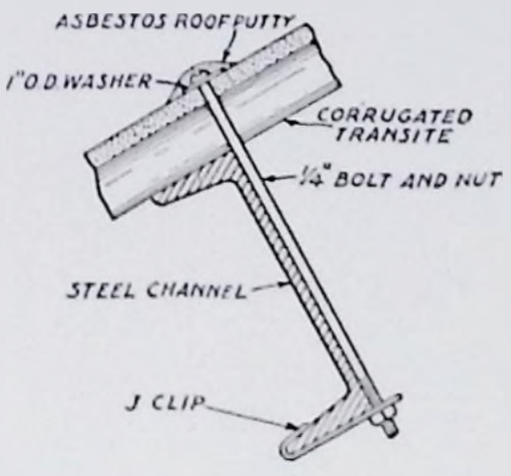
DETAIL OF DRIVESCREW



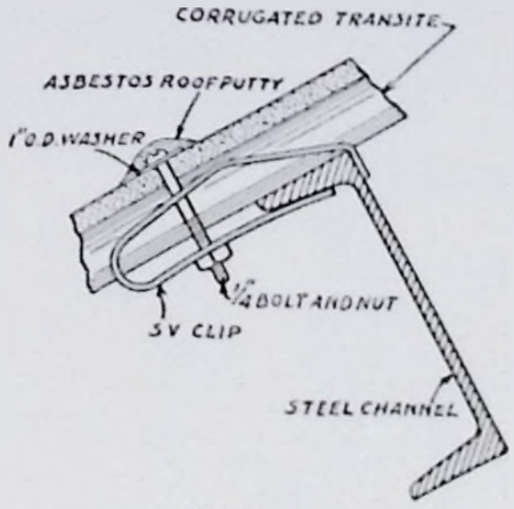
DETAIL OF HOOK CLIP



DETAIL OF Z CLIP



DETAIL OF J CLIP



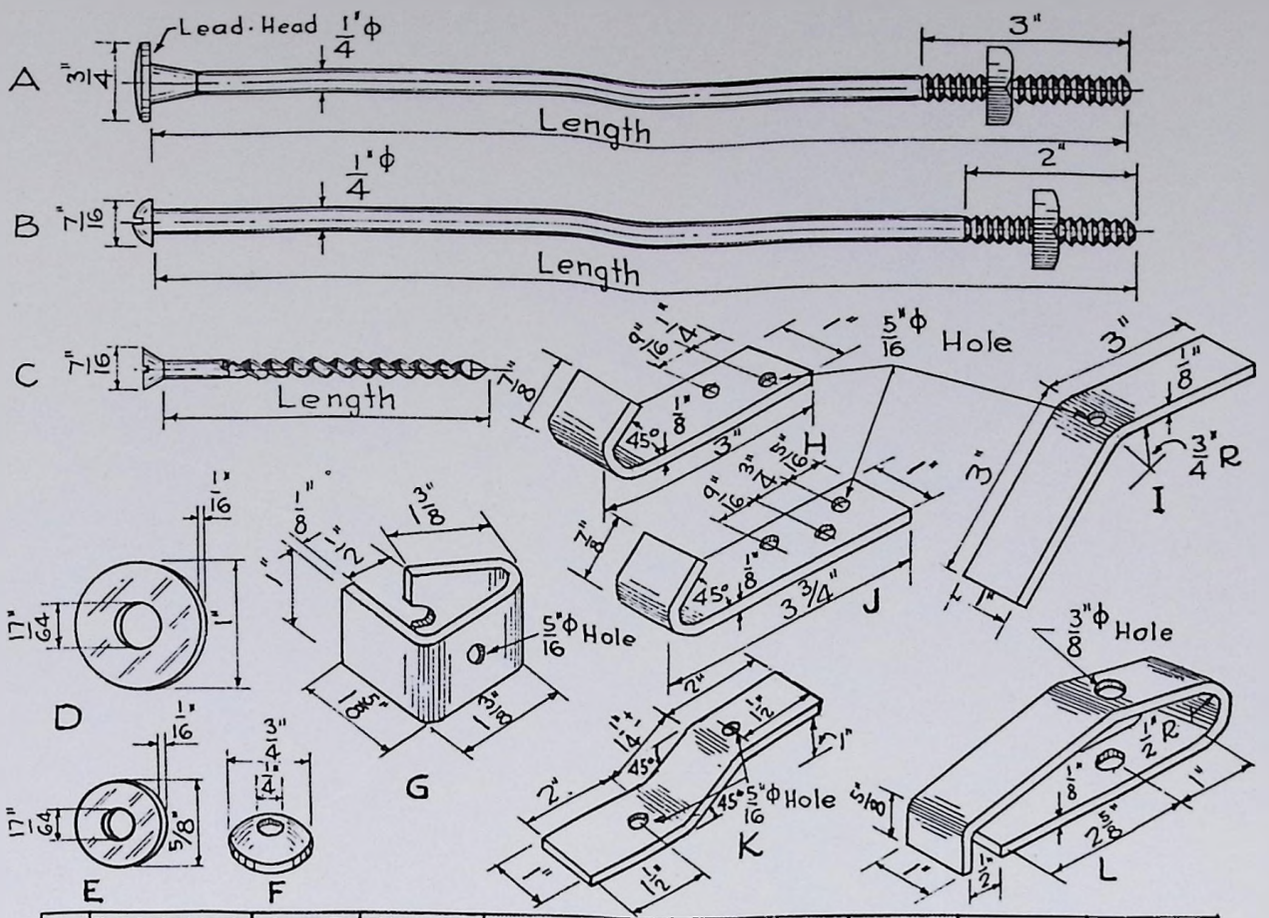
DETAIL OF SV CLIP

Patents No. 1,489,474, 2,015,129 and 2,021,929 Patented Canada 1925

CONSTRUCTION DETAILS FOR CORRUGATED TRANSITE
June, 1937 (Cancelling sheet dated March, 1937) 4-A-4 [BMT-4]

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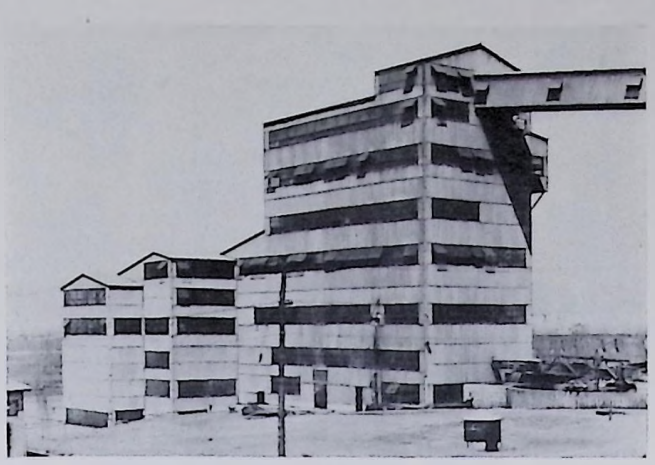


	FASTENER	SIZE	FINISH	WEIGHT		FASTENER	SIZE	FINISH	WEIGHT
A	LEAD HEAD BOLTS	1/4" X 2"	CADMIUM PLATED	18 PER #	B	ROUND HEAD BOLTS	1/4 x 7 1/2	CADMIUM PLATED	12 PER #
"	"	" 3"	"	15 "	"	"	" 8"	"	11 "
"	"	" 4"	"	13 "	"	"	" 8 1/2"	"	10 1/4 "
"	"	" 5"	"	11 1/2 "	"	"	" 9"	"	10 "
"	"	" 6"	"	10 "	"	"	" 9 1/2"	"	9 1/2 "
"	"	" 7"	"	9 "	"	"	" 10"	"	9 "
"	"	" 8"	"	8 1/2 "	"	"	" 10 1/2"	"	8 1/2 "
"	"	" 9"	"	8 "	"	"	" 11"	"	8 1/4 "
"	"	" 10"	"	7 "	"	"	" 11 1/2"	"	8 "
"	"	" 11"	"	7 "	"	"	" 12"	"	7 1/2 "
"	"	" 12"	"	6 1/2 "	"	"	" 12 1/2"	"	7 "
B	ROUND HEAD BOLTS	1/4" X 1 1/4"	"	54 "	C	DRIVE SCREWS	# 14 - 4	"	28 "
"	"	" 1 1/2"	"	48 "	"	"	# 14 - 3	"	33 "
"	"	" 1 3/4"	"	44 "	D	WASHERS	1" OD x 9/32"	GALV	74 "
"	"	" 2"	"	39 "	E	"	5/8" OD x 7/32"	"	225 "
"	"	" 2 1/2"	"	33 "	F	"	3/4" OD x 1/4"	LEAD (CUPPED)	77 "
"	"	" 3"	"	28 "	G	HOOK CLIP		GALV.	7 "
"	"	" 3 1/2"	"	24 1/2 "	H	J CLIP - 2 HOLE		"	7 1/2 "
"	"	" 4"	"	21 1/2 "	J	J CLIP 3 HOLE		"	6 "
"	"	" 4 1/2"	"	20 "	I	TOGGLE		"	4 3/4 "
"	"	" 5"	"	18 "	K	Z CLIP		"	5 1/2 "
"	"	" 5 1/2"	"	16 "	L	SV CLIP		"	3 "
"	"	" 6"	"	15 "					
"	"	" 6 1/2"	"	14 "					
"	"	" 7"	"	13 "					

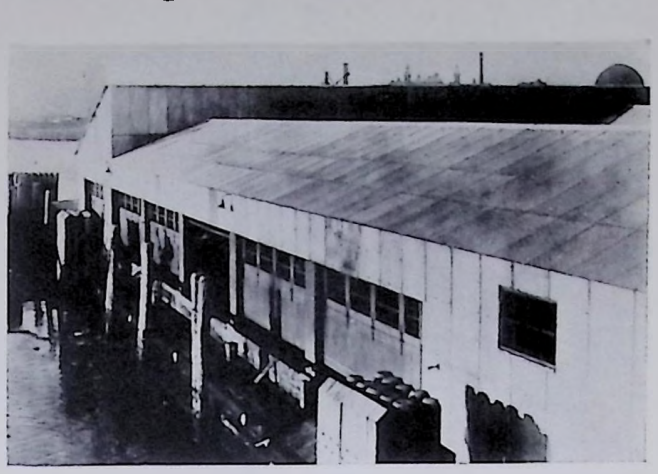
Corrugated Transite Fasteners

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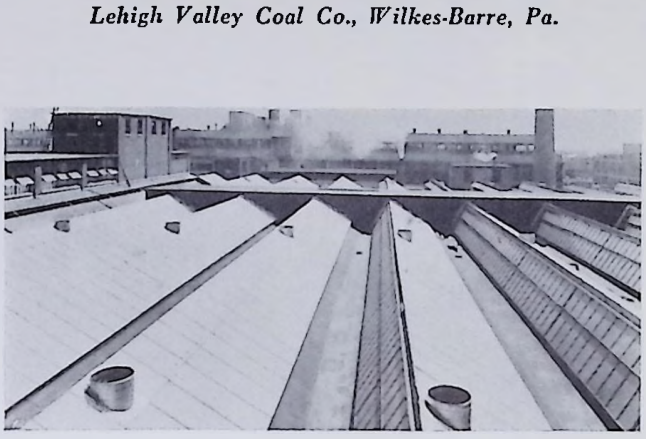
Typical Installations of Corrugated Transite



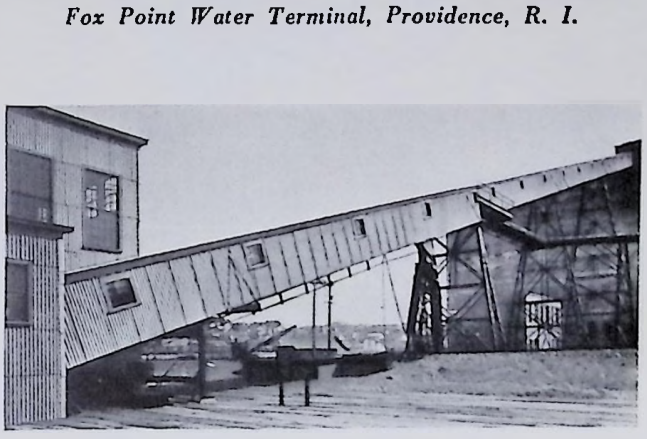
Large coal breaker, roofed and sided with Corrugated Transite for fire safety and low maintenance. Lehigh Valley Coal Co., Wilkes-Barre, Pa.



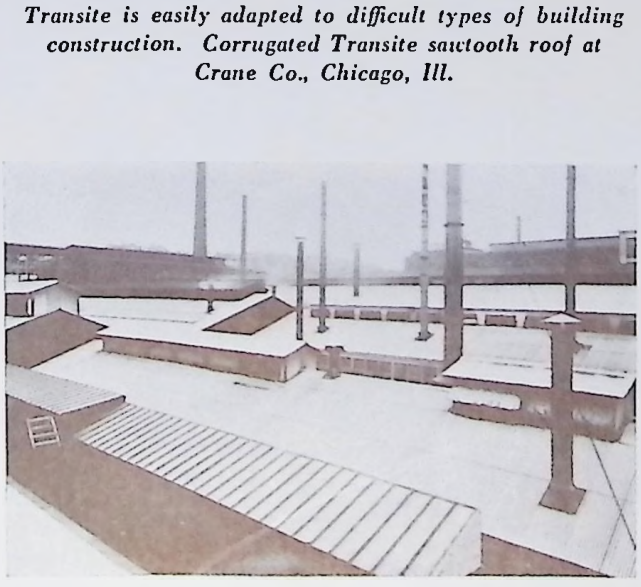
Salt air rapidly deteriorates water-side buildings—but not if they are constructed of Corrugated Transite. Fox Point Water Terminal, Providence, R. I.



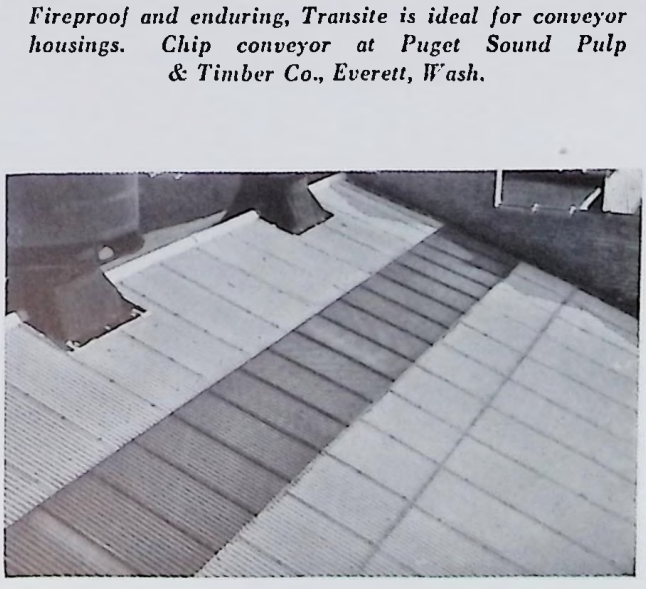
Transite is easily adapted to difficult types of building construction. Corrugated Transite sawtooth roof at Crane Co., Chicago, Ill.



Fireproof and enduring, Transite is ideal for conveyor housings. Chip conveyor at Puget Sound Pulp & Timber Co., Everett, Wash.



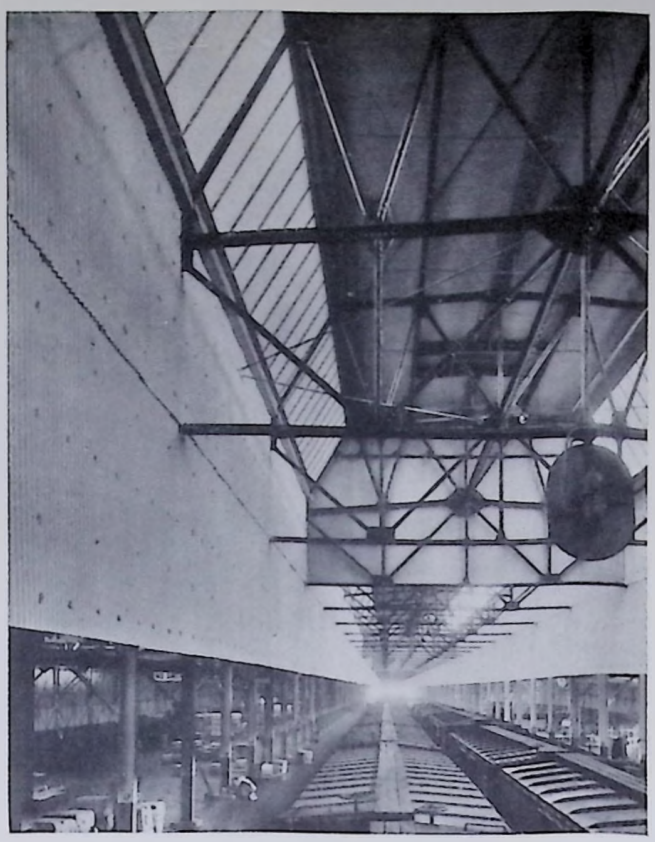
Because of their fume-resisting quality, Transite roofs are extensively used in the non-ferrous industry. Chase Companies, Inc., Waterbury, Conn.



Continuous corrugated wire-glass skylight in Corrugated Transite roof obviates expensive lighting arrangements. Richards & Co., Stamford, Conn.

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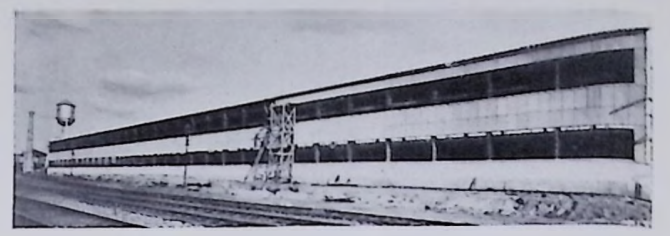
Slum Clearance Program: Specifications and Data on Various Building Materials (1938)
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Corrugated Transite smoke baffles and fire stops.
Pier No. 8, Baltimore, Md.



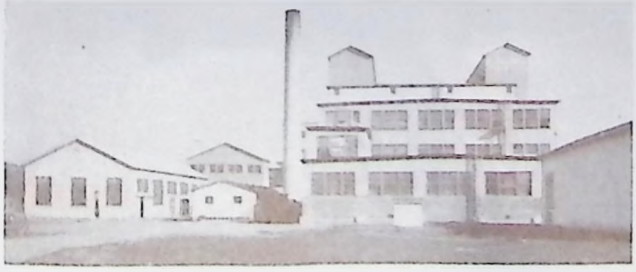
Transite saves maintenance on infrequently used fair and exposition buildings. It needs no painting.
Fair Grounds, Timonium, Md.



Corrugated Transite is particularly economical for roofing and siding buildings of large size.
General Motors Assembly Plant, Sao Paulo, Brazil



Corrugated Transite, fireproof, easily erected, light-reflecting, is the best building material for hangars.
Purdy Boat Works, Port Washington, L. I.



Heavily salt-charged atmosphere is destructive to many siding materials, but Transite remains unaffected.
Morton Salt Co., Newark, Calif.



Erected with straight lap lines, Corrugated Transite presents an attractive appearance on large wall areas.
Montgomery Ward & Co., Fort Worth, Texas

Printed in U.S.A.

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STANDARD SPECIFICATION
J-M CORRUGATED TRANSITE ROOFING AND SIDING

Roofing and Siding:

Where shown or indicated on drawings, the roofs and sides of buildings shall be covered with Corrugated Transite Roofing and Siding (4.2" pitch) as manufactured by Johns-Manville. The material shall be of solid, monolithic unlaminated construction, weighing approximately 4.1 lb. per sq. ft. It shall have a 4.2" pitch and be approximately 7/16" thick at ridge and valley of corrugations and approximately 5/16' thick on slope.

Sheets shall be approximately 42" wide and of suitable length so that all end laps shall occur over a purlin or grit. Sheets shall be furnished in one of the two forms indicated below:

(a) With cut corners, enabling material to be laid with side laps forming vertical lines.

(b) With all square corners for staggered joint construction.

Sheets shall be laid with at least 6" end lap and one corrugation side lap. All side and end laps of roofing sheets shall be laid up in J-M Asbestos Roof Putty (black).

Flashing (and building trim):

Where indicated on drawings, Ridge Roll, Corner Roll, Louvres, and Flashing shall be of the same material as the roofing and siding.

J-M Transfalt Strips (state whether Type S, Type R, or Type V) shall be included.

All other flashing shall be (state whether 4-lb. chemical soft lead, 2-1/2-lb. 6-oz. antimonial lead, or 16-oz. copper).

Fasteners:

All fasteners shall be those furnished by Johns-Manville. The bolts shall be (state whether "lead-head" or "round-head" type). The heads of the round-head bolts shall be covered with Gray Asbestos Roof Putty.

Method of Application:

The method of application shall be in strict accordance with the manufacturer's standard erection instructions.

NOTE: Spacing of Supports (to be provided for in specifications covering roof and wall framing): Roof purlins shall be spaced on not greater than 54" centers, and siding girts on not greater than 66" centers.

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ERECTION INSTRUCTIONS
CORRUGATED TRANSITE ROOFING AND SIDING

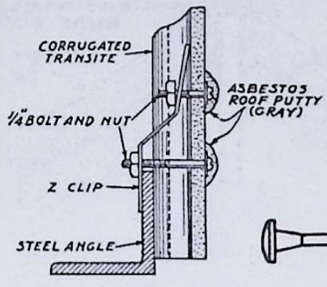
The following application instructions relate to the erection of Corrugated Transite with 4.2" pitch.

1. Delivering and Handling of Material: When Corrugated Transite is shipped in carload lots uncrated (less than carload shipments will always be crated), sheets should be carefully piled on firm, level supports, spaced on approximately 12" centers, supports to extend the full width of sheets. Never pile higher than 18". Keep material dry and clean before erection. Material that is crated should not be uncrated until ready for application. Sheets lying around loose on the job often cause expensive shortages. Fasteners for attaching the sheets are shipped in kegs, boxes and bags accompanying the sheets.

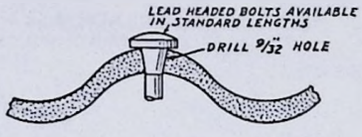
2. Spacing of Supports: The framing members over which this material is to be applied, shall be spaced not to exceed the following: Purlins, 54" centers; Siding girts, 66" centers.

3. Types of Sheets: For straight lap line construction, Transite sheets are furnished in Types X (square corners), and Y and Z (cut corners). All drawings should be studied carefully for identification and location of sheets. For staggered joint construction, all sheets are furnished with all square corners. The smooth side of the Transite is exposed to the weather.

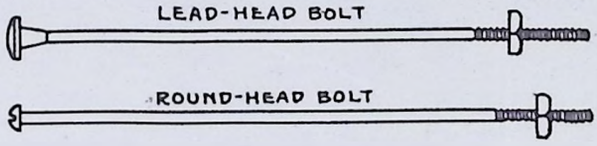
4. Fasteners: The style of fasteners to be used will be governed by the type, shape and position of the purlins and girts. Either lead-head bolts or round-head bolts shall be used as specified. (Refer to drawings, showing fasteners and fastening details).

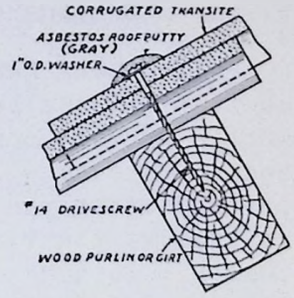


DETAIL OF Z CLIP

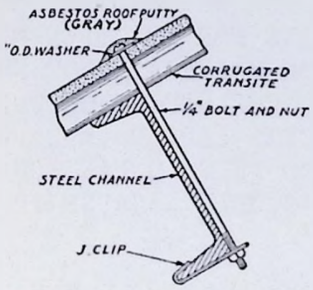


ALTERNATE TYPE, FASTENER BOLT

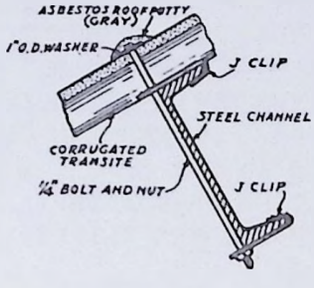




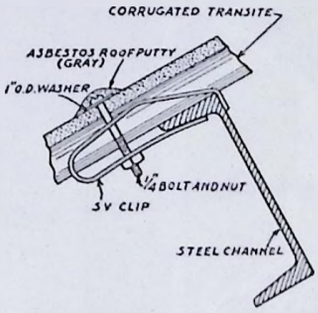
DETAIL OF DRIVESCREW



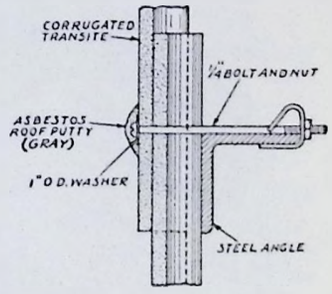
DETAIL OF J CLIP



DETAIL OF DOUBLE J CLIP



DETAIL OF SV CLIP



DETAIL OF HOOK CLIP

Patents No. 1,489,474, 2,015,129 and 2,021,929 Patented Canada 1925

Standard Fasteners used in erecting Corrugated Transite

5. Drilling: Holes must be drilled to receive bolts, using the ordinary twist drill in a brace. The use of a small electric drill will be found rapid and economical. In all instances, holes must be made in high part of corrugation. A 9/32" hole is drilled for lead-head bolts and a 1/4" hole for round-head bolts.

JOHNS-MANVILLE Building Materials	DATE June, 1938 (Cancelling sheet dated June, 1937
Erection Instructions Corrugated Transite Roofing and Siding	BMT-20

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6. Cutting: Where sheets are cut in the field, a power carborundum wheel or power saw should be used. For small jobs, a hand saw cut five points to the inch and set for cross-cutting purposes may be employed.

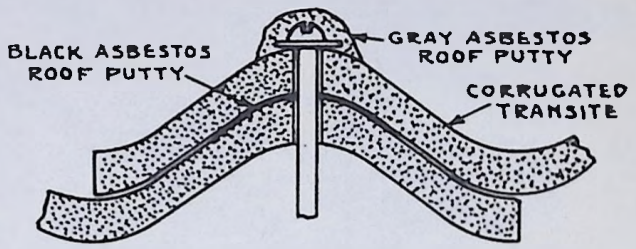
7. Spacing of Fasteners: Sheets shall be secured to all purlins and girts, spacing fasteners as follows:

Clips, on approximately 18" centers on main body of roof and approximately on 12" centers along all eaves and on unusually exposed areas. Drivescrews, on approximate 12" centers. Side lap bolts, in each side lap midway between purlins or girts on spans not exceeding 48" and two, evenly spaced, on greater spans. Fasteners shall be placed generally as shown on drawing of Fastening Details, spacing them as specified above. Washers shall be used wherever the head or nut of fasteners come in contact with the Transite.

8. Protection of Fasteners: All bolt heads that are exposed to weather, except the lead-head type, shall be adequately covered on the weather side with J-M Asbestos Roof Putty (gray), or with a heavy coat of white lead. In extreme cases, where it is required to have a more non-corroding fastener, the fasteners should be cleaned of all grease and foreign matter and then dipped in hot asphalt and allowed to drain and dry. After the fasteners are in place, it will be necessary to touch up the bolt threads and other abraided places with hot asphalt.

9. Application - General: (a) Sheets must be laid with a side lap of one corrugation and an end lap of at least 6". J-M Asbestos Roof Putty (black) shall be laid in all side and end laps of roofing sheets only. This putty shall be spread evenly over ridge only of end corrugation, in vertical laps, and near head of underlying sheet in horizontal laps.

(b) Sheets must be of proper length so that all end laps will occur over a purlin or girt and so that fasteners at ends of sheets will pass through both upper and underlying sheets. The fasteners must be tight against the back of the purlin.



Side lap, showing round-head bolt



(c) CORRUGATED TRANSITE IS AMPLY STRONG FOR THE SERVICE FOR WHICH IT IS DESIGNED AND PERFECTLY SAFE FOR ERECTION WITH REASONABLE CARE, BUT THE MATERIAL MUST NOT BE SUBJECTED TO ABUSE, OVERLOADING OR UNDUE SHOCK. PLANKS AND CHICKEN LADDERS MUST BE USED IN THE ERECTION AND THIS IS PARTICULARLY TRUE WHEN MATERIAL IS WET, BECAUSE IT THEN BECOMES SLIPPERY.

MEN MUST ALWAYS WALK OVER THE FRAMING MEMBERS AND NO SHEET SHALL BE SUBJECTED AT ONE TIME TO WEIGHT IN EXCESS OF THAT OF ONE MAN. MEN MUST NOT BE ALLOWED TO JUMP OR STEP HEAVILY UPON THE MATERIAL IN PLACE ON THE ROOF NOR SHALL THE FREE EDGE OF ANY SHEET BE SUBJECTED TO A MAN'S WEIGHT.

MATERIAL MUST NOT BE PILED UPON THE ROOF UNLESS THE LOAD IS DISTRIBUTED SO AS TO BE BORNE BY THE FRAMING MEMBERS.

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(d) It is important that the application be started correctly, true to line, etc. If a careless start is made, improper alignment will result. The generous use of chalk or plumb lines is therefore advisable and care must be exercised at all times to keep the vertical line of joints plumb, and horizontal lines straight. Application should be started at the left, progressing toward the right. As sheets are placed in position, they must be firmly fastened in place.

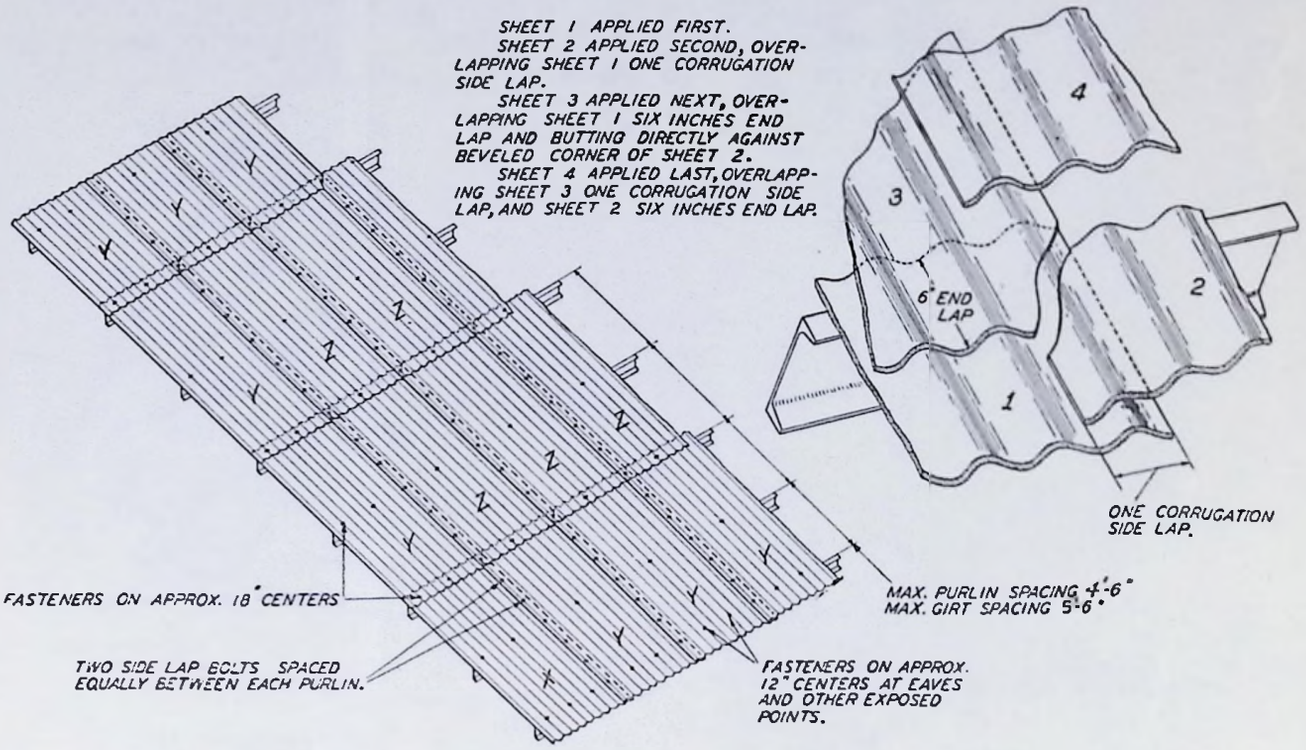
(e) Unless otherwise specified, an overhang at the eaves of 6" to 9", from the outside of the lower roof purlin is usually sufficient. At the gables, sheets should not overhang ends of purlins more than two corrugations.

10. Application - Vertical Joint Method: (a) The first or eave course of sheets should be laid to a guide line, stretched along the entire length of building. This line to be placed at a point corresponding to the eave or overhang of roof.

(b) Apply three or four sheets of first course, fastening sheets firmly in place. The first sheet of first course will be type X. (Refer to drawing). The succeeding sheets will be type Y, to be lapped one corrugation at side with cut corner uppermost.

(c) Apply two or three sheets of second course, inserting a few fasteners to hold sheets in place. The first sheet of second course will be type Y, laid with cut corner downward, butting this cut corner against the cut corner of second sheet of first course. The succeeding sheets will be type Z, lapped one corrugation at sides and butting cut corners as before. Succeeding courses up to top course will be applied in a similar manner.

(d) Apply one sheet of top course, inserting fasteners as in preceding courses. The first and intermediate sheets of top course will be type Y, with cut corner downward.



Straight lap line construction with cut-corner sheets

JOHNS-MANVILLE	Transite Products	DATE June, 1937
Erection Instructions Corrugated Transite Roofing and Siding		(BMT-21)

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(e) A start has now been made along the eave and sheets have been laid up the gable to top of roof. Ascertain if work is squared up along eave and gable, making any corrections necessary before proceeding. The remaining fasteners may then be placed and all tightened up securely.

Application of sheets in all courses may now proceed. Each course should be stepped back of preceding course one sheet, so as to eliminate the necessity of fitting in the intermediate sheet between two cut corners. Several sheets in each course may be applied before stepping back to the next. This will be governed by scaffolding, facilities for handling material, etc. The last sheet of the second course will be type Y, with cut corner uppermost; the last sheet of the top course will be type X. On narrow roofs, such as monitors, which are only one course wide, type X will be used throughout.

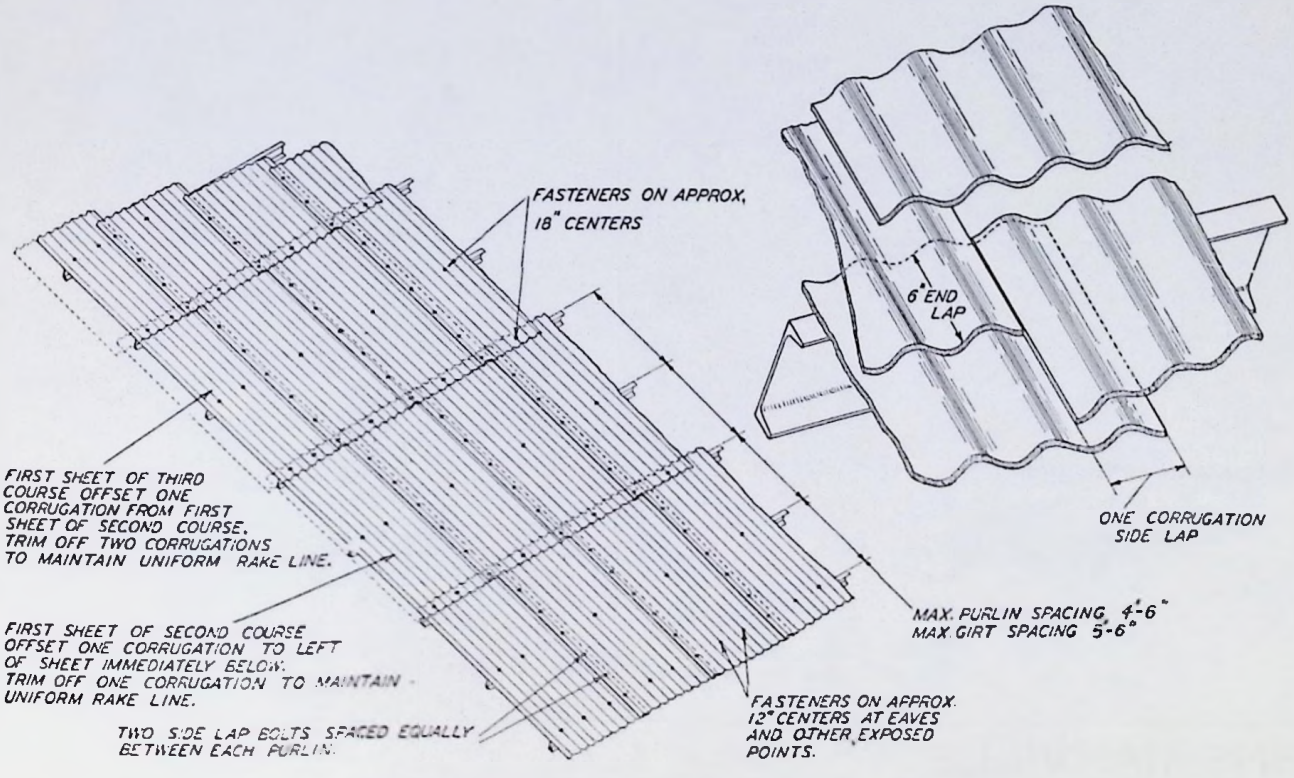
11. Application - Staggered Joint Method: (a) The first or eave course of sheets should be laid to a guide line stretched along the entire length of the building. This line should be placed at a point corresponding to the eave or overhang of roof.

(b) Apply three or four sheets of the first course, fastening same firmly in place. Lap sheets one corrugation. (Refer to drawing).

(c) Trim off one corrugation from the first sheet starting the second course. Side-butt this sheet snugly against the second sheet of the first course. Lay the first sheet of this course with a 6" end lap. Snap a chalk line 6" down from the top edge of the first course as a guide to insure proper lap. Apply the second sheet of the second course with a one-corrugation lap over the first sheet. Continue application of remaining sheets of this course in the same manner.

(d) Trim off two corrugations from the first sheet starting the third course. Side-butt this sheet snugly against the second sheet of the second course, allowing 6" for end lap. Proceed as with second course.

(e) Apply subsequent courses in the same manner, offsetting the first sheet of each course one corrugation from the preceding course.

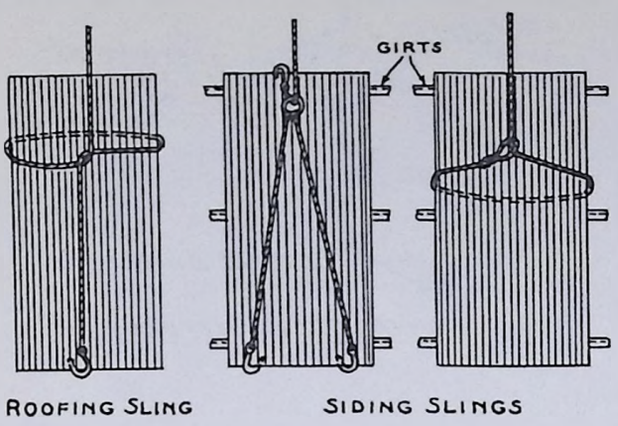


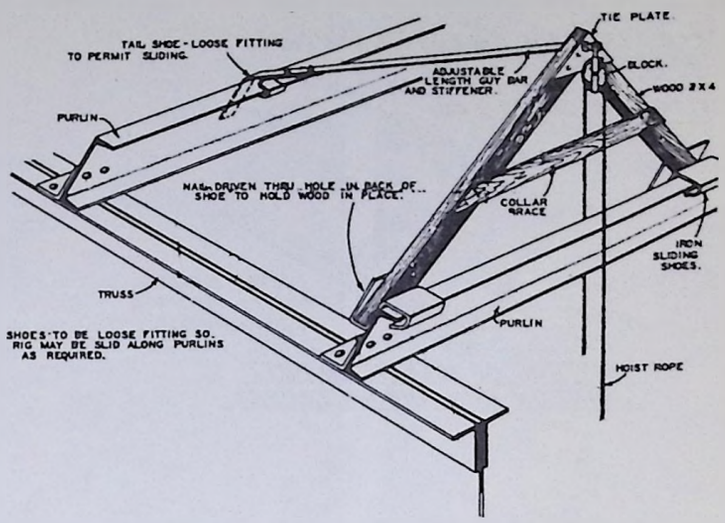
Staggered joint construction with square corner sheets

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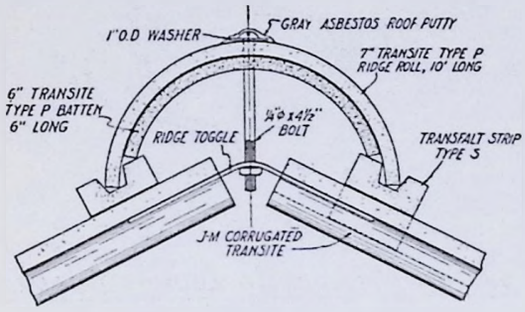
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12. Application of Siding: The procedure in the application of siding is generally the same as for roofing. It will be found necessary, however, to hold siding sheets in place with a hoisting sling until fasteners are placed. For this reason a sling similar to that shown in drawing should be employed. If a corner roll is to be used, keep siding sheets back about one inch from corner on each side to allow corner roll to seat properly. (See drawing of Corner Roll Construction Details).

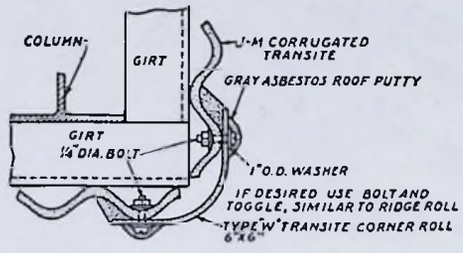




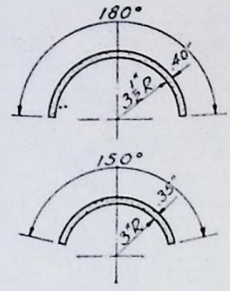
13. Application of Ridge Roll and Corner Roll: Ridge roll (type P) is to be applied as shown on drawing of Ridge Details, using long bolts and toggles. Sections of ridge roll are butted end to end, these butted joints being flashed with ridge roll battens (type P). Corner roll (type W) is to be applied as shown on drawing, bolting it directly to siding sheets, or with toggles similar to ridge roll. The sections of corner roll are butted end to end, these butted joints being flashed with battens (type U) pointed up with gray asbestos roof putty.



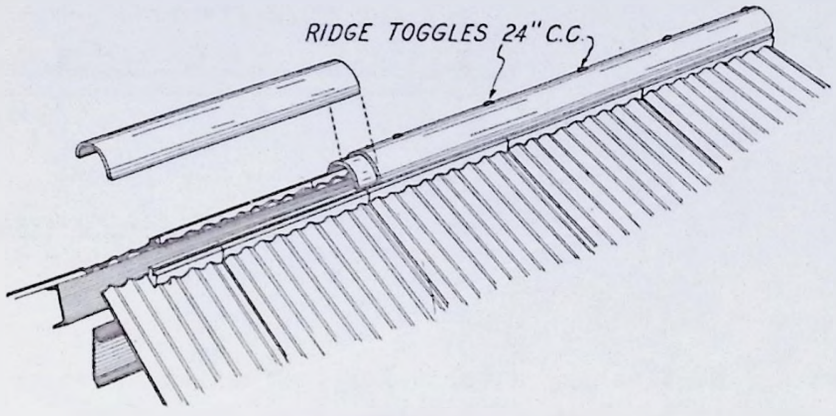
Ridge Roll construction



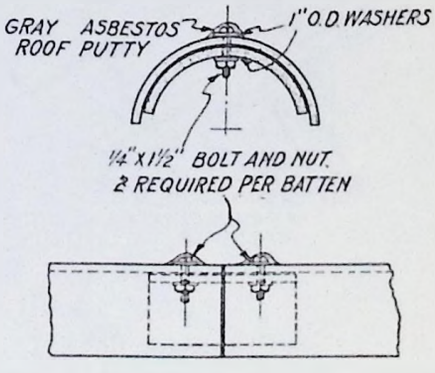
Corner Roll construction details



Above—Ridge Roll, Type P, 10' 0" long. Below—Batten, Type P, 6" long



Transite Ridge Roll—assembly



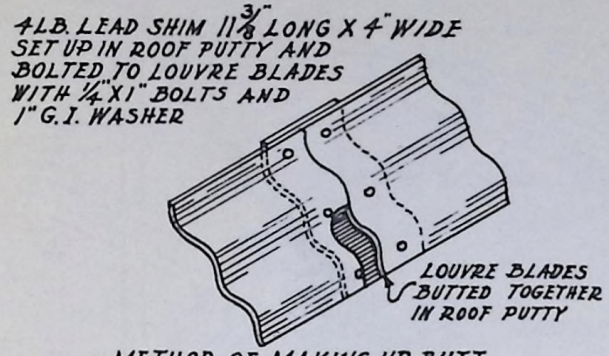
Detail of internal batten

JOHNS-MANVILLE Transite Products	DATE December, 1937 (Cancelling sheet dated June, 1937)
Erection Instructions Corrugated Transite Roofing and Siding	(BMT-22)

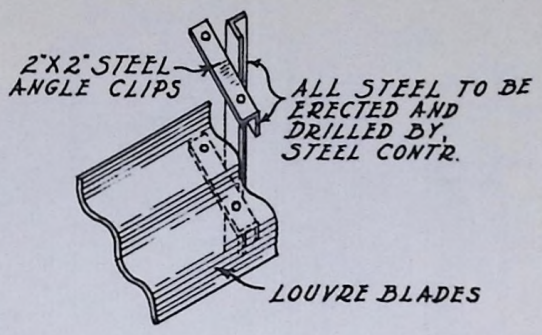
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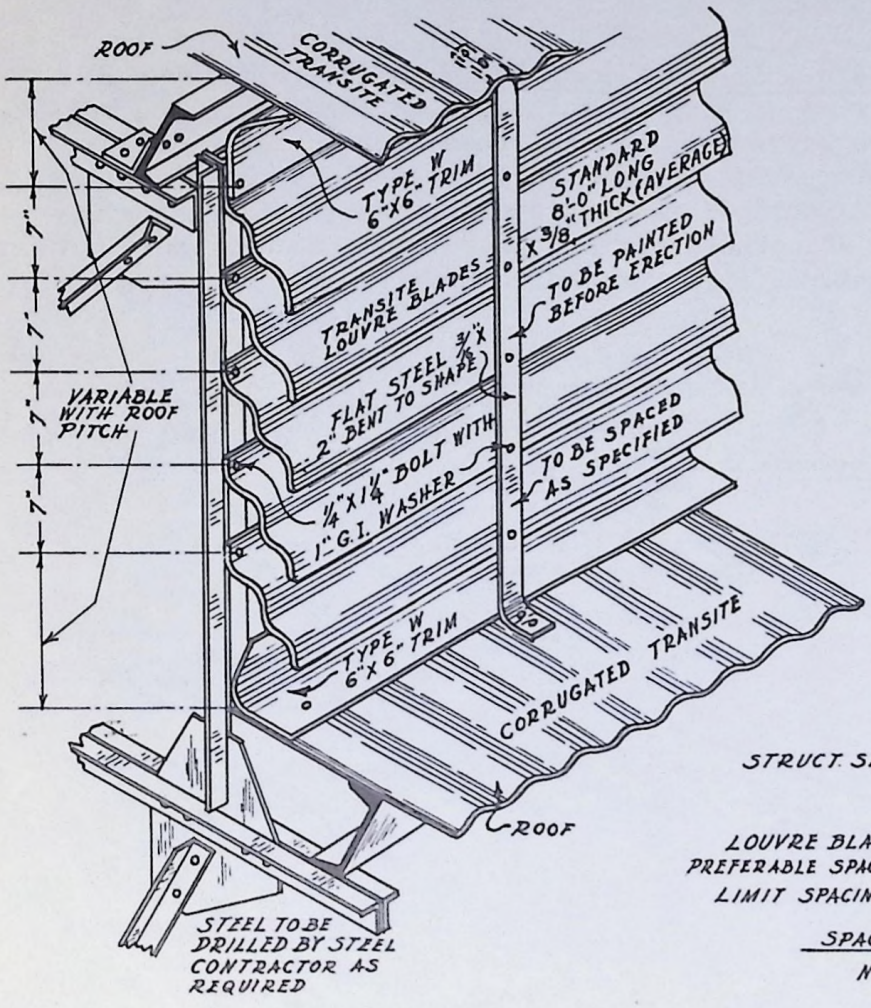
Drawings of Louvre Details show the manner in which louvres are erected. Each section is butted end to end, joints being underlaid with a strip of 2-1/2 lb. hard or 4-lb. soft lead set up in gray asbestos roof putty, securely bolted to both sections. Such butted joints should occur at vertical supporting members.

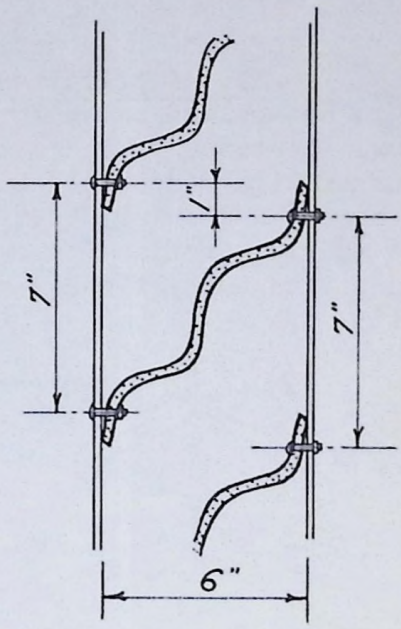


METHOD OF MAKING UP BUTT JOINT ON CONTINUOUS LOUVRE

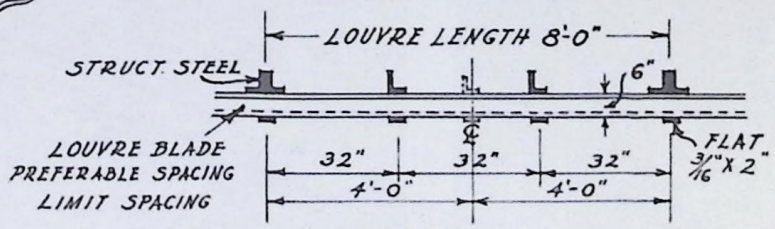


DETAIL OF CLIPS FOR LOUVRE FRAME





SECTION THROUGH LOUVRE BLADES



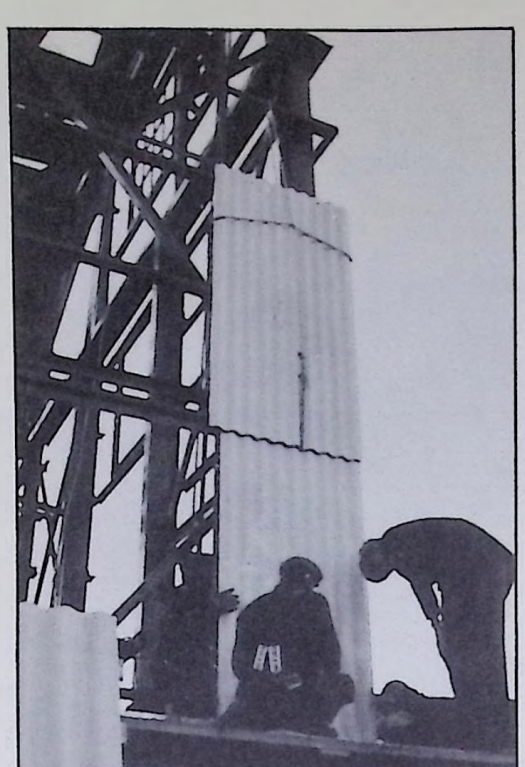
SPACING OF VERTICAL MEMBERS TO CARRY LOUVRES

NOTE:- ALL FASTENERS TO BE COVERED WITH ROOF PUTTY ON WEATHER SIDE

Flashing Details: Drawings of flashing details for Corrugated Transite, shown on following data sheets, indicate the manner in which flashings are applied. Flashings are formed of non-ferrous metal or, in certain cases, Type W corner roll and transfalt strips may be used. Wherever metal flashings are used, they should be 2-1/2-lb., 6 percent antimonial lead or 4-lb. chemical soft lead, or 16-oz. copper.

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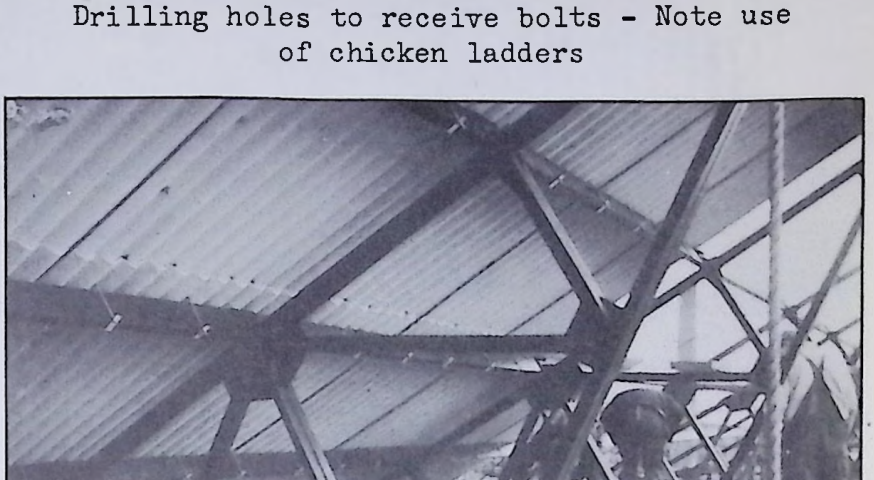
CORRUGATED TRANSITE INSTALLATION VIEWS



A rope sling is used to hoist sheets in place

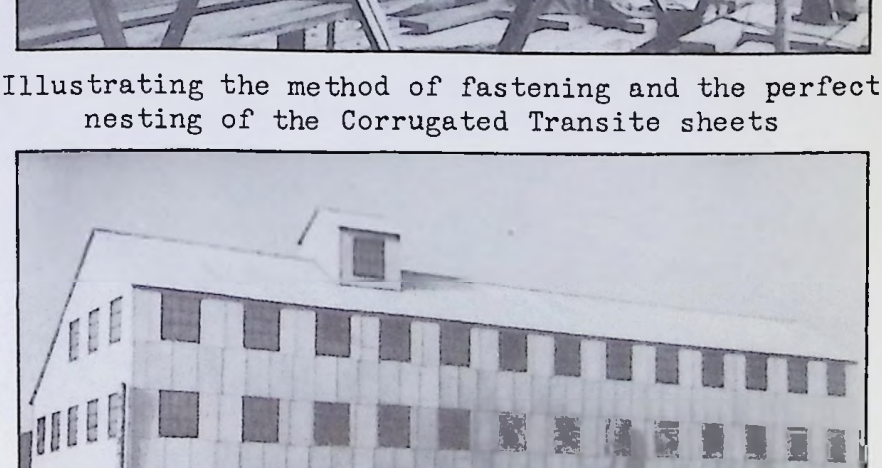


Drilling holes to receive bolts - Note use of chicken ladders



Illustrating the method of fastening and the perfect nesting of the Corrugated Transite sheets





The erection of J-M Corrugated Transite is rapidly and simply accomplished. The view at the left shows the stepping back of sheets for staggered joint construction

JOHNS-MANVILLE	Building Materials	DATE May, 1938
Corrugated Transite Installation Views Erection Details - Corrugated Transite and Corrugated Wire Glass		BMT-26

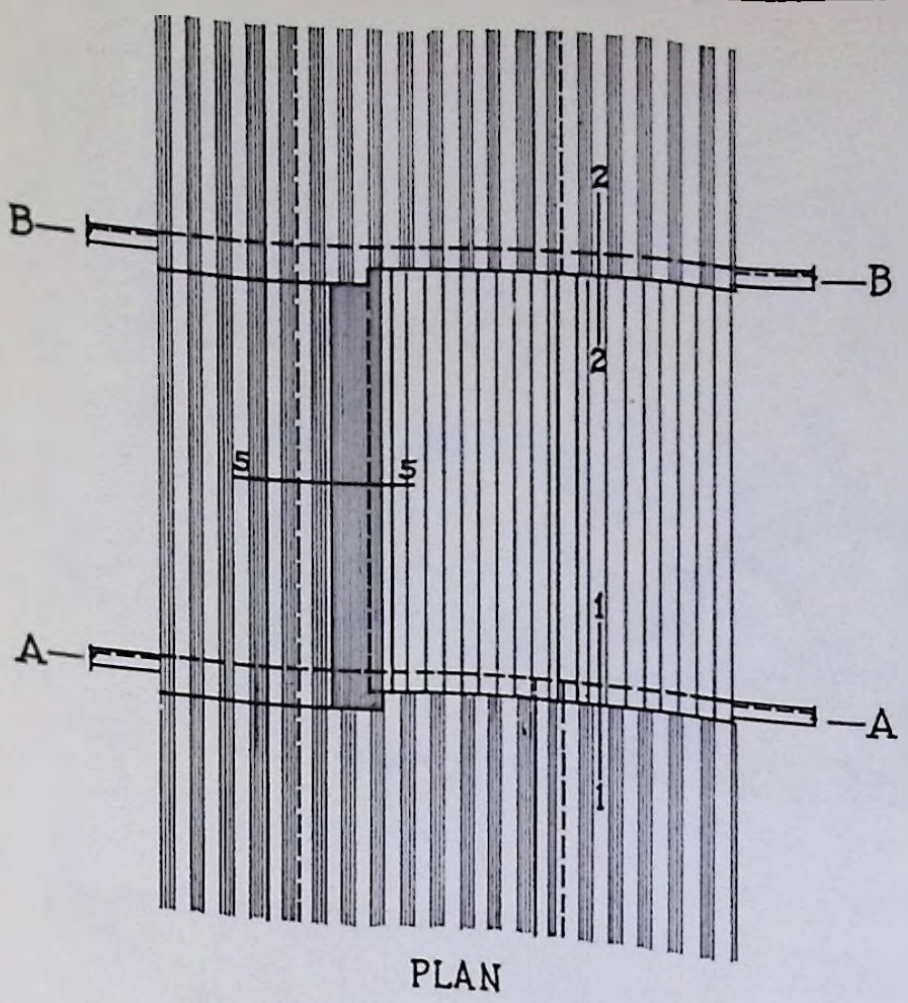
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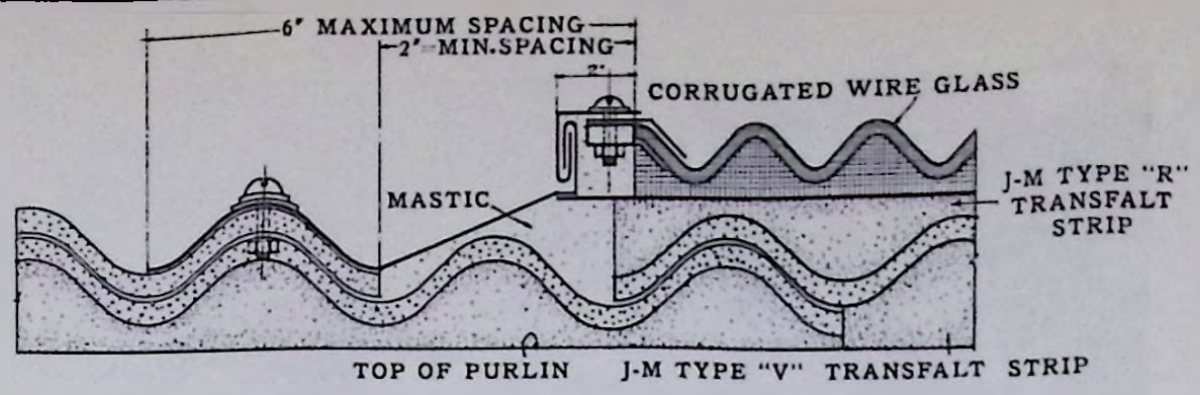
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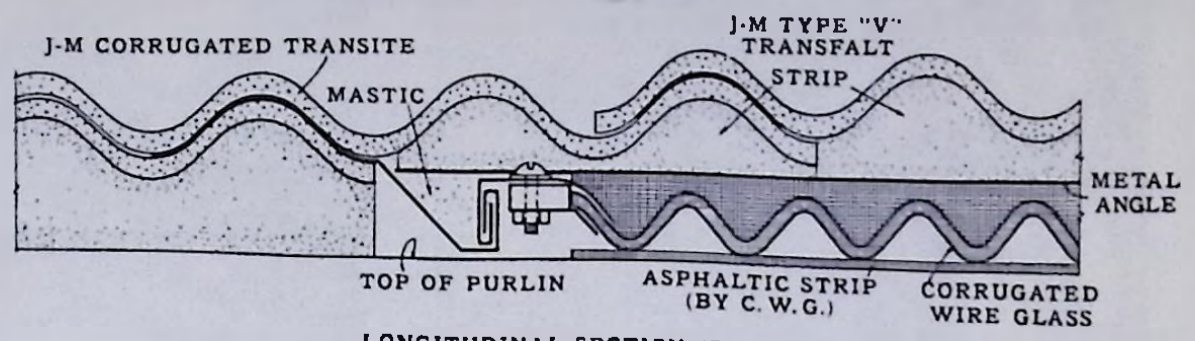
ERECTION DETAILS - CORRUGATED TRANSITE AND CORRUGATED WIRE GLASS



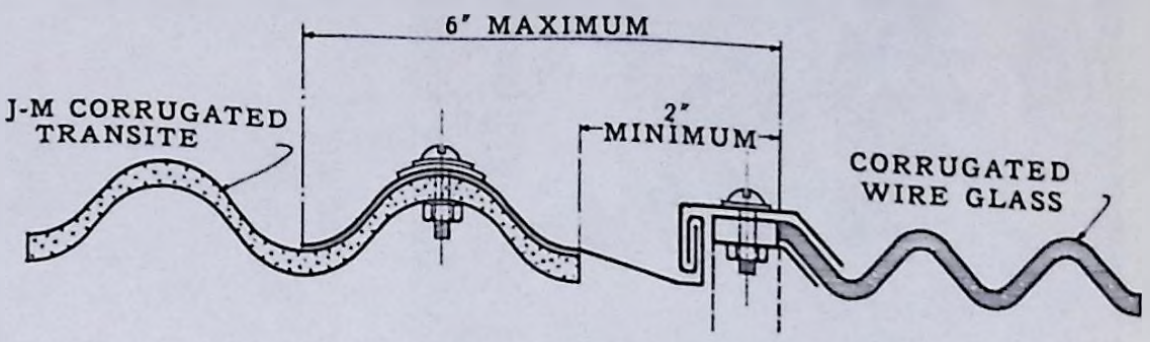
PLAN



LONGITUDINAL SECTION "A-A"

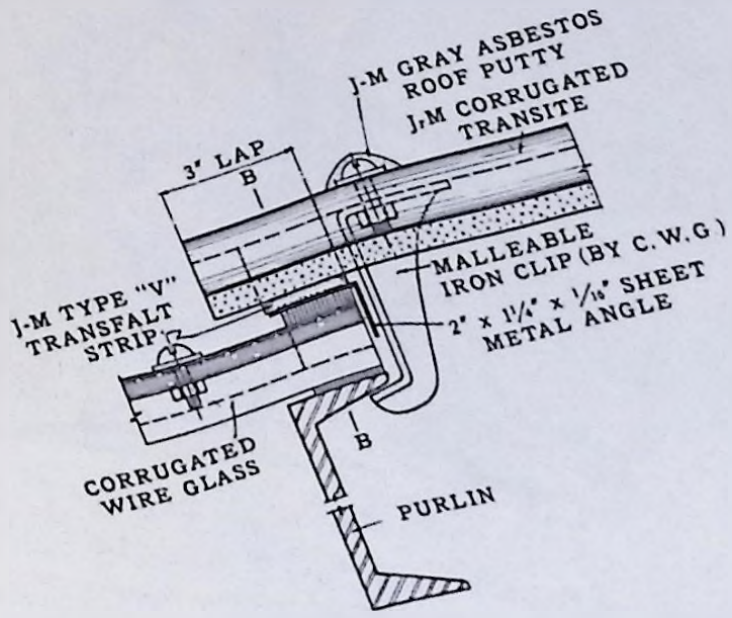


LONGITUDINAL SECTION "B-B"

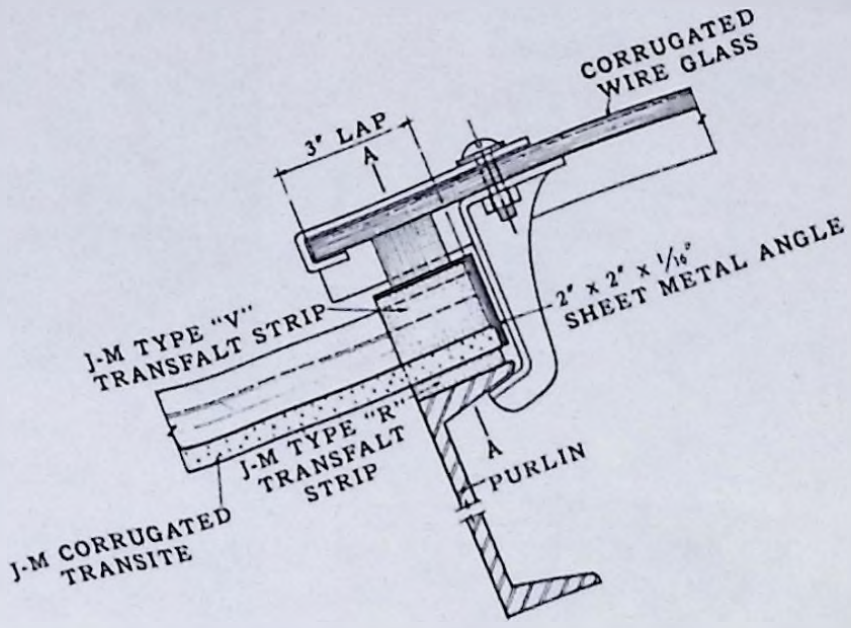


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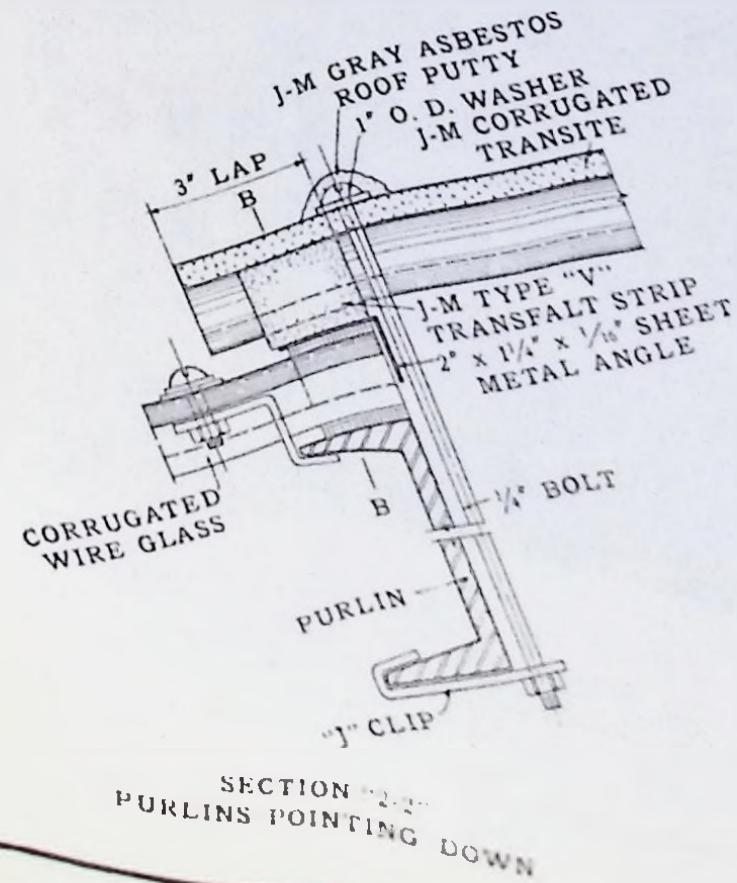
CORRUGATED WIRE GLASS DETAILS



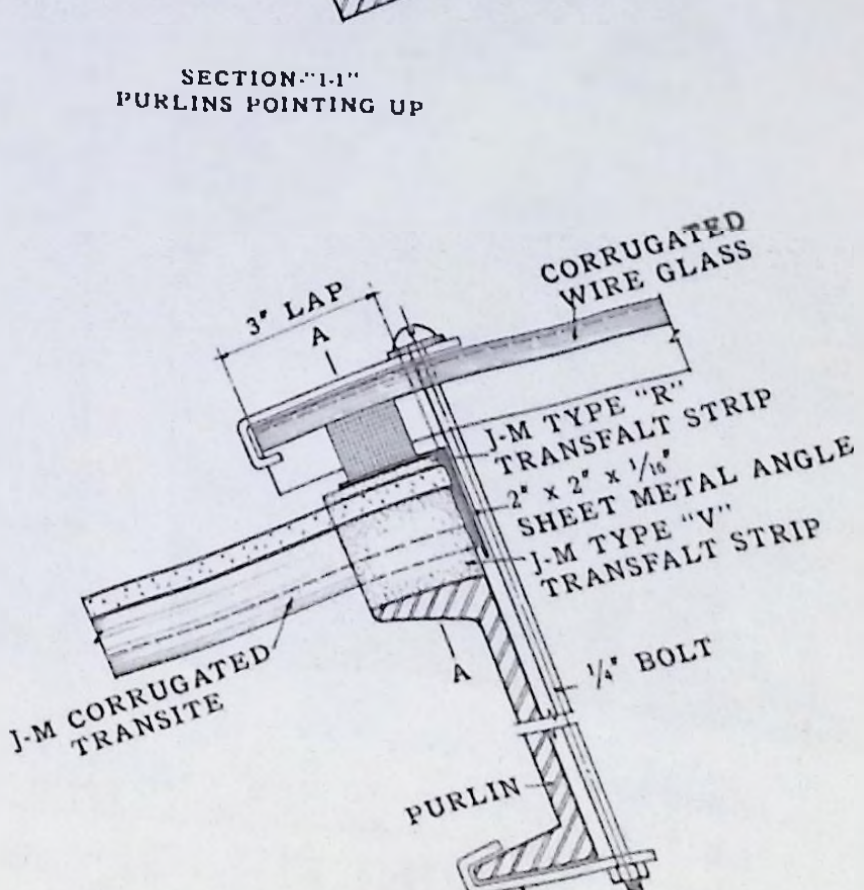
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PURLINS POINTING UP



SECTION "1-1"
PURLINS POINTING UP



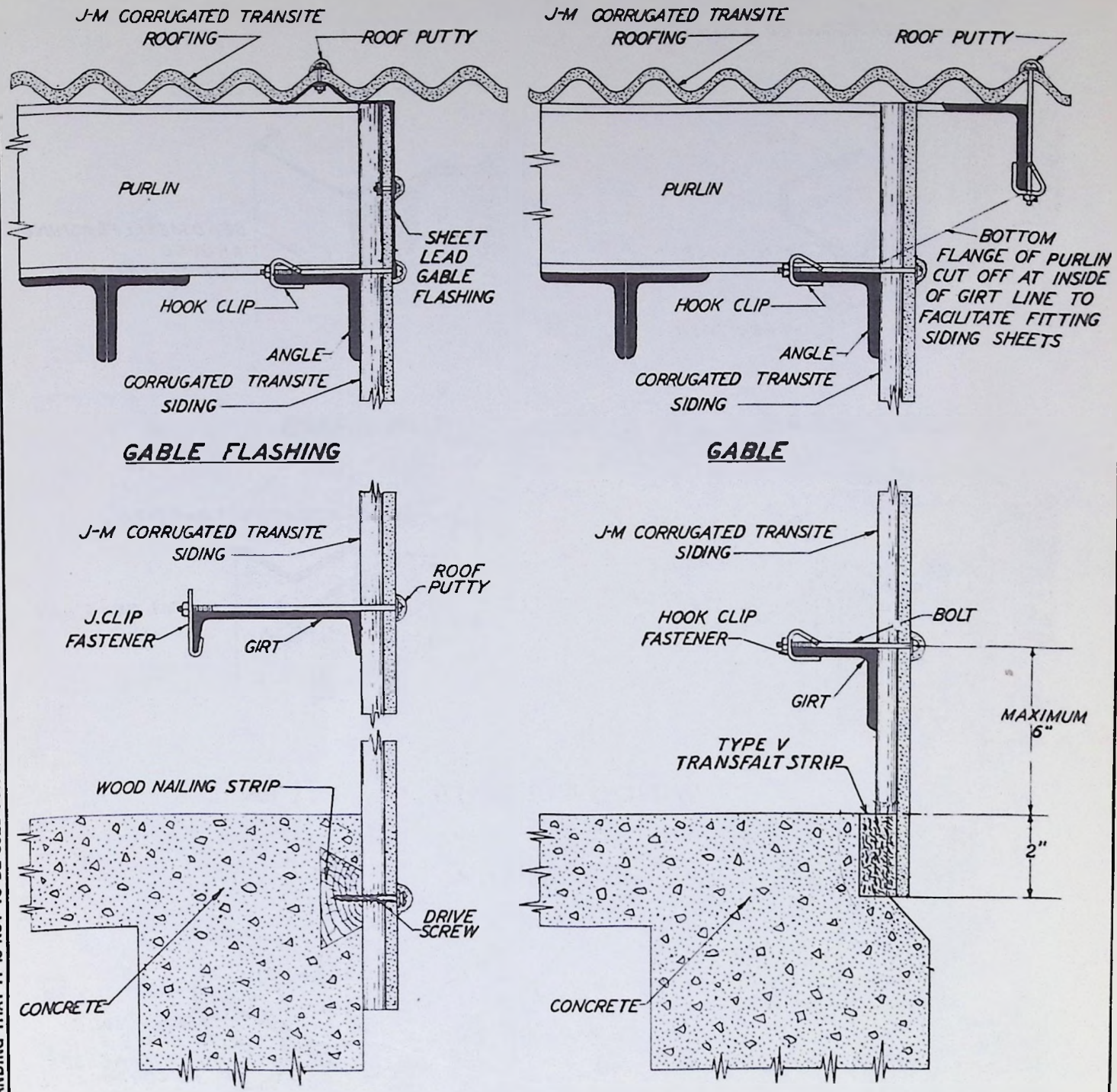
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PURLINS POINTING DOWN



SECTION "1-1"
PURLINS POINTING DOWN

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TYPICAL GABLE AND SILL DETAIL



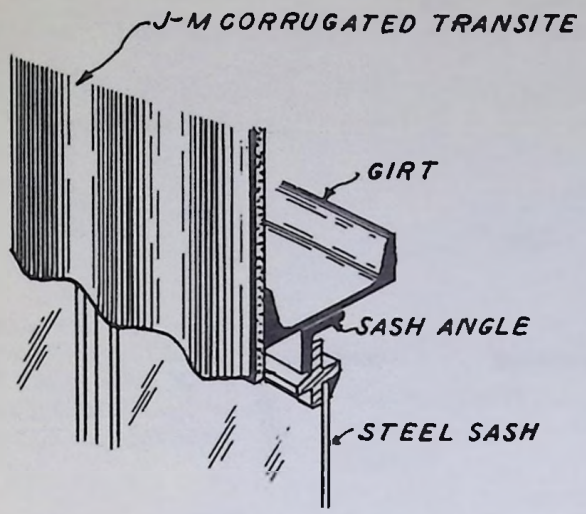
TYPICAL DETAILS BASE CONSTRUCTION

JOHNS-MANVILLE Transite Products	DATE December, 1937 (Cancelling BMT-36 & 31 dated 1934 & '36)
Corrugated Transite Typical Gable and Sill Detail	(BMT-31)

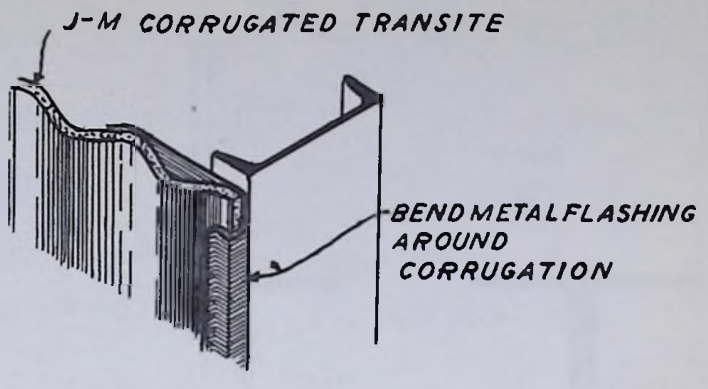
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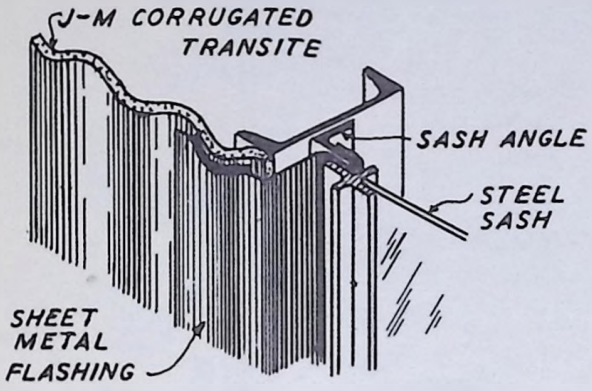
CORRUGATED TRANSITE FLASHING DETAILS

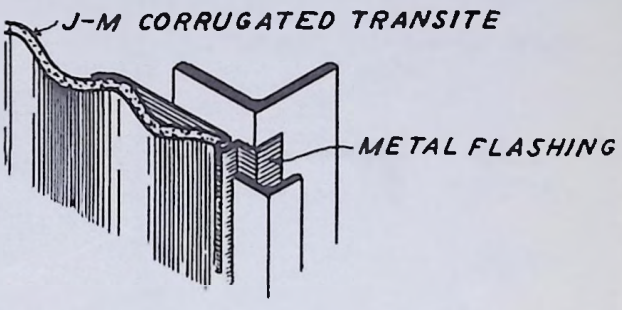


WINDOW HEAD

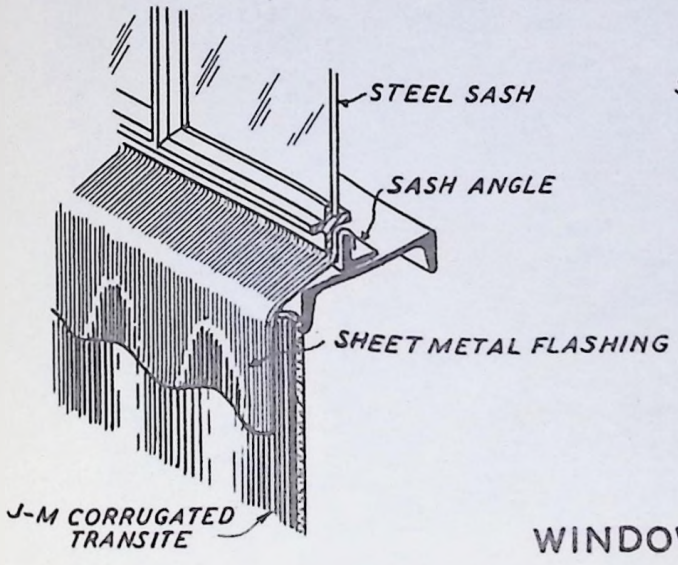


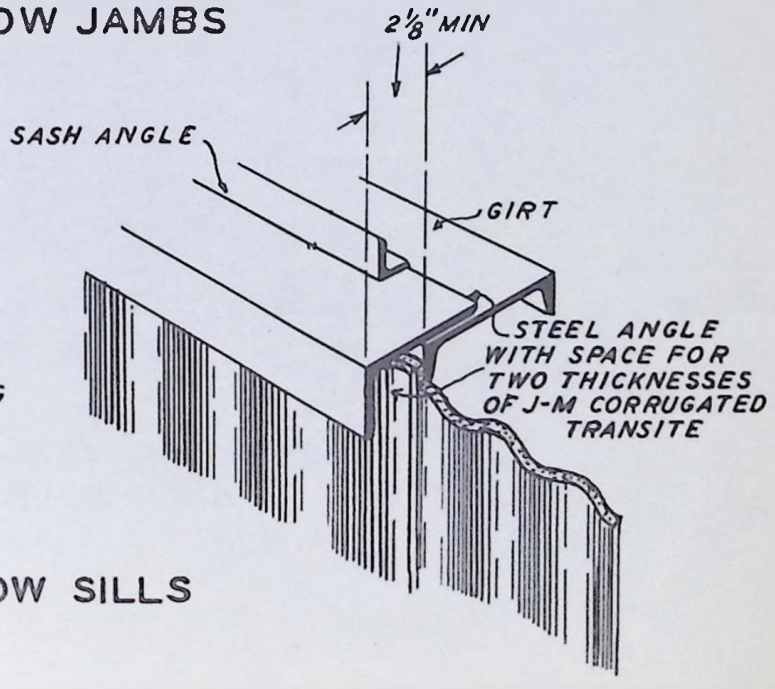
DOOR JAMB





WINDOW JAMBS





WINDOW SILLS

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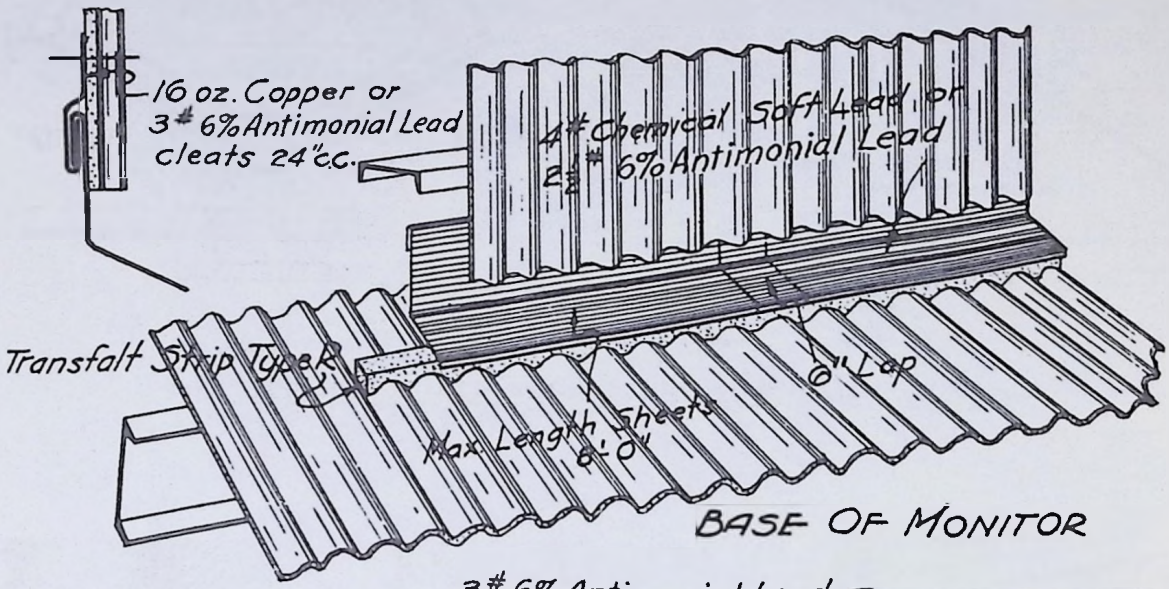
LEAD FLASHING OF CORRUGATED TRANSITE

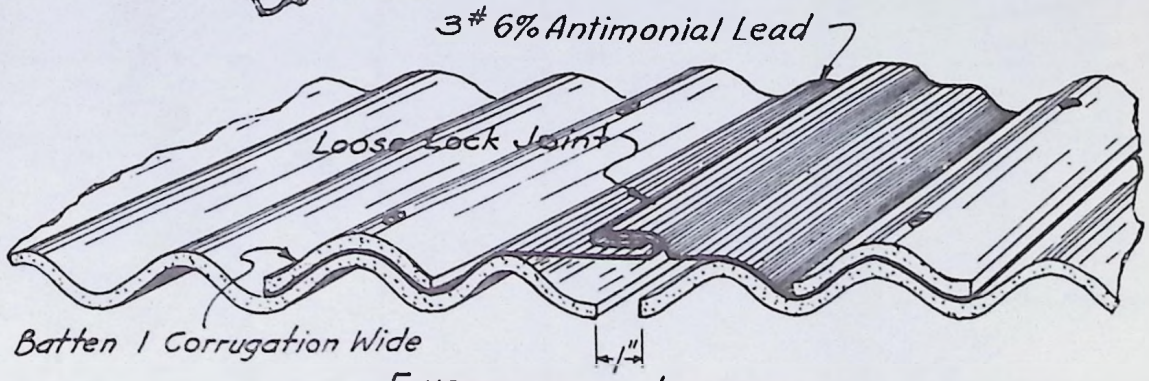
The use of lead as a flashing material is desirable due to its ability to conform readily to irregular surfaces. For general flashing purposes either 4-lb. chemical soft lead, or 2½-lb. 6 percent antimonial lead should be used. For expansion joints, 3-lb. 6 percent antimonial lead, made up with a loose lock joint, should be used.

Sheet lead should never be fastened so rigidly as to eliminate all possibility of movement, as its expansion coefficient is almost two and one-half times as great as steel. The use of cleats of 16-oz. soft rolled copper, or 3-lb. 6 percent antimonial lead is recommended. (See detail below.) Sheet lead should never be used in lengths greater than 8 ft.

The typical details shown below should be closely followed for satisfactory service of lead flashing.

Lead should not be bent at sharp angles; a radius greater than the thickness of the metal should always be maintained. When forming loose lock joints, a 1/8" x 1½" leather belt should be used to maintain equal space in grooves to permit unhampered movement of flashing sheets.





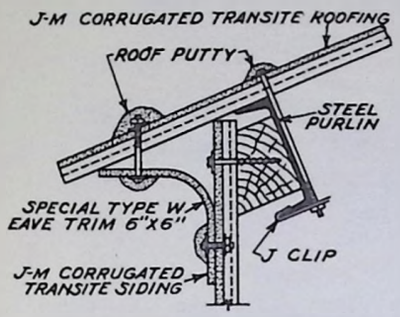
JOHNS-MANVILLE	Transite Products	DATE December, 1937 (Cancelling BMT-33 & 35 dated 1932 & '37) (BMT-33)
Corrugated Transite Lead Flashing Details		

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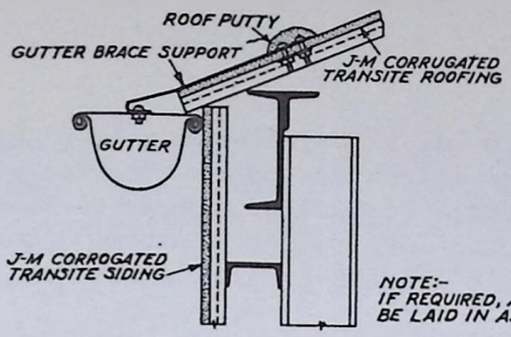
TECHNICAL DATA SECTION

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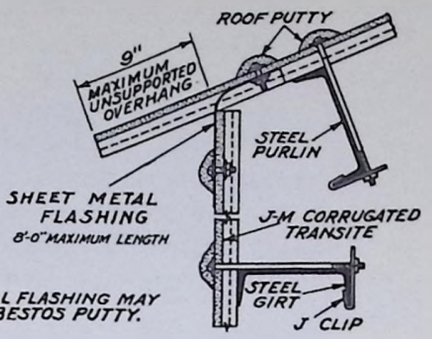
CORRUGATED TRANSITE
DETAILS FOR EAVES, VALLEYS, GUTTERS AND FLASHINGS



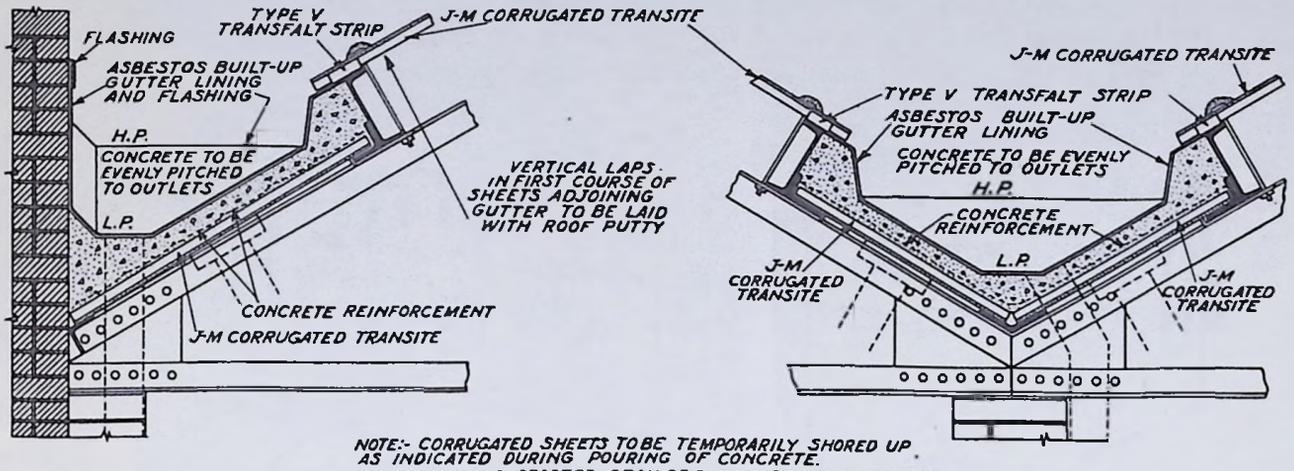
EAVE DETAIL



GUTTER DETAIL

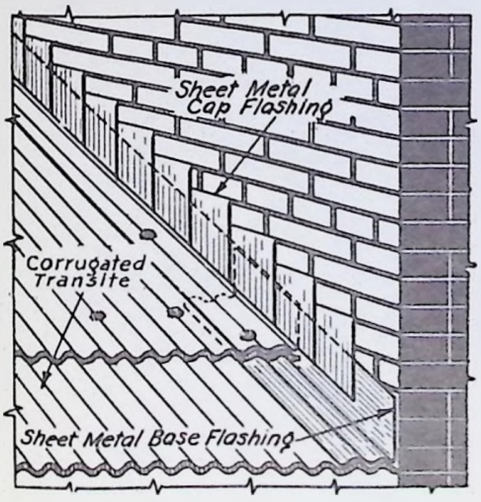


FLASHING AT EAVE

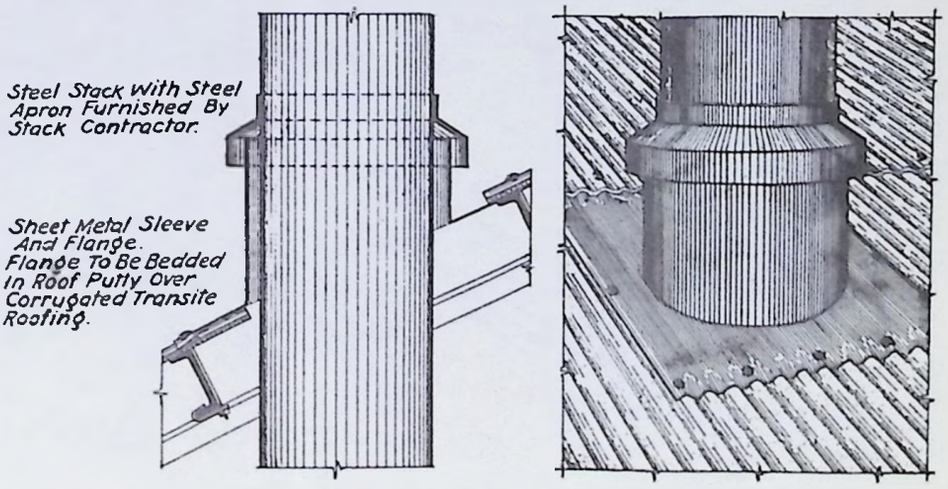


NOTE:- CORRUGATED SHEETS TO BE TEMPORARILY SHORED UP AS INDICATED DURING POURING OF CONCRETE.
MAXIMUM UNSUPPORTED SPAN OF GUTTER SHEETS TO BE 42".
PROVIDE SCUPPERS THROUGH WALLS WHERE POSSIBLE.

CORRUGATED TRANSITE VALLEY AND GUTTER CONSTRUCTION DETAILS



SIDE WALL FLASHING



STEEL STACK FLASHING DETAILS

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PARTIAL LIST OF INSTALLATIONS OF CORRUGATED TRANSITE

INSTALLATION DATE	NAME	LOCATION	TYPE OF BUILDING	APPROX. SQUARES
	ALABAMA			
1929	Southern Natural Gas. Co.	Reform	Compressor Bldgs.	150
	CALIFORNIA			
1932-35	California Packing Corp.	Honolulu, T.H.	Warehouse	1500
1929-34	Durkee Famous Foods	Berkeley	Warehouse & Garage	600
1936	Glidden Paint Co.	San Francisco	Paint Mfg. bldg.	240
	Ford Motor Co.	Long Beach		1000
1925	Hammond Lumber Co.	Samoa	Power plant	800
1926	Morton Salt Co.	Newark	Salt works bldg.	383
1932-35	Mutual Telephone Co.	Honolulu, T.H.	Warehouse & shops	190
	Naval Ammunition Depot	Oahu, T.H.		2000
1932-35	Omomea Sugar Co.	Omomea, T.H.	Boiler house & mill	400
	Pacific Portland Cement Co.	San Francisco	Cement plant	345
	Pan American Petroleum Co.	Los Angeles	Boiler house & oil tanks	8716
1923	Pan American Petroleum Co.	Watson	Refinery bldgs.	1700
1931	Shell Chemical Co.	Shell Point	Ammonium sulphate bldg.	300
1936	Standard Oil Co.	Richmond	Power house	317
1926	Stanford University	Palo Alto	Laboratory	325
1927	Stauffer Chemical Co.	Los Angeles	Acid plant	270
1926	Union Oil Co.	Los Angeles	Flare backs	135
1932-36	U. S. Army	Schofield Barracks	Gymnasium, Bowling alley Hospital bldgs.	400
1932-35	U. S. Navy	Pearl Harbor	Forge shop extension	200
1934	U. S. Navy	San Diego	Aircraft assembly bldg.	185
1932-35	U. S. Quarantine Sta.	Sand Island, T.H.	Barracks bldg.	150
	CANADA			
1927	International Harvester Co.	Hamilton, Ont.	Warehouse	120
1935-37	Electro-Metallurgical Co.	Welland, Ont.	Furnace bldg., Electrode bldg. & Coking bldg.	350
	Kellogg Co.	London, Ont.	Grain elevator	18
	Hiram Walker & Sons Ltd.	Walkerville, Ont.	Power house	35
1936	Canadian Sugar Factories	Picture Butte, Alberta	All buildings	560
1929	Churchill River Power Co.	Island Falls, Saskatchewan	Power house	300
1929	Hudson Bay Mining & Smelting	Flin Flon, Man.	Electrolytic tank house	200
1929	Consolidated Mining & Smelting	Trail, B.C.	Sulphuric Acid bldgs.	1000
1937	Consolidated Mining & Smelting	Trail, B.C.	Head Refinery	300
	Imperial Tobacco Co. of Canada, Ltd.	Montreal, P.Q.		
	Canada Cement Co. Ltd.	Montreal East, P.Q.		
	J. R. Booth Co. Ltd.	Ottawa, Ont.		
	Mersey Pulp & Paper Co. Ltd.	Liverpool, N.S.		
	Bathurst Power & Paper Co.Ltd.	Bathurst, N.B.		33
	COLORADO			
1921	General Chemical Co.	Denver	Sulphuric acid plant	272
	CONNECTICUT			
	Chase Brass Co.	Waterbury		500
	DELAWARE			
1924	Speakman Company	Wilmington	Brass foundry	297
	FLORIDA			
1925	Seaboard Air Line Railway	Bocagrande	Phosphate storage bin	600
1920	Standard Agricultural Chemical Company	Bocagrande	Fertilizer bin	250
	GEORGIA			
1920	City of Atlanta	Atlanta	Garbage disposal	120
	ILLINOIS			
1931	Central Illinois Public Service Company	Canton	Gas house	100
1930	Central Illinois Public Service Company	Quincy	Gas house	110
1931	Central Illinois Public Service Company	Springfield	Store-room & loading canopy	50
1930	Crane Company	Chicago	Forge shop	1800
1922	Darling Fertilizer Co.	Monsanto		500
1928	International Harvester	E. Moline		15000
1929	Jones & Laughlin	Chicago	Warehouse	800
1929	Morton Salt Co.	Chicago	Warehouse	800
	Nanapo Ajax Corp.	E. St. Louis		600
1934	Union Starch & Refining Co.	Granite City		150
	INDIANA			
1923	Blackford Window Glass Co.	Vincennes	Glass plant	255
1923-26	Brazil Clay Company	Brazil	Brick plant	500
1933	Commercial Solvents Corp.	Terre Haute	Distillery	600
1930	Empire Oil & Ref. Co.	East Chicago	Refinery bldg.	250
1923	Standard Oil Company	Whiting	Run down lines	588
1926	Stauffer Chemical Co.	East Chicago	Chemical plant	300
	IOWA			
1924	Riverside Power & Mfg. Co.	Iowana	Power house	223
	KANSAS			
	American Royal Exposition Bldg.	Kansas City		1300
1930	Bd. of Public Utilities	Kansas City	Coal conveyor	220
1927	Carey Salt Co.	Hutchinson	Entire Pan Room & other bldgs.	600
1924	Cudahy Packing Co.	Kansas City	Loading docks	416
1934	Independent Oil & Gas. Co.	Kansas City	Boiler house & receiving house	170
12-1931	Ozark Smelting & Mining Co.	Coffeyville	Baghouse "C" (brick bldg.)	260
1933	Ozark Smelting & Mining Co.	Coffeyville	Baghouse "D"	260
	LOUISIANA			
1927	Baptist Tabernacle	Minden	Tabernacle	250
1932	De Soto Parish School Board	Mansfield	Gymnasium	100
1933	Freeport Sulphur Company	Grand Ecaille	Entire plant	2000
1925	Lake Charles Rice Milling	Lake Charles	Entire plant	1000
1921	New Orleans Gas Company	New Orleans	Gas bldg.	200
1933	Penick & Ford Company	Harvey	Warehouses	185
1931	Sou. Advance Bag & Paper Co.	Hodge	Various bldgs.	300
1928-30	Standard Oil Co. of La.	Baton Rouge	Chemical bldg. & Utility bldgs.	1000
1926	Interstate Natural Gas Co.	Ferriday	Compressor bldg.	175
1928	Interstate Natural Gas Co.	Fowler	Compressor bldg.	175
1928	Interstate Natural Gas Co.	Scotland	Compressor bldg.	175
	MARYLAND			
1922	Standard Oil Company	Baltimore	Asphalt filling shed	363
	Standard Wholesale Phosphate & Acid Works, Inc.	Curtis Bay		600
	MASSACHUSETTS			
	Boston & Maine Railroad	East Cambridge	Freight house and canopies	300
	Cambridge Gas Light Co.	Cambridge	Water Gas Plant	150
	Cities Service Refining Co.	East Braintree	Boiler & Pump Houses, Machine Shop, Heater Roofs	400
	General Electric Company	Everett	Foundry	340
	Watertown Arsenal	Watertown	Locomotive house	285
	Wiggin Terminals Company	Charlestown	Pier shed	450
	U. S. Gypsum Company	Charlestown	Elevator & scales housing coating canopies	450
	MICHIGAN			
1927	Buick Motor Car Co.	Flint		329
1922	Cadillac Malleable Iron Co.	Cadillac	Foundry	144
1922	Consumers Power House	Jackson	Oven house	101
1923	Detroit Rock Salt Co.	Detroit	Warehouse	308
1926	Peninsular Portland Cement Co.	Cement City	Power house	116
1923	Wilson Foundry & Machine Co.	Pontiac	Foundry	244
	MINNESOTA			
1930	International Harvester Co.	St. Cloud	Warehouse	136
1930-33	Minneapolis Gas Light Co.	Minneapolis	Gas plant	380
	Northern States Power Co.	Minneapolis		300
1930-36	Koppers Coke Co.	St. Paul	Shops and coal handling	1750
	MISSISSIPPI			
1931	Mississippi Match Co.	Natchez	Mfg. plant	200
1930	Municipal Airport	Meridian	Hangar	125
1929	Planters Oil Mill	Greenwood	Linter bldg.	110

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JOHNS-MANVILLE Transite Products

Corrugated Transite
Partial List of Installations

DATE March, 1938
(Cancelling BMT-85 dated July, 1937)

4-A-35 (BMT-85)

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Slum Clearance Program: Specifications and Data on Various Building Materials (1938)
ACL Doc 21293 · Page 304 of 443

Partial list of installations of Corrugated Transite -- continued

INSTALLATION DATE	NAME	LOCATION	TYPE OF BUILDING	APPROX. SQUARES
	MISSOURI			
	Kansas City Power & Lt. Co.	Kansas City	Coal conveyors & central station roof	260
	NEBRASKA			
1931	Metropolitan Util. Dist.	Omaha	Gas plant & gas retort bldg. Sides & roof	109
	NEW HAMPSHIRE			
	Asbestos Wood Co.	Nashua	Factory	600
	NEW JERSEY			
1922	Sayre & Fischer	Sayreville	Brick yards	1200
1923	Standard Oil Co.	Bayway	Refinery	900
1922	Warner Sugar Co.	Edgewater	Dock and Bldgs.	1000
	NEW MEXICO			
	U. S. Potash Company	Carlsbad	Power house & refinery bldgs.	1757
	NEW YORK			
1923	Eastman Kodak Co.	Rochester	Acid Unit	600
	Jova Brick Works	Newburgh		400
1924	Jova Brick Works	Roseton	Brick-kiln	400
1923	Ostend Baths	Far Rockaway	Bath houses	700
1929	St. Joseph Lead Co.	Edwards	Mfg. bldgs.	300
1934	Universal Atlas Portland Cement Co.	Hudson	Mfg. bldgs.	1500
1936	Jones & Laughlin Steel Service, Inc.	Long Island City	Warehouse	1150
1937	Third Avenue R. R. Co.	New York City	Car barn	1000
	OHIO			
1923	A. M. Byers	Girard	Cast house	188
1923	Carnegie Steel Co.	Mingo Junction	Boiler house	108
1926	Contractors Const. & Supply Company	Cleveland		105
1931	General Motors Radio Corp.	Dayton	Loading shed	504
1924	Hocking Valley Prod. Co.	Glendale	Mfg. plant	106
1926	Illinois Pipe Line Shipped to Ellwood City Ind.	Findlay	Boiler & pump house	157
1934	Jones & Laughlin Steel Corp.	Cincinnati	Warehouse	300
1926	New Idea Spreader Co.	Coldwater	Storage bldg.	171
1926	New Idea Spreader Co.	Coldwater	Transite insulex deck assembly bldg.	193
1931	Pennsylvania R. R. Co.	Dayton	Freight station	183
1924	Peerless Clay Prod. Co.	Port Homer	Mfg. plant	242
1925	Pure Oil Company	Columbus		129
1923	Republic Iron & Steel Co.	Youngstown	Quenching sta.	131
1924	S. W. Portland Cement Co.	Osborn	Mfg. plant	1400
1924	S. W. Portland Cement Co.	Osborn	Cement plant	1400
1923	Standard Oil Company	Toledo	Fire barriers	196
1928	Standard Silica Co.	Cincinnati	Furnace bldg. Gas plants	150
1927	Thew Shovel Co. Lorain Steel Casting Co.	Lorain	Foundry bldg.	153
1926	Tool Steel Gear & Pinion Co.	Cincinnati		140
1928	Transue Williams Company	Alliance	Factory bldgs.	231
1926	Union Gas & Electric Co.	Cincinnati	Gas plants	250
1924	Union Gas & Electric Co.	Cincinnati	Generator bldg.	441
1928	West Carrollton Parchment Co.	W. Carrollton	Stock house	250
	OKLAHOMA			
1928-9	Empire Oil & Ref. Co.	Okmulgee	Refinery bldgs.	158
1930	Empire Oil & Ref. Co.	Ponca City	Car repair shops & warehouse	383
1930	Empire Oil & Ref. Co.	Ponca City	Car repair shops & warehouse	
1930	Empire Oil & Ref. Co.	Ponca City	Wax Press house	104
	PENNSYLVANIA			
1923	Carnegie Steel Co.	Pittsburgh	Manufacturing	279
1924	Ford Motor Co.	Glassmere	Glass plant	273
1926	Gulf Refining Co.	Pittsburgh		258
1926	Jones & Laughlin Steel Co.	Woodlawn	By-prod. plant	709
1926	Jones & Laughlin Steel Co.	Woodlawn	Mfg. plant	900
1922	M. L. Shoemaker Co.	Philadelphia	Fertilizer bldg.	374
1924	Madeira Hill Co.	Frackville	Breaker	378
1926	Monongahela R. R.	S. Brownsville	Machine shop	166
1930	Morris Wheeler Company	Philadelphia	Building	1500
1928	Olney Foundry Co.	Philadelphia	Foundry bldg.	474
1929	P. & R. Coal & Iron Co.	Locust Summit	Central breaker	650
1927	Stauffer Chemical Co.	Pryo	Mfg. plant	230
1923	West, E. & M. Co.	Sharon	Siding on shipping & foundry	104
1924	W. E. Pulverman Co.	Wilkes-Barre	Fan house	366
	RHODE ISLAND			
	M. T. Stevens & Sons Co.	Peacedale	Grease Recovery Plant	150
	TENNESSEE			
	Dupont Company	Nashville		500
	TERRITORY of HAWAII			
	(See under California)			
	TEXAS			
1928	Freeport Sulphur Co.	Freeport	Boiler rooms, pump house, etc.	300
1930	Humble Oil & Ref. Co.	Baytown	Refinery bldg.	300
1927	Humble Pipe Line Co.	Satsuma	Station	154
1928	Morton Salt Co.	Grand Saline	Kleer-Krock mine bldg.	680
1929	Morton Salt Co.	Grand Saline	Salt plant	650
1930	Phillips Petroleum Co.	Borger	Refinery bldgs.	140
1933	State Highway Department		Warehouse bldgs.	600
1928	Texas Company	Port Arthur	Compounding bldg.	600
1929	Texas Company	Amarillo	Power house	270
1930	Texas Company	Port Arthur	Refinery bldg.	400
1930	Texas Gulf Sulphur Co.	New Gulf	Various bldgs.	2500
1928	Trinity Portland Cement Co.	Houston		290
	UTAH			
1933	American Smelting & Refining Co.	Garfield		200
1924	Morton Salt Co.	Burmeister		100
	Oregon Short Line R.R. Co.	Salt Lake City	Freight Depot	600
1928	Royal Crystal Salt	Saltair		400
1931	U. P. Railway Co.	Salt Lake City		100
1926-28	Utah Railroad	Lehi and Martin		120
	VIRGINIA			
1923	Chesapeake & Ohio R. R.	Newport News	Pier shed	1600
	WASHINGTON			
1927-37	Longview Fibre Co.	Longview	Siding Mill	500
1930-37	Puget Sound Navy Yard		Various	500
1936	Soundview Pulp Co.	Everett	Monitor walls, fan houses	400
1930	U. S. Light House Service	Seattle		90
	WEST VIRGINIA			
1923	Barium Reduction Corp.	Charleston	Chemical bldg.	285
1924-25	Barium Reduction Corp.	S. Charleston	Mfg. plant	203
1933	Carbide & Carbon Chemical Co.	S. Charleston	Shipping bldg.	181
1926	E. I. du Pont	Belle	Various	2300
1924	Norfolk & Western R. R.	Auville	Engine house	344
1928	Northern & Western Ry.	Yeager		200
1925	Pure Oil Company	Cabin Creek		105
1933	Standard Ultramarine Co.	Huntington		137
1933-36	Westvaco Chlorine Products Co.	Charleston	Bisulphide & Caustic Fusion bldg.	305
	WISCONSIN			
	International Harvester Co.	Milwaukee		500
1933	J. I. Case Co.	Racine	Forge shop	350
1923	Milwaukee Coke & Gas Co.	Milwaukee	By-products bldg.	210
1938	Western Printing Co.	Racine	Warehouse & Garage	125
	FOREIGN			
	Arecibaball Co.	Cuba		2000
	Custom Houses	Tampico, Mexico		1500
	General Motors Corp.	San Paulo, Brazil		6500
	Govt. Whse. Buena Ventura	Columbia, S. A.		1200
	Hershey Corp.	Cuba		1800
1923	Panama Canal	Balboa	Wiry & forge shop	1593
1925	Panama Canal	Balboa		1000
1922	Pierce Oil Corp.	Mexico		325
	(Territory of Hawaii - See under California)			

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Transite Ventilators

Transite Ventilators, made from Transite Pipe, are designed for use on all buildings where fireproof, fume-proof and weather-proof construction is desired. They are especially satisfactory for engine houses, gas and power houses, laboratories, factories, etc., where a corrosion-resisting ventilator is essential.

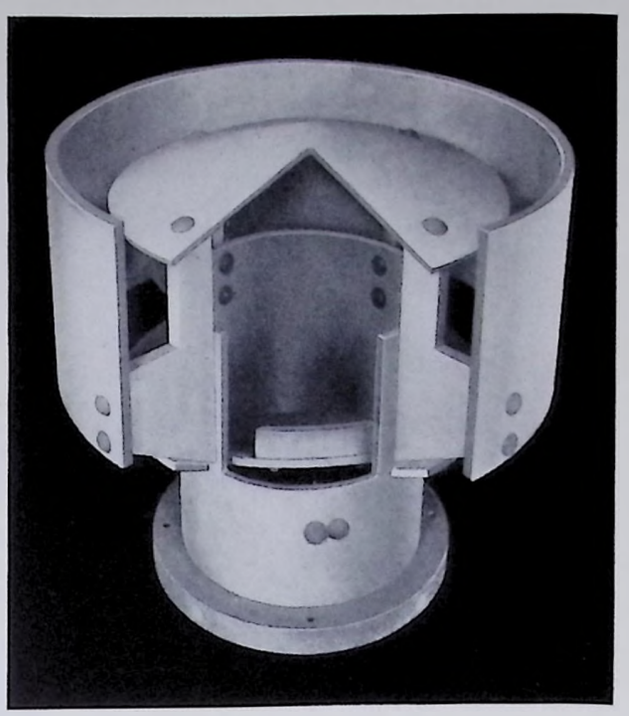
Transite Ventilators are manufactured to give the best possible air circulation. They never need painting and have proved most economical because of their permanence and freedom from maintenance.

At no place is the destructiveness of the elements more apparent than in ventilators. In a position exposed to the action of wind, rain, snow and ice from the outside, they are frequently subjected to corrosive gases and vapors from the inside. Successful operation under these conditions requires that the ventilator be constructed throughout from materials which will withstand the action of the elements, resist corrosion and be unaffected by rapid change of temperature.

The gases and vapors from many industrial processes contain acids which, when the temperature of the gas is lowered, are deposited in diluted form on the ventilator. Tests by the Underwriters' Laboratories on Transite Flue Pipe, as well as many installations subjected to severe service, demonstrate the high resistance of Transite to corrosion. This quality assures protection to the ventilator both from exhaust fumes and from corrosive outside air. Its fire-resisting properties provide security against sparks or accidental hot blasts from equipment.

The comparatively low heat conductivity of Transite Pipe is evidenced by Underwriters' reports showing a temperature difference of 160 deg. F. between the interior and exterior of the pipe when the gases conveyed were 314 deg. F. This quality is essential to the efficient operation of a ventilator. The flow of gases through Transite Ventilators is promoted by keeping the gases at their maximum temperature. Furthermore, the formation of acidulous condensate is either decreased or prevented altogether by minimizing temperature drop.

Factors which contribute in no small way to the effectiveness of ventilators are smooth interior surfaces and unobstructed air passages. Transite Pipe, due to the method by which it is manufactured, has a surface smoother than new and clean metal, while intensive study and research have combined to provide surface contours which permit the unimpeded flow of exhaust gases to the outside atmosphere.



Construction:

Transite Ventilators have no exposed metal parts on either the interior or exterior surfaces. This important development is accomplished by the use of Transite throughout and the protection of bolt heads and nuts by a cement similar to Transite itself.

The drawing illustrates the construction of a Transite Ventilator and designates its various parts by numbers.

The stack, part No. 1, is the foundation of the assembly and its interior diameter indicates the size of the ventilator. Thus, a 12″ ventilator is one in which the stack is made from 12″ I.D. Transite Pipe.

The suction thimble, part No. 2, is the means used for inducing draft in the ventilator, which is caused by the wind blowing across the top and bottom of the suction thimble in any direction.

The cap, part No. 3, is to prevent the entrance of rain, snow and wind into the building. Rain and snow would cause damage and the entrance of wind would interfere with the operation of the ventilator.

The wind louvre, part No. 4, prevents winds deflected by pitched roofs from opposing the exit of air

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or gases. Air deflected in this way actually helps to induce a draft.

The damper, part No. 5, is used for regulating the volume of air to be exhausted from the building. The trunnions on which the Transite damper revolves are non-metallic, as are the stop and counterweight. The chain for operating the damper must be ordered separately or purchased locally. Ventilators without dampers will be furnished if desired.

Brackets, parts No. 6 or 6A, support the suction thimble, the cap and the wind louvre. All bolt heads and nuts are protected as shown.

Sizes and Shipping Data:

The drawing shows the sizes in which Transite Ventilators are furnished, as well as the dimensions of the various parts.

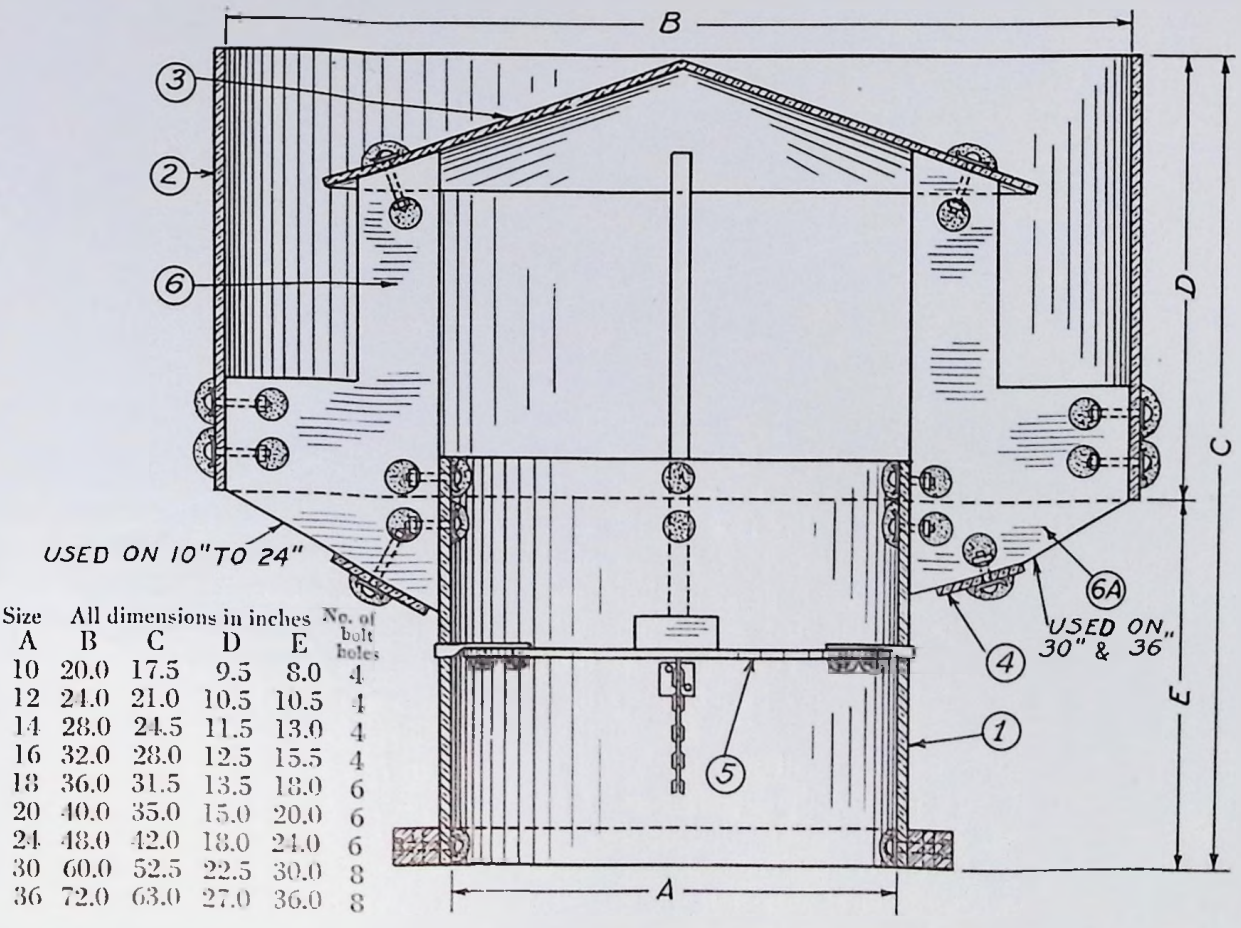
Transite Ventilators are furnished with lengths of stacks as shown in the table. Around the bottom of the stack is an annular ring of Transite provided with bolt holes for fastening the ventilator to the curb on which it rests.

Transite Ventilators may be placed on the top of a section of Transite Pipe, if it is necessary to raise them above parapet walls or other obstructions to the wind.

Sizes 10″ to 24″ are shipped completely assembled ready for erection. Larger sizes are shipped knocked down.

List Prices and Approximate Weights

Size, inches	Weight of Ventilator, lb. with damper	Weight of Ventilator, lb. without damper	Weight of crate, lb.	Price each
10	62	55	45	$100.00
12	84	77	50	120.00
14	120	110	55	140.00
16	188	175	65	160.00
18	221	205	75	180.00
20	245	225	85	200.00
24	424	400	100	240.00
30	635	595	290	300.00
36	870	825	350	360.00

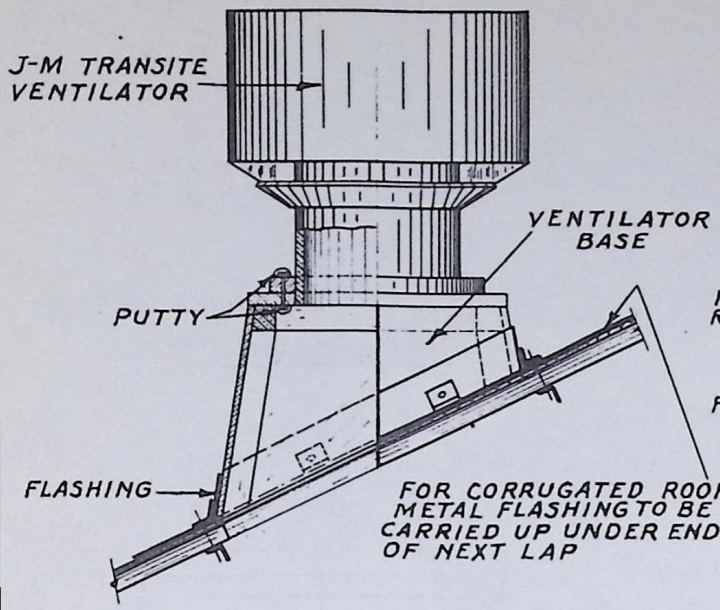


Size	All dimensions in inches				No. of bolt holes
A	B	C	D	E	
10	20.0	17.5	9.5	8.0	4
12	24.0	21.0	10.5	10.5	4
14	28.0	24.5	11.5	13.0	4
16	32.0	28.0	12.5	15.5	4
18	36.0	31.5	13.5	18.0	6
20	40.0	35.0	15.0	20.0	6
24	48.0	42.0	18.0	24.0	6
30	60.0	52.5	22.5	30.0	8
36	72.0	63.0	27.0	36.0	8

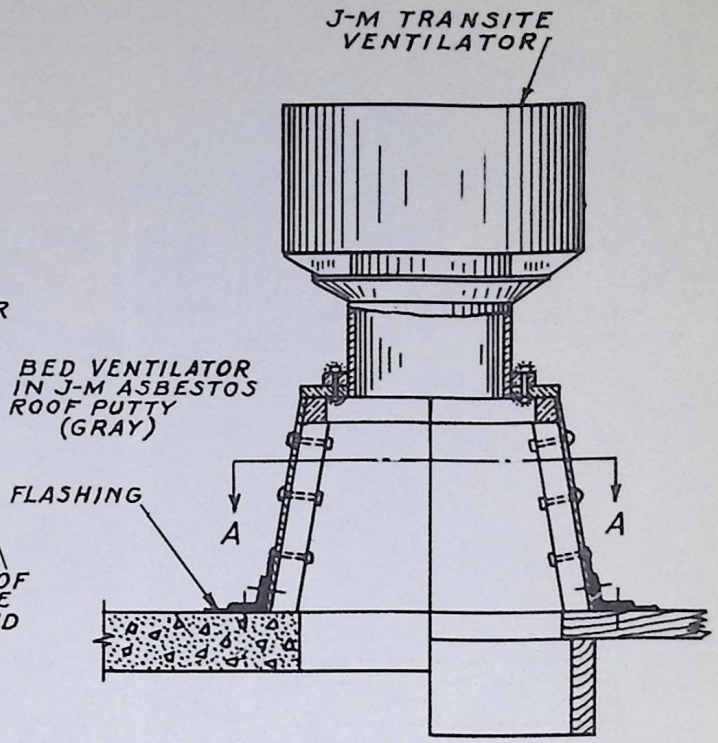
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THIS SHEET IS THE PROPERTY OF JOHNS-MANVILLE, NEW YORK CITY, AND IS LOANED SUBJECT TO RECALL, WITH THE DISTINCT UNDERSTANDING THAT IT IS NOT TO BE USED FOR ANY PURPOSE WHICH MIGHT BE DETRIMENTAL TO THE INTEREST OF THE COMPANY.

TRANSITE VENTILATOR
BASE AND FLASHING DETAILS

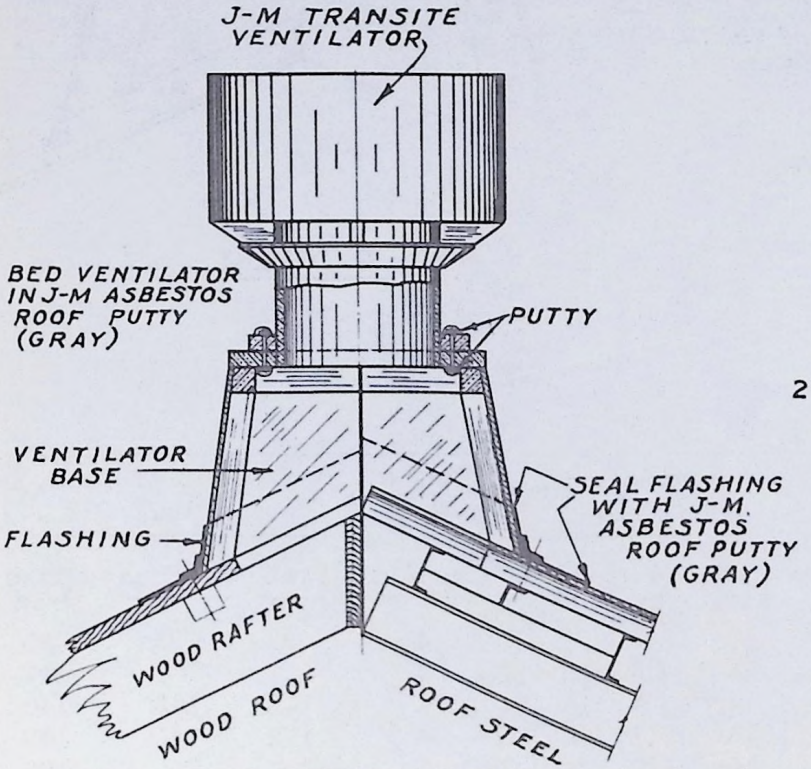


TRANSITE VENTILATOR AND BASE FOR SLOPING ROOF

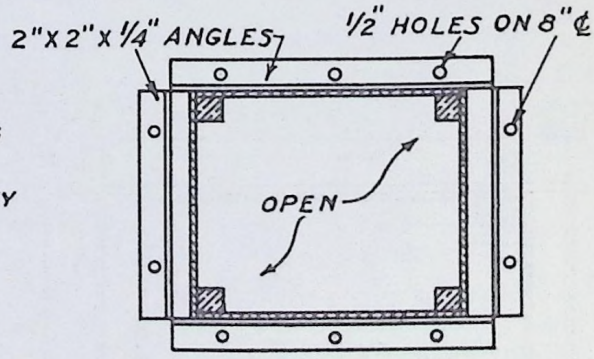


CONCRETE ROOF WOOD ROOF

TRANSITE VENTILATOR AND BASE FOR FLAT ROOF



TRANSITE VENTILATOR AND BASE AT RIDGE OF ROOF



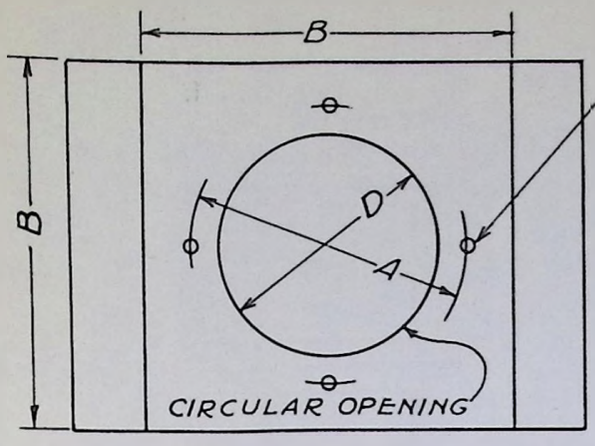
SECTION A-A

VENTILATOR BASE

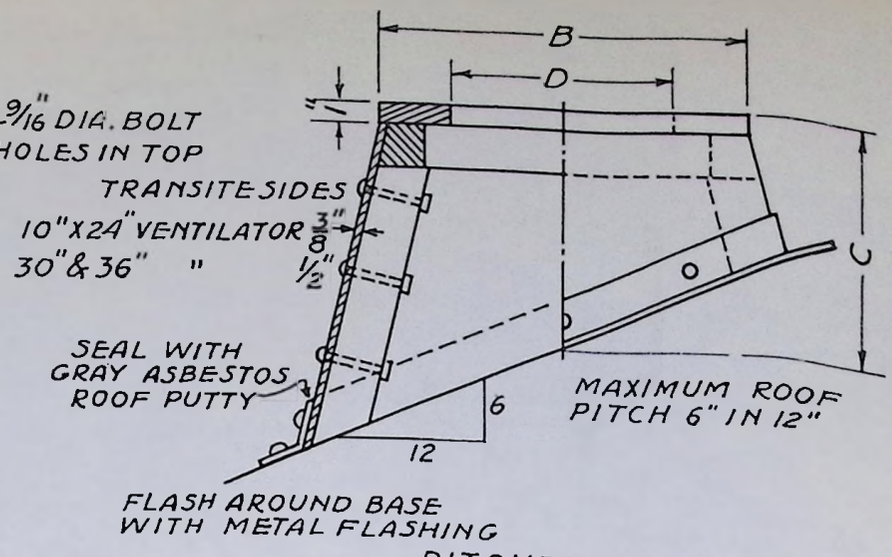
JOHNS-MANVILLE Transite Products	DATE February, 1938 (Cancelling sheet dated February, 1937)
Transite Ventilator Base and Flashing Details	(BMT-323)

PRINTED IN U. S. A. TECHNICAL DATA SECTION

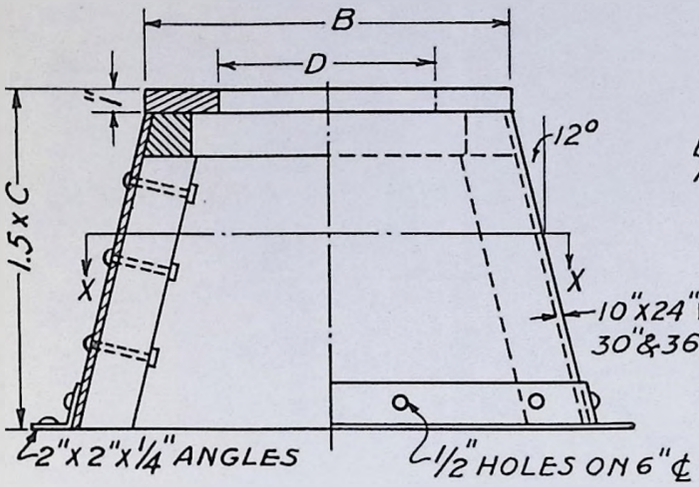
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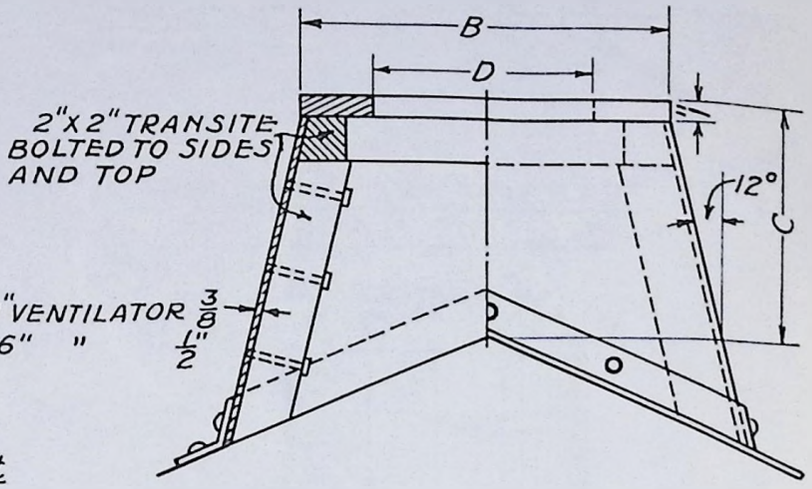
PLAN



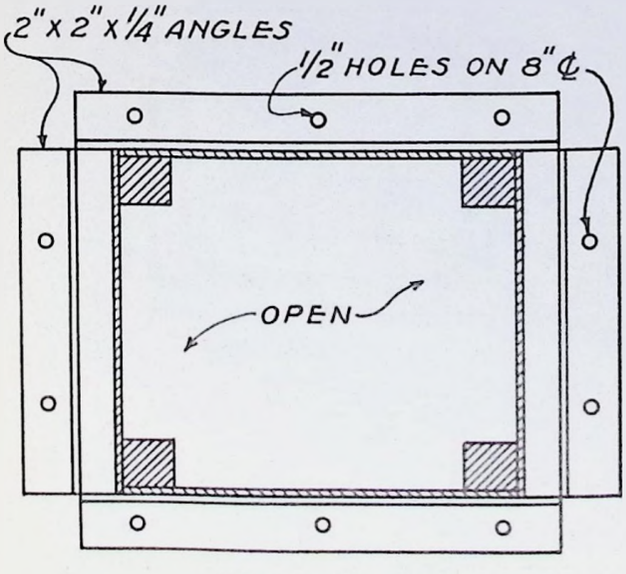
PITCHED ROOF



FLAT ROOF



RIDGE



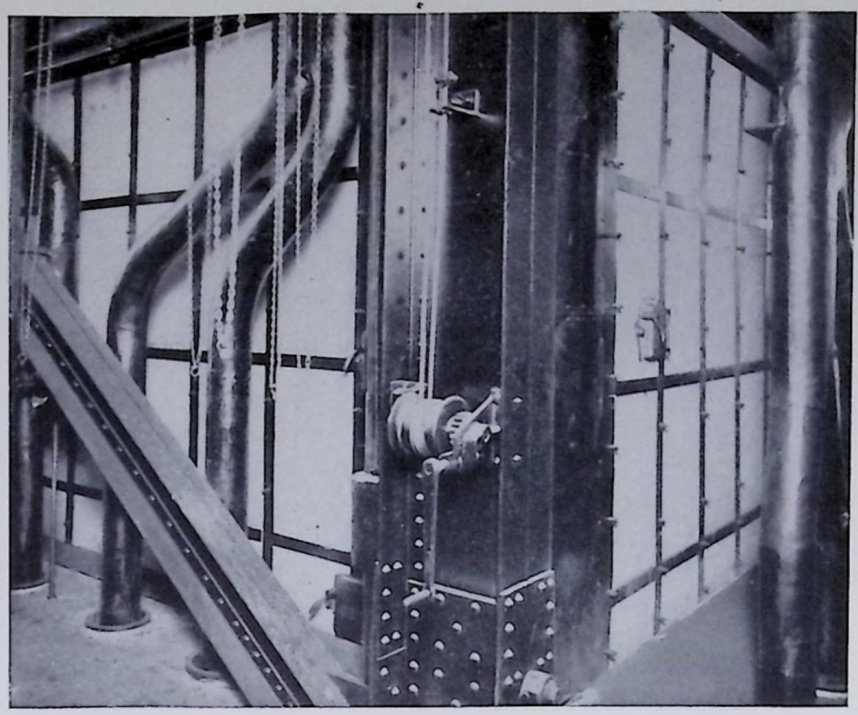
SECTION X-X

Dimensions, inches				No. of Bolt Holes	Weight of Base, lb.		
D*	A	B	C	in Top	Flat	Pitched	Ridge
10	12.3	16	10	4	98	85	95
12	14.4	18	12	4	122	100	117
14	16.4	20	14	4	143	115	140
16	18.5	22	16	4	172	145	165
18	21.0	24	18	6	207	165	195
20	23.1	26	20	6	250	190	240
24	27.2	30	24	6	322	245	305
30	33.4	36	30	8	435	370	460
36	39.5	42	36	8	697	495	645

*Ventilator size

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Flat Transite Asbestos Sheets



Transite casing over insulation on boiler water-wall

Transite is generally recognized as the outstanding fire- and corrosion-resisting building sheet on the market today. It is composed of asbestos fibre and portland cement, united under tremendous pressure into dense, monolithic sheets of remarkable strength, rigidity and durability.

Transite is light gray in color, and has a specific gravity of about 2.0, weighing approximately 124 lb. per cu. ft. It can be drilled with twist drills, punched, fastened with nails and screws and sawed with a hand saw (set 5 points to the inch). A portable power saw should be used if much sawing is to be done in the field. For shop practice, see other data sheets.

Transite does not become warped, distorted or weakened in service; in fact, it actually strengthens and toughens with age. It offers high resistance to acid fumes and severe weather conditions. It has withstood severe fire tests and is widely used where resistance to fire is important. Painting, finishing or protection against deterioration is never required.

Flat Transite is exactly the same material as Corrugated Transite, except for form. It is suitable for use under constant temperatures up to 600 or 700 deg. F., and much higher temperatures of short duration. The characteristics of Transite are gone into in greater detail in connection with the description of the corrugated material on other data sheets.

Finishes:

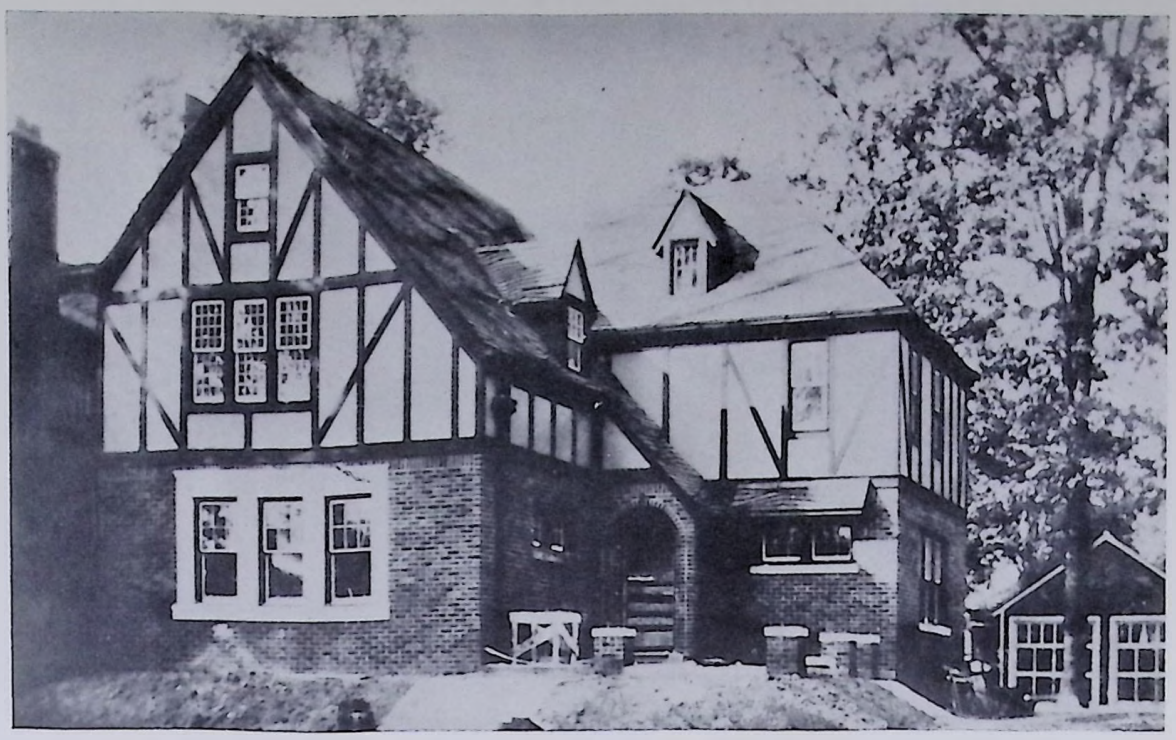
Standard Transite is sufficiently smooth for practically all purposes, and thickness, to and including 2″, is controlled within plus/minus 1/32″. Material can be furnished, however, sanded on one side (S-1-S) or on two sides (S-2-S) to provide special smoothness and thickness control within plus/minus 1/64″. In thickness from 2½″ to 4″, the manufacturing tolerance is plus/minus 1/16″ in either standard or sanded finish. Unless otherwise specified, standard material is always furnished.

Painting and Cleaning:

If Transite is to be painted, it should first be primed with a coat of linseed oil. Pencil marks on Transite can be removed with art gum or sand paper. Black grease is washed off with a solution of sodium carbonate and the Transite sanded while still wet. Rust stain can be cleaned with oxalic acid or a 5% solution of phosphoric acid. If bloom stains appear on the Transite, a weak solution of phosphoric or hydro-

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Flat Transite half-timber effects on residence in Detroit, Mich.

chloric acid will take them off. White or red lead should first be scraped off and the oil stain taken out with caustic soda. Then the Transite should be sanded while still wet.

Where Flat Transite Is Used

Because of its strength, resistance to both fire and corrosion, weatherproof qualities, comparatively light weight, attractive appearance and durability, the applications of Transite are practically unlimited. It finds a wide use in thousands of industrial plants as well as in hospitals, libraries, office buildings, railway stations, machine shops, garages and residences.

General Industrial Uses:

In all types of industrial plants, Flat Transite is used for walls, ceilings and partitions. Its easy workability and the speed with which the large units can be erected are important advantages. Transite is also used in industrial plants for housing of various types and for ducts, bins, table and bench tops and many other uses requiring a durable sheet material.

Furnace Casings:

It is an ideal material for casings over insulation on furnaces, boilers, tanks and other heated equipment. The 3/8" thick material is recommended, particularly on the larger types of equipment and where removable panel construction is required. Its relatively light weight and low thermal conductivity, compared with the steel casings otherwise used, and its corrosion-resistance, attractiveness and light-reflecting features combine to make Transite a highly satisfactory material for this purpose.

Residential Construction:

Transite is equally well adapted to interior and exterior use. Fire-resisting walls, ceilings and partitions, etc., for various types of construction, can be readily made of this material.

It lends itself particularly well to half-timber effects and for the construction of summer cottages and bath houses. Such construction is stronger than cement stucco applied over wire lath and will not crack, scale or erode. It can be readily applied directly over wood or steel studding by the same carpenters used for the balance of the work. Vertical and horizontal joints are covered with battens of the same material, of the width and thickness desired. Battens can be painted as required for architectural effects.

Flat Transite is also used in combination with Corrugated Transite for the complete construction of skeleton-frame buildings. This type of curtain wall construction is easily erected, fire-resistant, durable, attractive and economical.

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Flat Transite Sizes, Weights and Types

Flat Transite is furnished as shown in the following table of nominal sheet sizes and thicknesses:

Nominal sheet size, inches	Thickness, inches
36 x 48	1/8 to 4
42 x 48	1/8 to 4
42 x 96	1/8 to 2
48 x 48	1/8 to 2
48 x 96	3/16 to 2

Uncut sheets run somewhat full in length and width. When cut to another size, Flat Transite is furnished with a tolerance of plus or minus 1/32″ of specified length and width. Material cut to a closer tolerance is supplied only on special order. Sheets can be drilled and countersunk at the factory, if required.

Thickness, Weights and List Prices (Uncut Sheets)

Thickness, inches	Approximate weights in lb. per sq. ft.* Uncrated Standard	Uncrated S-1-S	Crated Standard	Crated S-1-S	List prices per sq. ft.
1/8	1.7	1.4	1.8	1.5	$0.20
3/16	2.1	2.0	2.3	2.1	.25
1/4	2.8	2.6	3.0	2.8	.30
5/16	3.4	3.3	3.7	3.5	.35
3/8	4.0	3.9	4.4	4.2	.40
1/2	5.3	4.7	5.8	5.0	.50
5/8	6.9	6.7	7.5	7.2	.60
3/4	7.6	7.5	8.4	8.2	.70
7/8	8.9	8.7	9.7	9.4	.85
1	10.1	9.9	11.0	10.7	1.00
1 1/4	13.0	12.8	14.0	13.8	1.25
1 1/2	15.7	14.0	17.6	15.2	1.50
1 3/4	18.5	16.8	20.6	18.3	1.75
2	21.0	19.6	23.1	21.2	2.00
2 1/2	26	25	28	27	2.50
3	31	30	34	33	3.00
3 1/2	36	36	39	38	3.50
4	42	40	45	43	4.00

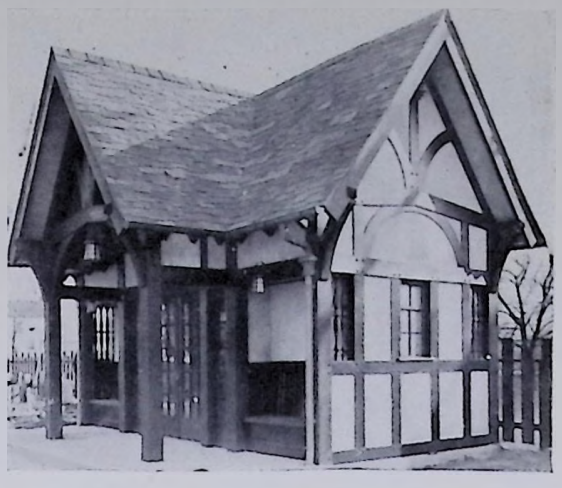
*These are actual weights of material and should be used for computing dead weight loads, but not for figuring price or freight.

Transite is also furnished in corrugated sheets approximately 3/8″ thick, 42″ wide and in lengths of from 3 ft. to 11 ft. Corrugated Transite is fully described in other data sheets.

Maximum Allowable Spans of Flat Transite

Thickness, inches	Ceiling, inches	Wall, inches
1/4	24	36
5/16	32	39
3/8	36	42
1/2	42	48
5/8	45	54
3/4	49	60
1	54	72

Flat Transite sheets may be curved or moulded, in manufacture, to suit requirements. The sheets may be curved in any one direction, with a minimum radius of 5″. Special sections of ridge and trim can also be furnished. Transite is also moulded into ducts, smoke jackets, etc., as described in other data sheets.



Standard Oil Co. filling station, Cleveland, O., sided with Flat Transite

W. R. Flat Transite

Flat Transite sheets can be furnished with a special bituminous impregnation to afford maximum impermeability where the material will be subjected to extreme and sustained moisture or acid conditions.

W. R. Flat Transite is furnished in standard size sheets, 42″ x 48″, 1/8″, 3/16″ and 1/4″ thick; 42″ x 96″, 1/4″ thick; and 36″ x 48″, 1/8″ and 3/16″ thick. Thicknesses greater than 1/4″ can be furnished on special order. The weight of W. R. Flat Transite, 1/4″ thick, is approximately 3 lb. per sq. ft. uncrated; or about 3.3 lb. per sq. ft. crated.

Black Transite

Black Transite is similar to standard Transite except for color. Used as a base for blackboards. No. 1 Finish is standard and No. 2 Finish is sanded. This material is made in standard flat sheets 42″ x 96″ and in thicknesses of 3/16″ and 1/4″.

White Transite

A special White Transite can be furnished on order in standard size flat sheets with either standard or sanded finish. This material is especially adapted to use for exteriors of bake ovens and for similar applications where an attractive appearance is desired.

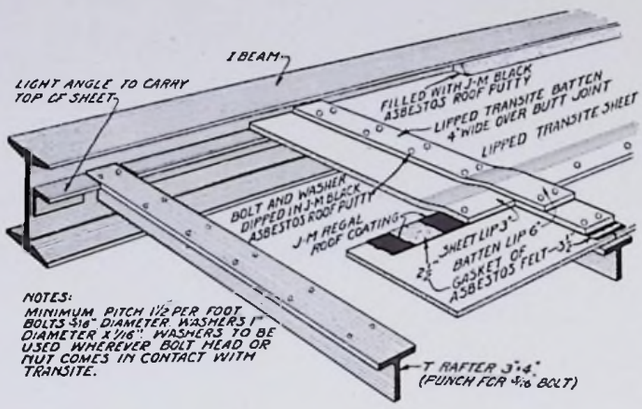
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Lipped Flat Transite

Flat Transite can be furnished in special lip construction for use where a roof of flat, instead of corrugated, material is desired. This product is formed with a 3″ wide lip along one side or end, the lip being offset the thickness of the sheet so as to overlap snugly the adjoining sheet. In ordering, the location of the lips should be specified. The material is furnished 42″ x 96″ and either 5/16″ or 7/16″ thick.

Lipped Flat Transite may be applied over either wood or steel rafters. The maximum allowable span for 5/16″ thick material is 32″, and for 7/16″ material, 36″. For fastening over wood, either bronze or galvanized screws and washers should be used. Over steel construction, bronze, galvanized or other non-corroding bolts and washers are used. Sheets should be fastened along laps on approximate 9″ centers, and to all rafters on approximate 10″ centers.

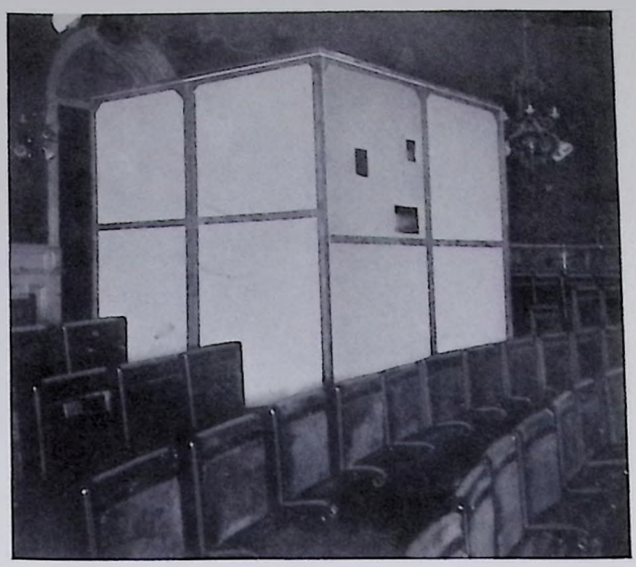


Lipped Flat Transite construction details

The ends of the sheets should be butted, over which a lipped Transite batten 4″ wide should be used. J-M Black Asbestos Roof Putty and Asbestos Felt Gaskets should be used in all laps and under battens. All bolt and screw heads should also be covered with the Black Asbestos Roof Putty.

Transite Motion Picture Booth

Because of the high inflammability of motion picture film, laws have been enacted in practically all states requiring that the projecting machine be housed in a fireproof booth or enclosure. Transite booths conform to the requirements in most of these states as well as to the regulations of insurance companies covering fireproof booths. They have many advantages over sheet metal booths, including lower sound transmission, greater fire resistance, higher



Transite Panel Booth in school auditorium

electrical resistance and more attractive appearance. Transite is a pleasing light gray in color, and can be painted if desired to match interior trim.

These booths are built of Flat Transite sheets, ¼″ thick on sides and top and ⅜″ thick on floor, assembled on a steel frame. Panels are plainly marked so that they can be easily put together by any carpenter without the necessity of fitting, filing or drilling. The Transite is bolted on the inside of the skeleton frame, thus insulating the frame from electrical currents and making the booth fireproof. Joints are pointed up with J-M No. 20 Plastic Refractory Cement, providing smoke-tight construction.

A complete ventilating system, with galvanized iron pipe flues and an exhaust fan, can be furnished.

The Transite booth can be easily enlarged by the addition of standard panels which can also be furnished mounted on the standard steel frame.

List Prices and Weights of Standard Booths

Booth	Approximate Outside Dimensions	List Price	Crating* Extra	Approx. Crated Weight, lb.
Junior	4′ 0″ x 6′ 3″ x 7′ 1½″ high	$150.00	$12.50	850
No. 1	6′ 3″ x 8′ 0″ x 7′ 1½″ high	225.00	15.00	1350
No. 2	8′ 3″ x 9′ 0″ x 7′ 1½″ high	275.00	17.50	1700
No. 3	8′ 3″ x 12′ x 7′ 1½″ high	300.00	17.50	2250
No. 4	9′ 3″ x 12′ x 7′ 1½″ high	350.00	20.00	2300
No. 5	8′ 3″ x 14′ x 7′ 1½″ high	375.00	22.50	2400
No. 6	9′ 3″ x 14′ x 7′ 1½″ high	425.00	25.00	2550

*All shipments by express or freight must be crated.

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Typical Installations of Flat Transite



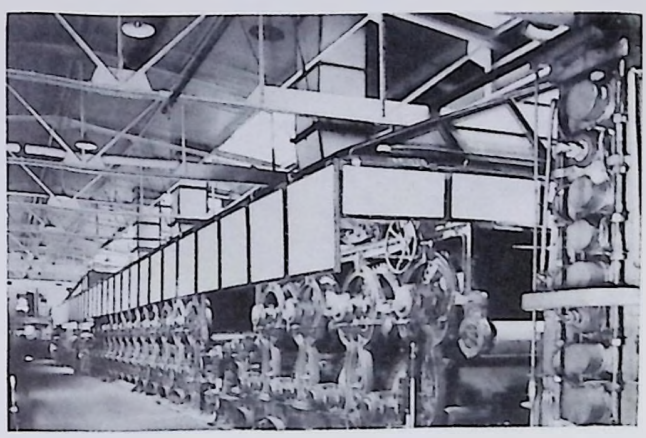
Novel indirect lighting effect obtained with Flat Transite in the outdoor music shell at the Hollywood Bowl. Hollywood, Calif.



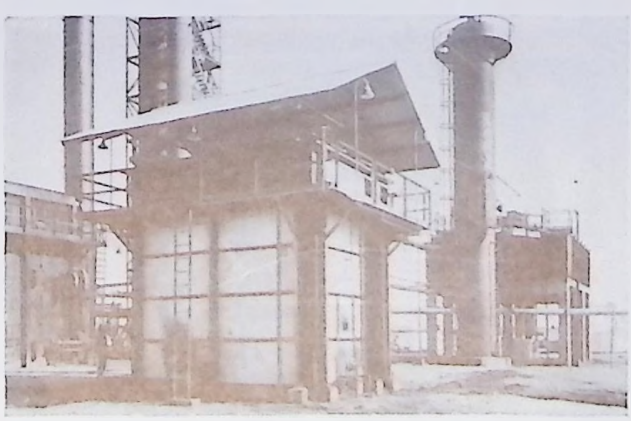
Comparative permanence under moist conditions is one distinct advantage of Transite. Municipal bath house at Ontario Beach Park, Rochester, N. Y.



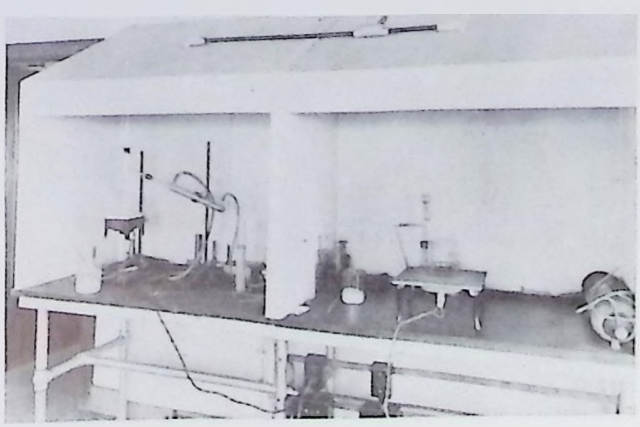
A permanently attractive "half-timber" effect is provided by Flat Transite in many suburban residences



Panel-type paper machine hood and vents constructed of Flat Transite. Standard Paper Mfg. Co., Richmond, Va.



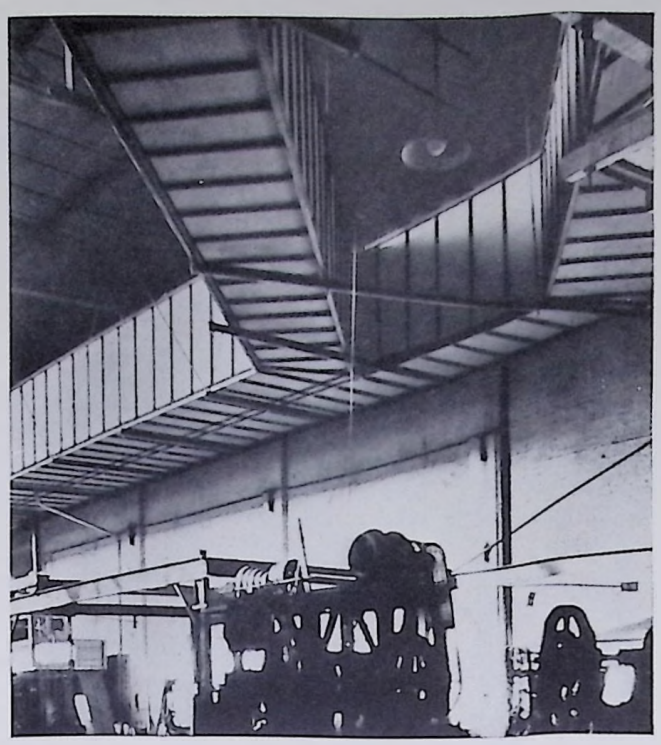
Tube-still cased with Flat Transite and shielded with a Corrugated Transite roof. Richardson Refining Co., Big Springs, Texas



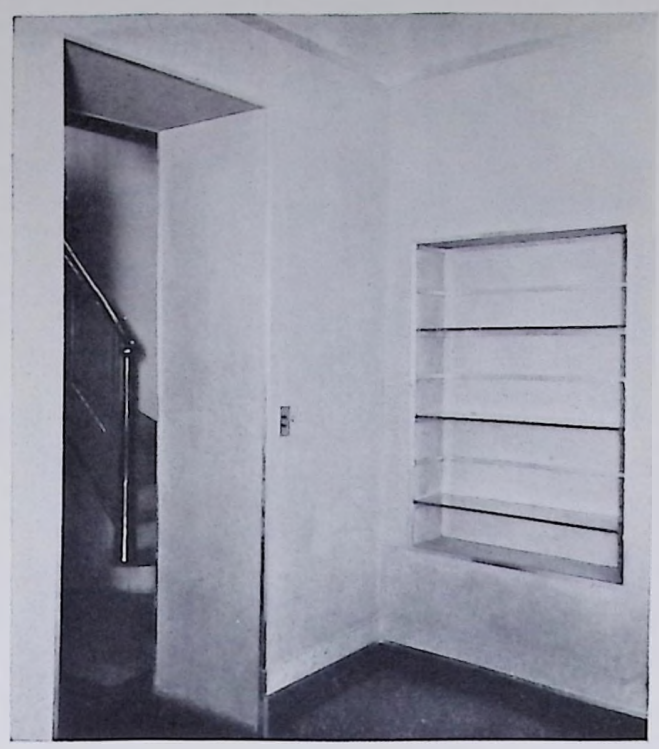
Laboratory fume hoods give little difficulty if constructed of Flat Transite. North Shore Coke & Chemical Co., Waukegan, Ill.

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Transite offers many alternative constructions in the building of ducts. Consolidated Water Power & Paper Co., Wisconsin Rapids, Wisc.



Attractive wall texture and modernistic effects secured by the use of Flat Transite, in its natural finish, for apartment interiors

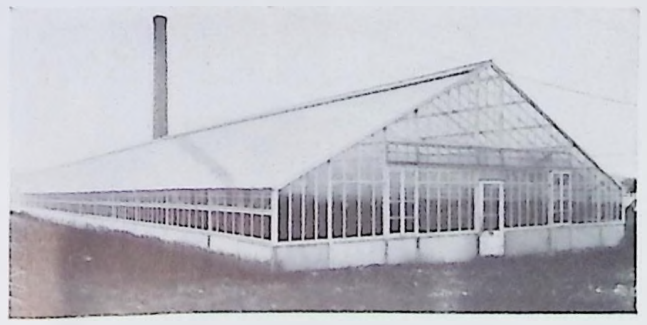




Steel-frame cottages constructed entirely of Transite, even to the shutters, showing the adaptability of the standard material to various types, such as Colonial wide clapboard, or English "half-timber" with stained Transite battens



Louvres of moulded Flat Transite assure lasting service, in Corrugated Transite housings over cooling coils. Pure Oil Co., Marcus Hook, Pa.



Freedom from all forms of deterioration recommends Transite for greenhouse dwarf wall construction. Hitchings & Co., Elizabeth, N. J.

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SPECIFICATION FOR FURNISHING AND APPLYING FLAT TRANSITE

NOTE: Specifications following are brief and incomplete, as it is practically impossible, with varying job conditions, to write specifications covering all uses to which Transite is adaptable. It will, therefore, be necessary for the Architect to write his own specifications with the following suggestions as a guide:

Material: The Transite shall be composed of asbestos fibre and portland cement, united under hydraulic pressure, into solid, monolithic, unlaminated sheets.

Fasteners: Shall be nails, screws or bolts, etc.

Samples: The contractor shall submit two samples, each _____ inches square, showing thickness and finish of the Transite, to the Architect for his approval, and all Transite shall conform, without marked variation, to the sample approved.

Size of Sheets: Shall be 36" x 48", 42" x 48", 42" x 96", or 48" x 96", or of such dimensions as shall cut economically from the above standard sizes.

Thickness: Shall be 1/8" (except 48" x 96" sheets), 3/16", 1/4", 5/16", 3/8", 1/2", 5/8", 3/4", 7/8", 1", 1-1/4", 1-1/2", 1-3/4", 2".

Finish: The finish of all Transite Asbestos shall be standard or special*.

Drawings: The contractor shall be furnished with all drawings, details and other information necessary for the furnishing and applying of Transite, including drawings or full and complete description of all classes of work with which the Transite engages.

Application: The Transite shall be applied with sheets butted and fastened with (nails, screws, bolts, etc.). Joints may be covered with battens of the same material, _____ inches wide and _____ inches thick. If moisture-resisting joints are desired, these battens may be underlaid with asbestos felt gaskets or J-M Gray Asbestos Roof Putty. All exposed fasteners should be J-M Lead-Head Bolts. Washers shall be used wherever the nut of fasteners come in contact with the material.

NOTE: Where alternates are given in the foregoing, cross out the one not desired.

* Standard Transite, sufficiently smooth for practically all purposes and thicknesses, to and including 2", is controlled within plus / minus 1/32". Material can be furnished, however, sanded on one or two sides to provide special smoothness and thickness control within plus / minus 1/64".

JOHNS-MANVILLE Transite Products

Specification for Furnishing and Applying Flat Transite

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TECHNICAL DATA SECTION

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SPECIFICATION FOR CEMENT-ASBESTOS SHEETS

The sheets shall be made of portland cement and asbestos fibre formed into dense, tough, structurally-strong sheets, of uniform thickness throughout. They shall have at least one plane, smooth surface. The product shall not warp, crack, peel or be affected by temperature changes, under the normal conditions for which it is recommended.

GENERAL REQUIREMENTS:

The size of the board shall be 42" by 96" for thicknesses from 3/16" to 2" and 48" x 96" for thicknesses 1/4" to 2".

The maximum variation of sheets for size shall be plus 1/4" minus 0" when so-called for on order. The thickness of the sheets shall be 3/16" to 2", as specified. The maximum variation in thickness of sheets shall be plus or minus 1/32". The color shall be a uniform light gray, obtained from the natural color of the cement and asbestos materials, and free from any indication of grain caused by any extraneous matter added to the mix.

DETAIL REQUIREMENTS:

The average normal density shall be 110 lb. per cu. ft. The normal moisture content shall vary from 5 to 10 percent by weight.

Modulus of rupture of the dry asbestos sheets shall not be lower than 3500 lb. per sq. in. up to 7/8" thickness and 3000 lb. per sq. in. over 7/8" thickness as tested dry, 1200 lb. per sq. in. as tested after immersion in water for 24 hours at room temperature, and not less than 800 lb. per sq. in. as tested dry after subjection to the flame test described below.

SAMPLES AND TESTS:

The manufacturer shall supply with his bid 3 sq. ft. of the board representative of what is proposed to be supplied. Tests shall be made of these samples for acceptance of the bid. Further tests shall be made on samples of the material as delivered.

Strength test shall be made with samples, 3" wide, tested on a span of between 7" and 10", under center load. Specimens to be tested after flame exposure shall be exposed over the center portion for 7 minutes to a flame from a Bunsen laboratory gas burner of 3/8" tube diameter. The full length of the flame shall be 10", the length of the reducing comb of the flame 4", and the distance from the top of the burner to the lower surface of the sample 4-1/2". The specimen shall be tested after cooling within four hours after the flame test, with the surface exposed to flame subjected to tensile stress.

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Slum Clearance Program: Specifications and Data on Various Building Materials (1938)
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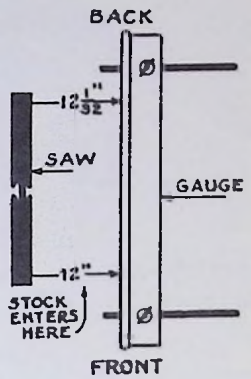
SHOP WORKING OF TRANSITE

The essential information relative to cutting, milling, beveling and drilling Transite is included in the following paragraphs.

Cutting Transite

For thicknesses of 3/4" and over, when accuracy and smooth finish is specified, one of the standard makes of coping machines is used. The features desirable in such a "wet" method machine include: (a) stationary table with drainage arrangement; (b) motor driven cutting wheel with raising and lowering attachment, all traveling on an overhead track; and (c) adjustable speed device to regulate cutting wheel.

For thicknesses up to 1", where accuracy and smoothness of cut are not essential, any standard make of universal saw table can be used for straight cuts. The gauge on the table should be adjusted as shown in the sketch. Note that there is a 1/32" greater clearance at the back of saw or wheel to prevent binding. As the material is hand-fed, accuracy cannot be expected.



Standard Method of Cutting:

Abrasive Wheel: Cuts Transite in thicknesses up to 3/4" very satisfactorily, as well as small pieces of greater thicknesses. The cut edges are smooth.

Use standard 16" dia. x 1/4" thick x 1" bore, of grade, resinoid and speed as recommended by the manufacturer for cutting asbestos-cement products.

Operate wheel at speed recommended by manufacturer. Equip the wheel with a heavy metal guard. Examine wheel carefully for cracks and warpage. Avoid heating and binding. As the quality of wheels is not always uniform, some work better after they have been worn down about an inch.

Optional Methods of Cutting Small Lots:

Circular Saw: Cuts Transite in thicknesses up to 1" satisfactorily, but saw is dulled rapidly. The cut edges are not smooth.

Use any standard saw, 16" dia. x 100 teeth x 10 gauge x 1" bore, suitable for dry cutting of asbestos-cement products. Operate at speed recommended by manufacturer.

For sharpening circular saws, until worn down to approximately 12" or 13" in diameter, use a standard make of abrasive wheel 1/2" x 10" with grit and grade as recommended for such purposes by the manufacturer. After that diameter is reached, use a 3/8" x 10" wheel so that teeth will not become too small. Give teeth ample set.

Band Saw: The saw specified below may be used to good advantage on Transite up to 3/8" thick. Heavier blades may be used for greater thicknesses.

Use any standard wood-working saw, 1/2" wide x 5 point x 21 gauge with a 36" wheel. Operate at 485 rpm. and keep very sharp.

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Jig Saw: The saw specified will cut Transite in thicknesses to 3/4", or greater thickness if kept well sharpened.

Use any standard wood-working saw with Felloe Web, 16" x 17 gauge, 1/4" to 1/2" wide. For making circular cuts, a 1/4"-wide saw gives best results.

Electric Saw (For constructor's use): Cuts limited quantities of Transite very satisfactorily.

Use any of a number of light-weight, electrically driven hand saws which can be readily equipped with abrasive wheels.

Hand Saw: Cuts any thickness of Transite but blade dulls rapidly.

Use a standard make hard steel saw, 5" x 28" x 5 points, with ample set. A hard steel saw is preferable because it retains its cutting edge longer.

Milling Transite

Milling Machines, Planers, Lathes: Various sizes of any standard make can be used.

In milling, use an inserted-tooth cutter or a standard high-speed, coarse-tooth cutter. A 1/2" x 1/2" cut is sufficiently heavy. Any greater cut will cause cutter to heat. Use a stiff brush to keep teeth of cutter clean.

Beveling Small Pieces

Sand Drums and Sand Wheels: Use a 16" dia., 30" wide, single drum. Sand wheels are 36" and 48" dia.

Sandpaper: Use 24-E, in rolls 30" x 36" and 48" wide.

Sand Wheel or Circular Disc: These discs, which are covered with 24-E sandpaper, are used to smooth pieces that have been cut on band or jig saws and also to finish pieces that are too small to be worked on sand drums.

Beveling Large Pieces

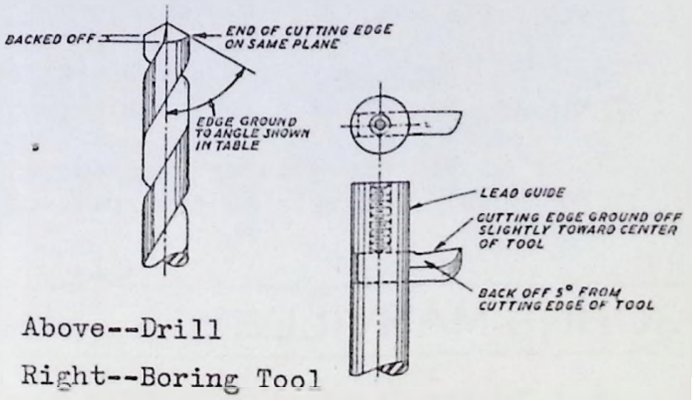
Large, thick sheets can be beveled on a planer or a power saw. The work can also be done with a 14" horse rasp file, using sandpaper to remove scratches made by the file.

Drilling Transite

Any standard make of twist drill, either of carbon or high-speed steel, can be used for holes up to 1-1/4" dia. Use a standard boring tool and cutting bar for holes up to 2-1/8" dia.; for larger holes use a fly-bar.

Drill Angle and Cutting Speeds for Holes

Diameter of hole, inches	Angle of Cutting Edge, degrees	Approx. Speed of Drill, rpm.
Up to 3/8	48 to 58	850
7/16 to 9/16	48 to 58	600
5/8 to 7/8	48 to 58	450
1 to 1-1/4	55 to 59	250
1-3/8 to 1-1/2	55 to 59	170
1-5/8 to 2-1/8	55 to 59	70

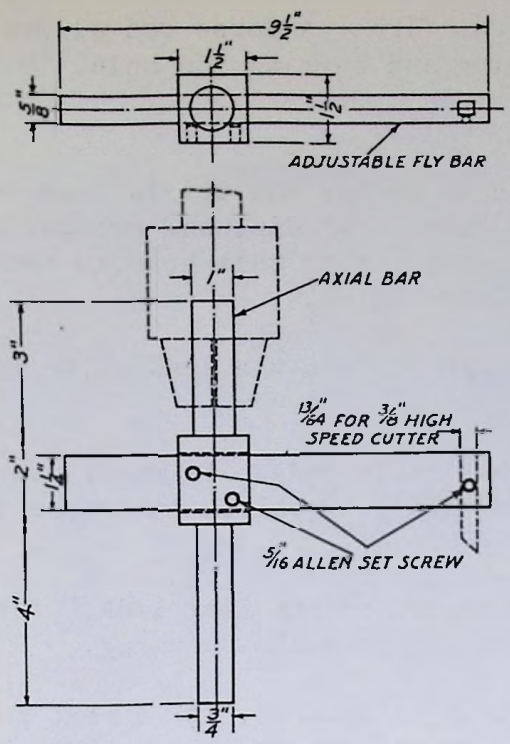


Above--Drill

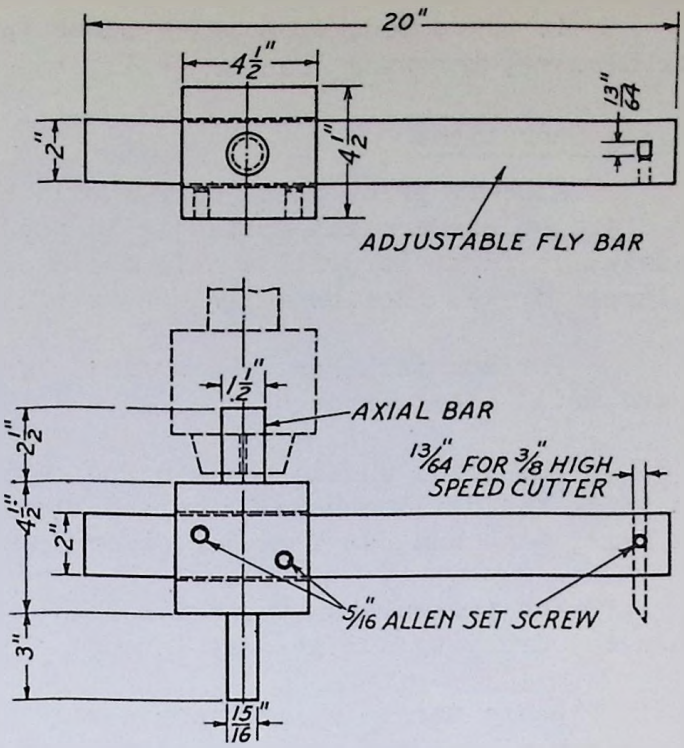
Right--Boring Tool

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Small fly-bar for cutting holes 3" to 15" dia.



Large fly-bar for cutting holes 6" to 36" dia.

Grinding Twist Drills and Boring Tools: Twist drills should be ground (preferably on an automatic drill grinder) so that the cutting edge is a straight line to the angle shown in table. The heels of the lips should be backed off about 5 deg. less than the cutting edges, about the same as for the drilling of mild steel or cast iron. (See sketch on facing page.)

The boring tool used consists of a spindle, holding a tool-steel cutter. The end of the spindle acts as a guide for the tool. The size of hole bored is regulated by moving the cutter in and out of the spindle.

As shown in the sketch the tool edge is not at right angles to the spindle, but instead is ground so that its extremity touches the work first, thus cutting a clean edge. The heel of the tool is backed off 5 deg., the same as a twist drill.

Points to Check Before Starting Drilling Operation: Because of the nature of Transite, there are several points in regard to drilling which must be carried out if accurate and clean holes are to be obtained.

1. Have the drill-press firm on its base. Otherwise, if a separate bed is used to hold the work, the drill and work will not be lined up at all times, thus enlarging and burring the hole.

2. Be sure the chuck is tight, both vertically and horizontally. Vertical play makes it difficult to "feel" the drill and will allow it to punch through the bottom of work. Horizontal play allows the drill to run out, making the hole inaccurate and burring the edges.

3. Be sure the drill is sharpened correctly and that it is not worn tapered. A dull drill causes punching, rough holes, and excessive time for drilling. A tapered drill causes burring on the top edge of hole.

JOHNS-MANVILLE Building Materials	DATE December, 1937
Shop Working of Transite	BMT-376

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4. Have bed, upon which stock is placed, firm. A loose bed allows stock to move, throwing load on drill, thus reaming and burring the hole.

Drilling Operation:

A heavy prick punch mark should be used to center all drills less than 3/4" dia., unless a metal drill jig is used. On holes 3/4" dia. and greater, it is advisable first to drill a hole 3/16" or 1/4" deep, using this hole to center the larger drill. Scribe marks are helpful for large holes.

For counterbores, use a drill large enough to take the lead guide freely, and drill clear through.

The drill should be hand fed (not automatically fed). In stock over 1/2" thick the drill should be raised to free its flutes of chips, otherwise it will heat, bind and cut a ragged, uneven hole.

The pressure on the drill should be released for the last 1/8". This allows the drill to cut its way through the bottom and prevents punching.

Where possible and where a very clean hole is desired, it is best to use a piece of natural wood, Transite or a metallic template under the stock being drilled.

In using a counterbore, to drill large holes through a panel, it is advisable to drill three-quarters through the stock, and finish the hole by turning the piece and drilling from the other side.

All drilling should be done dry. It is not necessary to use any lubricant.

Possible Causes of Drilling Troubles:

Holes run out of line and burr raised on top edge.

1. Drill press loose on base
2. Chuck loose in press
3. Drill too pointed
4. Drill worn tapered
5. Work not held steady (bed loose)
6. Scribe marks for hole too deep

Holes not clean on bottom.

1. Vertical play in chuck and drill
2. Drill too pointed
3. Forcing drill near end of cut
4. Speed too slow

Drills get hot and gum up.

1. Dull drill
2. Drill worn tapered
3. Speed too great
4. Crowding drill
5. Drill not freed of cuttings

Time used in drilling too great.

1. Drills not sharpened correctly.
2. Speed too slow
3. Drill fed too slowly
4. Drill not freed of chips

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Field-working of Transite

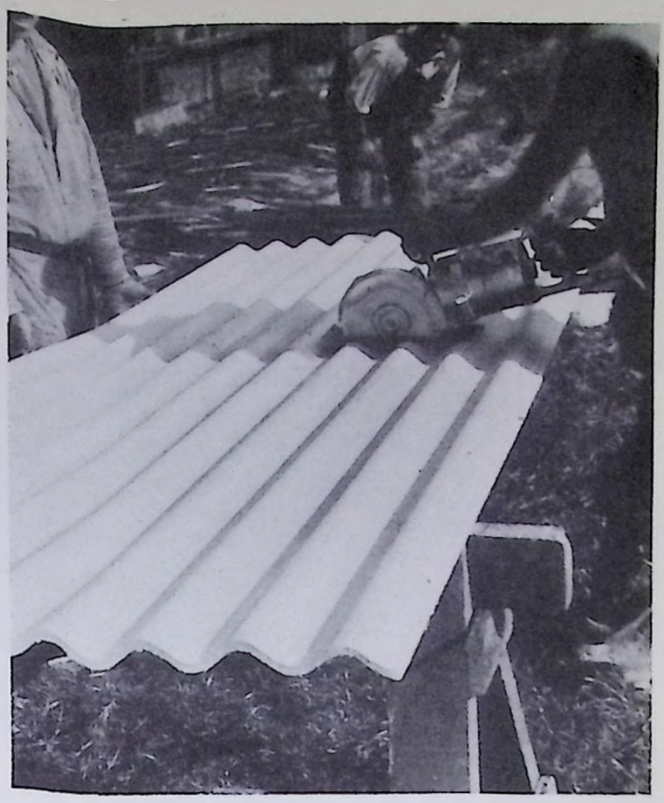
A. Work bench of proper height is built of planks laid across wooden horses to serve as a rest for the Transite in cutting. A portable electric saw, made by the Portable Power Tool Co., of Chicago, Illinois, with motor to operate at 110 volts A.C. and D.C. and equipped with ⅛″ thick 8″ diameter carborundum wheel, specially made for Transite and furnished by the Abrasive Company, Philadelphia, Pa., is used in making the cut. Care must be taken that the wheel does not bind while cutting through the Transite since the carborundum wheel is brittle and the blade will break readily if binding occurs. In the hands of an experienced operator 300 to 500 linear feet of cutting through ⅜″ thick Transite may be completed before the wheel breaks or is worn out.

The above described saw may also be conveniently used in making minor changes in the steel work necessary for maintaining the Transite casing in place. The carborundum wheel wears rapidly when used to saw steel battens, but the fact that it may be so used renders the application of this tool very general in casing construction work.

B. For rectangular cut-outs to be made in Transite sheets, when these are of fairly large size, the same method as described above may be used. Where the cut-out is in the center of a sheet, with no edge to start on, the saw should be lowered to the surface of the sheet, cutting through the Transite from the top. The cut should be run just short of each corner and when this has been done on all four sides of the rectangle, the piece may be knocked out with a sharp blow. The corners are then filed to desired shape (either circular or square) with a 10″ or 12″ wood rasp.

C. For making small rectangular cut-outs inside the Transite sheet, holes may be drilled at each corner, large enough to make possible the entrance of a power hack-saw blade. Then working the blade by hand, the cut is made between holes around the entire perimeter. The edges are smoothed and leveled by means of a wood rasp.

D. For making circular or curved cuts in Transite, the best procedure is to drill small holes along the line of cut (¼″ holes on ¾″ centers are satisfactory). Then by tapping cut-out with a hammer, it may be broken out. The rough edge which this leaves is smoothed and leveled with a wood rasp. This method may also be used for small rectangular cut-outs instead of method "C" and is often more satisfactory.



E. When an electric power saw is not available, straight cuts may be made with a carpenter's hand saw. However, it is only possible to cut about 30 linear feet of ⅜″ thick Transite before such a saw must be sharpened and set. A more satisfactory method is to score the Transite, at line of cut on both sides, with a sharp-edged instrument, such as the corner of a square file, deeply enough so that it will break along this line when pressure is applied. By placing the piece so that the scored line is along edge of work bench and applying an even pressure on the overhanging portion, it may be broken off. The rough edge is then smoothed and leveled with a wood rasp.

F. Transite may be drilled with a portable high speed rotary electric drill. Where there are a number of similar panels to be drilled in same manner, time may be saved by marking location of holes on one panel, then lining up three or four panels beneath it and drilling through the several panels at one time. Drills will dull rapidly when used on Transite and should be sharpened in the same manner as though being used for drilling steel.

It is convenient in spotting holes for drilling to make use of a heavy prick punch mark to center the drill. A piece of wood directly underneath the Transite being drilled will eliminate the possibility of breaking away the edges of the drilled piece when the drill comes through. *No lubricant should be used on the drill when drilling Transite.*

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JOHNS-MANVILLE Transite Products

Field-Working of Transite

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BMT-380

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TECHNICAL DATA SECTION

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PAINTING AND REMOVING STAINS FROM CEMENT-ASBESTOS PRODUCTS
RECOMMENDED TREATMENTS FOR INTERIOR AND EXTERIOR CONSTRUCTION

Recommended Treatment for Interior Construction

Interior Painting:

The surface must be clean, dry and free from loose dirt.

The primer should be applied according to the paint manufacturer's directions for thinning, drying time, etc. The primer used should be carefully checked to see that it is definitely recommended and specified as a primer for this purpose.

One or more coats of a good grade of interior paint of the color and gloss desired is then applied over the primer.

For interior work where severe moisture conditions prevail as, for example, where the boards are applied against unprotected exterior concrete or brick walls, or in bathrooms or basements below grade, the stock should receive a priming coat of boiled linseed oil as recommended for exterior work.

Painting Waxed Surfaces (Decorative Flexboard): Completely remove all trace of the wax finish. This may be done by washing the surface with benzol, naptha, or high-test gasoline and thereafter washing the surface with clean water. Then paint may be applied in accordance with recommended treatment outlined above.

Removing Stains:

Surface Stains: Ordinary soiling of the surface can be removed with a soap-abrasive type of cleanser, such as "Old Dutch Cleanser", or "Bab-O".

Penetrating Stains: Stains produced by oils, greases, butter, lard, and similar substances should be treated by repeated washes of carbon tetrachloride (Carbona), high test gasoline or benzol, followed by wiping with a clean, dry cloth. A heavy paste of such solvents and an absorbent filler like whiting or powdered chalk is effective when applied to the grease stain and allowed to dry.

Iodine stains can be removed by the application of a 5 percent solution of sodium thiosulfate (hypo) in water. Allow the solution to remain in contact with the stain for several minutes. Sodium thiosulfate can be obtained at any drug store or photographers' supply house.

Mercurochrome can be removed fairly successfully with water and soap, or an abrasive cleaner. Paints or lacquers can be removed by the use of solvents such as benzol or commercial paint removers.

When used upon Decorative Flexboard any of these solvents will, of course, remove the wax finish and necessitate rewaxing.

Recommended Treatment for Exterior Construction

Exterior Painting:

In order to obtain a satisfactory job, it is essential that the instructions regarding priming of the surface be followed carefully. Failure to do this will result in a poor bond, causing the paint to peel.

It is extremely important that the surface to be painted be clean and dry. The surface should be thoroughly wiped to remove any loose dirt or efflorescence. Oil or grease spots should be cleaned with oil-free gasoline.

A heavy brush coat of boiled linseed oil should be applied to all exposed surfaces and edges, brushing the oil well into the surface. The oil should dry at least 24 hours before applying any paint. In cold weather, when the viscosity of the oil is too high for good penetration, it may be thinned 10 to 15 percent with naptha or turpentine.

(continued on other side)

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JOHNS-MANVILLE Building Materials

Painting and Removing Stains from Cement-Asbestos Products
Recommended Treatments for Interior and Exterior Construction

DATE March, 1938
(Cancelling BMT-760 dated May, 1937)
BMT-335

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After all nails are puttied, three coats of good grade exterior oil paint should be applied over the oil priming coat. The first coat of paint should be reduced equal parts with boiled linseed oil, the second and third applied as received. There will be some suction spots showing in the first coat of paint, and possibly a few in the second coat, showing that there are still absorptive spots left in the stock, but the third coat of paint will cover these successfully.

Removing Stains:

The areas to be cleaned should be dry-brushed thoroughly to remove the dust and loose material, and then scrubbed with a fiber scrubbing brush (never a wire brush) using one of the chemicals mentioned in the following paragraphs. It is very important that immediately following the application of the cleaning compound the entire area treated should be thoroughly rinsed with clean water.

In the following treatments the percentage of chemicals in solution is determined by mixing, in a porcelain or glass receptacle, the amount of chemical and clean water. For example, a five percent solution of phosphoric acid means five parts by volume of commercial phosphoric acid and 95 parts by volume of water.

Where acids or strong chemicals are necessary the cleaning solution should be handled carefully. It is recommended that rubber gloves be used. All painted trim and shrubbery should be protected and any cleaning compound dropped on same should immediately be removed with clean water.

Window Screens (Bronze, iron, aluminum, etc.): Rain flowing from window screens is frequently the cause of discoloration to painted surfaces and siding shingles, clapboards, etc. To remove stains from this source use a dilute solution (5 percent) of white vinegar applied as previously described. It is recommended that, after cleaning, the screens be periodically painted with dilute spar varnish to prevent further staining.

Earth Stains on Lower Courses of Shingles at Grade Line: Dry brushing and rinsing with clean water will generally remove ordinary earth stains.

Rust Stains from Nails, Hinges, Gutters, Leaders, etc.: Iron rust stains may be cleaned with a 2 percent solution of oxalic acid or a 5 percent solution of phosphoric acid.

Stains from Unpainted Wood Trim: Stains caused by water running over unpainted wood trim may be removed by scrubbing them with Oakite or Babbitt's Cleanser. If stains are deep, a scrubbing with a strong solution of sodium hypochlorite or a 2 percent solution of oxalic acid may be necessary.

Ordinary Dirt and Soot Stains: These may be removed with a mild cleanser such as Ivory Soap or a 0.6 percent solution of Duponal W A Flakes made by the Du Pont Co.

Deeply-Penetrated Dirt and Soot Stains: These may be removed by careful scrubbing with Oakite, Babbitt's Cleanser or similar product. Very severe dirt and soot stains may be removed with a bleaching agent such as sodium hypochlorite.

Discoloration from Oil-Stained Wood Shingles: In cases where the shingles are discolored from oil-stained wood shingles, it will generally be found necessary to use a two-solution treatment. First apply a 20 percent solution of sodium citrate brushed on and allowed to dry. Then apply a 20 percent solution of phosphoric acid applied with a scrubbing brush. This coat will readily remove the stains, but in some cases it will be found that it will leave a slight "bloom" on the shingles. Where this happens, it will be necessary to wash entire area with a dilute (5 percent) solution of phosphoric acid.

It is most important with this method to scrub wall surface thoroughly with clean water to remove all traces of acid or bloom.

Paint Stains: Wipe off with a cloth soaked in turpentine or other paint solvent. If paint is old and dried, repeated applications may be necessary.

Oil Stains: Oil readily penetrates the material and is extremely difficult to remove. Repeated applications of solvents such as carbon tetrachloride (Carbona) will help to reduce the intensity of the stain outline.

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Steeltex Reinforcing Bases

Standard-type competitive materials of proved merit

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Steeltex Reinforcing Bases

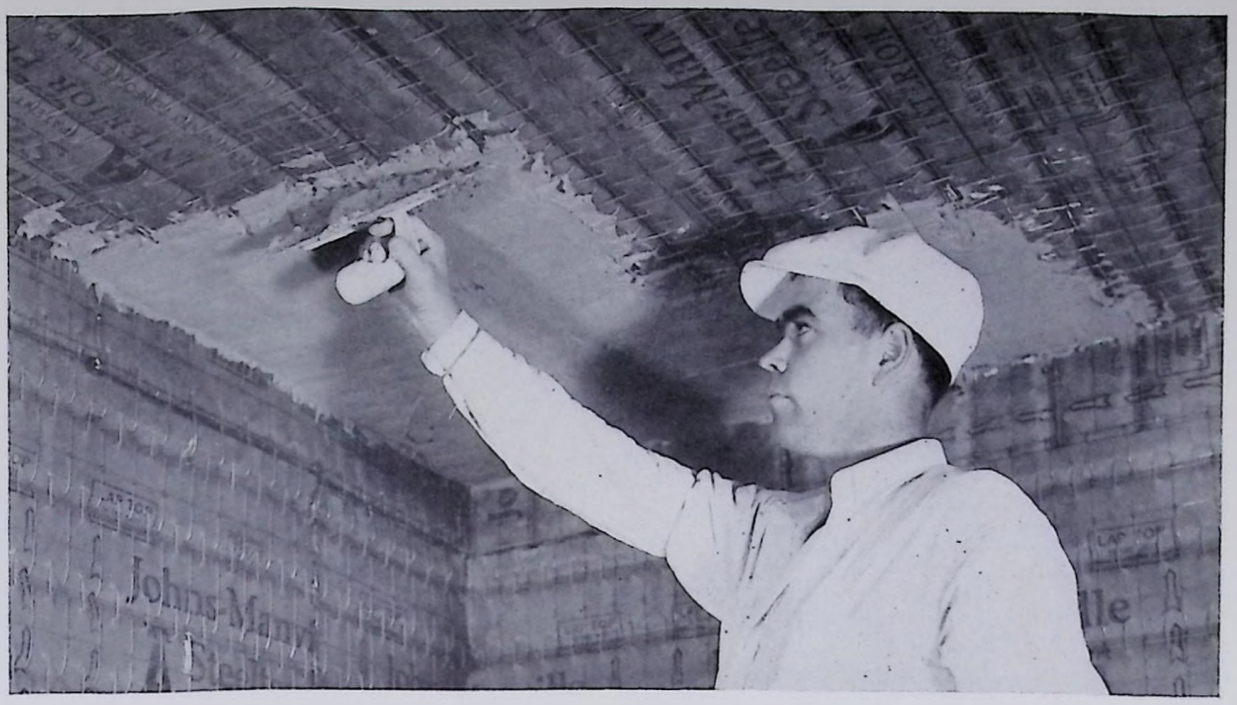
In this section there are treated the following: Bases for plaster, suspended ceilings, attached ceilings, hollow partitions, furred walls, brick veneer and stucco; concrete reinforcing for steel joist construction.

Metal reinforcing bases for gypsum and cement have long been specified in government work and have been installed in numerous buildings of the Federal Government, states and municipalities. Steeltex meets the requirements of Federal Specification QQ-B-101b and is familiar on Federal Housing, P.W.A. and resettlement projects in addition to the work of other government bureaus and agencies.

Superior performance has resulted with Steeltex and at costs comparable to other types. The architect's attention is particularly invited to the test information appearing in this section on these products.

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Johns-Manville Steeltex



Steeltex for Plaster gives effective reinforcement, distributing strains equally and reducing plaster cracking hazard to the minimum

To provide a better method of reinforcing plastic building materials, Johns-Manville offers Steeltex, in styles for interior or exterior application. The use of Steeltex does not involve a single change in building methods and is no more costly than the less satisfactory materials formerly employed. Many years of service have proved its structural value, fire-resisting qualities, economy and speed in erection.

J-M Steeltex is an electrically welded, cold-drawn, galvanized steel wire mesh to which is attached an integral fibrous backing. It is made in four styles which differ in the gauge of wire and spacing and in the type of backing, according to the purpose it is to serve. The attachment of the backing to the steel wire reinforcing element is accomplished by independent furring wires, so fabricated as to hold the backing the proper distance from the reinforcing mesh to assure the thorough embedding of the wires within the plastic material when it is placed or plastered against the fibrous backing.

The four styles of Steeltex comprise the following: Steeltex for Plaster; Steeltex for Stucco; Steeltex for Brick or Stone Veneer; and Steeltex Floor Lath for concrete and gypsum floors and roof slabs. The detailed description of each style is given in the following paragraphs.

J-M Steeltex for Plaster—Type A

The new Steeltex for Plaster, known as Type A, is the result of several years of research and development, the objects of which were to improve further the product and to arrive at a design and manufacturing process which would permit substantial reductions in cost. Compared with the former styles of Steeltex for Plaster, Type A is not only considerably lower in cost but also it provides a great increase in effective steel reinforcing embedded in the plaster slab.

Type A Steeltex is composed of a 2″ x 2″ mesh, 16-ga., cold-drawn, electrically welded, self-furring, galvanized, copper-bearing steel wire fabric to which a specially made fibrous absorbent backing is secured by 18-ga. stitched wires on 2″ centers. The reinforcing mesh is corrugated every 4⅜″, forming a steel truss which extends the length of the Steeltex sheet. This design gives a board-like rigidity. The steel reinforcing wires extend beyond the fibrous backing to insure continuous reinforcing when the sheets are lapped.

The fibrous backing is offset from the steel mesh the proper distance to secure the automatic embedding of the reinforcing in the plaster and is absorbent enough to hold the wet mortar in place until it has set about the reinforcing wires. The wire mesh dis-

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tributes strains equally in all directions and reduces plaster cracking hazards to the minimum. The rigidity of the sheet eliminates sag and insures maximum plaster coverage. No mortar is wasted in keys and the fibrous backing automatically gives a back-plastered job. When the plaster has been applied, the fibrous backing becomes an integral part of the plaster slab and acts as a seal against infiltration of air, to an extent insulating against heat, cold and sound.

J-M Steeltex for Plaster is shipped in strong, fibreboard cartons. Each carton contains 44 sheets, 50 sq. yd., weighing approximately 113 lb. The sheets are 30½″ x 49″, a convenient size to handle.

Steeltex is equally adaptable to all types of plaster construction, ranging from small residences to large fire-proof buildings. It is economical, because of savings effected in materials and labor, and easy to plaster over because of its truss-action rigidity and the instant bonding of the fibrous backing. Plaster is not wasted in droppings or in formation of plaster keys.

The material is also economically adapted to fire-proof construction through the medium of Steeltex Attachment Bars, Channels and Partition Studs. These accessories are used in the erection of suspended ceilings, contact ceilings, furred walls and hollow-plaster partitions. Application is easily accomplished.

Application:

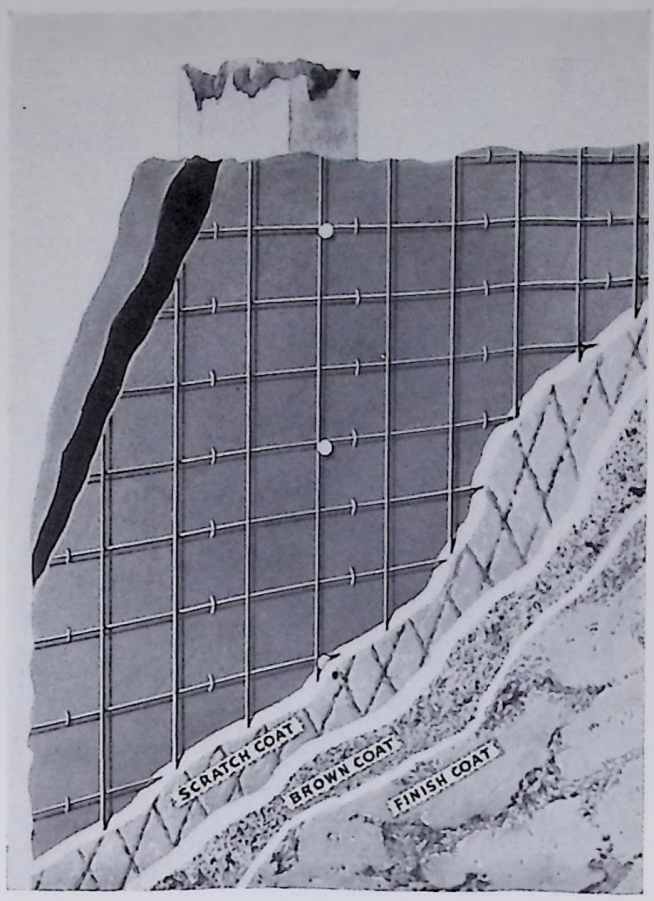
Steeltex for Plaster is attached to walls and ceilings with Type A lath nails driven into each bearing to engage the reinforcing wire at the center of the stiffening corrugation. In all cases, there should be metal to metal laps of 1″, with all joints staggered on both ceilings and sidewalls, so that four corners of adjacent sheets will not occur at any one place. Application should be started at one corner of the ceiling and sidewalls should be lathed from the ceiling down so that all horizontal laps are made over top sheets.

Plaster over Steeltex for Plaster should be finished to not less than ¾″ grounds.

J-M Steeltex for Plaster for use in fire-proof construction with Steeltex Attachment Bars, Channels and Partition Studs is discussed on other data sheets, as are also additional details in connection with frame construction briefly discussed above.

J-M Steeltex for Stucco

J-M Steeltex for Stucco is the same 2″ x 2″ mesh, electrically welded, galvanized, copper-bearing steel wire fabric as in Steeltex for Plaster, except that the wire is 14 instead of 16-ga. and the waterproof membrane backing is composed of a double layer of tough fibrous backing, with the layers cemented to each other and further waterproofed by a layer of waterproof mastic compound between. The backing is fastened to the reinforcing wires by crimped stitch wires which permit it to fall away from steel reinforcement ⅜″, thus insuring the complete embedding of the steel wires in the stucco slab. The backing, in addition to providing a suitable base to receive and hold the wet mortar until it has set, furnishes a seal against moisture penetration and air-infiltration.



Steeltex for Stucco provides galvanized welded-wire reinforcing, completely embedded, together with a double-ply, waterproof backing which seals the structure against penetration of air and moisture

J-M Steeltex for Stucco is furnished in rolls 49″ wide and 110½ ft. long, containing 50 square yards and weighing 142 lb. per roll. Also supplied in sheets 49″ x 52″, shipped in bundles of 50 square yards (26 sheets) weighing 160 lb.

Steeltex Furring Nails (galvanized) for applying Steeltex for Stucco are furnished 1½″ long, 500 per box; 12 boxes per carton, weighing about 50 lb.

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Application:

Steeltex for Stucco affords rapid and economical application. It is cut to length and nailed completely about the building, one width above the other, shingle fashion, with all joints lapped at least 1″ wire to wire, no backing between reinforcing wires, and all joints staggered. Rolls or sheets should be carried around all corners and the roll material stretched taut before nailing. The special J-M Steeltex Furring Nails (galvanized) should be used to apply Steeltex for Stucco, nailing the horizontal wires over every stud horizontally across the building and every 6″ vertically on the studs. Sheets should be stretched by toe-nailing on each stud.

When using roll material, the window and door openings are cut away after the Steeltex has been nailed. The cut out pieces can be handily used in gable work and other odd-shaped locations.

J-M Steeltex for Brick or Stone Veneer

J-M Steeltex for Brick or Stone Veneer is exactly like Steeltex for Stucco except that the galvanized steel reinforcing fabric is made of 16-ga. instead of 14-ga. copper-bearing wire. The backing is the same, two layers of heavy waterproofed fibrous material cemented together with a layer of waterproof mastic.

It is furnished in rolls 49″ wide and 110½ ft. long, containing 50 square yards and weighing 107 lb.



Steeltex for Brick or Stone Veneer gives a monolithic wall, sealed against air and moisture infiltration

Application:

Steeltex for Brick or Stone Veneer is wrapped around the building frame in place of sheathing, stretched taut and nailed to the studs with galvanized nails. Successive widths are lapped one above the other shingle fashion.

As each course of brick or stone is laid, the mortar is spaded in behind with the bricklayer's trowel to fill up the 1″ space between the brick or stone and the Steeltex. The mortar flows around the reinforcing wires, bonding to them and to the brick or stone. The result is a monolithic wall of brick or stone and steel-reinforced cement greatly strengthening the framework and offering permanent resistance to the penetration of air and moisture.

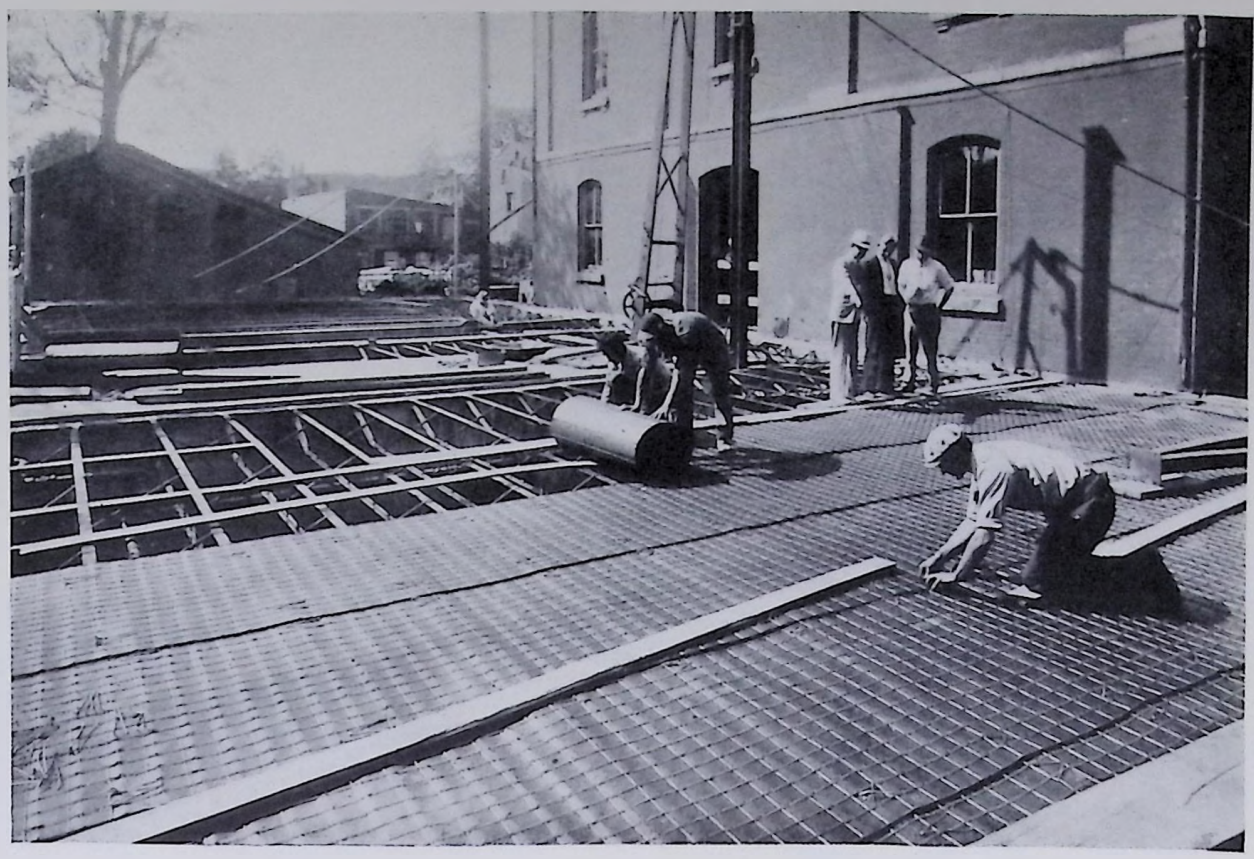
J-M Steeltex Floor Lath

J-M Steeltex Floor Lath is a combined reinforcing and form for light concrete or gypsum floors and roofs of 2″ to 3½″ slabs. The reinforcing element is a 3″ x 4″ mesh, cold-drawn, 12-ga. galvanized steel wire, electrically welded at the intersections, which gives a steel area of .035 sq. in. per ft. longitudinally and .026 sq. in. per ft. transversely. To the mesh is attached by stitch wires the form element, a cord-reinforced fibrous backing which is water-resistant and of ample strength not only to support the concrete while being poured, and the customary rough usage encountered on any construction work, but also to afford a safe walking surface once the fabric has been attached to the joists. The stitch wires which run across the underside of the corded backing and attach it securely to the reinforcing steel, are crimped to give the proper depth to the backing to allow automatic, uniform embedment of the reinforcing within the concrete slab. The water-resistant backing permits the use of concrete designed on the correct water-cement ratio, prevents the loss of water and cement from the concrete mix, and minimizes drip, and consequent clean-up expense, on the floors below. The retention of water in the concrete, as mixed, further aids in the curing and thus has a marked effect on the strength of the concrete.

Properly installed, there is no excessive sag when concrete is being poured, which effects considerable saving. Also, because Steeltex Floor Lath extends in one piece across the entire panel or bay, it gives lateral stiffness, continuity of reinforcing and distribution of loads over a number of joists or beams.

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Steeltex Floor Lath, rolled across the joists, provides a continuity of reinforcing and marked economy in material and labor

The speed of work is also facilitated by the ability to cut necessary openings for pipes, etc., with snips or knife instead of saw, chisel and auger. Naturally, rolls can be more quickly laid per unit of area than can sheets, and with less wastage since overlapping is minimized.

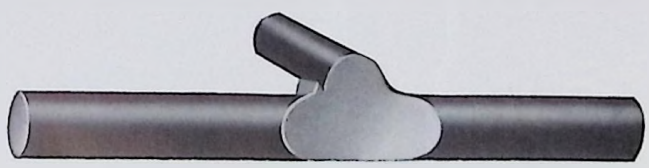
J-M Steeltex Floor Lath is furnished in rolls 4 ft. wide and 125 ft. long (500 sq. ft.) weighing approximately 187 lb. per roll.

Application:

Steeltex Floor Lath is rolled out across the top flanges or chords to the desired length and cut. It is then fastened to one end of the bay or panel by clips or wedges, pulled taut by a Steeltex Stretcher attached at the other end of the strip, and clipped to the joists with Steeltex Sharp Nose Clips, turned in alternately opposite directions. This process is repeated until the whole panel has been covered, lapping the sides of the Steeltex Floor Lath at least 2″ and making end laps of at least 1 ft. directly over the nearest intermediate joist.

J-M WELDED WIRE REINFORCEMENT

For the efficient reinforcement of all types of concrete construction, Johns-Manville supplies J-M Welded Wire Reinforcement. This is an electrically-welded wire fabric of square or rectangular mesh, furnished in various gauges and wire spacings.



The superiority of J-M Welded Wire Reinforcement is typically illustrated in the electric weld which fuses the wires into one homogeneous section, assuring unimpaired strength and maintained wire spacing

Only the highest grade, cold-drawn steel wire is used to provide high tensile strength with elastic and ductile properties especially suitable for the reinforcement of concrete. J-M Welded Wire Reinforcement is furnished, either plain or galvanized, in rolls or sheets, and is susceptible to a wide range of sectional-area requirements.

Complete detailed information on J-M Steeltex products is given in DS Series 176, Steeltex for Plaster; DS Series 177, Steeltex Floor Lath and Welded Wire Reinforcement; and DS Series 178, Exterior Stucco Reinforcements and Steeltex for Brick or Stone Veneer.

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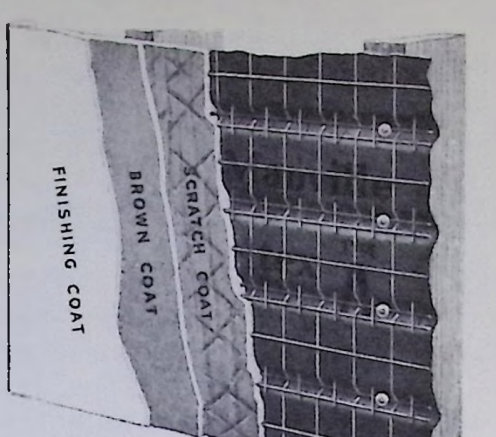
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J-M STEELTEX FOR PLASTER APPLICATION SPECIFICATIONS

LATHING CEILINGS AND SIDEWALLS OVER WOOD FRAMING:

All interior walls, partitions and ceilings, where specified and designated plaster, shall be lathed with J-M Steeltex for Plaster Type A. (2" x 2" mesh, 16 gauge, cold-drawn electrically-welded, galvanized, copper bearing, self-furring wire fabric to which a tough fibrous backing is secured by means of 18 gauge stitch wires on 2" centers.)

Steeltex shall be attached to ceilings and sidewalls with Steeltex Type A Lath Nails (11 gauge by 1-5/16") driven into each joist or stud so as to engage the horizontal wire in the center of the crimps. Nail at every rib formed by the crimped wires.



Steeltex automatically assures a steel-reinforced plaster slab

All joints shall be staggered on both ceiling and sidewalls so that four corners of adjacent sheets shall not occur at any one place.

All laps shall be at least 1" and made so that wire laps against wire.

Lathing of ceiling shall start at a corner bending the first sheet of Steeltex at the ceiling angle to make a drop or apron down the side walls of at least 4". Side walls shall be lathed from ceiling down so that all horizontal laps are made over top sheets.

All plaster shall be applied to full 3/4" grounds.

Note: Other types of nails may be used provided they penetrate the wood a full 1" and securely engage the reinforcing wire. This would include 4d Common or Box Nails (bent over the wire), 1-1/8" Blued Hook-Head Nails, 1-1/4" Blued 7/16" Head Plasterboard Nails and 1-1/4" Blued Metal Lath Staples.

LATHING SIDEWALLS OVER STRUCTURAL STEEL FRAMING:

J-M Steeltex for Plaster (2" x 2" mesh, 16-ga., cold-drawn, electrically-welded, galvanized copper-bearing steel wire, self-furring fabric, to which a tough, fibrous backing is secured by 18-ga. stitch wires on 2" centers) shall be attached to the flanges of structural members, with Steeltex V-shaped Attachment Bars or 3/4" Steeltex Channel (19-ga. Attachment Bars where spacing of framing is 24" to 36"; and 3/4" Steeltex Channels where spacing is over 36").

Attachment Bars or Channels shall be placed on 16" centers at right angles to steel framing members and tied with 18-ga. galvanized annealed wire to flanges of structural members.

Steeltex for Plaster shall be placed with ribs at right angles to Attachment Bars or Channels and attached by pushing the lath against the prongs of the bars or channels so that they puncture the backing. Then, when the lath rests firmly against the Attachment Bar or Channel, bend the prongs over the reinforcing wires of the lath and press the ends of the prongs in firmly.

JOHNS-MANVILLE Building Materials

J-M Steeltex for Plaster Application Specifications

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LATHING SIDEWALLS OVER STRUCTURAL STEEL FRAMING: Continued

Sidewalls shall be lathed from ceiling down so that all horizontal laps are made over top sheets. Joints shall be staggered so that four corners of adjacent sheets shall not occur at any one place. End laps shall be made over Attachment Bars only, and not between, and shall be 1". Side laps shall also be 1".

LATHING CEILINGS UNDER STEEL JOISTS:

J-M Steeltex for Plaster (2" x 2" mesh, 16-ga., cold-drawn, electrically-welded, galvanized copper-bearing steel wire, self-furring fabric to which a tough, fibrous backing is secured by 18-ga. stitch wires on 2" centers) shall be attached to steel joists with Steeltex V-shaped Attachment Bars or 3/4" Steeltex Channels (19-ga. Attachment Bars where spacing of joists is less than 24"; 16-ga. Bars where spacing is 24" to 36"; 3/4" Steeltex Channels where spacing is over 36").

Attachment Bars or Channels shall be placed at right angles to the steel joists and attached to the flanges of rolled section joists with clips which hook over the flange of the beam and to the bottom chord of bar joists by tying with a double strand of 14-ga. galvanized annealed wire. In all cases, Attachment Bars or Channels shall be spaced not over 16" and so arranged that joints of the Steeltex sheets shall be made over the Attachment Bar or Channel and not between.

Steeltex for Plaster shall be applied with ribs at right angles to the Attachment Bars or Channels, starting at the corner of the ceiling and bending the first sheet at the ceiling angle to provide a drop or apron down the sidewall of at least 4". The Steeltex shall be secured to the Attachment Bars or Channels by pushing the lath against the prongs so that they puncture the backing and when the lath rests firmly against the Attachment Bar of Channel, bending the prongs over the reinforcing wires of the lath and pressing the ends in firmly.

Joints shall be staggered so that the four corners of adjacent sheets shall not occur at any one place. End laps shall be made over Attachment Bars or Channels only, and not between, and shall be 1". Side laps shall be 1".

ERECTING AND LATHING SUSPENDED CEILINGS:

Plastered ceilings suspended from flat slab, arches, pan system, or other similar floor construction shall be constructed with J-M Steeltex for Plaster (2" x 2" mesh, 16-ga. cold-drawn, electrically-welded, galvanized copper-bearing steel wire, self-furring fabric to which a tough fibrous backing is secured by 18-ga. stitch wires on 2" centers) applied to 3/4" Steeltex Channels. 3/4" Steeltex Channels shall be spaced on 16" centers and tied with 16-ga., galvanized annealed wire to 1-1/2" runner channels, spaced on not over 4 ft. centers. Runner Channels shall be suspended the required distance from the floor slab with heavy gauge, galvanized wire or with hanger straps.

Steeltex for Plaster shall be placed with ribs at right angles to 3/4" Steeltex Channels and secured to 3/4" Steeltex Channels by pushing the lath against the prongs so that they puncture the backing and, when the lath rests firmly against the 3/4" Steeltex Channel, bending the prongs over the reinforcing wires of the lath and pressing the ends in firmly.

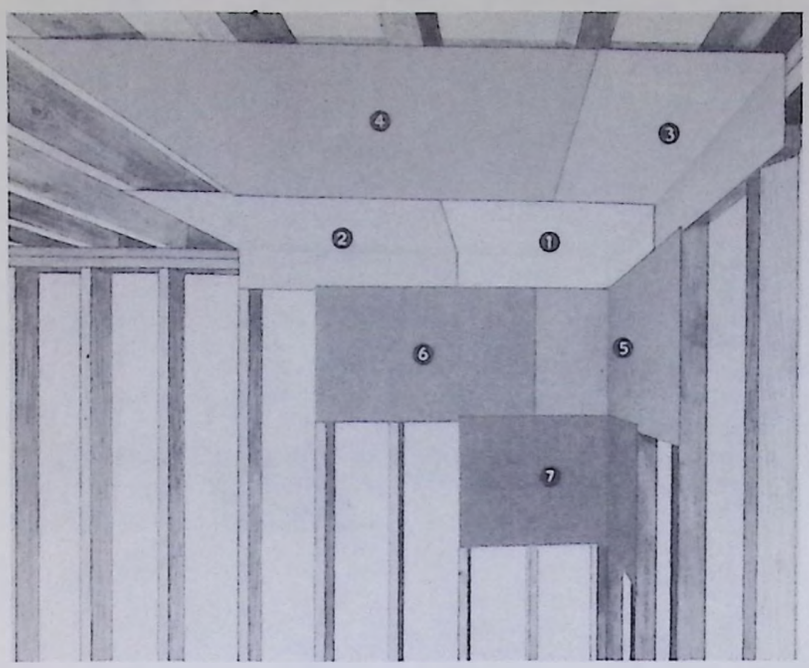
Joints shall be staggered so that four corners of adjacent sheets shall not occur at any one place. End laps shall be made on channels only, and not between, and shall be 1". Side laps shall be 1".

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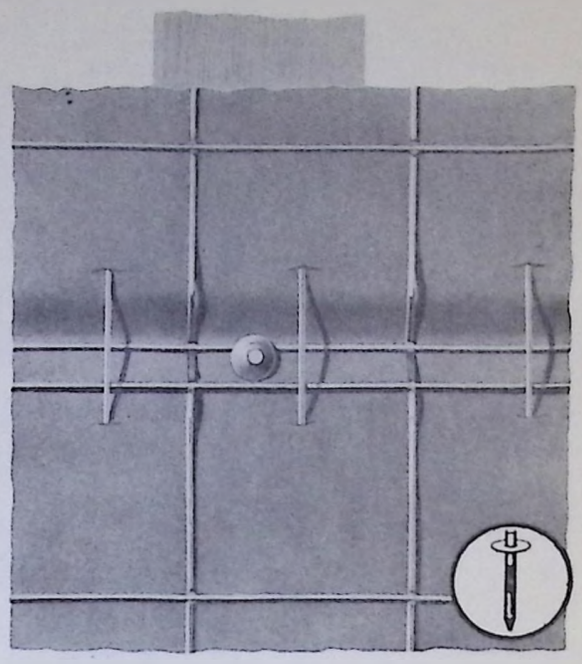
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J-M STEELTEX FOR PLASTER APPLICATION DIRECTIONS

The following application directions, covering the new improved plaster base, J-M Steeltex for Plaster Type A, should be carefully followed to obtain the best lathing results.



Lathing Sequence



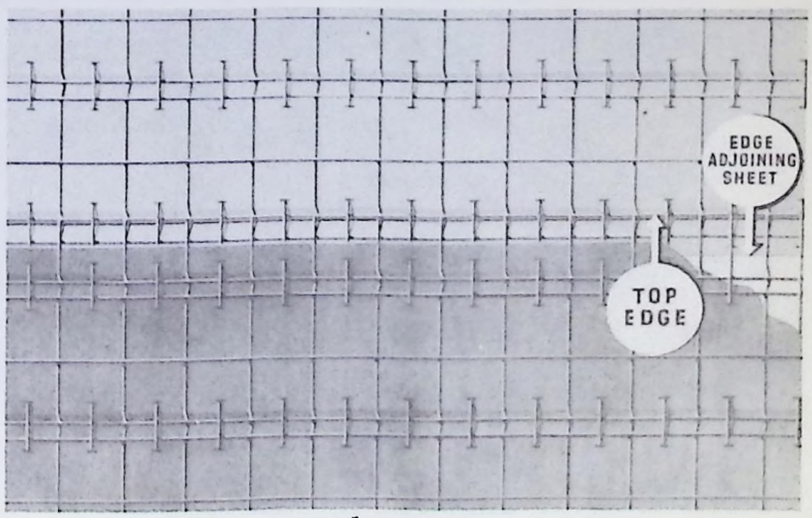
Nailing

Lathing Sequence: Start lathing on ceiling at corner of room as shown in above drawing. Sheet No. 1 is the key sheet. Complete lathing on ceiling, then start on the side wall. Joints should always be broken as indicated.

Nailing: The Steeltex Type A Lath Nail is recommended. This nail, blued and sterilized, is of 11-ga. by 1-5/16" in length. Other types of nails may be used provided they penetrate the wood a full 1" and securely engage the reinforcing wire. This would include 4d common or box nails (bent over the wire), 1-1/8" blued hook-head nails, 1-1/4" blued 7/16" head plasterboard nails and 1-1/4" blued metal lath staples.

The Type A nail, as shown above, should be placed so that the collar fastens the reinforcing wire at the center of the crimp. The nails must be driven into every stud and joist on both ceilings and sidewalls at every rib formed by the crimped wires.

Lapping: All sheets must be lapped so that the reinforcing steel extends across all joints. This procedure provides continuous reinforcing and protects against plaster cracking at the joints. On sidewalls the Steeltex is lathed from the ceiling down. The top of each succeeding sheet is lapped over the bottom of the upper sheet. All laps, both vertical and horizontal, must be at least 1" and wire lapped over wire.



Lapping

Alternate Method: When desired, the ceiling and sidewall sheets may be butted into the ceiling angle and inside corners and J-M Corner Reinforcing applied over the lath.

JOHNS-MANVILLE Building Materials

J-M Steeltex for Plaster Application Directions

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BMM-110

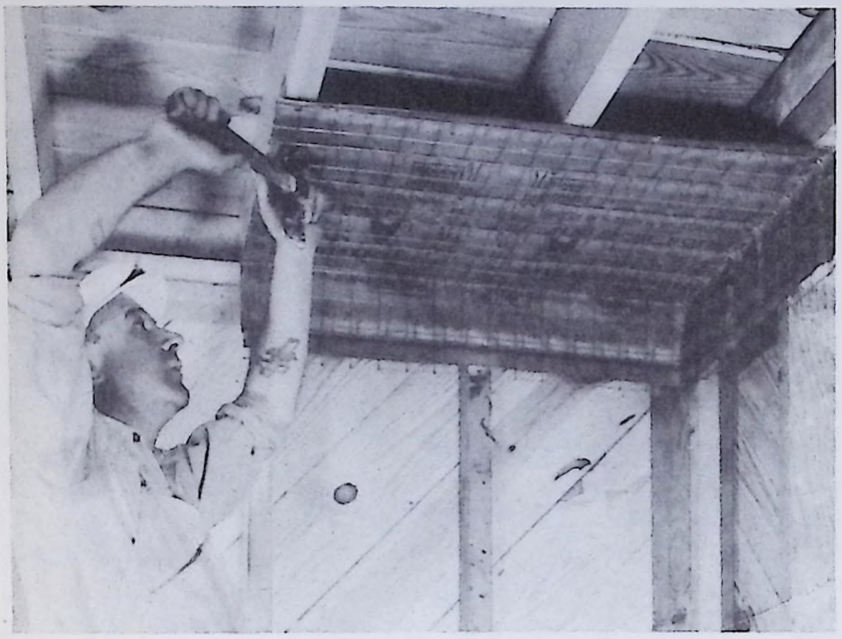
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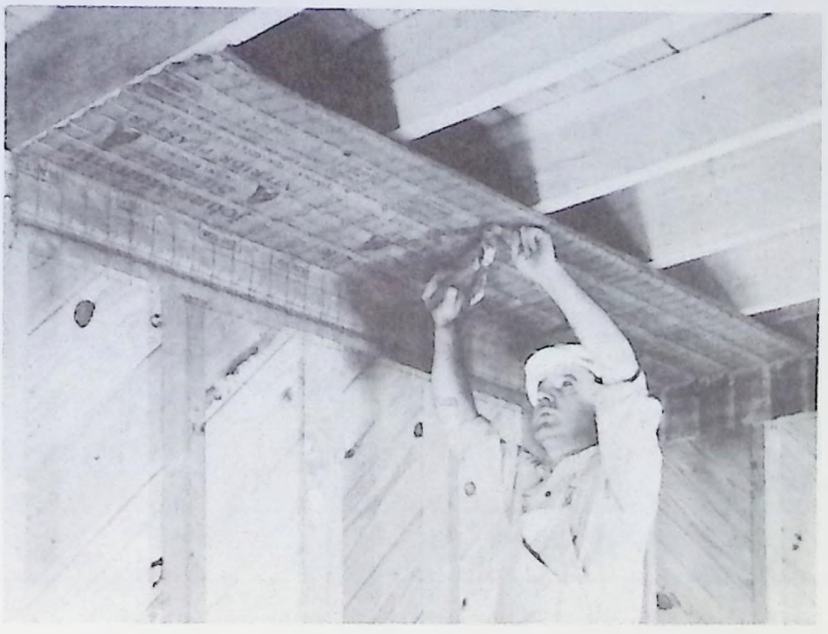
To form sharp, straight ceiling and corner angles, any convenient piece of board or scaffolding and a hatchet or block may be used. To cut the Steeltex regular No. 2 lath snips are used. See illustration to the right





Lathing is started on the ceiling at the corner of the room by cutting and bending the Steeltex to form a shoe of at least 4", extending down the sidewalls as shown to the left. Note that this sheet is cut at the second joist

The second sheet of Steeltex is then applied as shown to the right by bending a shoe of at least 4" to extend down the sidewall. Note that this sheet is not required to be cut

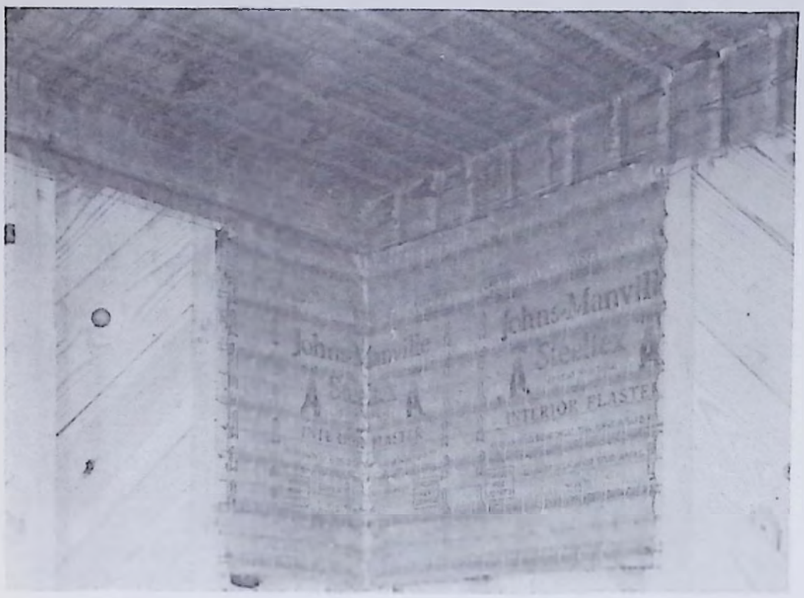


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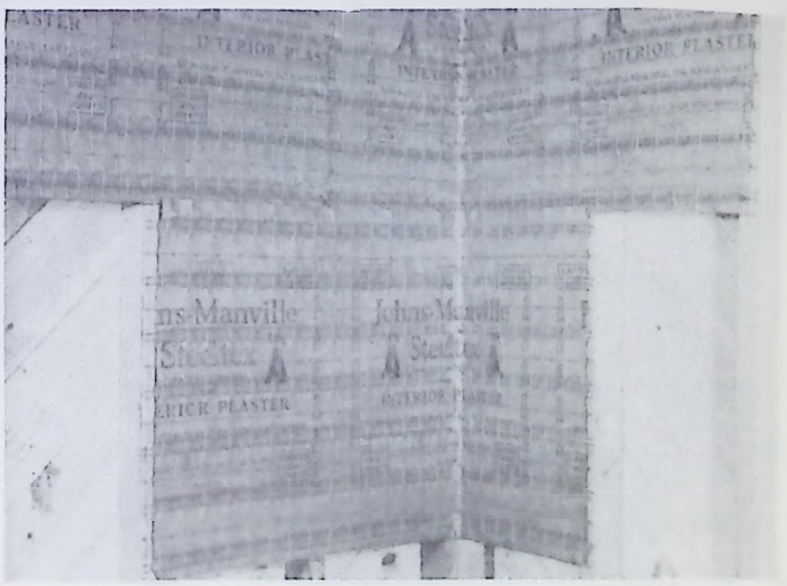
The third sheet of Steeltex is applied by again bending a shoe down the sidewall. Note that the Steeltex is cut off at the first joist in order to break the joint. See illustration to the right





The view at the left shows the application of the first sidewall sheet after the ceiling has been completely lathed. Note how the Steeltex is bent around the corner and lapped over the ceiling sheets in order to provide continuous reinforcement at all angles and joints

Illustrating, to the right, another sidewall sheet bent around the corner and properly lapped over the upper sheets. Note that vertical joints are broken (staggered) and the reinforcement steel extends across all joints



JOHNS-MANVILLE Building Materials

J-M Steeltex for Plaster Application Directions

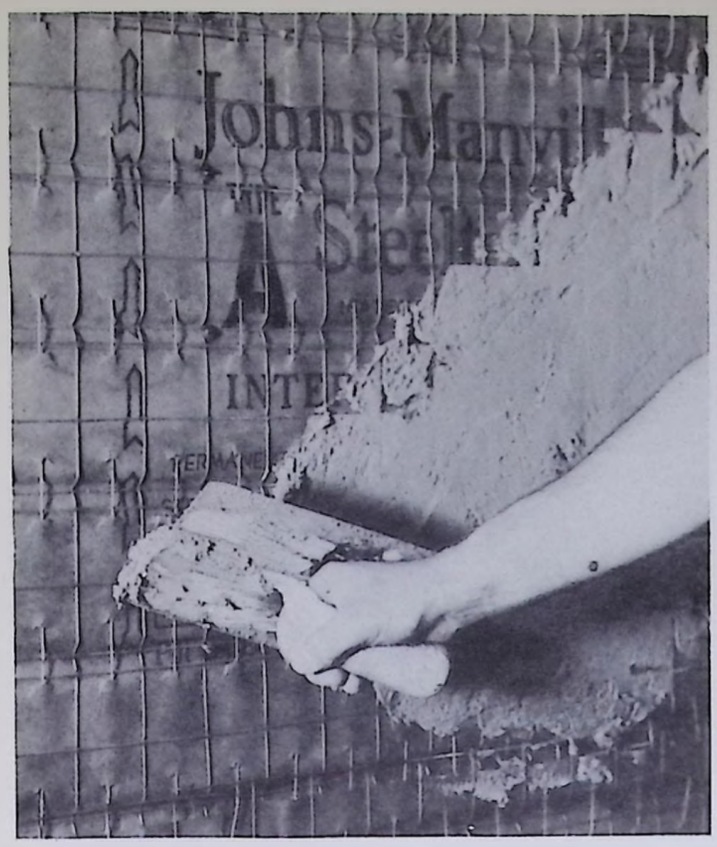
DATE February, 1938

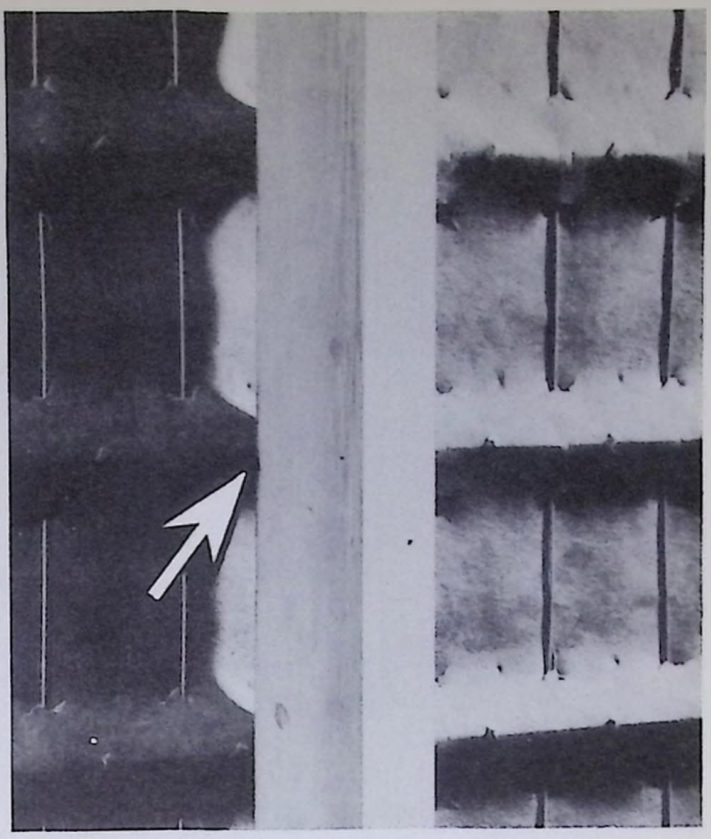
BMM-110.1

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The boardlike rigidity and instant bonding action of Steeltex provides easier troweling and maximum plaster coverage. The illustration on the right shows the rear of a wall plastered over Steeltex. Note the minimum contact between the wet plaster and the dry lumber and the absence of wasteful plaster keys

Structural Advantages

1. Reinforced Plaster: The embeddment of the welded steel wire mesh in the plaster results in reinforced construction similar in principle to reinforced concrete. This means maximum protection against plaster cracks.

2. Automatic Back-Plastering: All of the reinforcing steel is embedded and therefore the advantages of back-plastered construction are secured without extra expense.

3. All Angles and Laps Reinforced: Type A is so designed that when properly applied the reinforcing steel extends around and protects all angles and corners. Similarly the steel mesh extends across all laps offering maximum protection against lap cracks.

4. Permanence: The wire mesh is made of the highest quality reinforcing steel and since the steel is galvanized and copper-bearing and since all reinforcing steel is embedded in the plaster there is maximum protection against rusting and corrosive action.

5. High Bond Value: The bond value between Steeltex, Type A, and sanded gypsum plaster is 830 lb. per sq. ft. This is a factor of safety over 100 and is complete assurance that plaster bond failure will never occur.

6. Floating Wall Action: The furring action of the Steeltex separates the plaster slab from the framework which minimizes the contact between wet plaster and dry lumber. This is added protection against plaster cracks caused by swelling and distortion of the wood frame.

7. No Lath or Stud Marks: The furring action also eliminates any unsightly stud marks from appearing on the finished plaster surface. Lath marks do not occur over Steeltex.

Application Advantages

1. Easy to Bend and Cut: To form sharp, true ceiling and corner angles the Steeltex is simply bent over any convenient piece of board or scaffolding. Steeltex is readily cut with the lather's usual No. 2 snips.

2. Easy to Handle: The sheets of Steeltex have boardlike rigidity and are of such size (30-1/2" x 49") that one man can conveniently handle and apply them.

3. Instant Bonding Action: The fibrous paper backing of Steeltex is especially designed to bond instantly with the wet mortar. This is of particular advantage to the plasterer when working on overhead surfaces.

4. Boardlike Rigidity: There is less deflection of the lath under the pressure of the trowel which makes for greater speed in the application of the scratch coat.

5. No Plaster Wasted in Keys: Since Steeltex provides automatic back-plastered construction there are no plaster keys.

6. Less Waste in Labor and Material: Greater plaster coverage is secured due to the fact that Steeltex is a rigid lath. Moreover the plasterer trowels against a solid surface with no waste in plaster keys and a minimum of waste in plaster droppings. This results in outstanding economies in the use of sand, neat gypsum and labor.

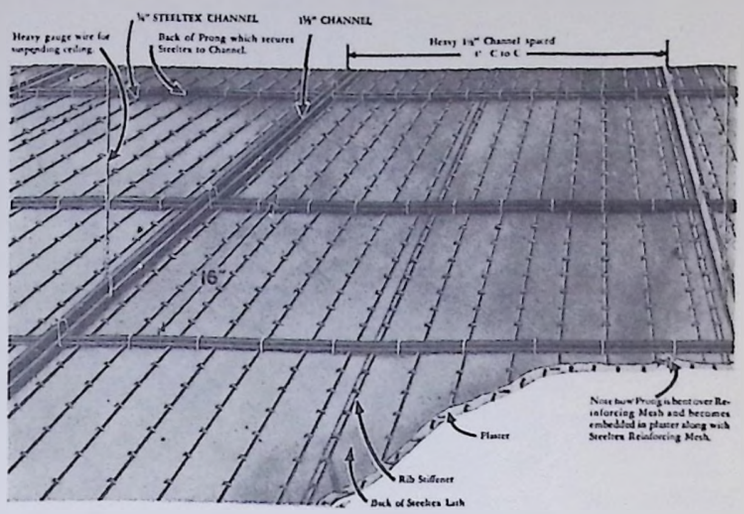
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J-M STEELTEX SUSPENDED CEILING
PRONG CHANNEL METHOD

USING 3/4" STEELTEX PRONG CHANNEL:

Plastered ceilings suspended from flat slab, arches, pan system or similar floor construction are readily constructed with the 3/4" Steeltex Prong Channel. The method of construction is identical to the usual suspended ceiling construction in that the sizes, type and spacings of hangers and runner channel are such as to conform to the architects' or engineers' design. The only change is that the Steeltex Channels with 12-1/2 ga. galvanized annealed wire prongs welded at 5" intervals are substituted for ordinary channels.

The Steeltex method of construction provides a much more rapid means of attaching the lath and also provides a more secure tie than is obtained with ordinary tie wire. The Steeltex Suspended Ceiling is rapidly and readily adapted to any desired contour and is light in weight, weighing only 6.3 lb. per sq. ft. based on a plaster slab with a density of 4-1/2 lb. per sq. ft. per 1/2" thickness.



J-M Suspended Ceiling



3/4" Steeltex Channel



Steeltex Suspended Ceilings under construction in a high school building. Suspension is effected from a flat slab by strap hangers which, in turn, are bolted to a standard angle. The wire prongs puncture the Steeltex backing and are bent to engage the reinforcing mesh

JOHNS-MANVILLE Building Materials	DATE June, 1938 (Cancelling sheet dated March, 1938)
Steeltex Suspended Ceiling Prong Channel Method	BMM-113

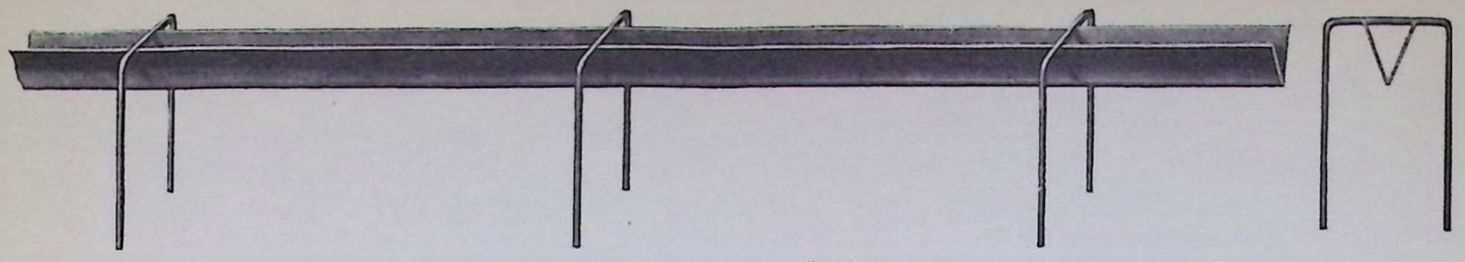
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ATTACHING STEELTEX TO STEEL-FRAME CONSTRUCTION
STEELTEX ATTACHMENT BARS AND 3/4" STEELTEX PRONG CHANNEL



A section and end view of the J-M Steeltex Attachment Bar

For attaching Steeltex to steel frame construction the Steeltex V-shaped Attachment Bar or the 3/4" Steeltex Prong Channel is used. The bars are used for steel framing up to 36" centers; spans greater than 36" centers require the 3/4" channel. Although the bars or channels usually involve the application of Steeltex to ceilings, they are equally adaptable for attaching Steeltex to interior and exterior walls.

This V-shaped bar is made of both 19 and 16-gauge 1" steel strip, formed into a "V" shape for stiffness, to which is welded 12½-gauge galvanized wire prongs on 5" centers. The steel strip is thoroughly lacquered to resist rust. For spans up to 24", 19-ga. bars are used; spans 24" to 36" require 16-ga. bars. Spans over 36" require the 3/4" Steeltex Prong Channel.

The Steeltex Attachment Bar and Steeltex Prong Channel provide a secure and speedy method of attaching Steeltex, interior or exterior application, to ceilings and side walls over metal studs and joists. Also, over concrete and other surfaces where nailing is impracticable. The bars or channels, in accordance with standard practice, are either wire tied or clipped to the steel members. Fig. 1 shows the simplicity of the Steeltex Clip for fastening Attachment Bars: The straight end is bent over beam flange into position (See dotted line). The Attachment Bar Clips are furnished in two sizes: The 3-1/2" clip will fit steel beams with a flange width up to 2-1/2" while the 5-1/2" clips will fit flanges up to 4-1/2" in width. Fig. 2 illustrates the method of tieing the Attachment Bars by a double turn of 14-ga. galvanized wire.

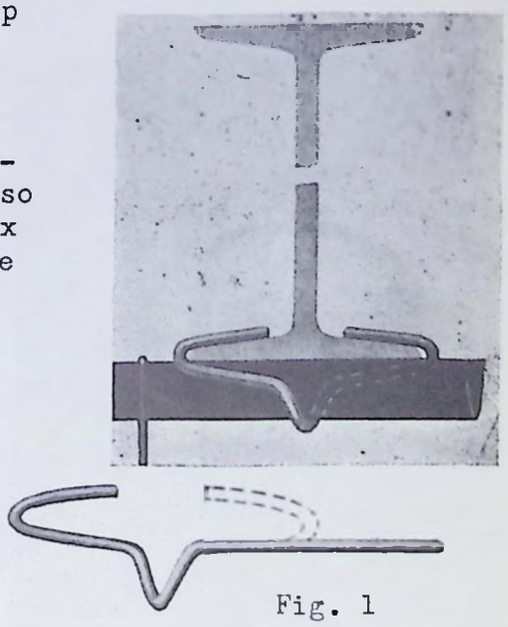


Fig. 1

Steeltex is then applied by pushing it against the prongs of the Attachment Bar or Channel so that the prongs puncture the backing of the Steeltex sheet. The wire prongs are then bent over to engage the reinforcing mesh of Steeltex, completing a fast and economical method of positive attachment to the steel framework. (See Fig. 3 and 4.)

The Steeltex backing is easily punctured by the galvanized wire prongs.

When the plaster is applied the wire prongs become automatically embedded in the plaster along with the wire-reinforcing mesh of Steeltex. (Fig. 4.)

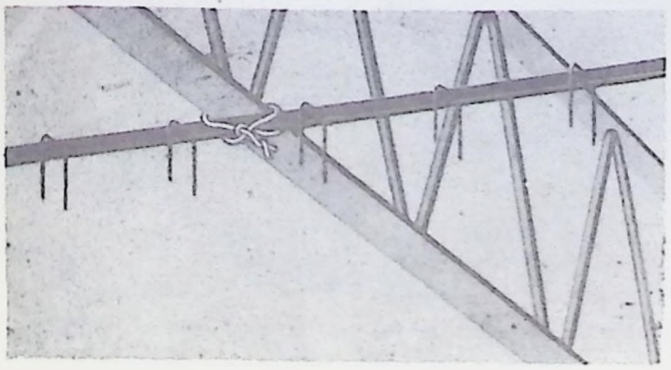


Fig. 2

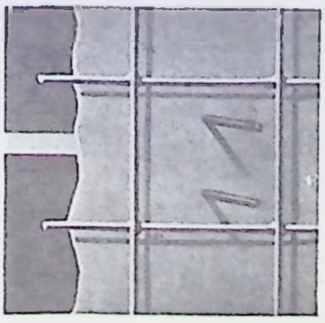


Fig. 3



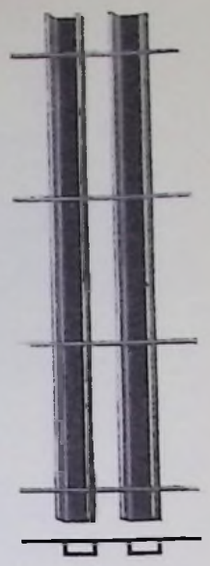
Fig. 4

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SPECIFICATION FOR ERECTING AND LATHING 4" STEELTEX HOLLOW PARTITIONS

Steeltex 4" Hollow Partitions shall be constructed with 2-1/2" J-M Steeltex Studs (steel studs fabricated by joining together two lines of 3/4" channels with 12-1/2-ga. galvanized annealed wire prongs welded across the legs of each channel at 5" intervals. The wire prongs are at least 5" long so that they extend not less than 1-1/4" beyond each edge of the stud, which has an overall depth of 2-1/2".



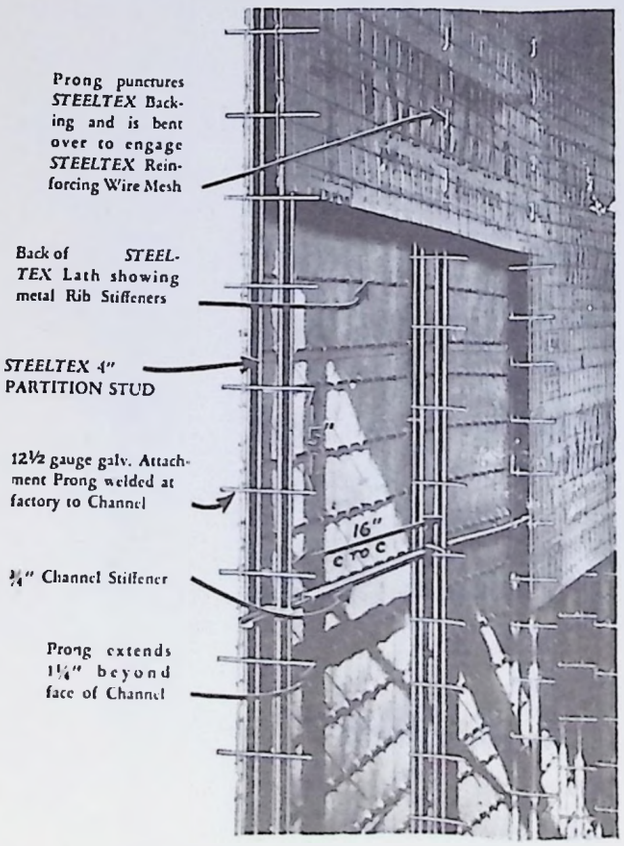
Cross section and view of STEELTEX 4" Partition Stud. Galvanized annealed wire attachment prongs are electrically welded to the ¾" channels

The Steeltex Studs shall be spaced as follows: on 16" centers for partition heights up to and including 9 ft.; on 12" centers for partition heights from 9 ft. up to and including 12 ft.; and on 8" centers for partition heights exceeding 12 ft. Maximum stud height shall be 16 ft.

All partitions shall be permanently braced with 3/4" channels, weighing not less than 276 lb. per 1000 ft., placed horizontally within the partition and securely "wire-tied" to each stud at all points of intersection with the studs. When the partition is 9 ft. or less in height, two lines of horizontal bracing channel shall be used at distances of 3 ft. and 5 ft. from the floor line. When the partition is from 9 ft. up to and including 12 ft. in height, three lines of horizontal bracing channel shall be used at distances of 3 ft., 5 ft. and 7 ft. from the floor line. When the partition exceeds 12 ft. in height, the horizontal bracing channel shall be located at distances of 3 ft., 5 ft., 7 ft. and 10 ft. from the floor line with additional braces at 3-ft. intervals to within 3 ft. of the ceiling line.

The Steeltex Studs shall be secured to the floor and ceiling bearings by runner channels, nailing, ceiling or floor brackets or by holes cut into the concrete floor and ceiling. (See note.)

After the partition studs have been erected plumb and true, J-M Steeltex for Plaster, Type A (2" x 2" mesh, 16-ga., cold-drawn, electrically-welded, galvanized copper-bearing, self-furring, steel wire fabric, to which a tough fibrous backing is secured by means of 18-ga. stitch wires on 2" centers, with stiffening ribs formed in fabric on not more than 5" centers) shall be applied on both sides of the studs by starting at the ceiling and lathing down to the floor so that all horizontal laps are made over the bottom edge of the upper sheets. Ribs of the lath shall be at right angles to the studs. The Steeltex shall be attached to the studs by pushing the lath against the prongs so that they puncture the backing. When the lath rests against the studs, the prongs shall be bent over the reinforcing wires of the lath and pressed in firmly.



Joints of the Steeltex lath shall be staggered so that the four corners of adjacent sheets shall not occur at any one place. End laps shall be made on studs only, and not between and shall be 1". Side laps shall also be 1". Lath shall be bent at right angles to brick or masonry walls with selvage edge of sheets nailed into joints or concrete.

NOTE: Methods of anchoring and fastening (door bucks, etc.) studs are discussed on other sheets.

JOHNS-MANVILLE Building Materials

Steeltex 4" Hollow Partition

DATE September, 1938

(Cancelling sheet dated June, 1938)

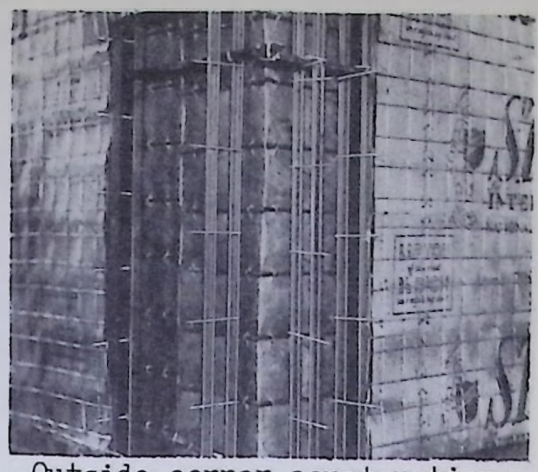
BMM-114

Slum Clearance Program: Specifications and Data on Various Building Materials (1938)
ACL Doc 21293 · Page 339 of 443
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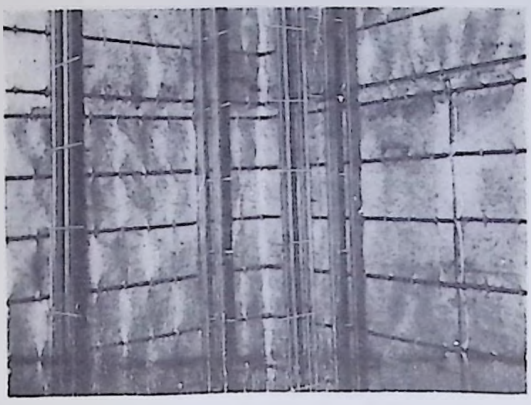
APPLYING STEELTEX 4-INCH HOLLOW PLASTER PARTITION

The illustrations show methods of forming corners with the Steeltex Lath. The rigidity of the lath allows a corner to be formed in the same manner as if pencil rods were employed. Steeltex Lath is bent exactly to fit in the corner and then attached to the prong studs as previously explained in the specification. Views of the outside and inside of the corner are shown.

The Steeltex 4" partition may be erected very rapidly and accurately with a minimum amount of labor. Also, debris is practically eliminated.



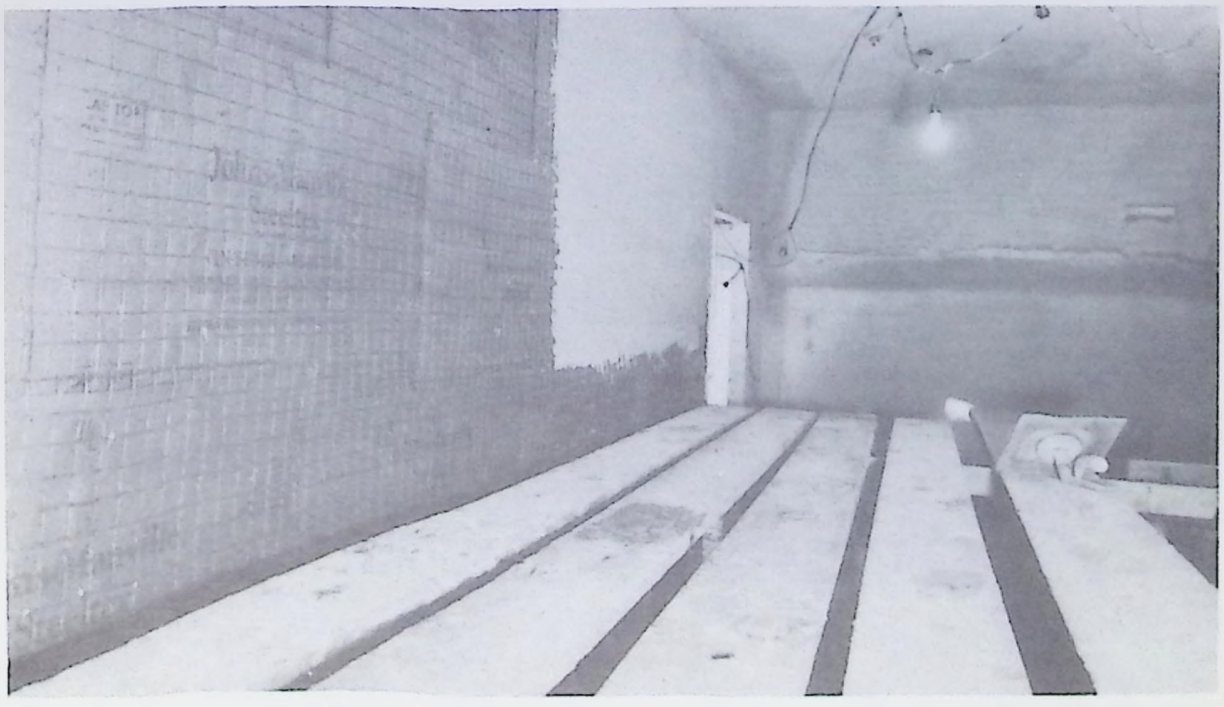
Outside corner construction of Steeltex 4" partition



Accurate interior corner formed by Steeltex Lath

The partition is unusually effective from the standpoint of sound-deadening and acoustics. It is light in weight, reducing dead loads. Actual weight is 14.7 lb. per sq. ft. based on plaster with a density of 4-1/2 lb. per 1/2" thickness.

The speed and precision with which this partition is erected can only be appreciated by the lather who has handled it on the job. It forms a rigid base for plastering and receives and holds the wet plaster with a minimum of droppings.

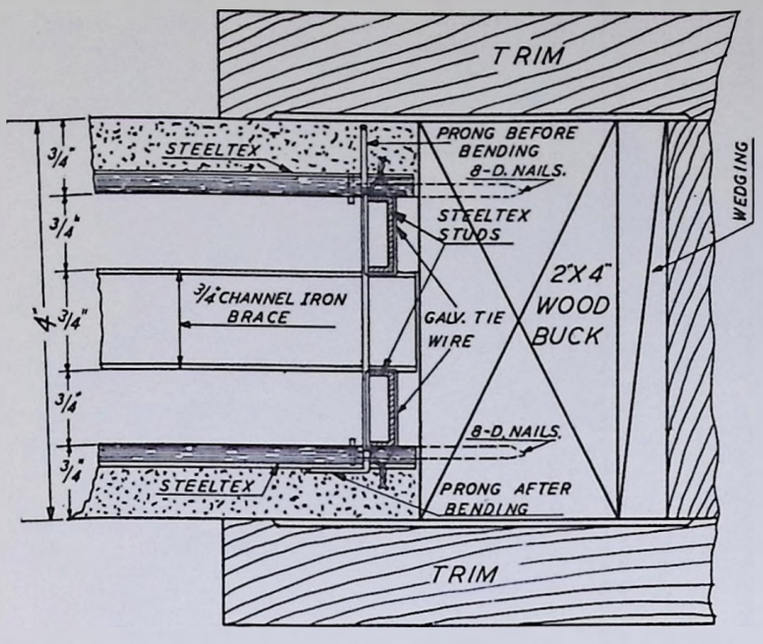


Illustrating application of scratch coat of plaster over the 4" Steeltex Hollow Partition in a hospital building. J-M Steeltex used throughout for Ceilings and Partitions

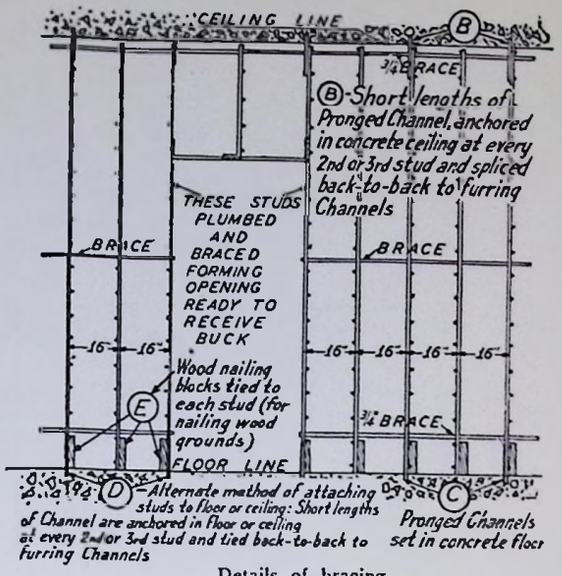
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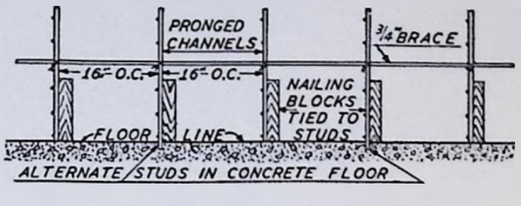
STEELTEX PARTITION CONSTRUCTION DETAILS



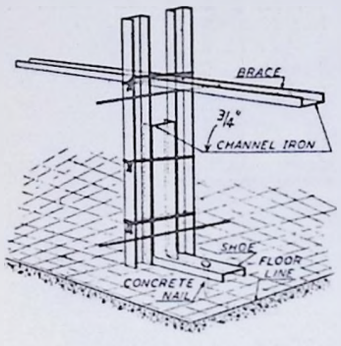
Method of fastening STEELTEX partition stud to rough door buck by the use of 8d nails. Nails are driven in pairs on each side of the channels at 19" intervals to which the channels are securely tied



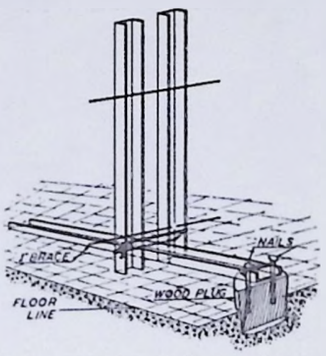
Details of bracing and anchoring partition, framing door openings and attaching nailing blocks



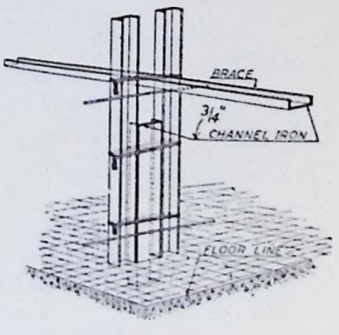
Methods of Anchoring *STEELTEX* 4" Hollow Partition to Concrete Floors and Ceilings



Anchoring partition with channel shoe



Using brace and wooden plug



Channel iron anchor embedded in concrete

(1) Short pieces of channel with shoe on one end are nailed to concrete floors and ceilings along center line of partition at every second stud

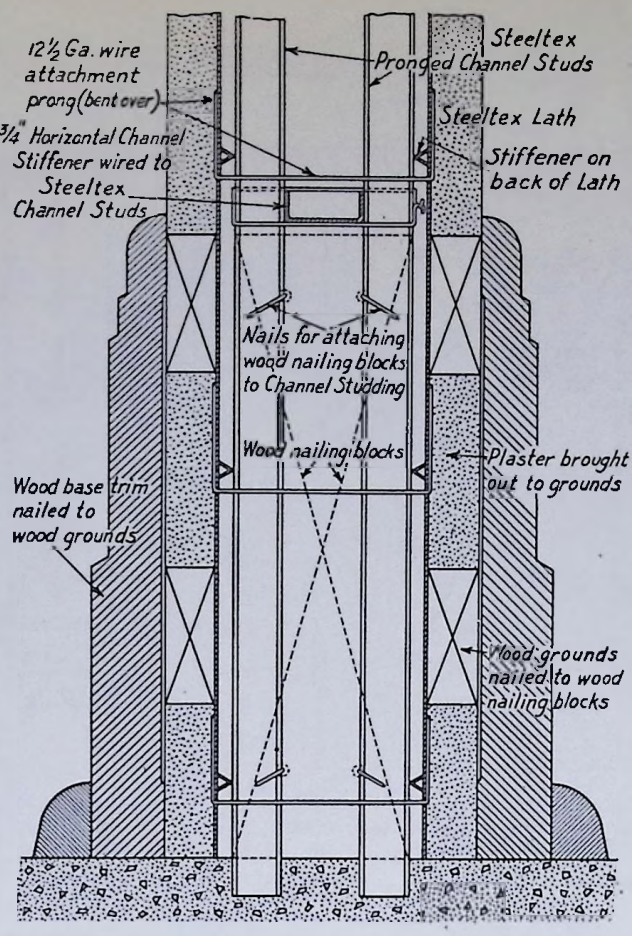
(2) Wood plugs are driven into holes in concrete floors and ceilings at 3' or 4' intervals. 1" channel iron is used as horizontal brace, anchored to the plugs by driving 8 or 10d nails on each side into the plug and tying channel to the nails

(3) Short pieces of 1" channel iron are driven into holes in concrete floors and ceiling at every second stud. The partition stud is tied to anchor channel

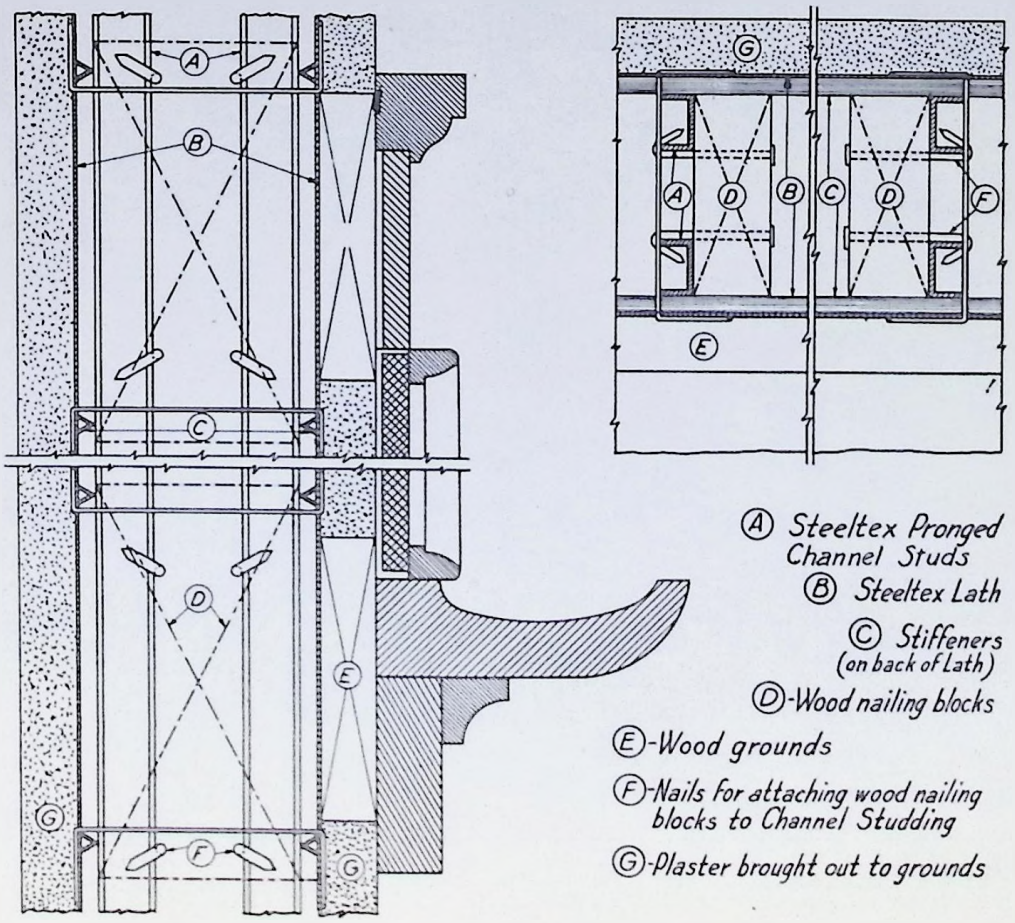
JOHNS-MANVILLE Building Materials	DATE August, 1938 (Cancelling BMM-116 & 116.2 dated 1936 & '35)
Steeltex Partition and Blackboard Construction Details	BMM-116

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Steeltex Partition Construction Details
Nailing-Block Grounds and Wood Base Details



Blackboard Construction Details

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BOND TEST ON J-M STEELTEX FOR PLASTER TYPE A
(COLUMBIA UNIVERSITY TESTING LABORATORIES)

"Report Number 2443 January 28, 1937

"GENERAL:

The purpose of the tests described herein was to determine the effectiveness of "Steeltex, Type A" Metal Lath in developing bond of sanded gypsum plaster applied to the lath as a plaster base. The samples of Steeltex, submitted for test by Johns-Manville, were marked "J.E.H.", indicating selection by J.E. Herman of the the Department of Buildings of New York City.

"DESCRIPTION OF TEST SPECIMENS:

Steeltex for Plaster, Type A, consists of a 2" x 2" mesh, 16 gauge, cold-drawn, electrically welded galvanized, copper-bearing steel wires, with a paper backing secured by means of 13 gauge galvanized lacing wires spaced 2" on centers. Suitably placed wires running lengthwise of the lath sheet, spaced 3-1/4" c-c and welded to the fabric provided additional rigidity.

Sections of Steeltex 10" x 10" were attached to wood blocks of the same size and 2" thick by means of nine 1-1/2" round head wood screws and 1/2" washers, spaced in three rows four inches apart. Ten pieces of Steeltex were thus attached to wood blocks, after which a 3/8" coat of U.S.G. Red Top Sanded Plaster was applied uniformly to the surface of the lath. The freshly plastered surfaces of two specimens were then pressed firmly together to form a single complete specimen, the ten sections making five complete specimens. Each specimen thus consisted of two sections of Steeltex lath bonded to a common coat of plaster. The plaster was allowed to cure by storage in air at room temperature for 14 days before testing.

"METHOD OF TEST:

The bond specimens were tested in a 20,000 lb. Southwark-Emery hydraulic type testing machine. Tensile load was applied to the wood blocks thru universal joints, resulting in a normal tensile stress over the bonded surfaces.

"WITNESSES:

The tests described herein were witnessed by the following representatives of the Department of Buildings of New York City:

J. Coleman - Department of Buildings, Borough of Queens and
J. Sheehan " " " " " Brooklyn F.C. Bell - Johns-Manville
J. Davies " " " " " Richmond H.M. Wilson - " "

"RESULTS OF TESTS:

The results of the tests are given in the following table:

PLASTER BOND TESTS MADE UPON STEELTEX FOR PLASTER, TYPE A

Specimen Number	Surface Area, Sq.Ins.	Maximum Load, lbs.	Plaster Bond Stress, lbs/sq. ft.
1	100	609	876
2	100	609	876
3	100	492	708
4	100	603	868
5	100	573	825
		Average	830

All the above tests resulted in bond failures at the lath surface.

The photographs included herein show the method of test and the character of failure.

"Respectfully submitted

W. J. Krefeld, Director
Engineering Materials Lab."

NOTE: Photographs not reproduced.

JOHNS-MANVILLE Building Materials

Bond Test on J-M Steeltex for Plaster Type A,
(Columbia University Testing Laboratories)

DATE February, 1938
(Cancelling sheet dated May, 1936)
BMM-117.1

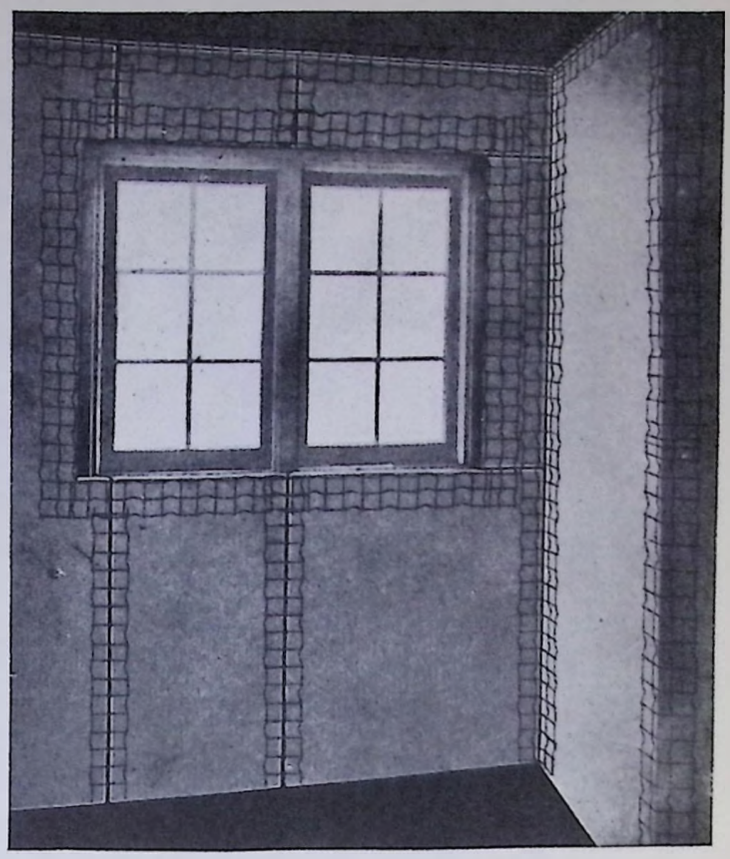
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J-M REINFORCING FOR CORNER AND JOINT CONSTRUCTION

J-M Corner and Joint Reinforcing is specially designed to provide needed reinforcement and to minimize cracking hazards at all corners and joints. where insulating lath, plaster board or wood lath is employed as the plaster base.



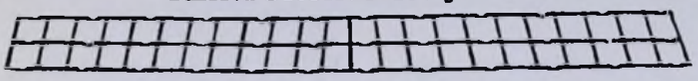
REINFORCING for Corners and Joints applied over wall board or insulating lumber

REINFORCING for Corners

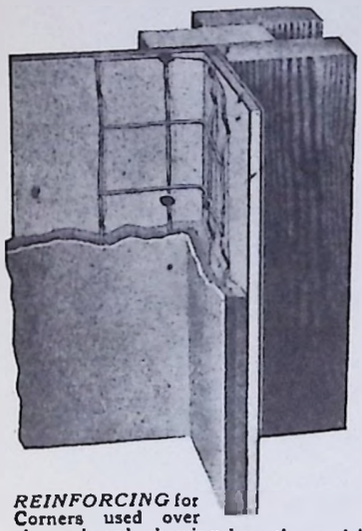


Made of cold-drawn, galvanized steel wires electrically-welded on 2" centers; each piece 50" long. Each leg of each angle is 3" wide. Packed 120 pieces (500 linear feet) to the bundle.

REINFORCING for Joints



These are 4" wide flat strips of cold-drawn galvanized steel wires electrically-welded on 2" centers. Packed 120 pieces (500 linear feet) to the bundle.



REINFORCING for Corners used over plaster board, showing how the steel is automatically embedded in the plaster.

In reinforced corner and joint construction a network of galvanized (non-rusting) cold-drawn, electrically-welded, steel mesh is nailed in and around all angles and frames, and across all butted joints. This wire reinforcing mesh, due to the 3/16" furring crimps at regular intervals, becomes automatically embedded in the plaster as it is applied. It is important that only wide mesh wire or metal lath be used for reinforcing corners and joints, otherwise two separate planes of plaster will be set up, forming two lines of weakness. This style of reinforcing element is specially designed and manufactured for reinforcing all corners and joints of buildings of every type where insulating lumber, plaster boards, wall boards, and wood lath are used as the plaster base for interior plaster. The danger of joint cracks, where such plaster bases are used, is minimized by applying joint reinforcing where all types of wall boards and insulating lumbers are butted, at window and door openings and at any other places subjected to severe internal stresses. Likewise, corner reinforcing should be used over wood lath, and all plaster boards and wall boards at all external and internal corners.

Tests have shown that joints reinforced with J-M Joint Reinforcing average 69% stronger than joints reinforced with 3" Expanded Metal Strips, and 123% stronger than unreinforced joints. These tests were made on gypsum lath over which was applied a 1/2" thickness of sanded gypsum plaster. The test specimen reinforced with J-M Joint Reinforcing broke at the edge of the reinforcement, proving the joint stronger than the board itself.

Since J-M Joint Reinforcing is not bulky, it does not create a plane of weakness. It correctly reinforces the joint by the embedment of cold-drawn steel wires and permits a greater plaster area in bond with the plaster lath than does other types.

JOHNS-MANVILLE Building Materials	DATE February, 1937 (Cancelling 4-M-140 dated May, 1935)
J-M Reinforcing for Corner and Joint Construction	BMM-117.8

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J-M STEELTEX FOR STUCCO
LATHING SPECIFICATIONS FOR STUCCO OVER WOOD FRAMING

All exterior walls where specified and designated stucco shall be lathed with J-M Steeltex for Stucco (2" x 2" mesh, 14-ga. cold-drawn, electrically-welded, galvanized copper-bearing steel wire fabric, to which is secured a tough, double-layer fibrous waterproof backing with a mastic filler between the layers).

Steeltex for Stucco shall be applied direct to studs or over sheathing or over old siding in the case of remodeling, and nailed to bearings. The Steeltex shall be nailed over every stud horizontally across the building and every 6" vertically on the stud. The Steeltex Furring Nails shall be placed under the horizontal wires at a corner of the mesh and toe-nailed to automatically stretch the Steeltex taut. Also nail around all door and window openings at 6" intervals.



Steeltex for Stucco permits rapid and economical application. It is cut to length and nailed completely around the building, one width above the other, shingle fashion

The first width of Steeltex for Stucco shall be started at the sill line and extend around the building. The second width shall lap the first at least 1" (shingle fashion), lapping so that wire laps against wire. Where vertical joints occur, the same method of lapping shall be employed.

Steeltex for Stucco shall be carried up to the openings or under the moulding of all doors and windows. In no case shall vertical joints be joined at corners, under or over window or door openings, or between studs, where applied direct to studs. In no case shall Steeltex for Stucco be butted and in all cases the wire reinforcing must be continuous across all laps and embedded in the scratch coat of stucco.

Steeltex for Stucco in rolls is recommended applied direct to studs. For such construction, all horizontal laps midway between studs are secured with one tie of 18-ga. galvanized tie wire. Two ties are used between studs if studding is on 24" centers.

If Steeltex for Stucco in sheets is used, all laps shall be at least 1" and the sheets placed so that the shortest dimension of the sheets extends across the studs.

In every case, the stucco placed over Steeltex for Stucco shall be applied in three coats to a total thickness of at least 7/8" in accordance with the specification of the Portland Cement Association.

For added protection at the corners of windows and door openings remove the backing from a 8" x 12" strip of Steeltex and apply the wire mesh diagonally at all corners to provide double reinforcing.

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JOHNS-MANVILLE Building Materials

J-M Steeltex for Stucco
Lathing Specifications for Stucco over Wood Framing

DATE June, 1938
(Cancelling BMM-118 and 120.1 dated in 1938 and 1937)
BMM-118

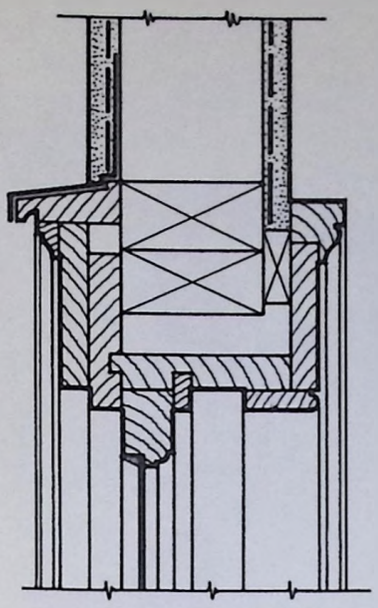
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TECHNICAL DATA SECTION

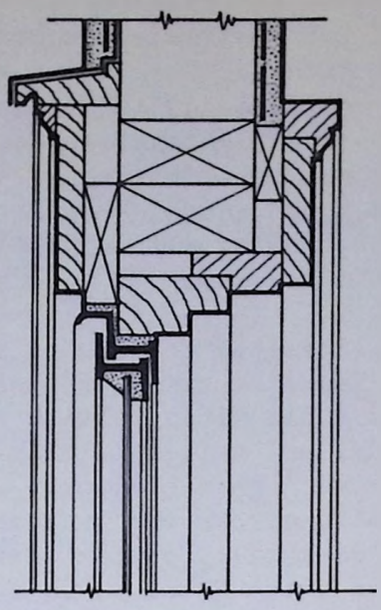
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asbestosclaims.law/library/21293/345

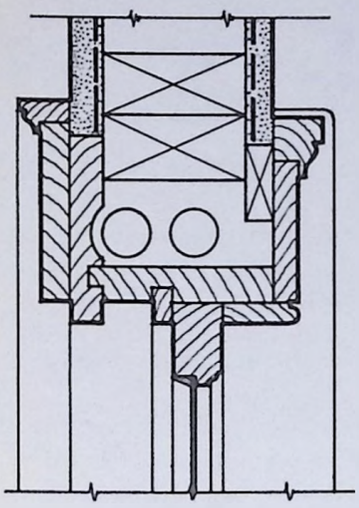
WINDOW DETAILS --- STUCCO CONSTRUCTION

J-M STEELTEX FOR STUCCO APPLIED DIRECTLY TO STUDS

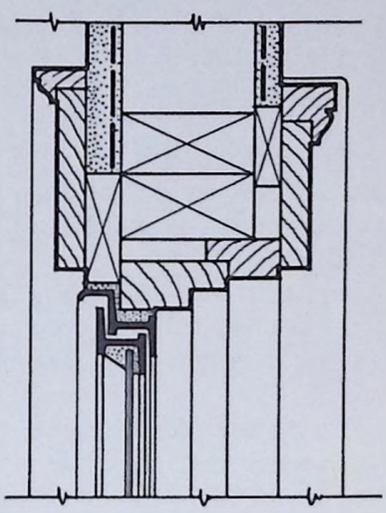


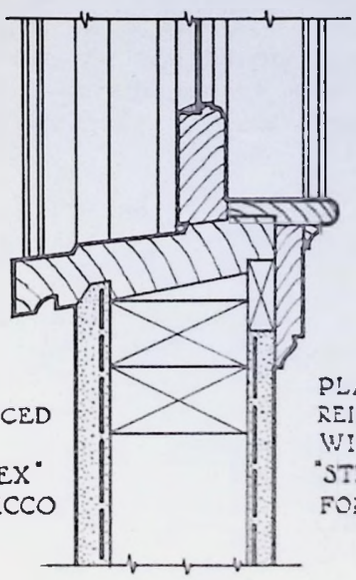
· HEAD ·



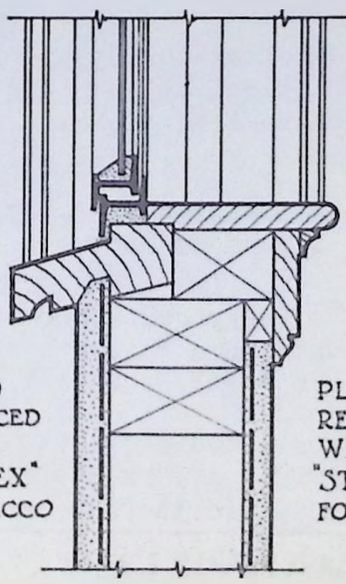


· JAMB ·





· SILL ·



STUCCO REINFORCED WITH "STEELTEX" FOR STUCCO

PLASTER REINFORCED WITH "STEELTEX" FOR PLASTER

SECTION THROUGH DOUBLE-HUNG WINDOW

STUCCO REINFORCED WITH "STEELTEX" FOR STUCCO

PLASTER REINFORCED WITH "STEELTEX" FOR PLASTER

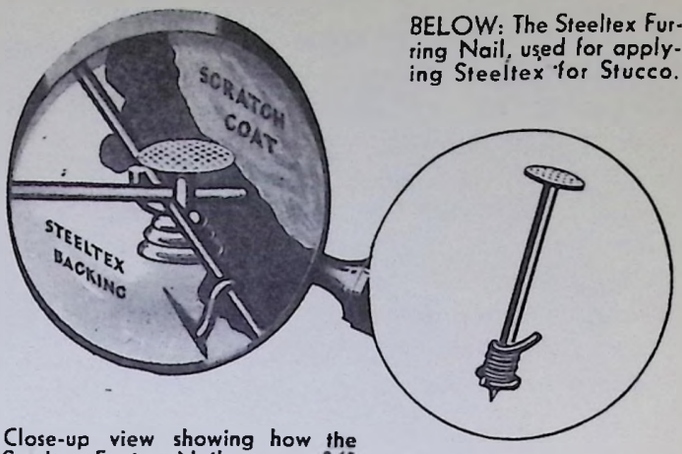
SECTION THROUGH STEEL-CASEMENT WINDOW

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APPLYING J-M STEELTEX FOR STUCCO

The illustration below shows Steeltex for Stucco, in rolls, being applied directly to wood studs. This method of construction is recommended. However, the Steeltex in either roll or sheet form may be applied over any type of wood or composition sheathing.



Close-up view showing how the Steeltex Furring Nail assures ⅜" embedment of the reinforcing mesh.

BELOW: The Steeltex Furring Nail, used for applying Steeltex for Stucco.

The Steeltex is cut to length and drawn taut as the nailing progresses. By the use of Steeltex furring nails, complete embedment of the steel reinforcing in the scratch coat of stucco is assured. (Note -- Steeltex furring nails cannot be used with insulating board sheathing. In such cases J-M Self-Furring Reinforcement Style C-214, applied with large-head galvanized wires, is used as described on other data sheets treating of this type of reinforcing.)

In applying Steeltex for Stucco the usual practice is to apply the first width at the sill line and extending it horizontally around the building. The second width is applied to lap the first shingle fashion and, on direct to stud construction, the horizontal lap is tied with tie wire, making one tie midway between studs.



J-M Steeltex for Stucco, in roll form, being applied directly to wood studs

JOHNS-MANVILLE Building Materials, Miscellaneous	DATE November, 1937 (Cancelling BMM-119 & 120 dated 1937 & '35) (BMM-119)
Applying J-M Steeltex for Stucco	

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TECHNICAL DATA SECTION

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J-M STEELTEX FOR STUCCO USED FOR OVERCOATING (MODERNIZING)

For home modernizing, Steeltex for Stucco applied directly over the old exterior provides a quick and economical method of increasing the value, attractiveness, comfort and life of old houses. By this simple and inexpensive operation the real estate value may be increased, the valuable life of the old house extended, the home made modern in appearance and comfort, mortgage financing protected, and the house made salable or given higher rental value.

Steeltex for Stucco used for remodeling and modernizing is nailed directly over the old exterior siding whether clapboards, shingles, or poorly constructed stucco, and then the cement stucco is applied in the usual manner.

The house is automatically blanketed against heat, cold, and dampness by the double-ply waterproof backing of Steeltex and a permanent "overcoat" of cement stucco correctly reinforced with a continuous network of galvanized steel wires buried effectively in the interior of the stucco overcoating.



An old house with clapboard siding before overcoating with J-M Steeltex for Stucco



The final result--a new and economical exterior of reinforced stucco

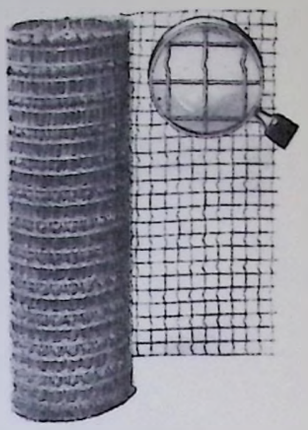
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J-M SELF-FURRING REINFORCEMENT C-214 AND C-216
WELDED WIRE REINFORCEMENT AA-1414 AND AA-1616

These styles of Johns-Manville Reinforcing are recommended for stucco reinforcement wherever the advantages of the Steeltex backing are not required.

Self-Furring Reinforcement C-214:



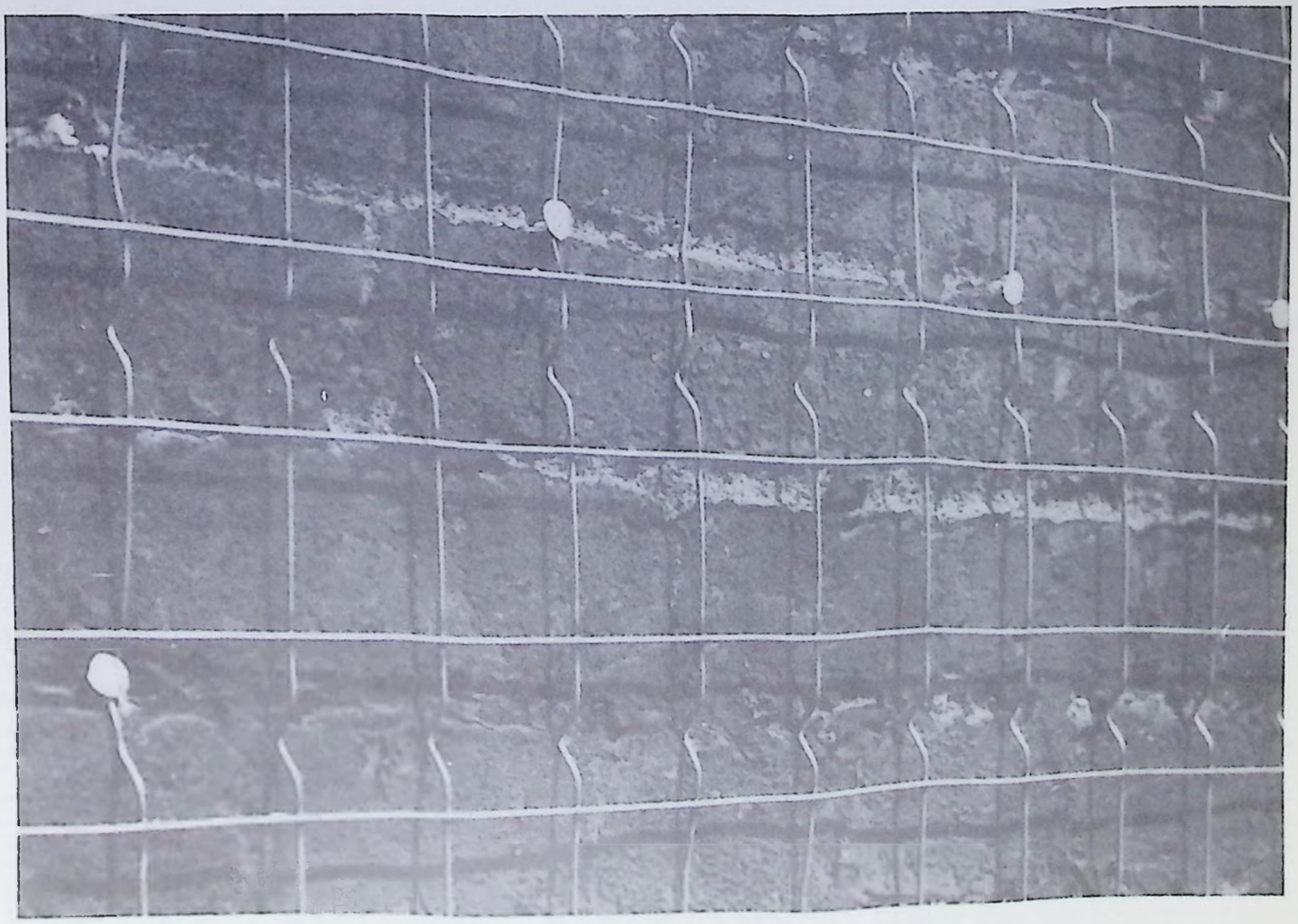
J-M Reinforcing, Style C-214

J-M Reinforcing, C-214, is an electrically welded galvanized copper-bearing steel wire reinforcing (2" x 2" mesh, 14-ga.), specially designed for the reinforcement of exterior stucco when applied over wood, insulating board or composition board sheathing. The material is crimped 3/8" which automatically assures embedment of the galvanized steel reinforcing mesh in the scratch coat of stucco. C-214 is also used for the reinforcing of stucco applied over brick or concrete.

C-214 is furnished in rolls of 50 sq. yd., measuring 48" by 112-1/2 ft.

Lathing Specification for C-214:

All exterior surfaces requiring stucco finish over wood sheathing, insulating board sheathing or composition board sheathing shall be covered with J-M Self-Furring Reinforcement C-214 (a 2" x 2", 14-ga. cold-drawn, electrically welded



C-214 Applied over Brick Masonry

JOHNS-MANVILLE Building Materials

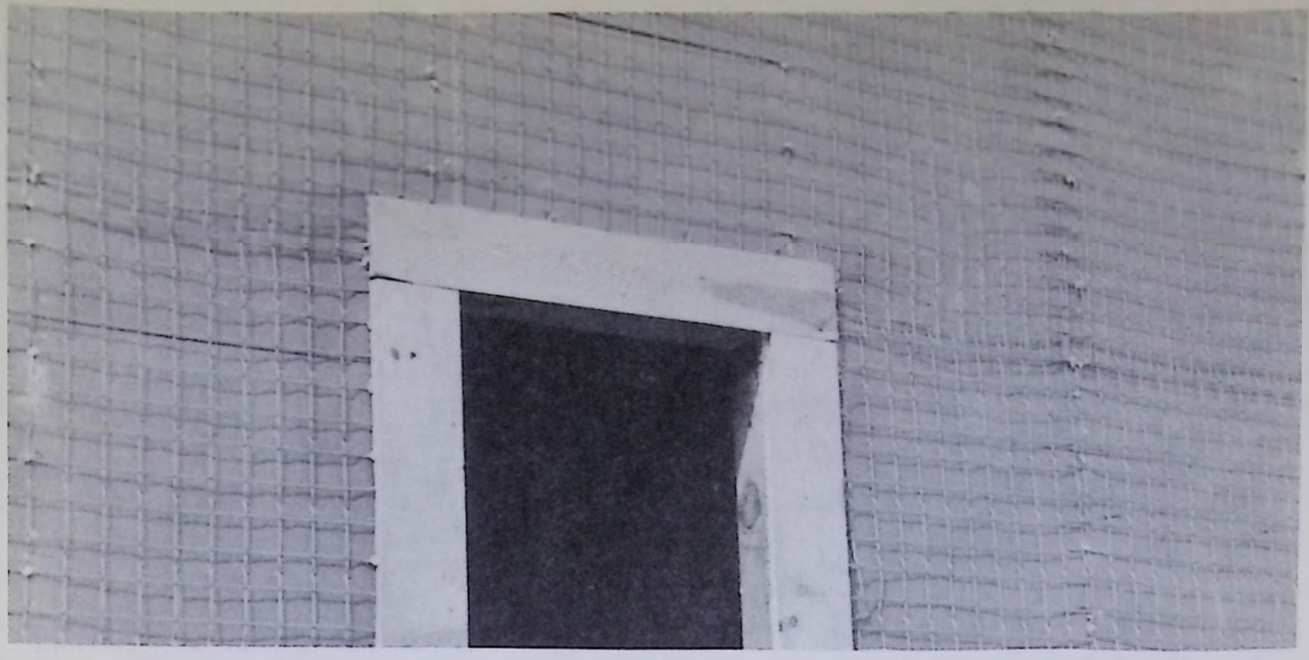
Self-Furring Reinforcement C-214 and C-216
Welded Wire Reinforcement AA-1414 and AA-1616

DATE September, 1938
(Cancelling sheet dated Dec., 1937)
BMM-120.3

TECHNICAL DATA SECTION

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C-214 Applied over Sheathing

galvanized wire mesh with 3/8" furring crimp). Before application of the reinforcement, wood sheathing shall be covered with an approved waterproof building paper or felt weighing not less than 15 lb. per 100 sq. ft. Such paper or felt shall be applied in weatherboard fashion, with each strip lapping the strip below and adjacent flashing at least 3". Where J-M Weathertite Sheathing or a similar material is used, the waterproof paper or felt may be omitted.

C-214 shall be secured over sheathing with either galvanized hook head nails (11-ga. by 1-1/2") or large-head galvanized roofing nails driven through the sheathing into the studs.

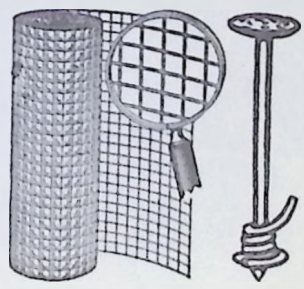
C-214 shall be nailed over every stud horizontally across the building and every 6" vertically on the studs. The first width shall be started at the sill line and extended around the building. The second width shall lap the first 1", shingle fashion. Vertical laps shall also be 1". C-214 shall be carried up to the opening or under the mouldings of all doors and windows. In no case shall vertical joints be joined at corners, under or over window or door openings, or shall the reinforcing be butted. In all cases, the stucco placed over C-214 shall be not less than 7/8" thick.

Self-Furring Reinforcement, C-216:

This reinforcing is identical in design and use to C-214 with the exception that C-216 is composed of 16-ga. galvanized wire and the self-furring crimp is 3/16" instead of 3/8". Furnished in same size rolls as C-214, 48" by 112-1/2 ft., 50 sq. yd.

Welded Wire Reinforcement AA-1414 and AA-1616:

Welded Wire Reinforcement AA-1414 and AA-1616 are identical to Self-Furring Reinforcement C-214 and C-216, respectively, except that they do not have the self-furring crimp. When used as stucco reinforcing these styles require the use of the Steeltex furring nail.



STEELTEX furring nails are recommended for application of AA-1414 and AA-1616.

AA-1414 is composed of 2" x 2" galvanized mesh of 14-ga. wire. AA-1616 is of the same 2" x 2" galvanized mesh but made of 16-ga. wire.

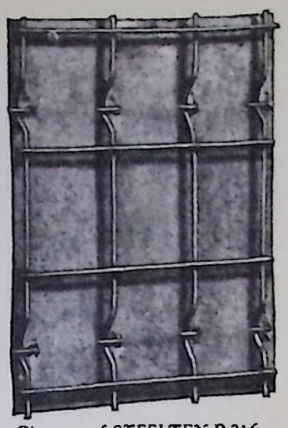
Both AA-1414 and AA-1616 are furnished in rolls of 50 sq. yd., measuring 48" by 112-1/2 ft.

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J-M STEELTEX P-216 FOR STUCCO

Steeltex P-216 is composed of a reinforcing mesh of galvanized, copper-bearing wire fabric (16-ga.) welded on 2" centers. This network is attached to a three-ply waterproof membrane backing by means of stitch wires which run across the width of the material between the layers of the backing. The reinforcing network is crimped to engage these stitch wires and to provide itself with automatic furring.



Close-up of STEELTEX P-216 showing self-furring crimps in reinforcing wires.

This style of reinforcing may be used for stucco construction in place of either Steeltex for Stucco or J-M Reinforcing, Style C-214 (Self-Furring). The difference between Steeltex P-216 and Steeltex for Stucco is that P-216 consists of 16-ga. wire instead of 14-ga. and is self-furring so that furring nails are not required in its application.

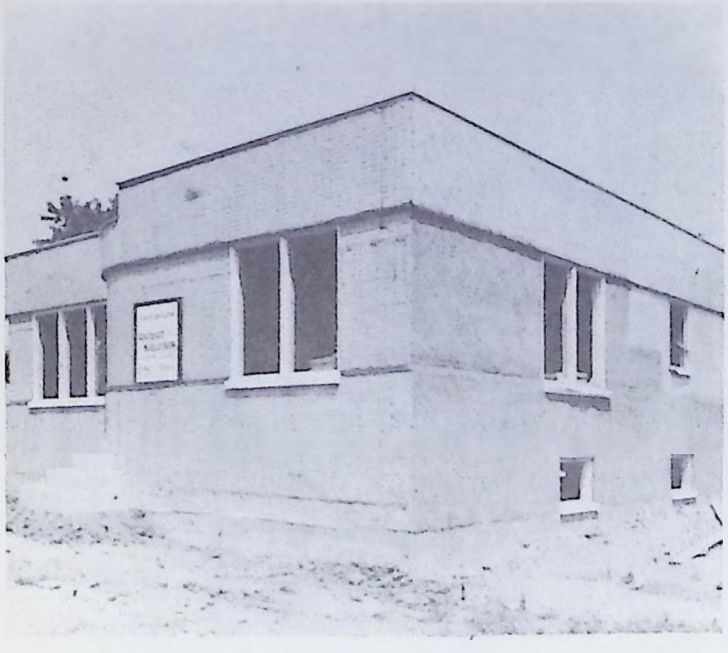
In application, Steeltex P-216 may be used either directly upon studs or over any type of exterior sheathing material whether it be wood, insulating board or composition board sheathing.

Steeltex P-216 is supplied in 50 sq. yd. rolls, measuring 49" by 110½ ft.

LATHING SPECIFICATION OVER WOOD FRAMING:

All exterior walls where specified and designated stucco shall be lathed with J-M Steeltex P-216, (2" x 2" mesh, 16-ga. cold-drawn, electrically-welded, galvanized, copper-bearing steel wire, self-furring fabric to which is secured a tough, double-layer fibrous backing with mastic filler between the layers).

Steeltex P-216 shall be applied direct to studs or sheathing, as the case may be, or over siding in case of "overcoating", and nailed to bearings. Steeltex P-216 shall be nailed every 16" horizontally and 6" vertically, and shall be toe-nailed at corner of mesh to stretch the fabric taut automatically. A galvanized nail shall be used; preferably of 11-ga. wire, 1½" long, with an offset head.



J-M Steeltex P-216 reinforcing ready for the application of stucco

The first width of Steeltex P-216 shall be started at the sill line and extend around the building. The second width shall lap the first 1" (shingle fashion), lapping wire to wire with no fibrous backing in between. Where vertical joints occur, the same method of lapping shall be employed.

J-M Steeltex P-216 shall be carried to the openings or under the moulding of all doors and windows. In no case shall vertical joints be joined at corners, under or over window or door openings, or between studs where applied direct to studs; and in no case shall Steeltex P-216 be butted nor shall the backing extend over the face of the wire mesh at joints. In all cases, the stucco placed over Steeltex P-216 shall be not less than 7/8" grounds.

JOHNS-MANVILLE Building Materials, Miscellaneous	DATE December, 1937 (Cancelling sheet dated April, 1937)
J-M Steeltex P-216 for Stucco	4-M-120.7 (BMM-120.7)

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LATERAL RESISTANCE TESTS ON STEELTEX WITH PORTLAND CEMENT STUCCO
COMPARISON OF STEELTEX AND NORTH CAROLINA PINE SHEATHING

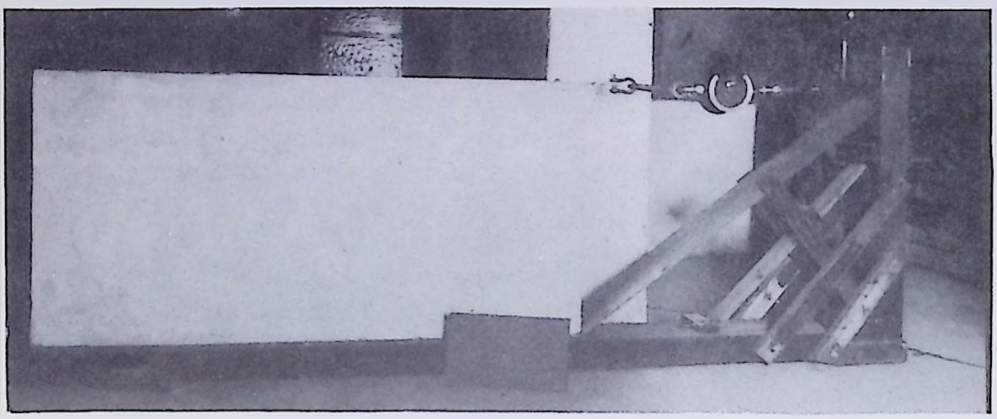
The report of these tests on the relative lateral resistance of rectangular timber frames was abstracted by Johns-Manville from Columbia University Testing Laboratories Report No. 1431, dated September 29, 1924.

Purpose of Tests:

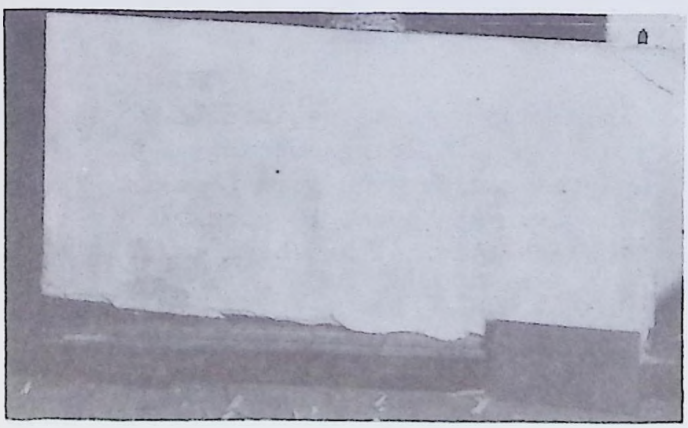
The tests were made for the purpose of determining the relative lateral resistance of rectangular timber frames covered on one side with portland cement stucco applied to Steeltex for Stucco, and North Carolina Pine Wood Sheathing applied both diagonally and horizontally.

Test Results:

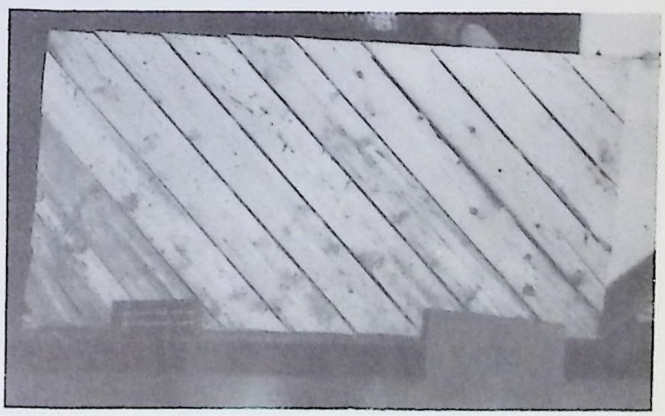
The following photographs illustrate the test results of portland cement stucco applied to Steeltex, and North Carolina Pine Wood Sheathing. In these tests the timber frames consisted of 2" x 4" spruce studding, on 16" centers, spiked to a 2" x 4" sill and plate. The frames were 4 ft. high and 8 ft. long. Although tests were made on both braced and unbraced frames, the following results are taken from the tests upon the unbraced type of framing.



Test frame with portland cement stucco on Steeltex, before test, and dynamometers for recording lateral load



Failure of frame shown above, due to a maximum lateral load of 8960 lb., resulting in a lateral deflection of 1.44 inches



Diagonal North Carolina pine sheathing. After a lateral load of 4275 lb. the horizontal displacement was 3.63 inches

Test Comparisons: (Continued on the reverse of this page.)

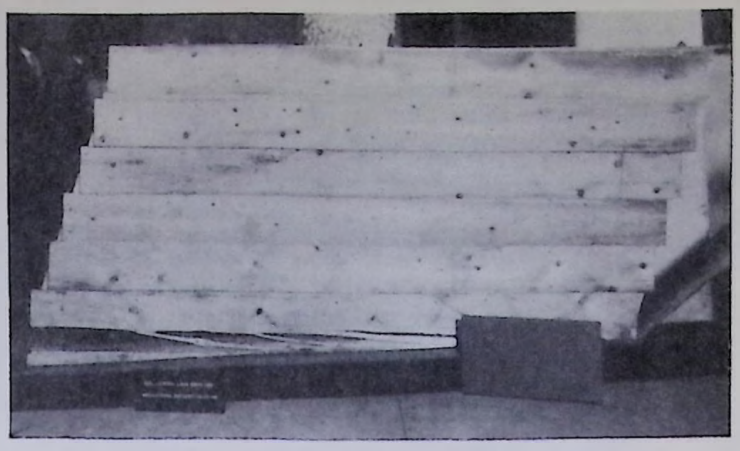
Slum Clearance Program: Specifications and Data on Various Building Materials (1938)
ACL Doc 21293 · Page 352 of 443
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Test Comparisons:

The foregoing tests demonstrate the great strength of portland cement stucco reinforced by the cold-drawn, galvanized steel wire of Steeltex.

Compared with diagonal sheathing the Steeltex-reinfored stucco slab carried more than twice the load with less than half the deflection.

In contrast with horizontal sheathing the load carried by the Steeltex slab was two and one-half times greater, and the deflection less than one-eighth.



Horizontal North Carolina pine wood sheathing. Conditions of panel after a lateral load of 3620 lb. had been applied. The horizontal displacement amounted to 12.27 in.

STEELTEX SUPERIORITY IN HURRICANE AND EARTHQUAKE ZONES

Once the structural strength of Steeltex construction had been demonstrated in laboratory experiments, proving that the structural principles were sound, it remained for the strongest forces of the natural elements to demonstrate its marked superiority for building purposes.

Following on this and subsequent pages, are excerpts of letters received from architects, engineers, contractors and dealers after the Florida storms of 1926, the Porto Rico hurricane of 1932, the New Zealand earthquake of 1931, and the Southern California earth tremor of 1933.

Mr. Rudolph P. Miller, New York - Building Code Authority - from an address April 28, 1927 entitled "The Florida Hurricane and its Effects on Buildings":

> "A material that interested me very much because of its satisfactory showing was --- (Steeltex) ---. Where used the buildings showed satisfactory resistance to the wind, and the dealers who were handling the material were very enthusiastic about it. As far as my observation went I found no case of a house in which such material had been used which had actually failed."

Mr. C. L. Clausells, Structural Engineer, San Juan, Porto Rico, from his letter of October 4, 1932:

> "I passed the hurricane in a concrete building with 8" concrete walls and there was a moment when I thought the whole structure was going to collapse on us. I expected to find the Steeltex buildings severely cracked and much to my surprise after carefully examining them noticed the amount of cracking to be almost negligible. Undoubtedly, the wire reinforcement adds a tremendous resistance to the structure."

The destructive effects of winds of hurricane force and of earthquakes upon various types of buildings are illustrated on following pages.

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Effects of Florida Storm of 1926 upon Steeltex Construction



This building was blown from its foundation. Steeltex-stucco walls show very few cracks and the corners held up well



This stucco home was not reinforced with Steeltex and the result was that the stucco material was broken loose from the exterior wall.



The Baptist Tabernacle at West Palm Beach, Florida, offered an example of the failure of tile and brick construction



Left - The West Palm Beach Yacht Club located near the bay had no protection from the wind, as evidenced by the torn roof and broken glass, yet the reinforced stucco remained structurally sound. Hundreds of Steeltex installations have similarly proved their superiority

Right - Ruins of the Telephone Exchange Building at Del Ray, Florida, showing the force of the storm. The first story was constructed of solid concrete blocks and the second story of clay tile with the exception of the rear wall. The second floor was completely demolished



JOHNS-MANVILLE Building Materials, Miscellaneous

DATE April, 1938

Steeltex Superiority in Hurricane and Earthquake Zones

BMM-121.1

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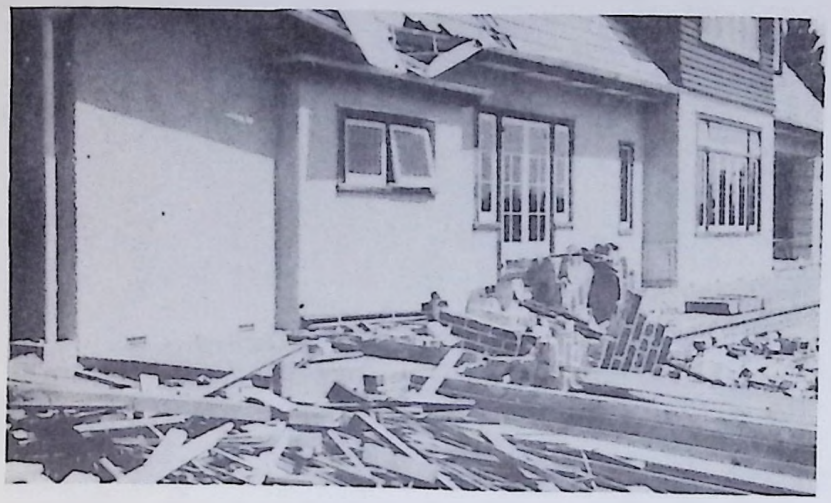
Effects of New Zealand Earthquake of 1931 upon Steeltex Construction

Mr. F. C. Pitsenbarger, Contractor, Huntington Park, California, from his letter of March 13, 1933:

> "Upon inspection of the houses I built seven years ago using --- (Steeltex) --- I found no damage, not even a crack, ... the tenants stated the houses moved as a solid mass through this earthquake. These houses were directly in the center of the quake where the greatest damage was done."

Mr. Wm. England of Winstone Ltd., Auckland, New Zealand, from his letter of May 29, 1931:

> "... but the walls of stucco, applied on Steeltex, came through without a fracture. Now this is astounding - nevertheless a fact. ... As a result of this experience, Philips, the architect for the Cotterell house, in writing his specifications for a large college in the Hasting district, specified 8000 yards of Steeltex for Exterior and also 18,000 yards of Steeltex for Plaster."



Left - The illustration shows the destructive force of the New Zealand earthquake of 1931. The Steeltex reinforced stucco came through without a fracture

Right - The New Zealand earthquake demonstrated that stucco, not properly reinforced, has practically no structural resistance



The use of J-M Steeltex for reinforcing plaster, stucco and brick or stone veneer serves the same purpose as the steel reinforcement of concrete.

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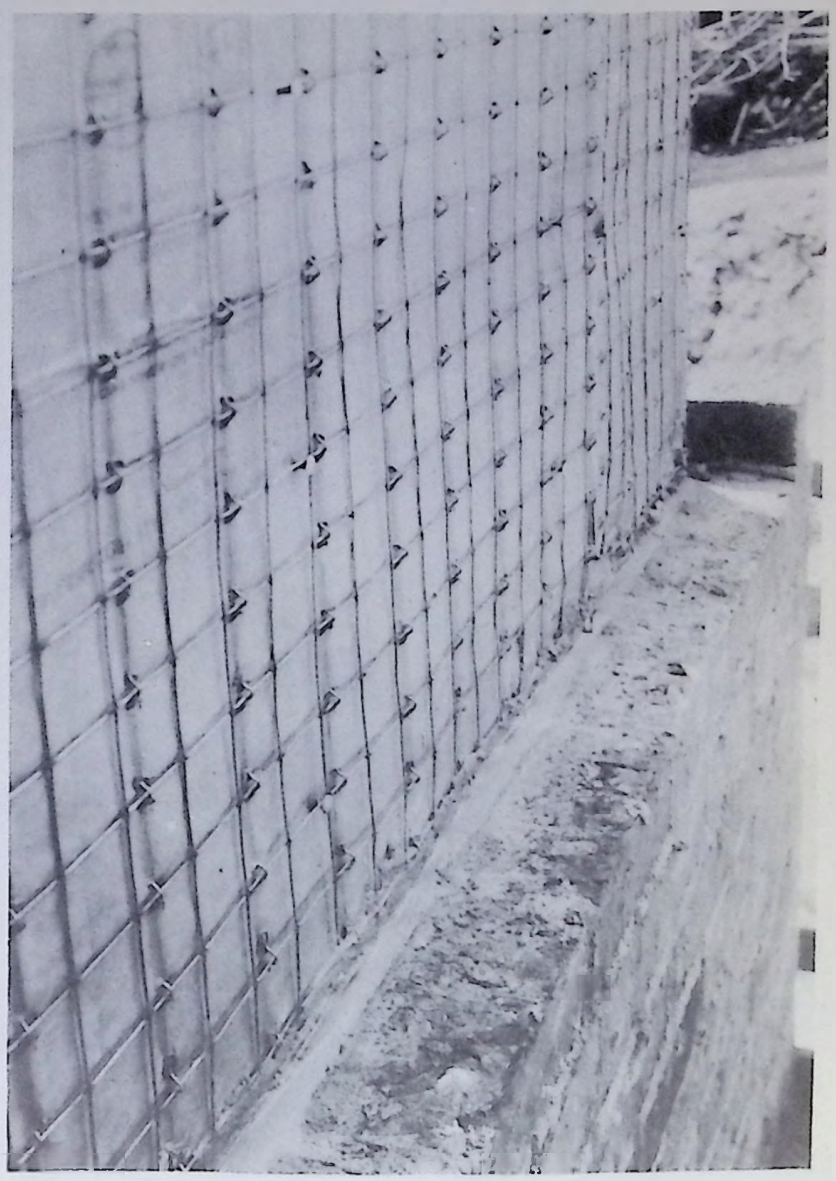
APPLICATION SPECIFICATIONS
J-M STEELTEX FOR BRICK OR STONE VENEER

STEELTEX SHEATHING OVER WOOD FRAMING:

All exterior walls for brick or stone veneering over wood framing shall be sheathed with Steeltex for Brick or Stone Veneer (38-16) (2" x 2" mesh, cold-drawn, electrically-welded, galvanized copper-bearing steel wire fabric, to which is secured a tough, double-layer, fibrous backing with a mastic filler between the layers).

The first width of Steeltex 38-16 sheathing shall be started at the sill line and extend around the building. The second width shall lap the first 1" (shingle fashion), lapping wire to wire with no fibrous backing in between. Where vertical joints occur, the same method of lapping shall be employed, with no fibrous backing in between.

Steeltex 38-16 shall be nailed with galvanized nails (preferably a 11 gauge, 1½" nail with an offset head) at every third wire, or on 6" centers to each stud and shall be securely nailed over every other wire, or on 4" centers, around all openings.



Application of brick veneer over J-M Steeltex

BRICK OR STONE VENEER:

All exterior walls of building where specified and designated brick or stone veneer shall be faced with one course of standard size approved brick or stone. The back of the brick or stone shall be laid 1" from the face of the studs or steel framing, and the space between the Steeltex 38-16 sheathing and the back of the brick or stone work shall be filled with cement mortar as each course is laid. The mortar shall be one part Portland cement, three parts clean, sharp sand, and 10 percent hydrated lime.

The brick or stone shall be laid in full beds of the same mortar with the vertical joints well filled and the back-up mortar well spaded in with the trowel, so as to assure bond of both brick or stone and Steeltex 38-16 sheathing. The class of brick or stone used, as well as the style of joint desired, shall be selected by the architect or owner.

JOHNS-MANVILLE Building Materials

Application Specifications
J-M Steeltex for Brick or Stone Veneer

DATE December, 1937
(Cancelling sheet dated April, 1937)
BMM-122

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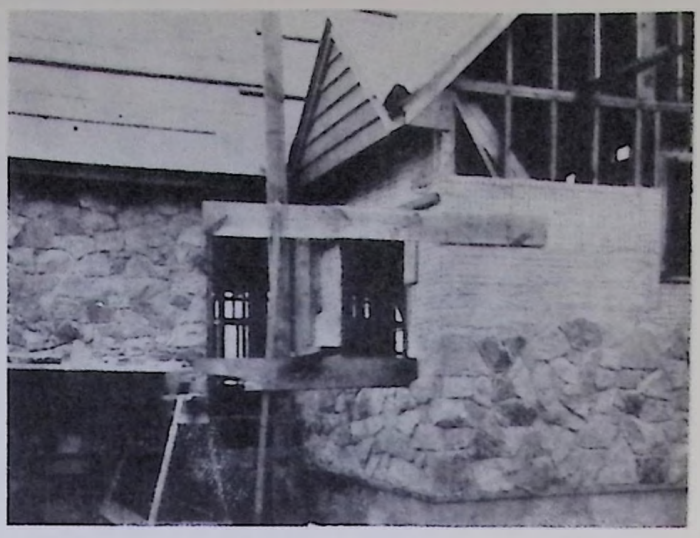
J-M Steeltex reinforcing for brick or stone veneer provides a stronger wall, eliminates the necessity for any other sheathing material, reduces the fire hazard by eliminating the 1" air space between the veneer and sheathing which acts as a flue in ordinary construction, and offers greater protection against the infiltration of air and penetration of moisture

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GENERAL APPLICATION OF J-M STEELTEX FOR BRICK OR STONE VENEER

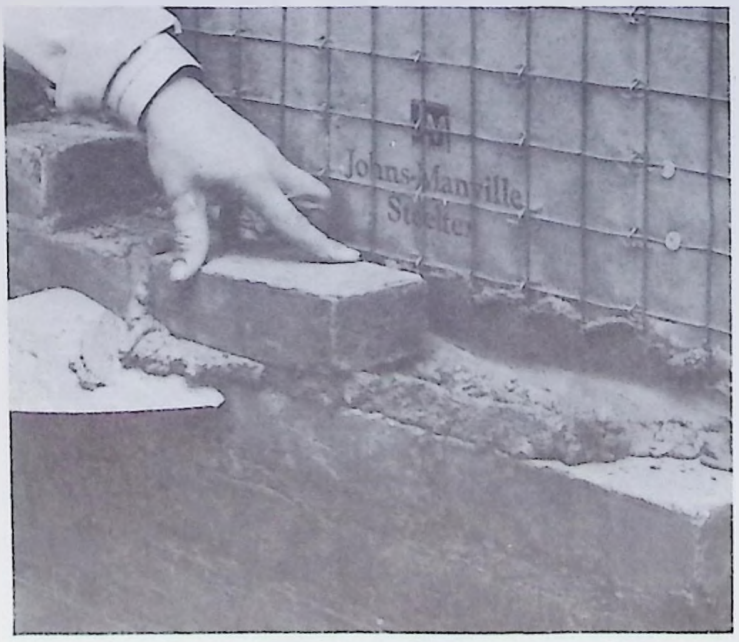
The Steeltex system of building a brick or stone veneer wall may be more accurately termed Reinforced Brick Construction or Reinforced Stone Construction. It does not involve a single change in building methods and is no more costly than the less satisfactory methods usually employed. In place of the usual method of tying the brick or stone to the framework by means of wall ties, the brick or stone are actually built into a reinforced cement slab and the whole is securely attached to and greatly strengthens the framework.



Stone veneer being applied over the J-M Steeltex Reinforcing

The Steeltex is wrapped about the building in place of sheathing lapping one width above another, shingle fashion. As each course of brick or stone is laid, the mortar is spaded in behind with the bricklayer's trowel to fill up the 1" space between the brick and the Steeltex. The mortar flows around the reinforcing wires of Steeltex, thoroughly bonding to them and to the brick or stone. The result is a monolithic wall of brick or stone and steel-reinforced cement, thoroughly sealed at the studs against moisture penetration and infiltration of air by the Steeltex membrane backing.

Detailed application is discussed on another data sheet entitled "Application Specifications, J-M Steeltex for Brick or Stone Veneer".

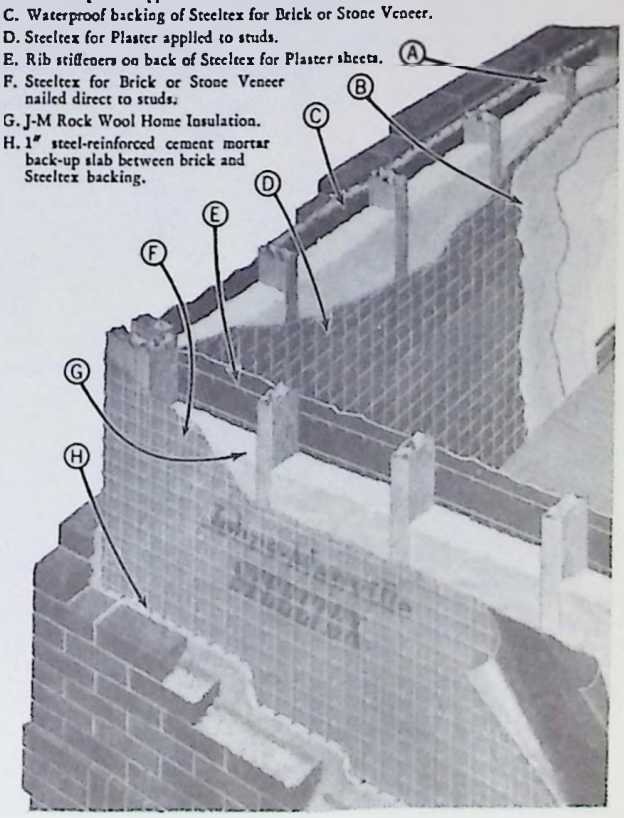


Typical application of J-M Steeltex reinforcing used for brick veneer construction

A Structural Wall that will endure

Here is an interesting example of how two Steeltex products—Steeltex for Brick or Stone Veneer and Steeltex for Plaster—supplemented by Johns-Manville Rock Wool Home Insulation between the studs, can be used to provide greater structural strength, comfort, fire-safety and water-tightness in modern home construction.

A. Wood studding, protected against fire on all four sides by J-M Rock Wool Insulation and steel-reinforced cement mortar and plaster.
B. Interior plaster applied over Steeltex for Plaster.
C. Waterproof backing of Steeltex for Brick or Stone Veneer.
D. Steeltex for Plaster applied to studs.
E. Rib stiffeners on back of Steeltex for Plaster sheets.
F. Steeltex for Brick or Stone Veneer nailed direct to studs.
G. J-M Rock Wool Home Insulation.
H. 1" steel-reinforced cement mortar back-up slab between brick and Steeltex backing.



JOHNS-MANVILLE Building Materials

General Application of J-M Steeltex for Brick or Stone Veneer

DATE December, 1937
(Cancelling BMM-123 and 123.1 dated in 1936 and 1937)
BMM-123

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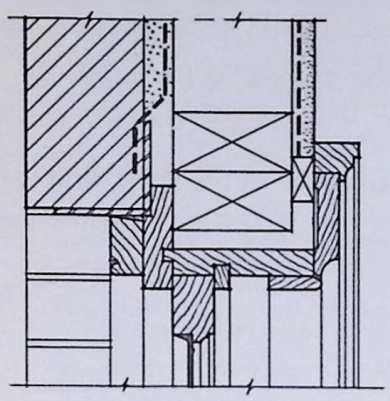
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WINDOW DETAILS--BRICK VENEER CONSTRUCTION
J-M STEELTEX FOR BRICK OR STONE VENEER

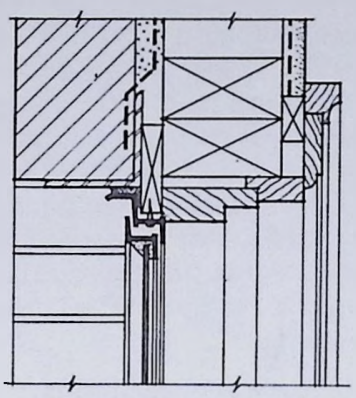
Although the details shown below are typical they are not intended to be restrictive for it is recognized that there may be many minor variations such as method of nailing the wood sill, use of box frame, use of steel casements with integral wood surround and use of an interior plaster return with steel casement.

Architects and builders will recognize these variations and that the fundamentals of the details remain unchanged and are in accordance with standard practice.

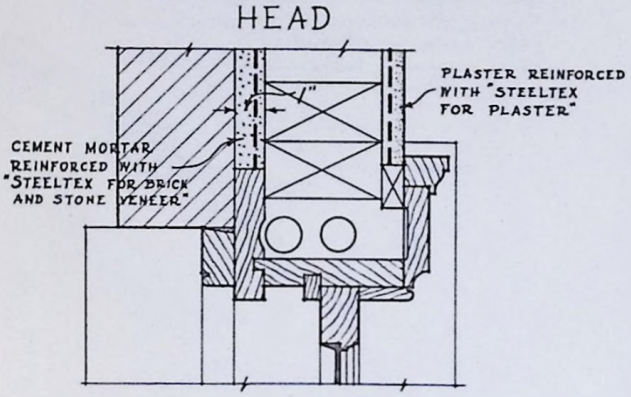
These details indicate two additional advantages to be gained through the use of Steeltex instead of ordinary sheathed construction: (1) Superior flashing and weather tightness at the window head and, (2) Improved air seal at the jambs and heads.



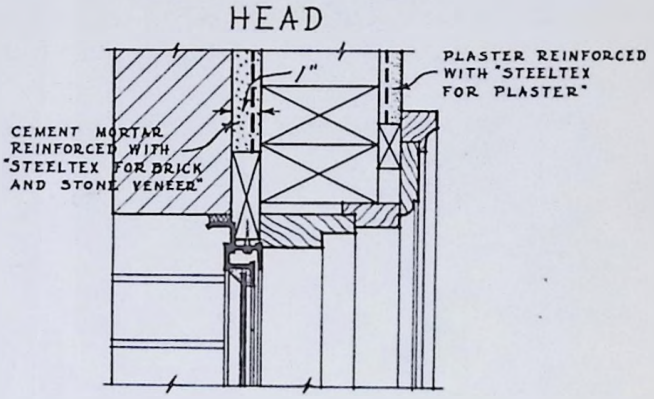
HEAD



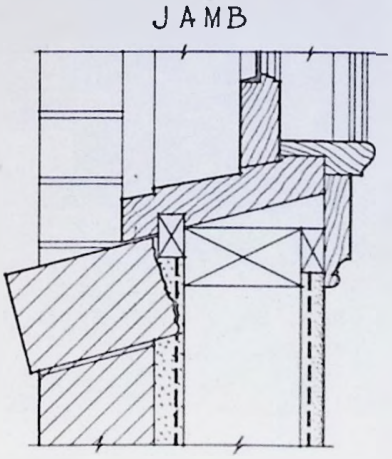
HEAD



JAMB

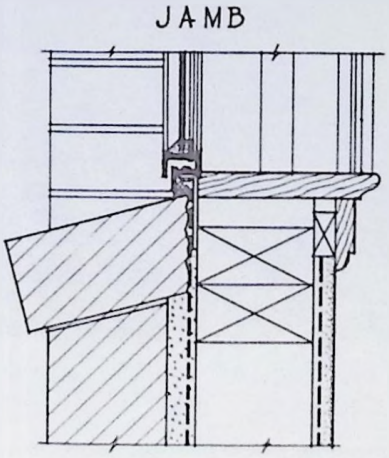


JAMB



SILL

SECTION THROUGH DOUBLE HUNG WINDOW



SILL

SECTION THROUGH STEEL CASEMENT WINDOW

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J-M STEELTEX FLOOR LATH

Specification for reinforcing concrete and gypsum floors and roofs over steel joists

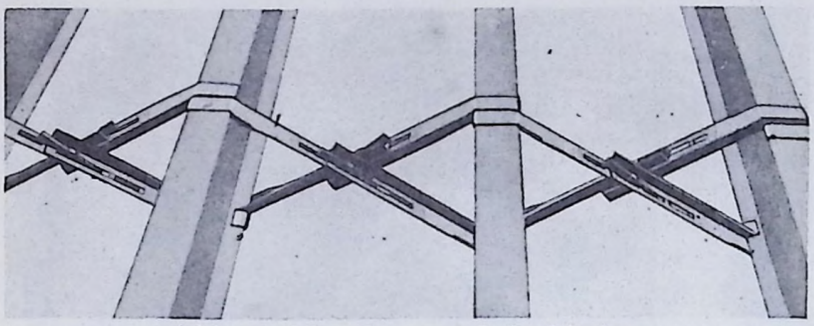
Before installing Steeltex Floor Lath, joists shall be rigidly bridged and end joists securely anchored in accordance with Steel Joist Institute specifications.

Steeltex Floor Lath (a 3" x 4" mesh, 12-ga. cold-drawn, electrically-welded, galvanized wire fabric, attached to a water-resistant backing) shall be unrolled across the joists to the desired length from the outer or bearing walls of the building, and shall be fastened every 12" along the end joist with special clips furnished with the Steeltex.

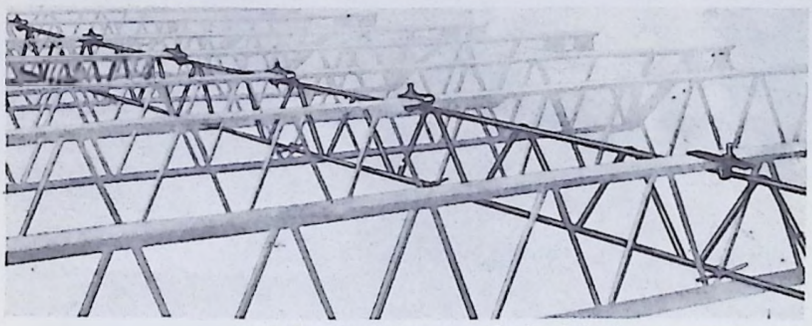
Steeltex Floor Lath shall be stretched taut longitudinally across the joists by a special stretcher, and clipped securely every 12" along the bearing to which the stretcher is attached. Steeltex Floor Lath shall then be clipped to each joist every 24" on joists spaced 16" and over, and one clip per width of roll for joist spacing under 16". Each clip shall face in the opposite direction from the clip adjacent to it.

Where end laps are necessary, Steeltex Floor Lath shall be lapped at least 1 ft. directly over a joist. Side laps shall be not less than 2".

BRIDGING STEEL JOISTS



Adjustable diagonal bridging

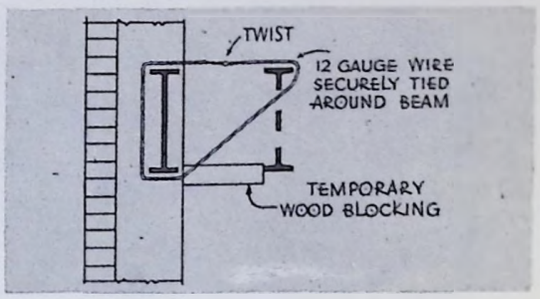


Adjustable horizontal bridging

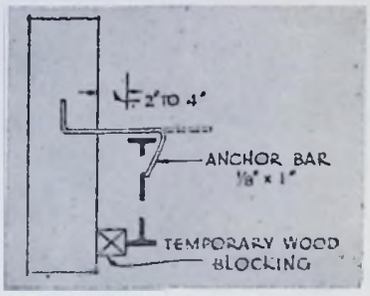


Diagonal bridging for definite joist spacing

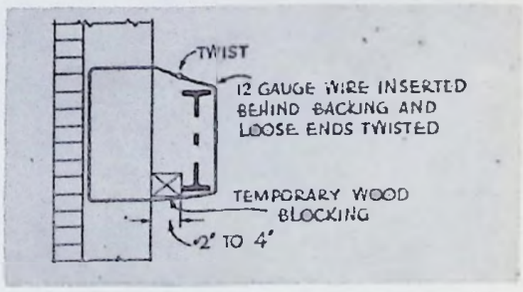
ANCHORING END JOIST



Steel frame, masonry curtain wall



Concrete or masonry wall



Another type for masonry wall

JOHNS-MANVILLE Building Materials	DATE October, 1938 (Cancelling sheet dated April, 1938)
J-M Steeltex Floor Lath Specification Bracing Details for Steel Joists and Steeltex Application	BMM-126

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APPLYING STEELTEX FLOOR LATH

Steeltex is unrolled over the joists and cut to length. It is then attached to an end or anchored joist, drawn taut by the stretching device at the opposite end joist, and fastened by clips to intermediate joists. See Figures numbered 1 to 5 inclusive.

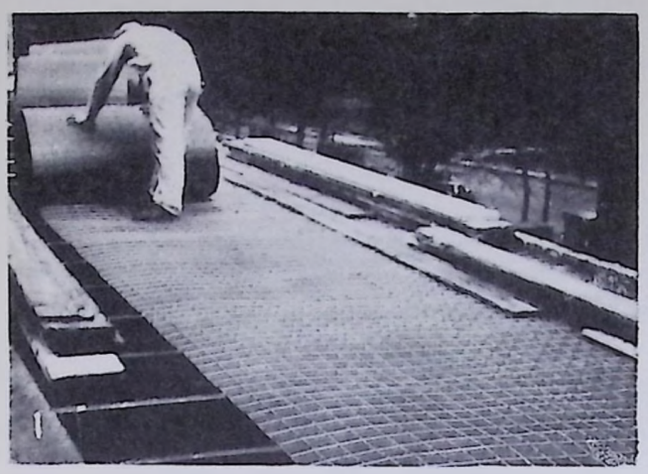


Fig. 1 - Unrolling Steeltex Floor Lath across the joists

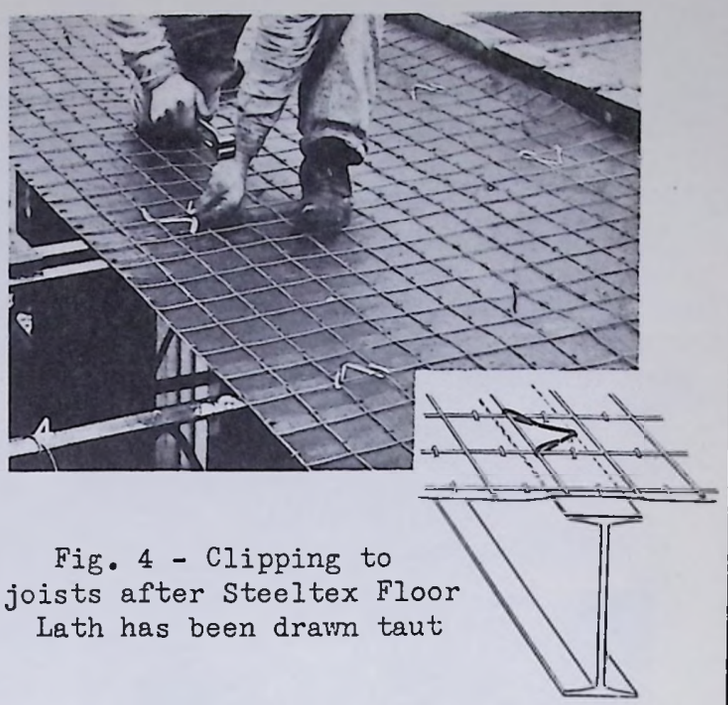


Fig. 4 - Clipping to joists after Steeltex Floor Lath has been drawn taut



Fig. 2 - Ratchet stretching device drawing Steeltex Floor Lath taut

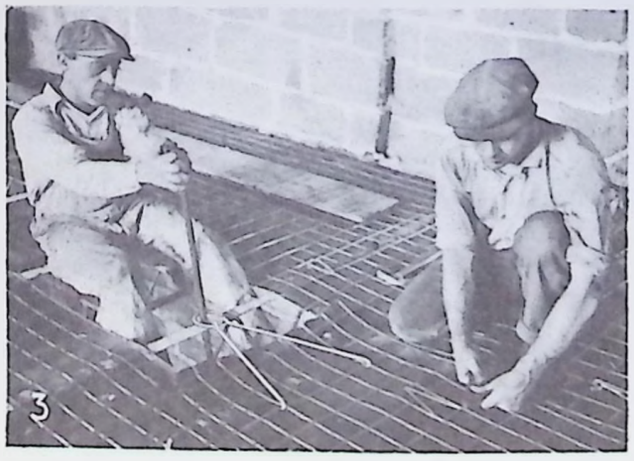


Fig. 3 - Ring stretcher which is recommended for short lengths of Steeltex Floor Lath

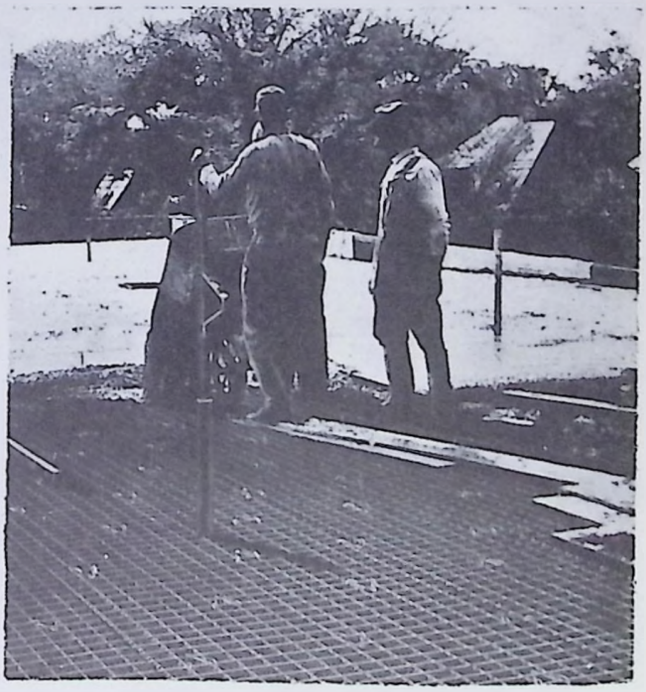


Fig. 5 - Concrete being poured over Steeltex Floor Lath

Concrete is poured at a rapid rate directly onto the Steeltex Floor Lath. The heavy corded backing assures against loss of concrete through droppings and permits slabs of designed strength. The galvanized wire reinforcing mesh is automatically embedded in the slab as the concrete is poured.

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Table of Safe Loads for Concrete Floor Slabs Using *STEELTEX* Floor Lath

Values in Table Are Total Safe Loads in Pounds per Sq. Ft. Uniformly Distributed, Including Slab

Span of Slab in Inches	2″ Slab Weight 25 lb. per sq. ft.	2½″ Slab Weight 31 lb. per sq. ft.	3″ Slab Weight 38 lb. per sq. ft.	3½″ Slab Weight 44 lb. per sq. ft.
18″	436	586	736	886
20″	353	475	597	718
22″	292	392	494	594
24″	245	330	415	499
26″	209	281	353	426
28″	180	242	305	366
30″	157	211	266	319
32″	139	186	234	281
34″	123	165	207	248
36″	109	146	184	222

NOTES

1. For partial continuity, i. e. $M = \frac{W1^2}{10}$ take 5/6 of loads in table.
2. For simply supported, i. e. $M = \frac{W1^2}{8}$ take 2/3 of loads in table.

For stress in steel other than 20,000, loads are directly proportional to stress, thus for 16,000, take 16/20 of load in table, for 18,000 take 18/20 of load in tables, etc.

CALCULATIONS

In computing the above table, the following commonly accepted theory of flexure as applied to the design of reinforced concrete slabs was used, based upon the following fundamental assumptions:

(a) Calculations are made with reference to working stresses and safe loads rather than with reference to ultimate strength and ultimate loads.

(b) A plane section before bending remains plane after bending, shearing distortions being neglected.

(c) The modulus of elasticity of concrete in compression is constant within the limits of working stresses, the distribution of compressive stress in beams therefore being rectilinear.

(d) In calculating the moment of resistance of reinforced concrete beams the tensile resistance of concrete is neglected.

(e) Bond between the concrete and steel reinforcement remains unbroken throughout the range of working stresses.

(f) Initial stress in the reinforcement due to contraction or expansion of the concrete is neglected.

The above table considers that type of slab classified as a beam of rectangular cross-section reinforced for tension only. Derivation of the various formulas used in the design of reinforced concrete slabs of this type involve the following notations, and standard practice the corresponding values given:

f_s = tensile unit stress in steel, 20,000 lbs. per sq. in.

f_c = compressive unit stress in concrete, not over 650 lbs. per sq. in.

$n = \frac{E_s}{E_c}$ = ratio of moduli of elasticity steel to concrete = 15

M = bending moment, or moment of resistance.

A_s = sectional area of steel. (For 12-inch width in slabs.) .035 square inches.

b = breadth of beam. (Taken as 12 inches in slabs.)

d = depth of beam to center of steel. Steel ½″ above bottom of slab.

k = ratio of depth of neutral axis to depth d.

j = ratio of lever arm of resisting couple to depth d.

$p = \frac{A_s}{bd}$ = steel ratio.

Based upon the foregoing assumptions, the common theory of flexure develops the following formulas:

Position of neutral axis,

$$k = \sqrt{2\,pn + (pn)^2} - pn \quad \ldots\ldots (1)$$

Arm of resisting couple,

$$j = 1 - \frac{k}{3} \quad \ldots\ldots (2)$$

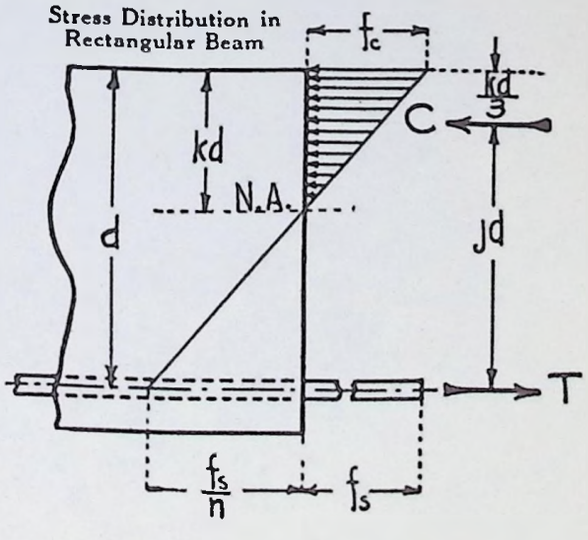
Compressive unit stress in extreme fiber of concrete,

$$f_c = \frac{2M}{jkbd^2} = \frac{2\,pf_s}{k} \quad \ldots\ldots (3)$$

Tensile unit stress in longitudinal reinforcement,

$$f_s = \frac{M}{A_s jd} = \frac{M}{pjbd^2} \quad \ldots\ldots (4)$$

Stress Distribution in Rectangular Beam



JOHNS-MANVILLE Building Materials	DATE April, 1935
Steeltex Floor Lath Table of Safe Loads	BMM-127

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STEELTEX FLOOR LATH COMPARATIVE TEST DATA

Tests were conducted by Mr. J. M. Daniels in the Materials Laboratory, Carnegie Institute of Technology. The following paragraphs are taken from Mr. Daniel's signed report.

Test Slabs:

Tests were made on two slabs, each measuring approximately 21" wide, 75" long, and 2" thick.

Reinforcing:

Two types of reinforcing were furnished for the test, 3/4" Rib Metal Lath, weighing 68 lb. per 100 sq. ft., and Steeltex Floor Lath.

In Steeltex Floor Lath, the longitudinal reinforcing was 12-ga. galvanized wire on 3-inch centers (cross-sectional area of wire, 0.035 sq. in. per ft. of fabric width), the transverse reinforcing 12-ga. galvanized wire on 4-inch centers (cross-sectional area of wire, 0.026 sq. in., per ft. of fabric width).

Concrete:

An arbitrary field mix of 1 : $1\frac{1}{2}$: $2\frac{1}{2}$ was selected and it was found that 1.65 cu. ft. of cement, 2.475 cu. ft. of sand and 4.125 cu. ft. of 1-inch gravel would make sufficient concrete for the two floor slabs and three standard 6" by 12" standard test cylinders.

After thorough mixing, slump tests were made, using material selected from three different parts of the mixed concrete, which gave the following slumps, respectively: 6 inches, $5\frac{1}{2}$ inches, and 6 inches. No record was kept of the volume of water used, the slump test being selected as an index of the workability of the concrete.

The two slabs and three standard 6" x 12" test cylinders were poured during the afternoon of Monday, May 9, 1927, and were immediately covered with tar paper and damp canvas which remained until the following morning, when all specimens and slabs were covered with damp sand and canvas and kept in a moist condition until the date of the test, Tuesday, May 24, 1927.

Wasted Material and Exposure of Metal:

Tar paper was placed under the slab forms to catch any material wasted or falling through the reinforcing. No material was wasted underneath the slab reinforced with Steeltex Floor Lath and all metal was thoroughly imbedded in the concrete. The slab in which the Rib Metal Lath was used had dimensions of $20\frac{3}{4}$" x $75\frac{1}{2}$" or 10.85 square feet of surface area. The material falling through this reinforcing when being poured weighed 21-7/8 lb., or a loss of material of approximately 2 lb. per sq. ft. of surface area. The rib lath was not imbedded in the concrete slab and the metal was fully exposed on the under side.

Tests:

(a) Floor Slabs: The two slabs were tested in the same manner under identical conditions. Two 4-inch rollers were placed on the bed of the testing machine and spaced on 24-inch centers. Plaster of paris was placed on the rollers and slabs placed on the bedment, the rollers supporting the slabs at their third points.

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Tests:

(a) Floor Slabs: (continued)

A third roller was placed on top of the slab at the center and bedded in plaster of paris, a load of 500 lb. being placed on the specimens until the bedments were firm.

By the use of these rollers and plaster of paris bedment, the slabs were supported and loaded over their entire width.

An Ame's dial reading directly to 0.001 of an inch was placed under the center of the slab and the load and corresponding deflections read as noted below.

3/4" Rib Metal Lath Slab:

Maximum load carried, supported as noted ..... 3,600 lb.
Deflection at center when maximum load was reached ... 0.220 inch

Steeltex Floor Lath Reinforced Slab:

Maximum load carried, supported as noted ..... 3,750 lb.
Deflection at center when maximum load was reached ... 0.060 inch.

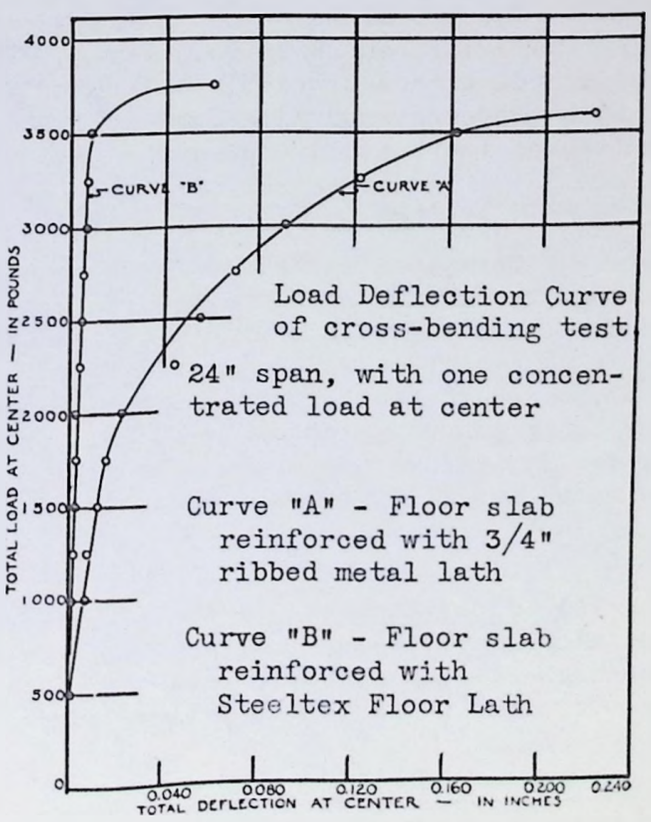
(b) Concrete Cylinders: The three cylinders were tested in accordance with standard laboratory practice, plaster of paris bedments and spherical bearings being used.

The average compressive strength of the concrete as based on three tests was 2,250 lb. per square inch.

All specimens were tested May 24, 1927, age 15 days.

Remarks:

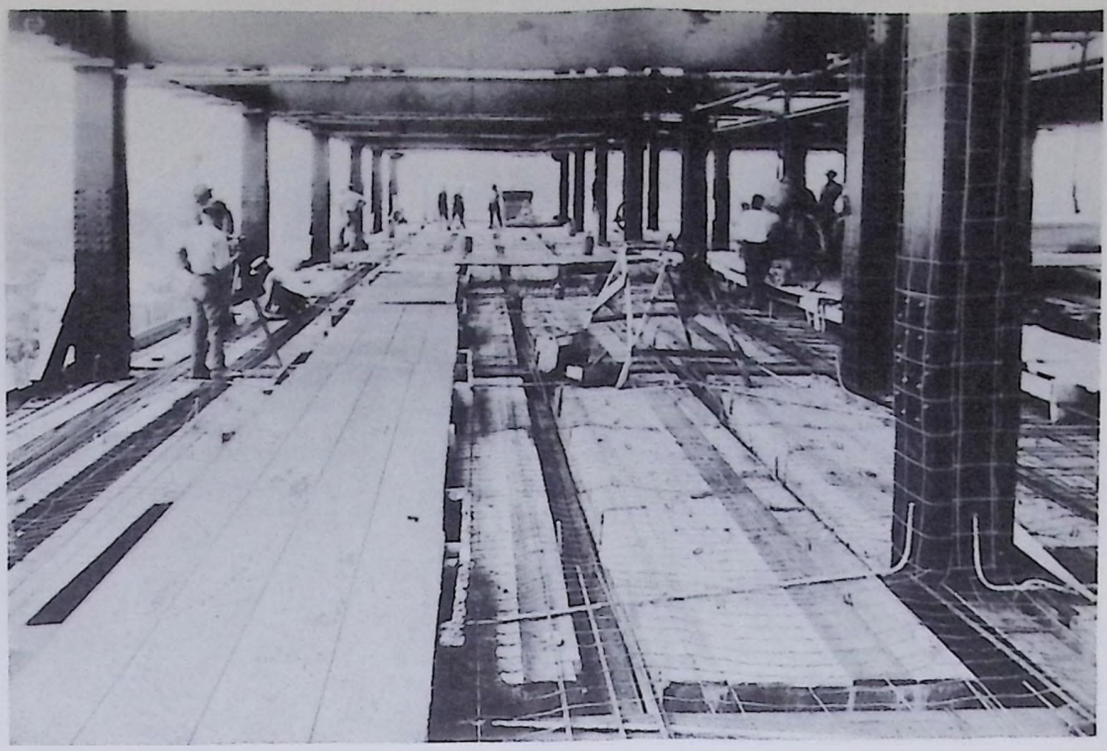
Although definite conclusions cannot be drawn from such a limited number of tests, due principally to the fact that concrete is not uniform, the outstanding difference in the two slabs tested was the increased stiffness of the slab reinforced with Steeltex Floor Lath, as shown on the curve. There was only 4.2% difference in the maximum center loads carried by the two slabs, the slab reinforced with Steeltex Floor Lath being the higher. A comparison of the material wasted has already been noted.



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J-M WELDED WIRE REINFORCEMENT FOR CONCRETE



The reinforcement in place, ready for pouring. Columns are wrapped in preparation for concrete fireproofing

J-M Welded Wire Reinforcement is essentially an electrically-welded wire fabric of square or rectangular mesh, furnished in various gauges and spacings of wires. The material is fabricated by automatic machines which accurately space and securely assemble the wires into fabric form by electrically welding each longitudinal and transverse member at their intersection. The fabric is manufactured from a special high-grade, cold-drawn steel wire, which may be furnished with either plain or galvanized finish. The wire of which the fabric is made has high tensile strength together with elastic and ductile properties of such a character as to render it especially suitable for the reinforcement of concrete.

J-M Welded Wire Reinforcement is furnished in a wide variety of gauges and spacings, either in rolls or sheets, and is susceptible to a wide range of sectional-area requirements. It is adapted for use as a reinforcment in all classes of poured concrete construction or cement gun work.

Styles of J-M Welded Wire Reinforcement kept in stock are cut with "close overhang", that is, the transverse wires are cut almost flush with the outside longitudinal wires. A special over-hang may sometimes be required: For example, a 1" over-hang on one side and a 2" over-hang on the other. The over-hang is measured from the center of the outside longitudinal wire. When other than a "close over-hang" is desired, complete information must be given as to the over-hang required on each side.

All orders for J-M Welded Wire Reinforcement should give the following necessary information: Gauge and spacing of both longitudinal and transverse wires (Style number); length of roll or sheet; center to center width of roll or sheet; and should specify either plain or galvanized finish. (When finish is not specified, plain material will be shipped.) The uses of this reinforcement and details of dimensions, areas and weights are discussed on the reverse of this sheet and following data sheets.

JOHNS-MANVILLE Building Materials, Miscellaneous	DATE August, 1937 (Cancelling sheet dated April, 1935)
J-M Welded Wire Reinforcement for Concrete	(BMM-145)

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USES OF J-M WELDED WIRE REINFORCEMENT

Among the many uses of J-M Welded Wire Reinforcement may be listed the reinforcing of roads, streets, sidewalks, driveways, runways, floors, roofs, canals, concrete pipe, gunite, and all concrete construction where it is necessary or desirable to avoid the numerous disadvantages common to non-reinforcement.

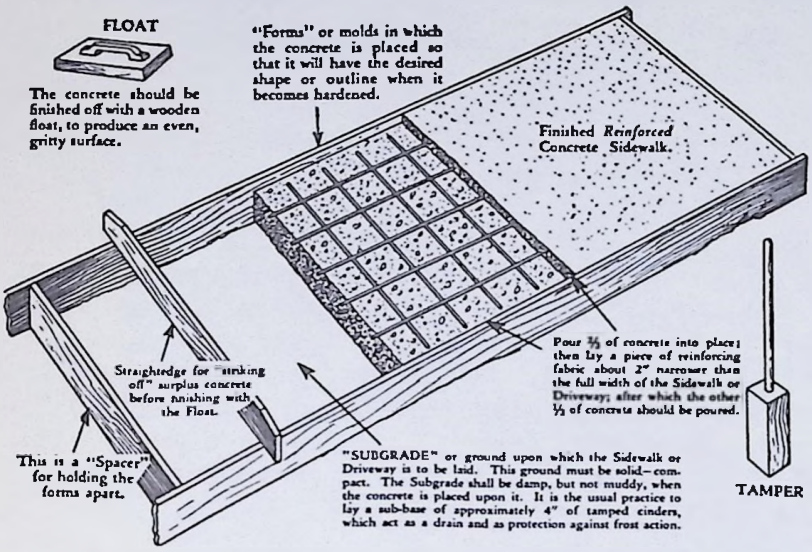
Concrete reinforced with J-M Welded Wire Reinforcement is protected against contraction and expansion, spalling and other factors such as vibration and the settlement of the ground under concrete flooring.

Typical of the many gauges and spacings of the reinforcements are Styles CC-1010 and CC-66.

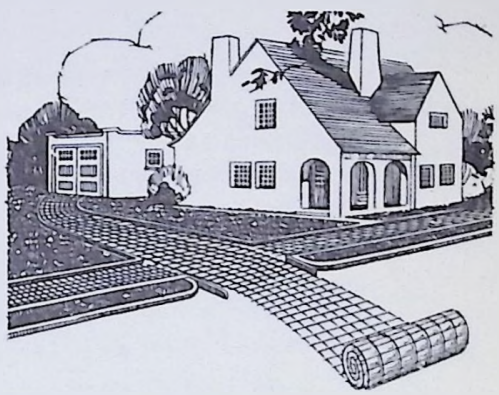
CC-1010 (6" x 6" mesh, 10 ga.) is widely used to reinforce sidewalks, basement floors, porch floors and residential garage floors.

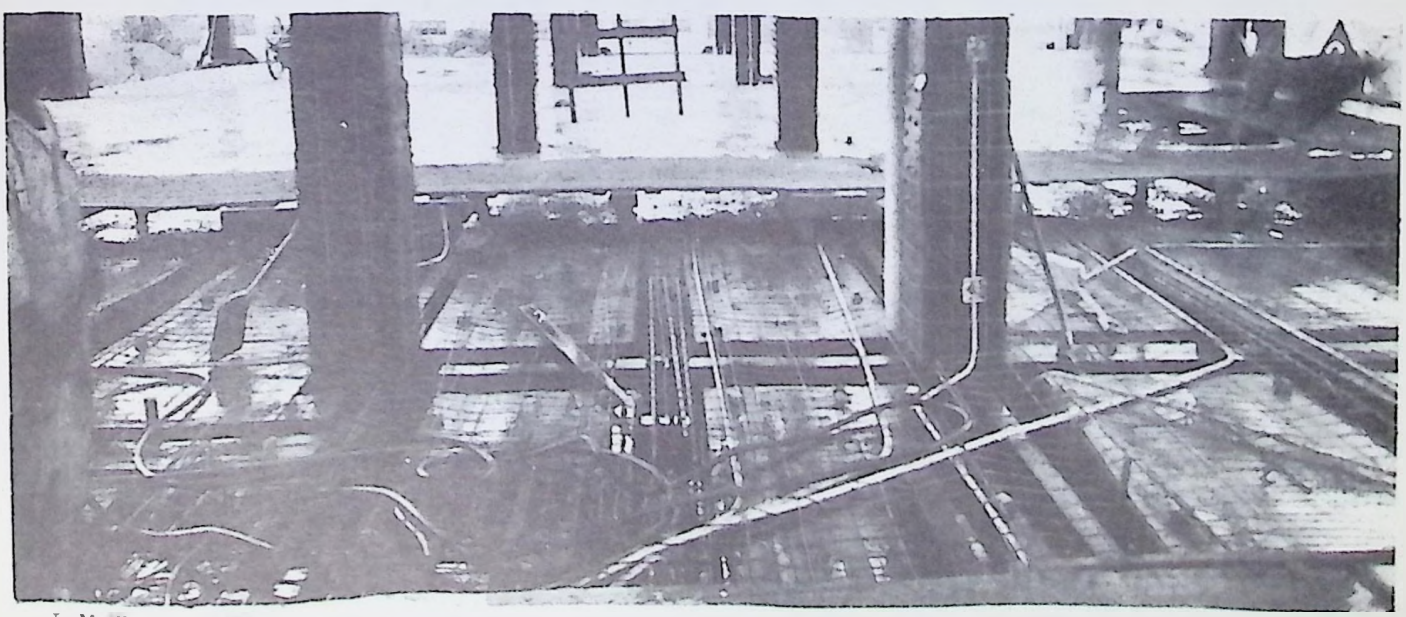
CC-66 (6" x 6" mesh, 6 ga.) is a heavier reinforcement recommended for public parking stations, filling stations, driveways, warehouse floors and similar construction subject to greater stress, vibration and wear than concrete work for which CC-1010 is suitable.

See following data sheets for complete list and details of J-M Welded Wire Reinforcements.



Method of laying concrete sidewalks and driveways using J-M Welded Wire Reinforcement





J-M Welded Wire Reinforcement provides an unbroken continuity of reinforcement, high tensile strength combined with proper ductile qualities and accurate, permanent spacing of steel wire members

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J-M WELDED WIRE REINFORCEMENT

Dimensions, Areas and Weights

Suitable Uses	Style	Spacing		Gauge of Wire		Sec. Area Sq. In. per Lin. Ft.		Weight per 100 Sq. Ft.
		Long.	Tran.	Long.	Tran.	Long.	Tran.	
Gunite, Composition Flooring, Fireproofing, Etc.	AA 1414	2″	2″	14	14	.030	.030	21
	AA 1212	2″	2″	12	12	.052	.052	37
	TT 1414	3″	3″	14	14	.020	.020	14
	TT 1212	3″	3″	12	12	.035	.035	25
	TT 1010	3″	3″	10	10	.057	.057	41
	BB 1414	4″	4″	14	14	.015	.015	11
	BB 1313	4″	4″	13	13	.020	.020	14
	BB 1212	4″	4″	12	12	.026	.026	19
	BB 1010	4″	4″	10	10	.043	.043	31
Gunite, Canal Lining, Etc.	BB 88	4″	4″	8	8	.062	.062	44
	BB 66	4″	4″	6	6	.087	.087	62
	BB 44	4″	4″	4	4	.120	.120	85
Sidewalks, Temperature Reinforcing, Ground Floors, Etc.	CC 1212	6″	6″	12	12	.017	.017	13
	CC 1010	6″	6″	10	10	.029	.029	21
	CC 99	6″	6″	9	9	.035	.035	25
	CC 88	6″	6″	8	8	.041	.041	30
	CC 77	6″	6″	7	7	.049	.049	36
	CC 66	6″	6″	6	6	.058	.058	42
Slab Reinforcing, Etc. (One direction only)	AH 711	2″	16″	7	11	.148	.008	55
	AH 610	2″	16″	6	10	.174	.011	65
	AH 510	2″	16″	5	10	.202	.011	75
	AH 49	2″	16″	4	9	.239	.013	89
	AH 38	2″	16″	3	8	.280	.015	104
	TH 711	3″	16″	7	11	.098	.009	38
	TH 610	3″	16″	6	10	.116	.011	45
	TH 510	3″	16″	5	10	.135	.011	52
	TH 49	3″	16″	4	9	.160	.013	61
	TH 38	3″	16″	3	8	.187	.015	72
	TH 28	3″	16″	2	8	.217	.015	83
	TH 17	3″	16″	1	7	.252	.018	96
	TH 06	3″	16″	0	6	.295	.022	113
	BH 711	4″	16″	7	11	.074	.008	30
	BH 610	4″	16″	6	10	.087	.011	35
	BH 510	4″	16″	5	10	.101	.011	40
	BH 49	4″	16″	4	9	.120	.013	48
	BH 38	4″	16″	3	8	.140	.015	56
	BH 28	4″	16″	2	8	.162	.015	64
Beam Wrapping, Fireproofing, Etc.	BD 1313	4″	8″	13	13	.020	.010	11
	BD 1214	4″	8″	12	14	.026	.008	12
	BD 1212	4″	8″	12	12	.026	.013	14
	BD 1112	4″	8″	11	12	.034	.013	17
	BD 1012	4″	8″	10	12	.043	.013	20
Concrete Pipe, Etc.	BD 912	4″	8″	9	12	.052	.013	23
	BD 812	4″	8″	8	12	.062	.013	27
	BD 711	4″	8″	7	11	.074	.017	33
Slab Reinforcing, Driveways, Etc.	BF 1012	4″	12″	10	12	.043	.009	19
	BF 912	4″	12″	9	12	.052	.009	22
	BF 812	4″	12″	8	12	.062	.009	26
	BF 711	4″	12″	7	11	.074	.011	31
	BF 610	4″	12″	6	10	.087	.014	37
	BF 510	4″	12″	5	10	.101	.014	42
	BF 49	4″	12″	4	9	.120	.017	50

Weight in Pounds per 100 Sq. Ft. of Longitudinal Wires

Gauge of Wires	Pounds per Foot	Center to Center Spacing of Longitudinal Wires in Ins.						
		2″	3″	4″	5″	6″	10″	12″
6-0	.5681	352.22	238.60	181.79	147.71	124.98	79.53	68.17
5-0	.4943	306.47	207.61	158.18	128.52	108.75	69.20	59.32
4-0	.4136	256.43	173.71	132.35	107.54	90.99	57.90	49.63
3-0	.3505	217.31	147.21	112.16	91.13	77.11	49.07	42.06
2-0	.2922	181.16	122.72	93.50	75.97	64.28	40.91	35.06
0	.2506	155.37	105.25	80.19	65.16	55.13	35.08	30.07
1	.2136	132.43	89.71	68.35	55.54	46.99	29.90	25.63
2	.1838	113.96	77.20	58.82	47.79	40.44	25.73	22.06
3	.1584	98.21	66.53	50.69	41.18	34.85	22.18	19.01
4	.1354	83.95	56.87	43.33	35.20	29.79	18.96	16.25
5	.1143	70.87	48.01	36.58	29.72	25.15	16.00	13.72
6	.09832	60.96	41.29	31.46	25.56	21.63	13.76	11.80
7	.08356	51.81	35.10	26.74	21.73	18.38	11.70	10.03
8	.07000	43.40	29.40	22.40	18.20	15.40	9.80	8.40
9	.05866	36.37	24.64	18.77	15.25	12.91	8.21	7.04
10	.04861	30.14	20.42	15.56	12.64	10.69	6.81	5.83
11	.03873	24.01	16.27	12.39	10.07	8.52	5.42	4.65
12	.02969	18.41	12.47	9.50	7.72	6.53	4.16	3.56
13	.02233	13.84	9.38	7.15	5.81	4.91	3.13	2.68
14	.01707	10.58	7.17	5.46	4.44	3.76	2.39	2.05
15	.01385	8.58	5.80	4.43	3.60	3.04	1.94	1.66
16	.01043	6.48	4.38	3.34	2.72	2.30	1.46	1.25

Weight in Pounds per 100 Sq. Ft. of Transverse Wires

Gauge of Wires	Pounds per Foot	Center to Center Spacing of Transverse Wires in Ins.						
		2″	3″	4″	6″	8″	12″	16″
0	.2506	155.37	103.58	77.69	51.79	38.84	25.89	19.42
1	.2136	132.43	88.29	66.22	44.14	33.11	22.07	16.55
2	.1838	113.96	75.97	56.98	37.98	28.49	18.99	14.24
3	.1584	98.21	65.47	49.10	32.74	24.55	16.37	12.28
4	.1354	83.95	55.97	41.97	27.98	20.99	13.99	10.49
5	.1143	70.87	47.24	35.43	23.61	17.72	11.81	8.86
6	.09832	50.96	40.64	30.48	20.32	15.24	10.16	7.62
7	.08356	51.81	34.54	25.90	17.27	12.95	8.63	6.48
8	.07000	43.40	28.93	21.70	14.47	10.85	7.23	5.43
9	.05866	36.37	24.25	18.18	12.12	9.09	6.06	4.55
10	.04861	30.14	20.09	15.07	10.05	7.53	5.02	3.77
11	.03873	24.01	16.01	12.01	8.00	6.00	4.00	3.00
12	.02969	18.41	12.27	9.20	6.13	4.60	3.07	2.30
13	.02233	13.84	9.23	6.92	4.61	3.46	2.31	1.73
14	.01707	10.58	7.06	5.29	3.53	2.65	1.76	1.32
15	.01385	8.58	5.70	4.28	2.86	2.15	1.43	1.08
16	.01043	6.48	4.30	3.24	2.15	1.62	1.08	.81

EXAMPLE: Weight per 100 square feet of 6 inches by 12 inches fabric with longitudinal wires No. 0, transverse wires No. 6. Add to weight of longitudinal wire No. 0 spaced 6 inches (55.13 lbs.), the weight of transverse wire No. 6 12 inches (10.16 lbs.) making total of 65.29 lbs. per 100 square feet. Take commercial weight to nearest Pound, or 65 lbs.

TABLE FOR COMPUTING CROSS-SECTIONAL AREA

AREA IN SQUARE INCHES PER FOOT OF WIDTH FOR VARIOUS SPACING OF WIRES

WIRE			CENTER TO CENTER SPACING												
Gauge W & M*	Diameter Inches	Area Sq. Ins.	2″	3″	4″	5″	6″	7″	8″	9″	10″	12″	14″	16″	18″
6-0	.4615	.16728	1.004	.669	.502	.402	.335	.287	.251	.223	.201	.167	.143	.125	.112
5-0	.4305	.14556	.874	.582	.437	.349	.291	.250	.218	.194	.175	.146	.125	.109	.097
4-0	.3938	.12180	.731	.487	.365	.292	.244	.209	.183	.162	.146	.122	.104	.091	.081
3-0	.3625	.10321	.618	.413	.310	.248	.206	.177	.155	.138	.124	.103	.088	.077	.069
2-0	.3310	.08605	.516	.344	.258	.207	.172	.148	.129	.115	.103	.086	.074	.065	.057
0	.3065	.07378	.443	.295	.221	.177	.148	.126	.111	.099	.089	.074	.063	.056	.049
1	.2830	.06290	.377	.252	.189	.151	.126	.107	.094	.084	.075	.063	.054	.047	.041
2	.2625	.05411	.325	.217	.162	.130	.108	.093	.081	.072	.065	.054	.047	.041	.036
3	.2437	.04664	.280	.187	.140	.112	.093	.080	.070	.062	.056	.047	.040	.035	.031
4	.2253	.03986	.239	.160	.120	.096	.080	.068	.059	.053	.048	.040	.034	.030	.026
5	.2070	.03365	.202	.135	.101	.081	.067	.058	.050	.045	.040	.034	.029	.025	.022
6	.1920	.02895	.174	.116	.087	.069	.058	.050	.043	.039	.035	.029	.025	.022	.019
7	.1770	.02460	.148	.098	.074	.059	.049	.042	.037	.033	.030	.025	.021	.018	.016
7½	.1695	.02256	.135	.090	.068	.054	.045	.039	.034	.030	.027	.023	.019	.017	.015
8	.1620	.02061	.124	.082	.062	.049	.041	.035	.031	.027	.025	.021	.018	.015	.014
9	.1483	.01727	.104	.069	.052	.041	.035	.029	.026	.023	.021	.017	.015	.013	.011
9½	.1416	.01575	.095	.063	.047	.038	.032	.027	.024	.021	.019	.016	.014	.012	.010
10	.1350	.01431	.086	.057	.043	.034	.029	.025	.021	.019	.017	.014	.012	.011	.009
11	.1205	.01140	.068	.045	.034	.027	.023	.019	.017	.015	.014	.011	.009	.008	.007
11½	.1130	.01002	.060	.040	.030	.024	.020	.017	.015	.013	.012	.010	.009	.008	.007
12	.1055	.00874	.052	.035	.026	.021	.017	.015	.013	.012	.010	.009	.007	.006	.006
12½	.0985	.00762	.046	.030	.023	.018	.015	.013	.011	.010	.009	.007	.007	.006	.005
13	.0915	.00657	.040	.027	.020	.016	.013	.011	.010	.009	.008	.006	.006	.005	.004
14	.0800	.00502	.030	.020	.015	.012	.010	.009	.008	.007	.006	.005	.004	.004	.003
15	.0720	.00401	.024	.016	.012	.010	.008	.007	.006	.005	.005	.004	.004	.003	.003
16	.0625	.00307	.018	.012	.009	.007	.006	.005	.005	.004	.004	.003	.003	.002	.002

Washburn & Moen

Tensile Strength: Wire used in all fabric will develop 70,000 pounds per square inch.

Widths: (ROLLS or SHEETS). For 4″ spacing of longitudinal wires, maximum width is 112″ and is measured from center to center of outside longitudinal wires. For 3″ and 6″ spacing of longitudinal wires, maximum width is 60″, with 138″ possible in some styles and is measured from center to center of outside longitudinal wires. All transverse wires will have close overhang (½″ or less) unless otherwise specified.

Lengths: ROLLS—Stock lengths 100′ to 300′ depending on style. Customer may specify length of rolls on orders not shipped from stock.
SHEETS—No extra for sheets 8′ or over. Length of sheets to be specified by customer.

Finish: PLAIN or GALVANIZED as specified (plain fabric will be shipped on all unspecified orders)

Note: The "Style" letter and numerals refer respectively to the spacing of wires and to the gauge of wires; for instance, "BD" means 4″ spacing of longitudinal wires and 8″ spacing of transverse wires, and "1112" means No. 11 gauge longitudinal wires and No. 12 gauge transverse wires.

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JOHNS-MANVILLE Building Materials, Miscellaneous

J-M Welded Wire Reinforcement
Sizes, Sectional Areas and Weights

DATE April, 1933
(Cancelling BMM-145.1 and 145.2 dated in in 1937 and 1936)
(BMM-149)

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TECHNICAL DATA SECTION

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J-M WELDED WIRE REINFORCEMENT
SIZES, SECTIONAL AREAS AND WEIGHTS

Style Numbers	Spacing Long.	Spacing Trans.	Wire Gauge No. Long.	Wire Gauge No. Trans.	Sectional Area sq.in.per lin.ft. Long.	Sectional Area sq.in.per lin.ft. Trans.	Wt.per 100 sq.ft.,lb.
*AA-1616	2"	2"	16	16	.018	.018	13
*AA-1414	"	"	14	14	.030	.030	21
*AA-1313	"	"	13	13	.040	.040	28
*AA-1212	"	"	12	12	.052	.052	37
AA-1111	"	"	11	11	.068	.068	48
AA-1010	"	"	10	10	.086	.086	60
*AB-1414	2"	4"	14	14	.030	.015	16
*AB-1314	"	"	13	14	.040	.015	19
*AB-1212	"	"	12	12	.052	.026	28
AF-38	2"	12"	3	8	.280	.021	105
AF-06	"	"	0	6	.445	.029	166
AH-812	2"	16"	8	12	.124	.006	46
AH-711	"	"	7	11	.148	.008	55
AH-610	"	"	6	10	.174	.011	65
AH-510	"	"	5	10	.202	.011	75
AH-49	"	"	4	9	.239	.013	89
AH-38	"	"	3	8	.280	.015	104
AH-28	"	"	2	8	.325	.015	119
AH-17	"	"	1	7	.377	.018	139
*TT-1414	3"	3"	14	14	.020	.020	14
*TT-1212	"	"	12	12	.035	.035	25
TT-1111	"	"	11	11	.045	.045	32
TT-1010	"	"	10	10	.057	.057	41
TT-99	"	"	9	9	.069	.069	49
TT-88	"	"	8	8	.082	.082	58
TH-812	3"	16"	8	12	.082	.006	32
TH-711	"	"	7	11	.098	.008	38
TH-610	"	"	6	10	.116	.011	45
TH-510	"	"	5	10	.135	.011	52
TH-49	"	"	4	9	.160	.013	61
TH-38	"	"	3	8	.187	.015	72
TH-28	"	"	2	8	.217	.015	83
TH-17	"	"	1	7	.252	.018	96
TH-06	"	"	0	6	.295	.022	113
*BB-1414	4"	4"	14	14	.015	.015	11
*BB-1313	"	"	13	13	.020	.020	14
*BB-1212	"	"	12	12	.026	.026	19
BB-1010	"	"	10	10	.043	.043	31
BB-88	"	"	8	8	.062	.062	44
BB-77	"	"	7	7	.074	.074	53
BB-66	"	"	6	6	.087	.087	62
BB-44	"	"	4	4	.120	.120	85
*BD-1313	4"	8"	13	13	.020	.010	11
*BD-1212	"	"	12	12	.026	.013	14
*BD-1112	"	"	11	12	.034	.013	17
BD-1012	"	"	10	12	.043	.013	20
BD-912	"	"	9	12	.052	.013	23
BD-812	"	"	8	12	.062	.013	27
BD-711	"	"	7	11	.074	.017	33
*BF-1212	4"	12"	12	12	.026	.009	13
*BF-1112	"	"	11	12	.034	.009	16
BF-1012	"	"	10	12	.043	.009	19
BF-912	4"	12"	9	12	.052	.009	22
BF-812	"	"	8	12	.062	.009	26
BF-711	"	"	7	11	.074	.011	31
BF-610	"	"	6	10	.087	.014	37
BF-67	"	"	6	7	.087	.025	40
BF-510	"	"	5	10	.101	.014	42
BF-57	"	"	5	7	.101	.025	45
BF-49	"	"	4	9	.120	.017	49
BH-711	4"	16"	7	11	.074	.008	30
BH-610	"	"	6	10	.087	.011	35
BH-510	"	"	5	10	.101	.011	40
BH-49	"	"	4	9	.120	.013	48
BH-38	"	"	3	8	.140	.015	56
BH-28	"	"	2	8	.162	.015	64
*CC-1212	6"	6"	12	12	.017	.017	13
CC-1010	"	"	10	10	.029	.029	21
CC-99	"	"	9	9	.035	.035	25
CC-88	"	"	8	8	.041	.041	30
CC-77	"	"	7	7	.049	.049	36
CC-66	"	"	6	6	.058	.058	42
CC-55	"	"	5	5	.067	.067	49
CC-44	"	"	4	4	.080	.080	58
CC-33	"	"	3	3	.093	.093	68
CC-22	"	"	2	2	.108	.108	78
CC-11	"	"	1	1	.126	.126	91
CC-00	"	"	0	0	.148	.148	107
CC-46	"	"	4	6	.080	.058	50
CF-77	6"	12"	7	7	.049	.025	27
CF-66	"	"	6	6	.058	.029	32
CF-55	"	"	5	5	.067	.034	37
CF-44	"	"	4	4	.080	.040	44
CF-33	"	"	3	3	.093	.047	51
CF-25	"	"	2	5	.108	.034	52
CF-17	"	"	1	7	.126	.025	56
CF-22	"	"	2	2	.108	.054	59
CF-14	"	"	1	4	.126	.040	61
CF-06	"	"	0	6	.148	.029	65
CF-11	"	"	1	1	.126	.063	69
CF-03	"	"	0	3	.148	.047	72
CF-005	"	"	00	5	.172	.034	76
CF-00	"	"	0	0	.148	.074	81
CF-002	"	"	00	2	.172	.054	83
CF-001	"	"	00	1	.172	.063	86
CF-0004	"	"	000	4	.206	.040	91
CF-0001	"	"	000	1	.206	.063	99
DD-33	8"	8"	3	3	.070	.070	51
FF-005	12"	12"	00	5	.086	.034	47
FF-002	"	"	00	2	.086	.054	53
FF-0004	"	"	000	4	.103	.040	56
FF-001	"	"	00	1	.086	.063	57
FF-0001	"	"	000	1	.103	.063	64

* These Styles Furnished Galvanized Only

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LATHING CEILING AND SIDE WALLS OVER WOOD FRAMING

All interior walls, partitions and ceilings where specified and designated plaster shall be lathed with a welded wire fabric consisting of a 2 x 2, 16 gauge, cold-drawn, electrically welded, galvanized, copper-bearing, steel wire, self-furring, to which a tough fibrous backing is secured by means of a 26 gauge V-shaped stiffening rib on not more than 5" centers, or attached by 18 gauge galvanized stitch wires on not more than 2" centers, with stiffening members formed in the fabric on not more than 5" centers.

The backing shall be so designed and attached to the metal as not to interfere with an overlapping of adjacent sheets of at least 1". There should be a margin of at least 3/4" of metal without backing along one longitudinal side of the sheet and a margin of at least 1/2" metal without backing along the two short sides of the sheet.

The lath shall be attached to both ceilings and sidewalls by nailing into each joist or stud at every rib with not less than 1" penetration of the nail into the wood members. The nail shall not be less than 12 gauge.

Joints shall be staggered so that four corners of adjacent sheets shall not occur at any one place.

Lathing of ceilings shall start at a corner, bending the first and all succeeding sheets to the ceiling angle to make a drop or apron down the sidewalls, measuring at least 4".

Sidewalls shall be lathed from ceiling down so that all horizontal laps are made over the upper sheets.

The lath shall be bent around all corners in such a manner as to prevent joints at the juncture of walls.

When wood framing abuts masonry at ceiling line on sidewalls, the lath shall be butted into the corners and corner reinforcing applied.

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SUSPENDED CEILINGS

Plastered ceilings suspended from (Flat slab) (Arches) (Pan System), etc. as indicated on drawings shall be furred or suspended with metal furring members.

HANGERS: Hangers shall be placed not to exceed 4' center to center in either direction. The minimum size for hangers shall be #8 galvanized wire, 1 x 3/16" flats or 7/32" round mild steel rods.

The upper ends of hangers, of wire, or rods or flats shall be long enough to wrap around beams or to provide a suitable anchorage in the concrete or tile. Where steel beams or purlins are not more than 4' center to center, hangers may be attached directly to them.

When hangers are hung from concrete beam or arches the hangers shall be placed before the concrete is poured. When the hangers are hung from terra cotta floors they shall be installed at tile joints during erection or may be installed after the tile is in place, holes bored through the tile and secured on the upper side by a toggle bolt or steel rod.

RUNNER CHANNEL: Runner channels shall be placed not to exceed 4 ft. centers, and shall be not less than 1-1/2", weighing not less than 442 pounds, per 1000 lineal feet. When wire hangers are used runner channels shall be securely tied to the lower end of the hanger wires by at least three twists. The lower end of rod hangers shall be secured to the runner channels by at least two twists, or by wiring them. When flat hangers are used the runner channel shall be bolted with 3/8" diameter bolts with flat sides of runner channel bolted to the flats.

FURRING CHANNEL: Furring channels shall be not less than 3/4" with a minimum weight of 276 lbs. per 1000 lin. ft. and shall be manufactured with double prongs of 12-1/2 gauge galvanized wires welded to the channels at points not over 6" apart and extending 1-1/2" beyond the bottom flange of each channel. The prongs shall be so arranged that when the welded fabric lath is applied, the prongs will puncture the backing and then be bent flat over the reinforcing wires of the lath. Wire prongs shall be not less than .09 inch in diameter - channels shall be spaced not more than 16" on centers. Channels shall be erected at right angles to Runner Channels and shall be securely saddle tied to them by at least 3 strands of #16 gauge galvanized annealed wire at each crossing or by #9 wire clips.

LATH: Lath shall be welded wire fabric, consisting of a 2" x 2" - 16 gauge cold drawn electrically welded galvanized copper bearing steel wire, self-furring fabric, to which a tough absorbent fibrous backing is secured by means of a 26 gauge "V" shaped stiffening rib on not more than 5" centers, or attached by 18 gauge galvanized stitch wires on not more than 2" centers, with stiffening members formed in fabric on not more than 5" centers. Backing shall be so designed and attached to the metal as not to interfere with an overlapping of adjacent sheets of at least 1". There shall be a margin of at least 3/4" of metal without backing along one longitudinal side of the sheet, and a margin of at least 1/2" metal without backing along the two short sides of the sheets.

Lath shall be secured to 3/4" furring channels by pushing the lath against the prongs so that they puncture the backing. When the Lath rests firmly against the 3/4" channels, bend the prongs over the reinforcing wires of the lath by pressing the ends in firmly.

Joints shall be staggered so that four corners of adjacent sheets shall not occur at any one place. Laps shall be made on channels only, and not between, and shall be 1". Side laps shall be 1/2". Lath shall be bent at all angles to brick or masonry walls with selvage edges of sheets nailed into joints of brick or concrete, or lath shall be butted into corners and corner reinforcing applied.

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APPLICATION OF CEILING LATH ON STEEL JOIST CONSTRUCTION

Ceilings under steel joists where specified and designated plaster, shall be lathed with a welded wire paper back lath, consisting of a 2" x 2" - 16 gauge, cold drawn electrically welded galvanized copper bearing steel wire, self-furring fabric, to which a tough absorbent fibrous backing is secured by means of a 26 gauge "V" shaped stiffening rib on not more than 5" centers, or attached by 18 gauge galvanized stitch wires on not more than 2" centers, with stiffening members formed in fabric on not more than 5" centers. Backing shall be so designed and attached to the metal as not to interfere with an overlapping of adjacent sheets of at least 1". There shall be a margin of at least 3/4" of metal without backing along one longitudinal side of the sheet, and a margin of at least 1/2" metal without backing along the two short sides of the sheets.

Lath shall be attached to steel joists with "V" shaped attachment bars or 3/4" channels. (19 gauge attachment bars where spacing of joists is less than 24" centers, 16 gauge attachment bars where spacing is 24" to 36" centers and 3/4" channels where spacing is over 36" centers.) Attachment bars or channels to have 12-1/2 gauge galvanized annealed double wire prongs welded on not over 6" centers.

Attachment bars or channels shall be placed at right angles to the steel joists and attached to the flanges of rolled section joists with clips which hook over the flange of the beam and to the bottom chord of bar joists by tying with a double strand of 14 gauge galvanized annealed wire. In all cases, attachment bars or channels shall be spaced not over 16" centers, and so arranged that joints of the lath shall be made over the attachment bar or channels and not between.

Lath shall be applied with ribs at right angles to the attachment bars or channels, starting at the corner of the ceiling and bending to the first sheet at the ceiling angle to provide a drop or apron down sidewall of at least 4". Lath shall be secured to the attachment bars or channels by pushing the lath firmly against the attachment bars or channels, bending the prongs over the reinforcing wires of the lath and pressing the ends in firmly. Joints shall be staggered so that the four corners of adjacent sheets shall not occur at any one place. End laps shall be made over attachment bars or channels only, and not between, and shall be 1" - side laps shall be 1/2". Lath shall be bent at all angles to brick or masonry walls with selvage edges of sheets nailed into joints of brick or concrete, or lath shall be butted into corners and corner reinforcing applied.

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FOUR INCH HOLLOW PARTITIONS

4" Hollow Partitions shall be constructed with 2½" studs (steel studs fabricated by joining together two 3/4" cold rolled channels with a minimum over all weight of 276 pounds per M lineal feet for each channel and welding 12½ gauge galvanized wire across the legs at not over 6" intervals, the wires extending at least 1¼" from the channels on each side and the studs having an over all width of 2½"). Studs shall be spaced on 16" centers for partitions in height up to, and including, 9'; on 12" centers for partitions in height from 9' and up to, and including, 12'; on 8" centers for partitions in height from 12' and up to, and including, 18'. All partitions shall be permanently braced with 3/4" channels placed horizontally within the partition and securely wire tied at every intersection with the studs. When the partition is 9' or less in height two lines of horizontal bracing channel shall be used at distances of 3' and 5' from the floor line. When the partition is from 9' and up to and including 12' in height three lines of horizontal bracing channel shall be used at 3', 5' and 7' from the floor line. When the partition exceeds 12' in height locate horizontal bracing channel at distances of 3', 5', 7' and 10' from the floor with additional braces at 3' intervals to within 3' of the ceiling line.

The 2½" studs shall be secured to the floor and ceiling bearings by track channels, nailing, ceiling and floor brackets, or holes cut in the concrete or in the ceilings, or some other such practise.

Lath shall be welded wire fabric, consisting of a 2" x 2" - 16 gauge, cold drawn electrically welded galvanized copper-bearing steel wire, self-furring fabric, to which a tough absorbent fibrous backing is secured by means of a 26 gauge "V" shaped stiffening rib on not more than 5" centers, or attached by 18 gauge galvanized stitch wires on not more than 2" centers, with stiffening members formed in fabric on not more than 5" centers. Backing shall be so designed and attached to the metal as not to interfere with an overlapping of adjacent sheets of at least 1". There shall be a margin of at least 3/4" of metal without backing along one longitudinal side of the sheet, and a margin of at least 1/2" metal without backing along the two short sides of the sheets.

After the partition studs have been erected plumb and true, lath shall be applied on both sides of the studs, by starting at the ceiling and working down to the floor so that all horizontal laps shall take place over the top sheet. The ribs of the lath shall be at right angles to the studs.

Lath shall be attached to the studs by pushing the lath against the prongs so that they puncture the backing, and when the lath rests firmly against the studs, bending the prongs over the reinforcing wires of the lath and pressing the ends in firmly. Joints shall be staggered so that four corners of adjacent sheets shall not occur at any one place. End laps shall be 1/2". Lath shall be bent at right angles to brick or masonry walls with selvage edge of sheets nailed into joints of brick or concrete, or lath shall be butted into corner and corner reinforcing applied.

Or equal as approved by Architect.

NOTE: For partitions larger than 4", (up to 8" partitions) the above specification applies, and thickness of partition is obtained by wider spacing of channels.

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FURRED WALLS

Where so indicated on drawings, exterior walls shall be furred with 3/4" cold rolled channels, with minimum weight of 276# per M lin. ft., with double prongs of 12-1/2 gauge galvanized wire welded on points of not over 6" centers. Furring shall be secured to floors and ceilings in a substantial manner. Channels shall be substantially secured to walls, provide rigid framing at all openings, channels shall be spaced on not over 16" centers.

Lath shall be welded wire fabric, consisting of a 2" x 2" - 16 gauge cold drawn electrically welded galvanized copper bearing steel wire, self-furring fabric, to which a tough absorbent fibrous backing is secured by means of a 26 gauge "V" shaped stiffening rib on not more than 5" centers or attached by 18 gauge galvanized stitch wires on not more than 2" centers, with stiffening members formed in fabric on not more than 5" centers. Backing shall be so designed and attached to the metal as not to interfere with an overlapping of adjacent sheets of at least 1". There shall be a margin of at least 3/4" of metal without backing along one longitudinal side of the sheet, and a margin of at least 1/2" metal without backing along the two short sides of the sheets.

Lath shall be secured to the 3/4" furring channels by pushing the lath against the prongs so that they puncture the backing. When the lath rests firmly against the 3/4" channels, bend the prongs over the reinforcing wires of the lath by pressing the ends in firmly. Joints shall be staggered so that four corners of adjacent sheets shall not occur at any one place. Laps shall be made on channels only, and not between, and shall be 1". Side laps shall be 1/2". Lath shall be bent at all angles to brick or masonry walls with selvage edge of sheets nailed into joints of brick or concrete, or lath shall be butted into corner and corner reinforcing applied.

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BRICK OR STONE VENEER CONSTRUCTION

All exterior walls of Brick or Stone Veneer over wood or steel framing shall be sheathed with a welded wire fabric lath, consisting of a 2" x 2" mesh, cold drawn, electrically welded, galvanized, copper bearing, steel wire fabric, to which is secured a tough, double layer fibrous backing with a mastic filler between the layers.

At all corners of exterior walls, suitable diagonal bracing shall be provided, and welded wire fabric lath shall then be applied in accordance with the manufacturers directions and specifications.

All exterior walls shall be faced with one course of standard size approved brick or stone, and shall be laid one inch from the face of the wood studs or steel framing, and this one inch space shall be filled with cement mortar as each course of brick or stone is laid. Mortar shall consist of one part portland cement, three parts clean sharp sand, and 10% hydrated lime, in accordance with manufacturers directions.

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STUCCO CONSTRUCTION

All exterior walls where specified and designated stucco shall be lathed with a welded wire fabric lath, consisting of a 2" x 2" mesh, of not less than 16" gauge, cold drawn, electrically welded, galvanized, copper bearing steel wire fabric, to which is secured a tough double layer fibrous water-proof backing with a mastic filler between the layers.

Welded Wire fabric lath shall be applied direct to wood studs or steel framing, or over wood sheathing, in accordance with the manufacturers directions.

Stucco over welded wire fabric lath shall be of Portland Cement, and applied in three (3) coats to a total thickness of at least 7/8", in accordance with the specifications of the Portland Cement Association.

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FLOOR LATH

Specifications for Reinforcing Concrete Floors and Roofs over Steel Joist Construction.

Before installing Floor Lath, joists shall be rigidly bridged and anchored in accordance with Steel Joist Institute Specifications.

Concrete floors and roofs as specified and designated shall be poured on Floor Lath (consisting of a 3" x 4" mesh, 12 gauge, cold drawn, electrically welded; galvanized wire fabric, attached to a water resistant backing). Lath shall be rolled across the joists to a desired length from the outside or bearing walls of the building, and shall be fastened every 12" along the end joist with a clip furnished by the manufacturer.

Floor Lath shall be stretched taut longitudinally across the joists by a ratchet stretcher, furnished by the manufacturer, and clipped securely every 12" along the bearing to which the stretcher is attached. Floor lath shall then be clipped to each joist every 24" on joist spaced 16" or over, and one clip per width of roll for joist spacing under 16". Each clip shall face in the opposite direction from the clip adjacent to it.

Where end laps are necessary, Floor Lath shall be lapped at least one foot directly over a joist. Side laps shall be not less than 2". - Or equal as approved by Architect.

NOTE: As a guide for safe loads on spacing of joists from 18" to 36" see page BMM-127.

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Flush Doors

Standard-type competitive materials of proved merit

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Flush Doors

The architectural merit of flush doors has long been recognized. Until recently, however, doors of this type could not be manufactured and sold within a reasonable price range. Today, flush doors are available which are competitive in price with panel doors made of the same wood.

Architects generally approve of a light-weight, durable and well-constructed flush door that will not swell, shrink or sag, especially when available in a variety of veneer facings or other finishes.

Inasmuch as there has been no Federal Specification established for flush doors, detailed specifications which will permit competitive bidding are included here.

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J-M Flush Doors

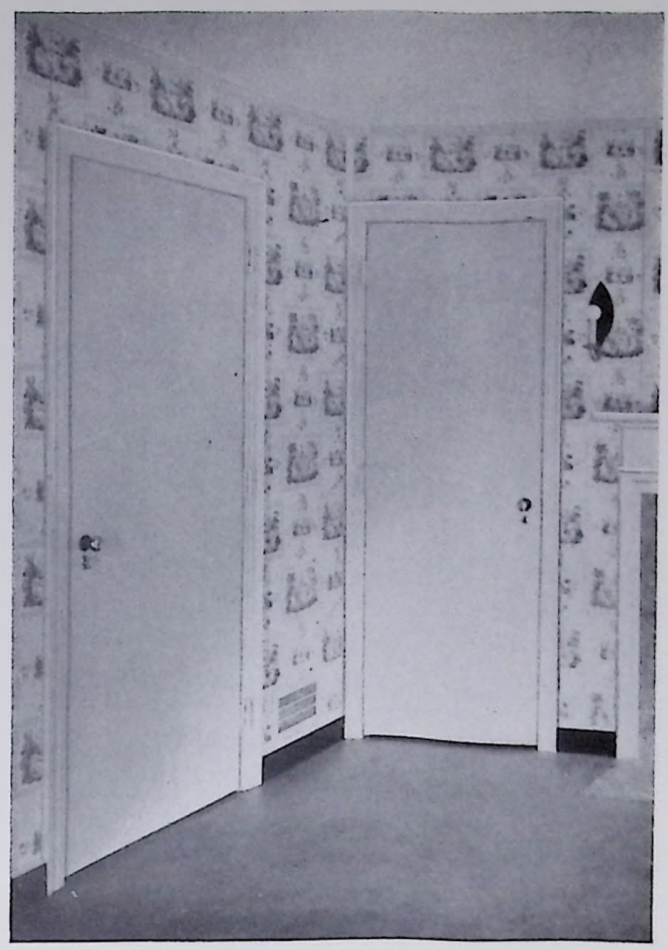
Inexpensive, yet superior flush doors of Johns-Manville manufacture have become increasingly popular since their introduction a number of years ago. This success can be attributed to their revolutionary design as well as to the skill of their makers.

Johns-Manville Flush Doors combine the utmost in appearance with light weight and extreme serviceability. The honey-combed grid and sealed core in these doors enables the production of an economical door which will withstand the severest usage.

Among the J-M Flush Doors constructed for various services, and described below, are the Wel-Built Door, the De Luxe Door and the Flexboard Door.

The craftsmanship employed in the manufacture of these J-M Flush doors has been proved by experiments conducted under conditions more severe than ordinary door-service. Tests reveal that every J-M Door will remain strong and straight after being slammed over 25,000 times with all the force of a powerful slamming machine. Even soaking in water for seven days has no effect on doors manufactured to resist moisture.

J-M Flush Doors harmonize with almost every type of interior decoration as they are available in an endless variety of natural woods. These doors are particularly adaptable for use in private homes, apartments, offices, hospitals and schools, where they add beauty equal to that of high grade cabinet furniture.



These painted J-M Flexboard Flush Doors become an effective part of this colonial decorative scheme

Construction of J-M Flush Doors

Frame: The framing of J-M Doors is of selected, straight-grained wood. Attached to the middle of the stiles are wood lock blocks which will receive standard locks without weakening the frame.

Core: The center grid is made of ½" strips of J-M Insulating Board halved together. The strips are of wood fibre, interlaced and compacted into a strong, stiff board. The core, sturdy and light in weight, is completely sealed by the faces. This construction eliminates expansion and contraction troubles and reduces weight that is characteristic of flush doors with a solid wood core.

Adhesives: As the stresses in flush doors are transferred to the faces, a strong bond must be obtained between the various members of the door. The type of adhesive used is governed by the conditions of the location where the doors will be hung. In all cases, the best quality of adhesive is used in fabrication.

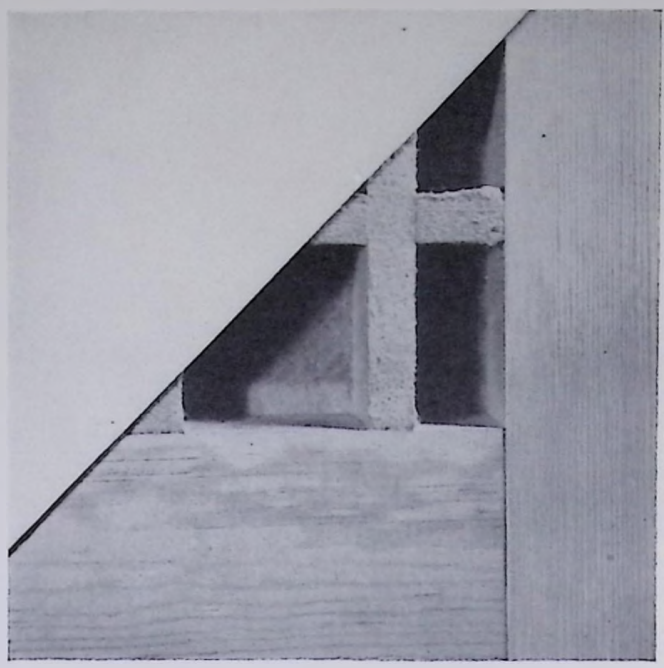
J-M Wel-Built Flush Door: This door, the most inexpensive of the J-M line, is designed for interior use. The stiles and rails are of even-textured yellow poplar. The facings, 3 plies of 1/18"-thick gum veneer, are applied with a high grade glue. At extra cost and on special order, facings of birch, red oak, red gum and knotty pine may be secured.

J-M De Luxe Flush Door: Standard facing of this door is 1/20"-thick rotary-cut birch over 2 plies of 1/18" gum. Stiles and rails are yellow poplar, and exposed stile edges of the same wood as the facing are "lindermanized" to the frame. Assembly is made with casein glue. If doors are for exterior use, "resin bonding" should be specified, at extra cost. On special order, face veneers of any other obtainable wood may be had.

J-M Flexboard Flush Door: This door, faced with Asbestos Flexboard, is especially adaptable where extreme moisture conditions exist or where a door is desired that will offer resistance to the passage of fire.

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Cut-away section of a J-M Flexboard Flush Door showing the J-M Insulating Board grid and general construction

Standard Flexboard facings are 1/8"-thick sheets of asbestos fibre and cement, formed under hydraulic pressure. The rigidity of Flexboard and the use of hot-press resin bonding aid in keeping these doors in their original straight, flat condition. To facilitate painting in the field, the Flexboard surfaces are factory-primed with an aluminum lacquer. Decorative Flexboard in rose, green, gray and buff may also be used for facing. These doors need no further finishing.

To secure the advantages of Flexboard Doors plus the beauty of wood graining and coloring, any commercial veneer may be applied over the Flexboard.

Installation and Maintenance

J-M Doors are easily fitted and hung in the ordinary manner, using regular hardware. The wood-faced doors, lighter than the average door with a solid core, require no special jambs or bucks. The Flexboard door, though heavier than J-M wood-faced doors, still is lighter than a solid-core door of the same size.

One of the well-known advantages of the flush door, in addition to distinctive appearance, is that dust cannot lodge on its plain, smooth surfaces. This makes the door sanitary and easy to clean or paint. The core of the door is sealed against dirt and vermin and, for exterior use, against moisture.

The surprising result of the J-M construction is that luxurious flush doors can now be obtained at approximately the cost of panel doors made of the same wood.

Sizes and Weights

The sizes and weights of J-M Wel-Built, De Luxe and Flexboard Flush Doors are as follows:

*Standard door sizes	Wel-Built lb. per door		De Luxe lb. per door		Flexboard lb. per door	
	1 3/8" thick	1 3/4" thick	1 3/8" thick	1 3/4" thick	1 3/8" thick	1 3/4" thick
1'- 6"x 6'-0"	17	24	—	—	—	—
1'- 8"x 6'-0"	19	27	22	29	39	44
2'- 0"x 6'-0"	24	31	26	33	47	52
2'- 2"x 6'-0"	27	33	29	35	51	56
2'- 4"x 6'-0"	29	35	31	37	55	60
2'- 6"x 6'-0"	31	37	33	39	59	64
2'- 8"x 6'-0"	33	39	36	41	63	68
2'-10"x 6'-0"	—	41	—	43	67	72
3'- 0"x 6'-0"	—	43	—	46	71	76
3'- 6"x 6'-0"	—	—	—	53	—	88
4'- 0"x 6'-0"	—	—	—	59	—	100
1'- 6"x 6'-6"	20	27	—	—	—	—
1'- 8"x 6'-6"	22	30	25	32	45	50
2'- 0"x 6'-6"	27	34	29	36	53	58
2'- 2"x 6'-6"	30	36	32	38	57	62
2'- 4"x 6'-6"	32	38	34	40	61	66
2'- 6"x 6'-6"	34	40	36	42	65	70
2'- 8"x 6'-6"	36	42	39	44	69	74
2'-10"x 6'-6"	—	44	—	46	73	78
3'- 0"x 6'-6"	—	46	—	49	77	82
3'- 6"x 6'-6"	—	—	—	56	—	94
4'- 0"x 6'-6"	—	—	—	62	—	106
1'- 6"x 6'-8"	21	27	—	—	—	—
1'- 8"x 6'-8"	23	29	25	31	47	52
2'- 0"x 6'-8"	28	34	30	36	55	60
2'- 2"x 6'-8"	31	37	33	39	59	64
2'- 4"x 6'-8"	33	39	35	41	63	68
2'- 6"x 6'-8"	35	41	37	43	67	72
2'- 8"x 6'-8"	37	43	39	45	71	76
2'-10"x 6'-8"	—	45	—	47	75	80
3'- 0"x 6'-8"	—	48	—	50	79	84
3'- 6"x 6'-8"	—	—	—	57	—	96
4'- 0"x 6'-8"	—	—	—	63	—	108
1'- 6"x 7'-0"	23	31	—	—	—	—
1'- 8"x 7'-0"	25	33	27	35	51	56
2'- 0"x 7'-0"	30	37	32	39	59	64
2'- 2"x 7'-0"	32	39	34	41	63	68
2'- 4"x 7'-0"	35	41	37	43	67	72
2'- 6"x 7'-0"	37	43	39	45	71	76
2'- 8"x 7'-0"	39	46	41	48	75	80
2'-10"x 7'-0"	—	48	—	50	79	84
3'- 0"x 7'-0"	—	50	—	52	83	88
3'- 6"x 7'-0"	—	—	—	59	—	100
4'- 0"x 7'-0"	—	—	—	65	—	112
2'- 6"x 7'-6"	—	—	—	49	—	—
3'- 0"x 7'-6"	—	—	—	56	—	94
3'- 6"x 7'-6"	—	—	—	63	—	106
4'- 0"x 7'-6"	—	—	—	69	—	118
2'- 6"x 8'-0"	—	—	—	53	—	—
3'- 0"x 8'-0"	—	—	—	60	—	100
3'- 6"x 8'-0"	—	—	—	66	—	112
4'- 0"x 8'-0"	—	—	—	72	—	121

*Only sizes with weights indicated are standard.

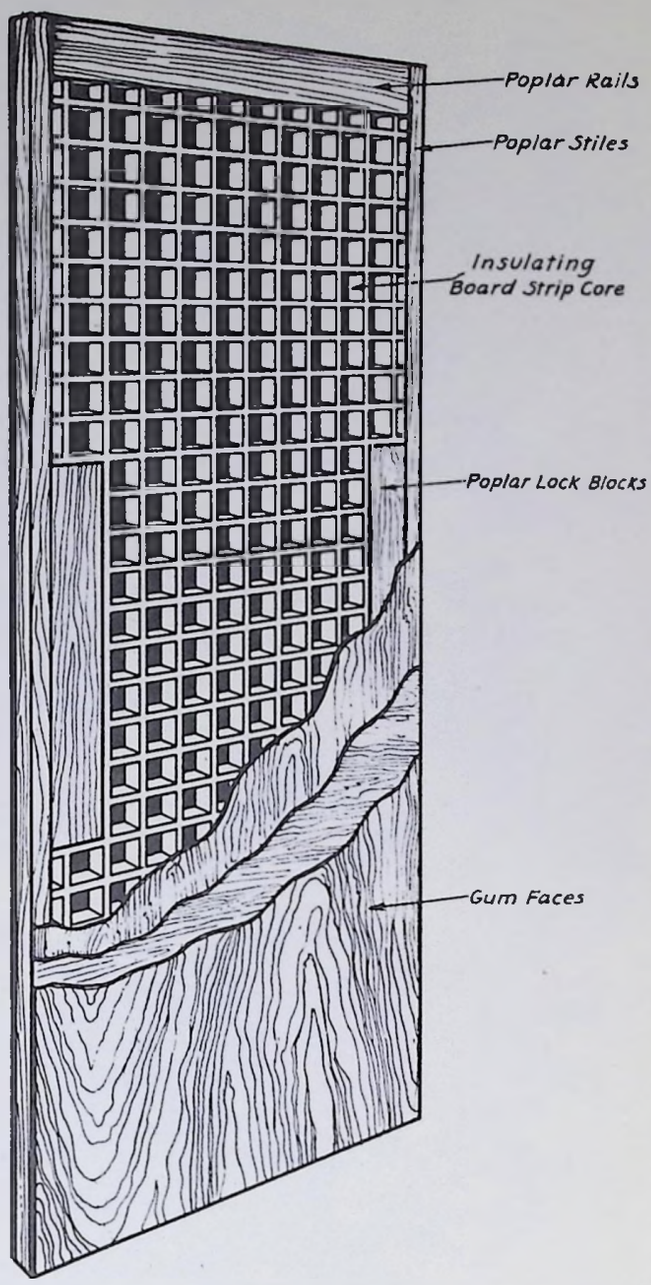
NOTE: Above weights are approximate for unpacked doors. About 8 lb. should be added to each wood door for crating; 12 lb. to Flexboard doors.

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SPECIFICATIONS FOR FLUSH DOORS
GUM FACED - GRID CORE

1. GENERAL: Doors shall be of size and thickness required. Tolerances: Thickness +0" -1/16", width and height +1 2" -1/32".

2. STILES AND RAILS FOR 1-3/8" AND 1-3/4" DOORS: Stiles shall be at least 1-1/8" wide and rails shall be at least 3-1/2" wide after doors have been trimmed to size required. Both rails and stiles shall be of such thickness that completed doors after sanding will meet door-thickness tolerance requirements. All framing material shall be of even-textured yellow poplar. Stiles to be "clear", 1/2" back from exposed edges after doors have been trimmed.



3. LOCK BLOCKS: Lock blocks shall be of same thickness as stiles and rails and shall be sufficiently wide to allow at least 4-3/4" from edge of door to the inside edge of the lock block. Lock blocks shall be placed at both sides of the door and at the center of stiles, the maximum distance from the bottom of the lock block to the bottom of the door or from the top of the lock block to the top of the door shall be 28-1/2".

4. CORES: Cores shall be made in grid pattern. Grid bars shall be halved together and shall be of a material that satisfies all requirements of the United States Government Specifications for grade "A" Insulating Board - United States Specifications LLF-321. Cores shall be of such thickness as is necessary to provide finished doors of the required thicknesses.

5. FACES: Each face of the door shall be three-ply standard plywood construction, composed of three 1/18"-thick veneers, of rotary-cut gum. Exposed ply shall be unselected for color but shall be matched for both color and grain at joints if in more than one piece. Exposed ply shall be in 1, 2 or 4 pieces only.

   NOTE: Standard exposed ply shall be rotary-cut gum. Exposed facings are also available, on special order, in rotary-cut birch, half-round red oak, plain rotary-matched selected red gum and sliced knotty pine.

6. ADHESIVE: Entire assembly shall be fabricated with a high grade vegetable glue.

7. FINISH: Doors shall be sanded to a smooth, even surface, ready for finish. Edges shall be planer cut - not sanded.

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A.I.A. File Number 19-E-12

JOHNS-MANVILLE Building Materials

DATE May, 1938

Government Specifications for Johns-Manville Flush Doors
Gum Faced - Grid Core

BMM-335

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TECHNICAL DATA SECTION

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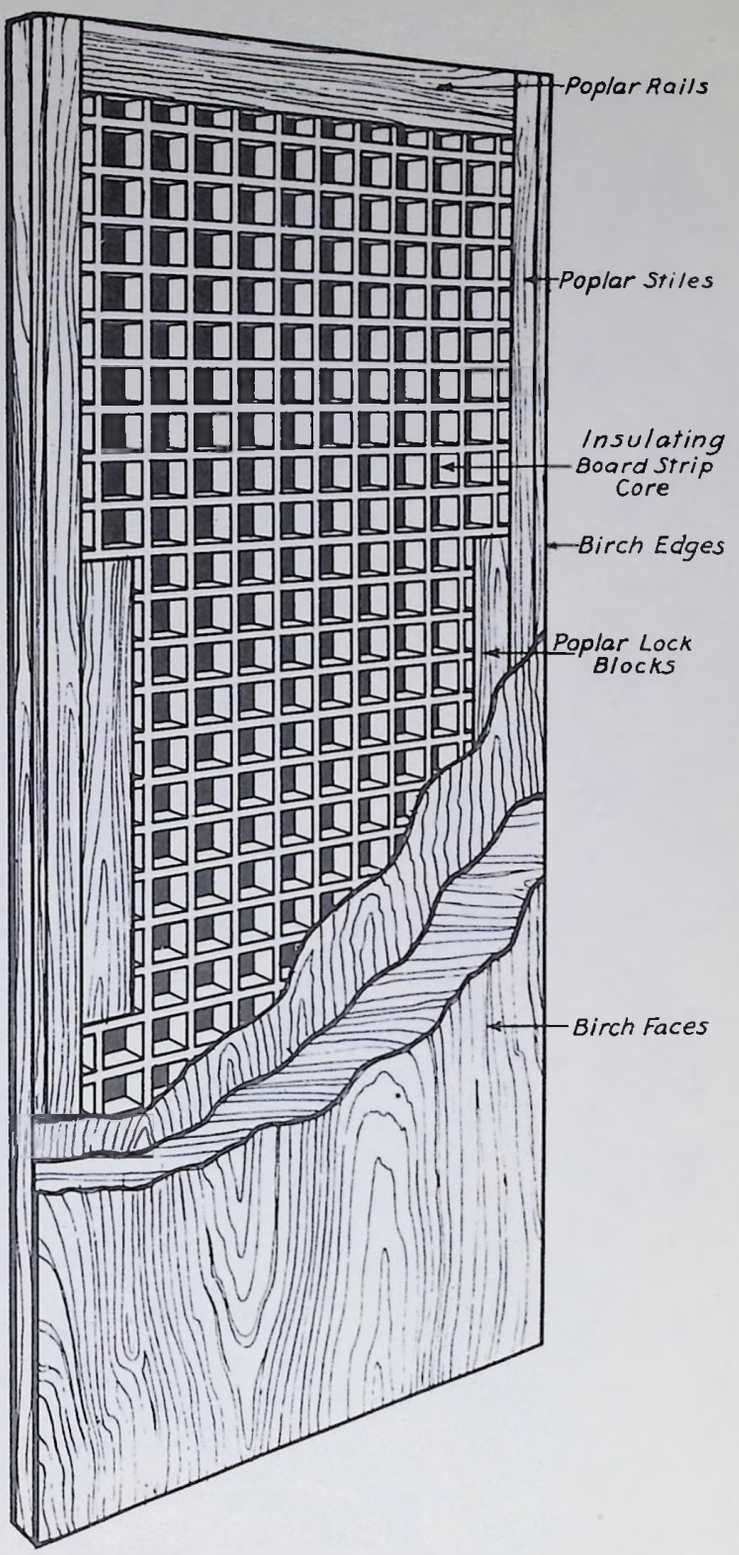
SPECIFICATIONS FOR FLUSH DOORS
BIRCH FACED - GRID CORE

1 GENERAL: Doors shall be of size and thickness required. Tolerances: Thickness +0" -1/16", width and height +1/32" -1/32".

2. STILES AND RAILS FOR 1-3/8" AND 1-3/4" DOORS: Stiles shall be at least 2-1/8" wide and shall have exposed edgings of birch not less than 3/4" in width. Edgings shall be double dovetailed to frame. Rails shall be at least 3-1/2" wide, after doors have been trimmed to size required. Both rails and stiles shall be of such thickness that complete doors, after sanding, shall meet door-thickness tolerance requirements. All framing material, except exposed edgings, to be of even-textured yellow poplar.

3. LOCK BLOCKS: Lock blocks shall be of same thickness as stiles and rails and shall be sufficiently wide to allow at least 5-3/4" from edge of door to the inside edge of the lock block. Lock blocks shall be placed at both sides of the door and at the center of stiles. The maximum distance from the bottom of the lock block to the bottom of the door or from the top of the lock block to the top of the door shall be 28-1/2".

4. CORES: Cores shall be made in grid pattern. Grid bars shall be halved together and shall be of a material that satisfies all requirements of the United States Government Specifications for grade "A" Insulating Board - United States Specifications LLF-321. Cores shall be of such thickness as is necessary to provide finished doors of the required thickness.



5. FACES: Each face of the doors shall be three-ply plywood construction, composed of two 1/16"-thick veneers used as back and cross banding. Exposed ply shall be 1/20"-thick rotary-cut birch, unselected for color but shall be matched for both color and grain at joints if in more than one piece. For facings other than rotary-cut birch see note on the reverse. Exposed ply shall be in one, two or four pieces only.

(continued on other side)

JOHNS-MANVILLE Building Materials

Government Specifications for Johns-Manville Flush Doors
Birch Faced - Grid Core

DATE May, 1938
(Cancelling BMM-336 dated June, 1937
BMM-337

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6. ADHESIVES: Entire assembly shall be fabricated with a casein derivative adhesive as standard construction but is available with the entire assembly resin-bonded on special order.

7. FINISH: Doors shall be sanded to a smooth, even surface, ready for finish. Edges shall be planer cut - not sanded.

8. PACKING AND CRATING: Each door shall be individually paper wrapped and/or cartoned.

NOTE: Standard exposed ply shall be rotary-cut birch. Exposed facings are also available, on special order, in:

Birch

Rotary-cut, selected, red

Gum

Rotary-cut, unselected
Rotary-cut, selected
Sliced, quartered, medium figured, red
Sliced, quartered, highly figured, red

Mahogany

Sliced, plain, quartered or flat cut
Sliced, plain stripe
Sliced, ribbon stripe or strong stripe

Oak

Rift sawn, red
Sawn, quartered, white
Rotary-cut or half-round, red
Rotary-cut or half-round, white

Pine

Knotty

Walnut

Half-round or sliced, plain (no sap)
Sliced, quartered (no sap)

*Cedar

Sawn, red

*(Red cedar edges cannot be furnished)

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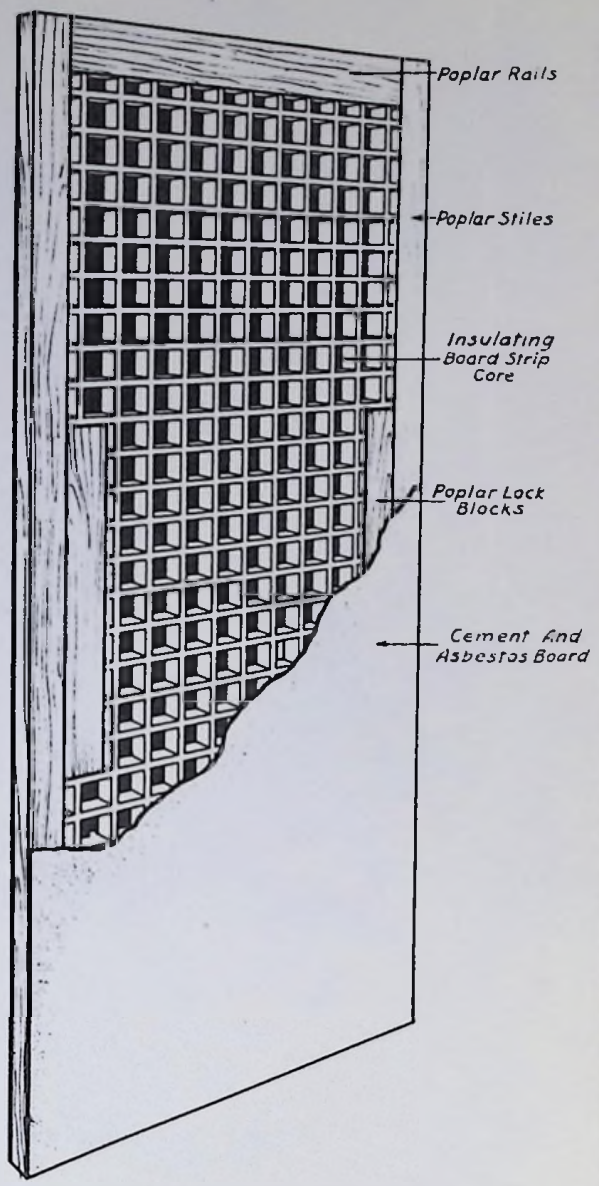
SPECIFICATIONS FOR FLUSH DOORS
CEMENT AND ASBESTOS BOARD - GRID CORE

1. GENERAL: Doors shall be of size and thickness required. Tolerances: Thickness +0" -1/16", width and height +1/32" -1/32".

2. STILES AND RAILS FOR 1-3/8" and 1-3/4" DOORS: Stiles shall be at least 2-1/8" wide and rails shall be at least 3-1/2" wide, after doors have been trimmed to size required. Both rails and stiles shall be of such thickness that completed doors, after sanding, will meet thickness tolerance requirements. All framing material shall be even-textured yellow poplar. Stiles to be "clear" 1/2" back from exposed edges, after doors have been trimmed.

3. LOCK BLOCKS: Lock blocks shall be of same thickness as stiles and rails and shall be sufficiently wide to allow at least 5-3/4" from edge of door to the inside edge of the lock block. Lock blocks shall be placed at both sides of the door and at the center of stiles. The maximum distance from the bottom of the lock block to the bottom of the door or from the top of the lock block to the top of the door shall be 28-1/2".

4. CORES: Cores shall be made in grid pattern. Grid bars shall be halved together and shall be of a material that satisfies all requirements of the United States Government Specifications for grade "A" Insulating Board - United States Specifications LLF-321. Cores shall be of such thickness as is necessary to provide finished doors of the required thickness.



5. FACES: Faces shall be of cement and asbestos material, carefully formed under hydraulic pressure and steam cured to give minimum change in dimension with change in moisture content. Faces shall be 1/8"-thick in one piece, free from defects.

6. ADHESIVES: Entire assembly shall be fabricated with hot-press resin bonding.

7. FINISH: Doors shall be sanded to a smooth, even surface and shall be primed with an aluminum-bronze lacquer. Edges of doors shall be sanded and finished as well as faces.

8. PACKING AND CRATING: Each door shall be individually paper wrapped and/or cartoned.

NOTE:

SPECIAL DECORATIVE DOORS: Decorative face doors shall be made in accordance with the above, except aluminum priming shall be omitted and decorative faces, integrally colored, shall be used. These faces are available in the following colors: rose, green, gray and buff.

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JOHNS-MANVILLE Building Materials	DATE May, 1938 (Cancelling BMM-335 dated June, 1937) BMM-339
Government Specifications for Johns-Manville Flush Doors Asbestos Flexboard Faced-Grid Core	

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TECHNICAL DATA SECTION

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Acoustical Treatment and Control of Sound

Standard-type competitive materials of proved merit

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Acoustical Treatment and Control of Sound

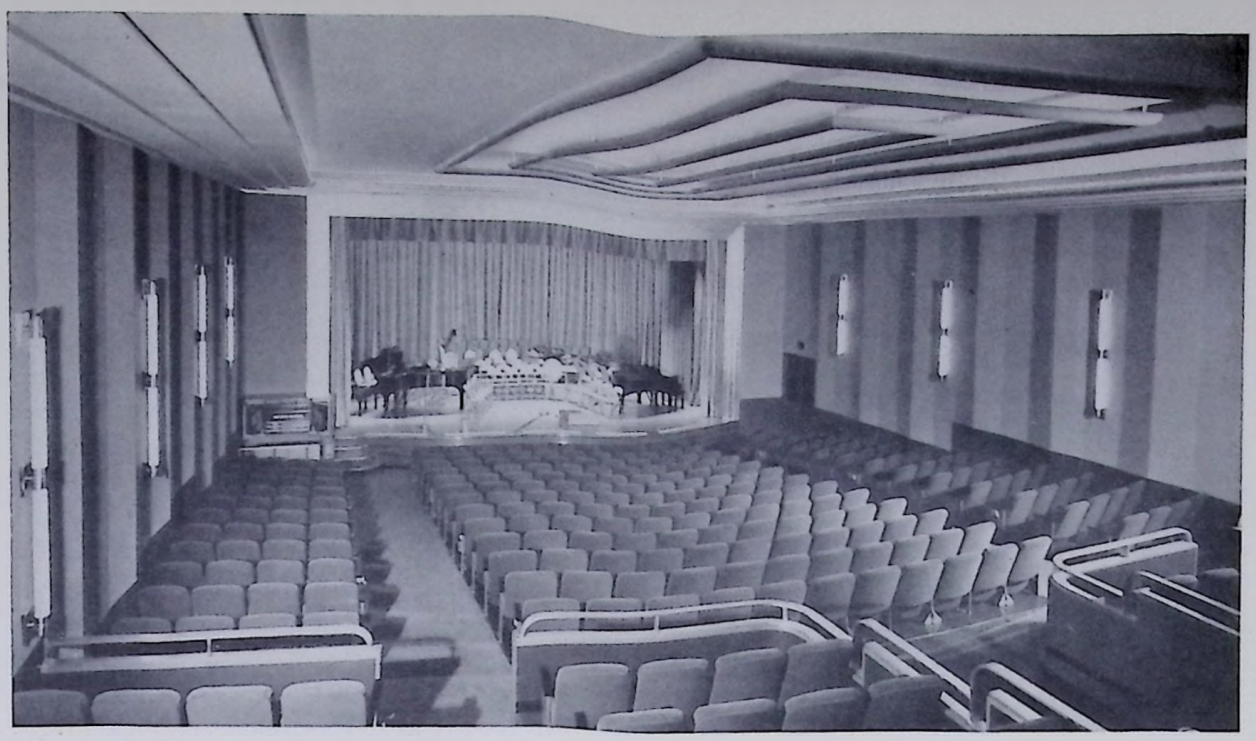
Methods and materials for the control of noise are most often thought of in connection with hospitals, restaurants, schools and working spaces. In many instances, however, irritating conditions exist in apartment dwellings as a result of noise originating either outside or inside the building.

Noise quieting methods as well as auditorium acoustics, sound isolation and sound control of mechanical equipment are described in this section. The technique of acoustical science has now been developed to a point where ordinary sound problems can definitely be solved.

Federal Specification SS-T-302 for Acoustic Tile is also included in this section.

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J-M Systems of Sound Control



J-M Systems of Sound Control provide the means for overcoming a great variety of sound problems. The acoustical treatment and sound isolation used in Station WWJ, Detroit, Mich., assure brilliance to the studio and fidelity to the program

The control of sound is every day becoming increasingly imperative to human health, comfort and efficiency. Wherever groups of people gather indoors for entertainment, worship or education, the problem of room acoustics or hearing conditions nearly always arises. In places where people work, study or eat, the need for sound-quieting is urgent. This is even more true in hospitals and sanitariums. The problem in other places, such as in machinery rooms, becomes one of sound isolation, the control of sound transmission and vibration.

For many years, Johns-Manville has pioneered in the solution of these sound control problems. The practical applications of control principles are predicated upon the researches of Professor Wallace C. Sabine of Harvard, who reduced the subject of sound as it relates to building interiors to an exact science. Retained by Johns-Manville as acoustical consultant, Professor Sabine carried forward his studies in collaboration with the J-M Research Laboratories, which still continue his work. As a result of these studies many techniques and materials have been developed: these serve as a basis for the J-M Systems of Sound Control through which thousands of acoustical difficulties have been overcome.

The Engineering Problem

Upon the researches of Professor Sabine are based the science of constructive and corrective acoustics, as applied to auditoriums and public buildings, and the noise reduction principles used in quieting offices, factories and hospitals. Professor Sabine discovered that poor hearing conditions result from reverberation, the persistence of sound after its source has ceased. This phenomenon is caused by excessive sound reflections from the walls and ceiling. These reverberations prevent the listener from distinguishing successive words or sounds as definite and separate elements. The result, to the listener, is irritation, confusion and consequent lack of intelligibility. Excessive sound reflections are also responsible for much of the din which prevails in offices, factories and other places where machinery is used. Professor Sabine concluded that through the use of certain materials the sound waves could be satisfactorily absorbed and excessive reflections eliminated.

He proceeded to work out a method of calculating the duration of reverberation under various conditions. This, he expressed in the formula, $T = \frac{.05\ V}{a\ \ S}$, wherein T equals the reverberation time in seconds; V

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In addition to quieting the disturbing noise, the Sanacoustic ceiling in the Toronto office of Colgate-Palmolive-Peet Co., Ltd., also affords the maximum of light reflection

represents the volume of the interior in cu. ft.; a is the average coefficient of all reflecting surfaces, allowing for the relative area of each type of surface; and S, the total surface. The product of $a \times S$ gives the number of absorption units in the room. An absorption unit is theoretically based upon the area of an open window one foot square from which, of course, no sound would be reflected. By comparison with this unit, the efficiency of all acoustical and sound-absorbing materials is measured.

A study was then made of rooms considered acoustically acceptable by average audiences. This revealed a direct relationship between the volume of sound and the number of absorption units necessary to reduce the reverberation to an optimum time. From these data, were plotted curves which enable the competent acoustical engineer to calculate, in advance of construction, the acoustical or hearing qualities of an auditorium. In a similar manner existing buildings may be accurately analyzed.

Further studies have developed methods to measure noise that results from necessary machine operations. In addition, a technique for isolating sound at its point of origin has been devised. As a result of this broad background of research, Johns-Manville has corrected many thousands of installations requiring the control of sound.

Practical Application:

The first general division of sound control embraces the improvement of audition in theatres, auditoriums and churches. It deals with the elimination of echoes, excessive reverberation and extraneous noises. With proper acoustical treatment, the audience may enjoy the entertainment or hear the speaker with ease. The treatment is effected with sound-absorbing materials applied to the reflecting surfaces.

Sound-absorbing treatments for the reduction of noise-level constitute the second general division. These treatments are applied in offices, banks, schools, hospitals and, in fact, wherever objectionable noise is produced. Through the use of such treatments, protection is afforded against discomfort, distraction and irritation from excessive noise. These first two groups are sometimes classified together as acoustics for room interiors.

Sound isolation, the third general division, involves the prevention of sounds and vibrations generated in one place from reaching another through interposing partitions, ceilings or floors. It includes the treatment of such locations as bowling alleys and broadcasting studios as well as machinery rooms. The underlying principles of sound isolation are entirely different from those employed to correct interiors for air-borne sound. However, in many cases both types of treatment are necessary as in broadcasting studios.

The control of machine noise makes up a fourth general group. This division often proves to be complex and quite different from those which involve the ordinary problems of room acoustics or vibration control. The most effective way to avoid noise generation in mechanical equipment is through careful designing, manufacturing and testing. Remaining noises can usually be controlled by proper treatment.

In all the other divisions of sound control, as in equipment-quieting, the proper planning and choice of materials, prior to building, permits considerable economy. However, it is usually feasible to apply corrective measures after erection of the structure.

Selection of Materials

In choosing a sound control material, the factors of chief importance are the efficiency of the material to absorb sound in the frequencies encountered, low maintenance cost and fire resistance. Where an acoustical installation acts as a surface of the room interior, other primary considerations include ease of cleaning, paintability, light reflection coefficient and decorative qualities of the material.

An analysis of any sound control problem can be obtained by writing to the nearest Johns-Manville office. Without obligation, a J-M engineer will study the conditions and suggest a suitable treatment.

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Description of Materials

There is a Johns-Manville sound control material available for every type of acoustical problem:

Sanacoustic, in tile design, because of its high degree of sound absorption, low maintenance cost and permanence, is widely recognized as the ideal acoustical material. Made up of metal, mineral wool and asbestos, the unit will not burn, rot or disintegrate. Sanacoustic consists of a perforated and enameled sheet-metal casing, which contains a special rock wool pad—the sound-absorbing medium. The units lock into tee bars, which are mechanically fastened to the surface to be treated. This method of erection enables a Sanacoustic installation to be taken down and relocated without loss of materials.

The face of the rock wool pad is left exposed behind the perforated metal to assure the maximum absorption of sound, especially at the higher frequencies. The back and edges of the pad, however, are covered with asbestos paper which keeps the units clean longer by preventing the infiltration of air.

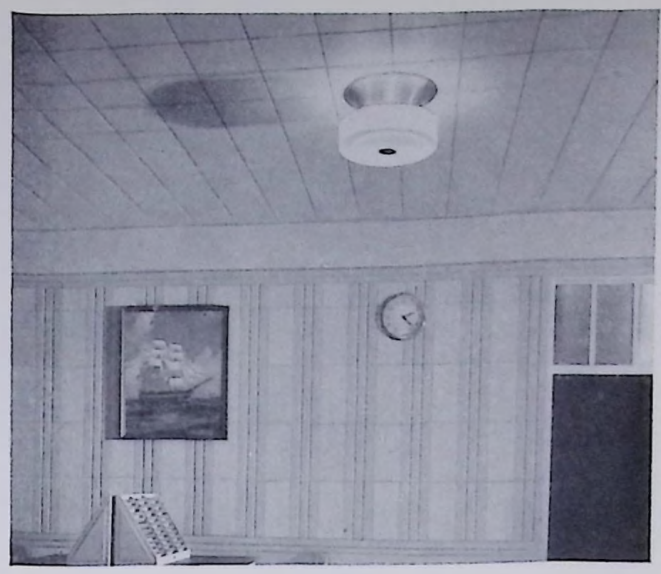
The enamel that is baked on the perforated metal facing is tough and durable and it may be washed repeatedly without injuring the finish. Sanacoustic also may be painted without loss of sound-absorbing efficiency, although this is unnecessary unless a change of color is desired. The permanence of the enameled-metal surface and the ease with which it may be cleaned assure low maintenance costs.

Sanacoustic, tile design, is available in standard white or standard cream enamel, in wood grain finish and in polished or enameled aluminum. Standard sizes are 12″ x 12″, 16″ x 16″ and 12″ x 24″. Attractive pre-decorated designs are also available in the 16″ x 16″ size.

Sanacoustic Panels have all the advantages of Sanacoustic, tile design, and, in addition, afford great flexibility of unit size. Steel panels with a priming coat of baked cream enamel are available in the following sizes: 96″, 120″, 144″ and 168″ long by 30″, 36″, 42″ and 48″ wide. In aluminum the same sizes can be furnished up to 48″ x 120″.

The rock wool blanket used as a sound-absorbing element possesses the same qualities and characteristics as the pad used in a unit of Sanacoustic.

Sanacoustic Ventilating Ceiling, besides quieting room noise, also affords uniform distribution of air. It consists of a suspended ceiling of 12″ x 24″ Sanacoustic units so installed that the furred space becomes a plenum chamber for the air-conditioning system. The thousands of perforations in each Sanacoustic unit serve as supply openings, through which air flows slowly and noiselessly into the room.



Sanacoustic is suited to a wide range of architectural effects. Office of the Manteno State Hospital, Manteno, Ill.

A slight air-pressure is built up in the plenum chamber behind the Sanacoustic Ventilating Ceiling and air is carried past the sound-absorbing pad to the perforated metal surface through Air Flow Channels.

Acoustex is a fire and moisture-resistant acoustical material made of wood fibre. It is particularly applicable in offices, schools, churches and gymnasiums where a sound-absorbing material giving a tile pattern or plank effect in harmonizing colors is desired.

Acoustex is available with a priming coat of light buff lacquer for painting and also in standard colors of white, light buff, medium buff, dark buff, light gray and apple green. The natural texture of the wood fibre, however, is unusually pleasing and, being light buff in color, has a high coefficient of light reflection. Other colors may be had on special order.

Acoustex is supplied 6″ x 12″, 12″ x 12″, 6″ x 24″, 12″ x 24″ and 24″ x 24″, in thicknesses of 5/8″, 3/4″, 7/8″, and 1 1/8″. It is also available in planks of 6″, 12″ and 24″ wide, lengths up to 96″. Cement and nails are used for installation. For suspended ceiling construction, which eliminates the need for lath and plaster, Acoustex is furnished 24″ wide in lengths from 24″ to 96″, 7/8″ and 1 1/8″ thick.

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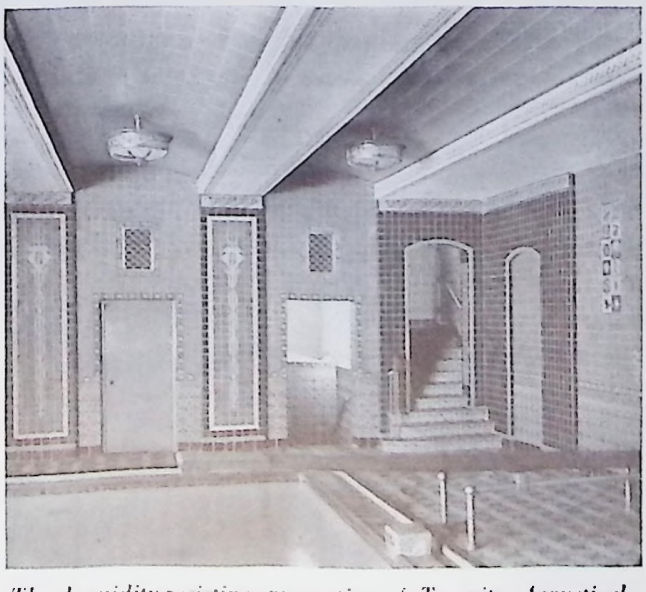
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The beauty and effectiveness of this Acoustex installation adds to the dignity of the Panel Room of Schrafft's Restaurant, 625 Madison Avenue, New York, N. Y.

Transite Acoustical Units, a utilitarian material, consist of perforated Transite and a rock wool sound-absorbing element backed with asbestos paper. The Transite facing is a cement-asbestos product which has been used for many years on industrial building exteriors and which has great resistance to moisture and corrosive fumes. The units, made entirely of minerals, are particularly fire-resistant. Embodying these properties, this Transite-faced acoustical material is ideal for chemical laboratories, gymnasiums, swimming pools, as well as offices and auditoriums.

Brass grommets, inserted in the corners of each unit, fasten the sound-absorbing element and the facing together, and also provide openings for nailing through the unit to the furring strips.



The humidity-resisting properties of Transite Acoustical Units make this material especially suitable for swimming pool installations. New Y. M. C. A., Harrisburg, Pa.

The units are furnished in a natural finish buff and a cream white finish in pieces 12″ x 12″, 1⅛″ thick.

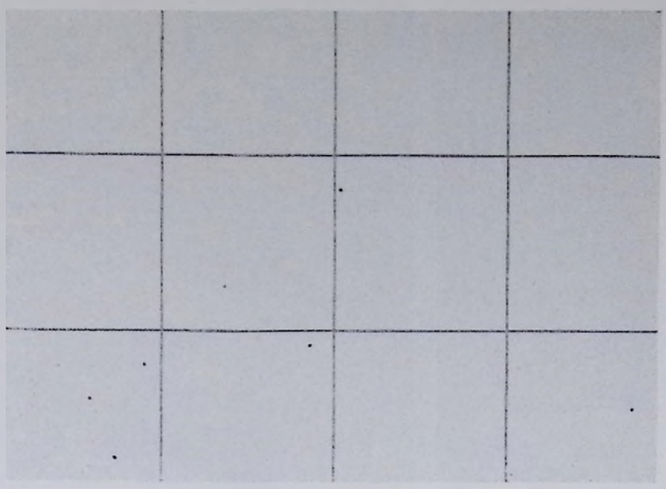
Transite Acoustical Panels consist of large sheets of perforated Transite backed by a rock wool sound-absorbing element. They are similar in properties to Transite Acoustical Units with the added advantage of being larger. The panels are available in natural finish buff with beveled or square edges and in cream white finish with beveled edges only. Standard sizes are 12″ x 12″, 12″ x 24″, 24″ x 24″ and 24″ x 48″.

The appearance of an unbroken perforated area can be had by ordering unbeveled Transite Acoustical Panels in sizes 23⅞″ x 23⅞″ and 23⅞″ x 47¾″.

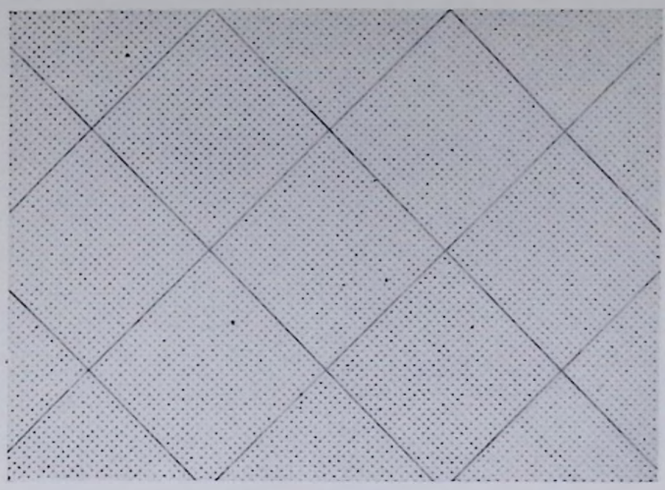
Rockoustile is a distinctively attractive acoustical material manufactured from mica which has been expanded by the application of heat. Its natural color is an iridescent golden ecru, but it is also furnished with an ivory cream finish. On special order, the material may be had in light-reflecting flat white and in slightly varying pastel shades of gray, buff, blue or any other color. It is supplied square-cut or bevel-edged, in sizes 6″ x 12″, 12″ x 12″ and 12″ x 24″, 1″ thick. Usually applied with nails and cement.

Nashkote Acoustical Finishes offer an acoustical treatment consisting of Asbestos Akoustikos Felt cemented to the surface to be treated and covered with a membrane. The membrane, which is secured with Acoustical Size, may be painted muslin (Nashkote Types A and AIS in which Type A resembles smooth plaster, AIS sand-finished plaster) or it may be Type F which has a membrane of high quality burlap. Other textiles such as canvas or rep may be used as a covering; sometimes no membrane is affixed.

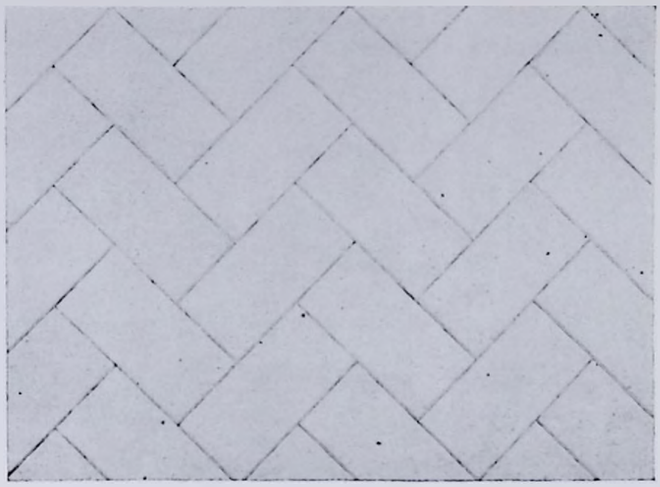
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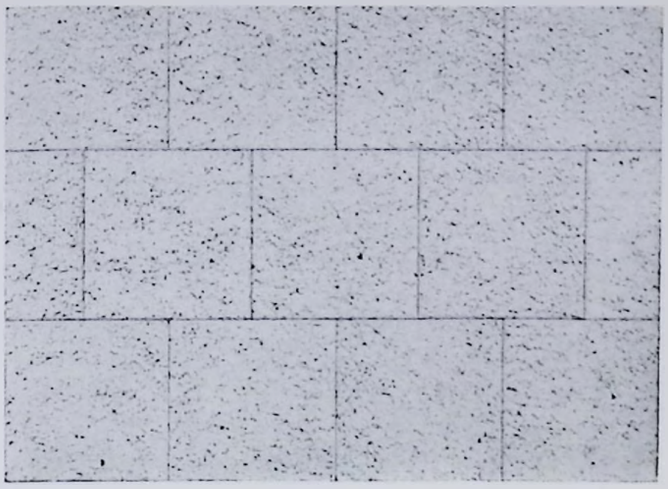
Sanacoustic, tile design, is the best general sound control material available because of its excellent sound-absorbing efficiency, permanently high light-reflection factor and extremely low maintenance cost



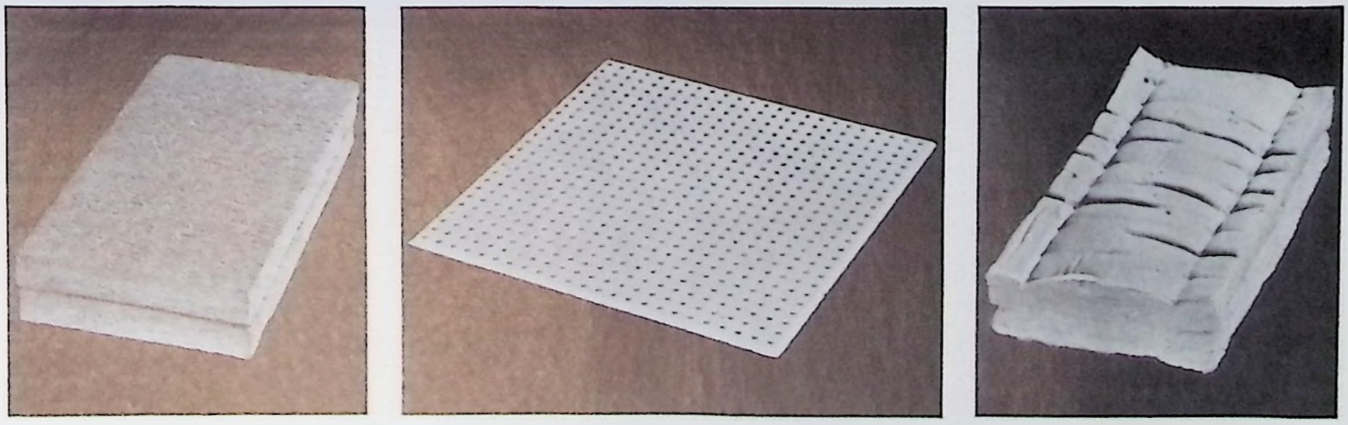
Transite Acoustical Units are unusually resistant to moisture, steam and corrosive fumes. This utilitarian material is ideal for use in chemical laboratories, kitchens, dishwashing rooms and swimming pools



Acoustex is particularly suited to locations that require a smooth, textured material. It is available in a wide range of colors and sizes. The herringbone effect as shown is only one of many architectural designs



Rockoustile is an exceedingly attractive acoustical material with an open texture. The broken joint construction provides a distinctive wall or ceiling pattern and is but one of several possible decorative schemes

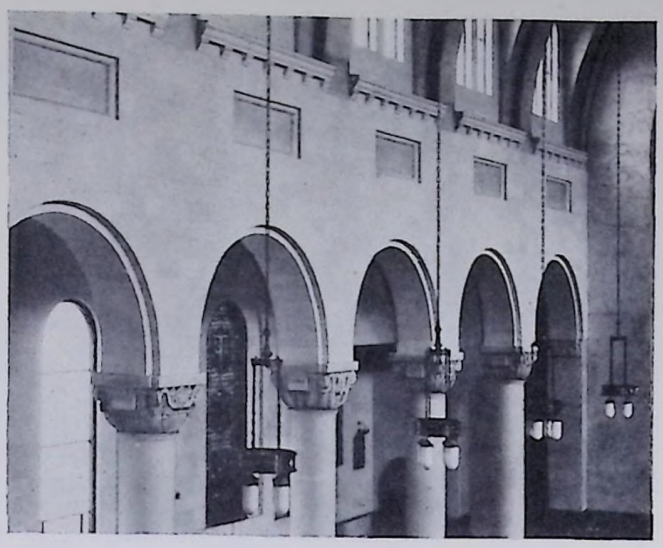


Broadcasting and Recording Studio Treatment corrects reverberation and assures faithful sound reproduction. The Transite Acoustical Panel, center, is used over the rigid Studio Element, left, or Sound Isolation Blanket, right, to achieve the correct acoustical balance.

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Additional Materials and Accessories



In addition to correcting the echo, J-M acoustical materials have beautified St. Anslem Church, Pittsburgh, Pa.

Following are descriptions of additional J-M sound control materials which cover a wide variety of conditions and locations. Also included are accessories for the installation of treatments.

Acoustical Cement, No. 130, an adhesive for cementing asbestos Akoustikos Felt, is supplied in 1, 3, 5 and 50-gal. containers. One gallon, with 40 percent added alcohol, will cover approximately 100 sq. ft. of smooth plaster.

Acoustical Cement, No. 132, is used for spot-cementing rigid acoustical units. Furnished in 1, 3 and 5-gal. containers. One gallon accommodates about 30 to 40 sq. ft. of units.

Acoustical Size is used to set the surface of Akoustikos Felt and to secure the finishing membrane of muslin. Furnished in 1, 5 and 50-gal. containers. For sizing, one gallon, with one gallon added water, will cover 200 sq. ft. For applying muslin, one gallon, with 40 percent added water, will cover 100 sq. ft.

Asbestos Akoustikos Felt, made of asbestos fibre and selected hair, is used where a flexible sound-absorbent is necessary. Supplied in approximately 160-ft. rolls of ¼", ½", ¾" and 1" thicknesses, weighing 40, 68, 98 and 128 lbs., respectively. Rectangular-cut or die-cut shapes made on special order.

Air Flow Channels are passageways governing the amount of air transmitted from the plenum chamber of the Sanacoustic Ventilating Ceiling into the room. Available 24" long with 10, 6, 3, or 1 openings—also blank for special use.

Anti-Vibration Platforms are constructions which utilize Sound Isolation Chairs and usually Sound Isolation Fill to prevent machine vibrations from being transmitted to supporting structures.

Banacoustic Blankets are fireproof acoustical blankets made from white, long-fibre rock wool, felted and secured between various types of binders. The material is usually covered with decorative cloth or placed behind ornamental grilles. Blankets also utilized to quiet mechanical equipment. Flame-proofed muslin one side is standard with Style No. 100; it may be had on all other styles on special order. Available in in thicknesses of 1", 1½" or 2" and standard sizes of 24" x 48" and 24" x 96", unless specified otherwise. The table at the top of the other column describes the binders used on the various styles of Banacoustic Blankets.

Standard Types of Banacoustic Blankets

Style No.	Type of Cover
100	1" wire mesh one side, 3" stucco lath with flame-proofed muslin under lath. (1" thick only)
102	1" wire mesh both sides
112	1" wire mesh and metal lath
122	Metal lath both sides
132	1" wire mesh and ⅜" rib lath
132-A*	Same as No. 132 except rib turned out
142	Metal lath and ⅜" rib lath
142-A*	Same as No. 142 except rib turned out
152	1" wire mesh and ¾" rib lath
152-A*	Same as No. 152 except rib turned out
162	Metal lath and ¾" rib lath
162-A*	Same as No. 162 except rib turned out
172**	⅜" rib lath both sides
182	Asbestos paper both sides. (Size 24" x 48" only)
192	No. 12 mesh fly-screen wire both sides

* The turned-out rib provides air space.

** Ribs may be turned in or out, and run lengthwise or across the blanket, or at right angles to each other, as specified.

Broadcasting and Recording Studio Treatment is designed for broadcasting and sound film studios. The treatment utilizes rigid Studio Elements, 2" thick, covered with decorated sheets of perforated metal or Transite applied to walls and ceilings. Sound Isolation Blankets, 2" and 4" thick, are sometimes used.

Sound Isolation Blankets Types KA, KK, MK and MM are composed of ½", 1" and 2" rock wool, stitched between sheets of various materials. Type KA has asbestos paper one side and flame-proofed Kraft paper the other; Type KK has flame-proofed Kraft paper both sides; Type MK, flame-proofed Kraft paper one side and flame-proofed muslin the other; Type MM, flame-proofed muslin both sides. Types KA and KK are furnished 36" wide in rolls 65, 35 and 18 ft. long, decreasing with increase of thickness. Types MK and MM are supplied 22" or 36" wide in rolls 50 ft. long for ½" and 1" thickness and 25 ft. long for 2" thickness and can be had with sealed or unsealed edges.

Sound Isolation Chairs and Wall or Ceiling Isolators are shock-absorbing units, shaped like stirrups, that are lined with punched felt. They are placed between the supporting structure and floated floors, walls or ceilings thereby reducing the transmission of vibrations of all kinds, including those induced by mechanical means and by air-borne sound.

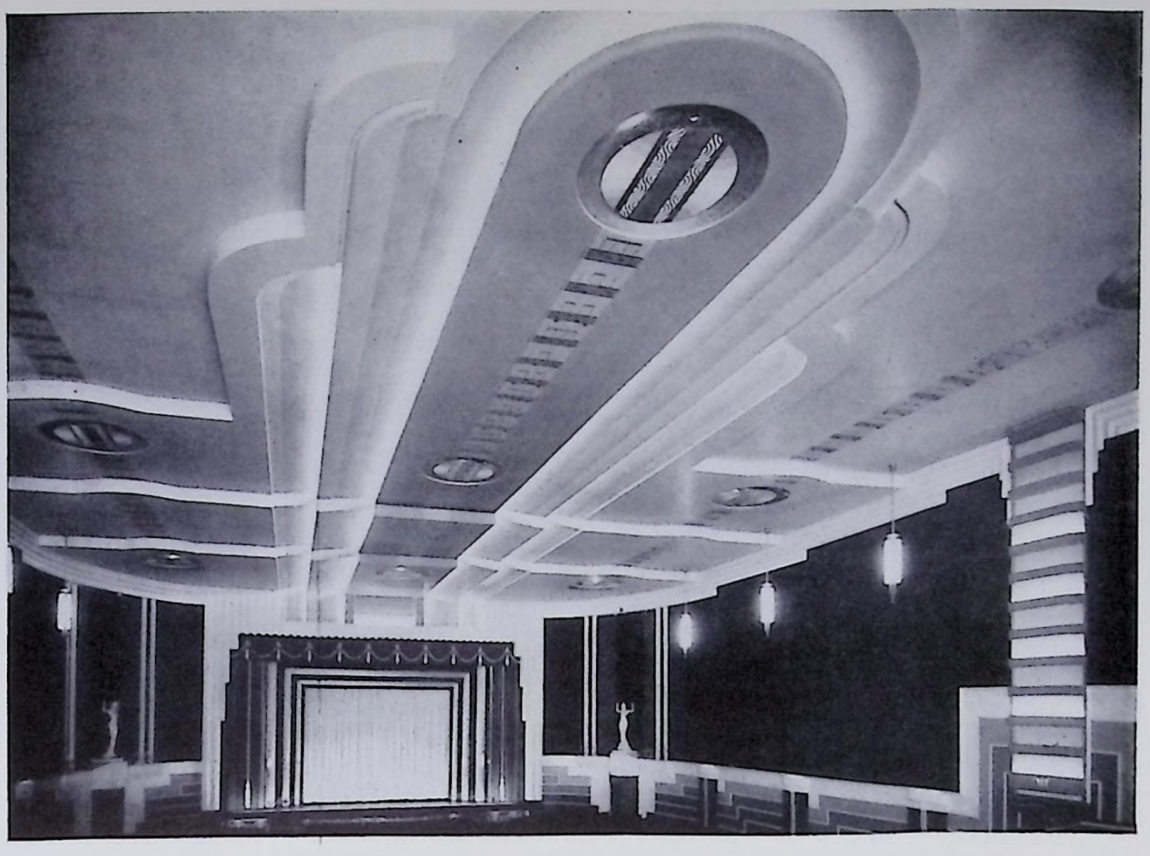
Sound Isolation Fill consists of rock wool, used in the space between the finished floor and the floor structure as a sound-damping medium and to prevent drum action. Also used in Anti-Vibration Platforms for the same purpose.

Transite Acoustical Wainscoting is an acoustical material that is used where only a wainscoting treatment is necessary or desired. It consists of perforated Transite panels applied over a 10½" x 18", rock wool, sound-absorbing element, 1" thick. The panels, 2 ft. wide x 4 ft. high with beveled edges on the vertical sides, are screwed to the furring. The treatment is finished with a metal cap at the top and an unperforated Transite base.

Occasionally materials that were designed primarily for the quieting of mechanical equipment can be advantageously adapted to acoustically treat room interiors. Descriptions of these J-M products may be found on other data sheets under the heading, Sound Control of Mechanical Equipment.

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Architectural Acoustics



The variety and flexibility of J-M acoustical materials make possible the fulfillment of all architectural requirements, as is evidenced by the striking beauty of this interior. Eglinton Theatre, Toronto, Ontario

Speech and music place very exacting acoustical requirements upon assembly halls, churches and theatres. The spoken syllables and words must be distinctly separate to assure intelligibility and ease of hearing. On the other hand, a certain amount of tone blending is desirable in music. If an auditorium is used for both purposes, the most satisfactory acoustical balance must be struck.

The Sabine formula is the standard method employed by acoustical engineers to solve the sound problems of auditoriums. In broadcasting studios, the modified formula for "dead rooms" should be used. In either case, to solve the problem correctly and economically, careful consideration must be given to the specific size of the room, the kind of presentations for which it will be used, the type of furnishings and the audience normally present. The audience, in particular, is an important factor of sound absorption. Frequently, a room that is satisfactory with a capacity audience is unsatisfactory when only partially filled. In such cases, it is necessary to introduce sufficient absorption materials to offset the lack of audience, an adjustment that will insure comfortable hearing.

Auditorium Acoustics

In auditoriums, the size and shape of the room are of paramount importance. The rectangular room is most desirable from an acoustical standpoint. Since curved surfaces tend to focus sound, echoes and dead spots result. The installation of a corrective treatment to the troublesome curve minimizes the sound focus and reduces the echo. However, the effect is more readily accomplished by a careful analysis before construction, calculated to adjust the radius of curvature of the surface or possibly to eliminate the curved surface entirely.

Favorable factors for good hearing include proscenium openings with large splayed surfaces to add reinforcement to the sound and wide balcony openings to allow the entry of sufficient sound to reach the rear seats. If better hearing conditions and the

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Sanacoustic, tile design, permits a wide range of decorative finishes. The ceiling design of the court room in the State Building, Los Angeles, Cal., was stencilled on the units after the installation was completed

undivided attention of the audience are to be insured, the elimination of extraneous noises is necessary.

The introduction of sound amplification has increased the need for acoustical materials. It has been found that amplification usually increases the intensity of the reverberation or reflected sound as well as the original sound. The increased reverberation can be offset only by absorption. Consequently, sound theatres and auditoriums with public address systems require more sound-absorbing treatment than correspondingly large auditoriums without amplification.



Undisturbed study is made possible in the other classrooms through the use of Sanacoustic in the kindergarten of Christian Park School, Indianapolis, Ind.

Ordinarily, acoustical materials are installed on large unbroken surfaces since such areas usually cause most of the hearing difficulties in auditoriums. The distance of these surfaces from the stage is an important consideration in determining the treatment because the reflection of sound from greater distances is more likely to cause echoes. When the auditorium has a low ceiling, treatment is usually confined to the rear and side walls. When high, the ceilings also are treated in many instances. Due to the directional power of amplification systems, rear wall treatments are of prime importance for theatres. Concave surfaces should always be treated when the center of curvature falls near any portion of the audience or near the source of sound.

Great care must be exercised in analyzing auditoriums. Acoustical materials must be selected for appearance and for efficiency, which, normally in auditoriums is calculated at 512 cycles per second. The efficiency and permanence of Sanacoustic, the open texture of Rockoustile, the pleasing appearance of Acoustex and the many possibilities of Nashkote finishes permit the correction of every phase of auditorium acoustics with architectural authenticity.

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Studio Acoustics

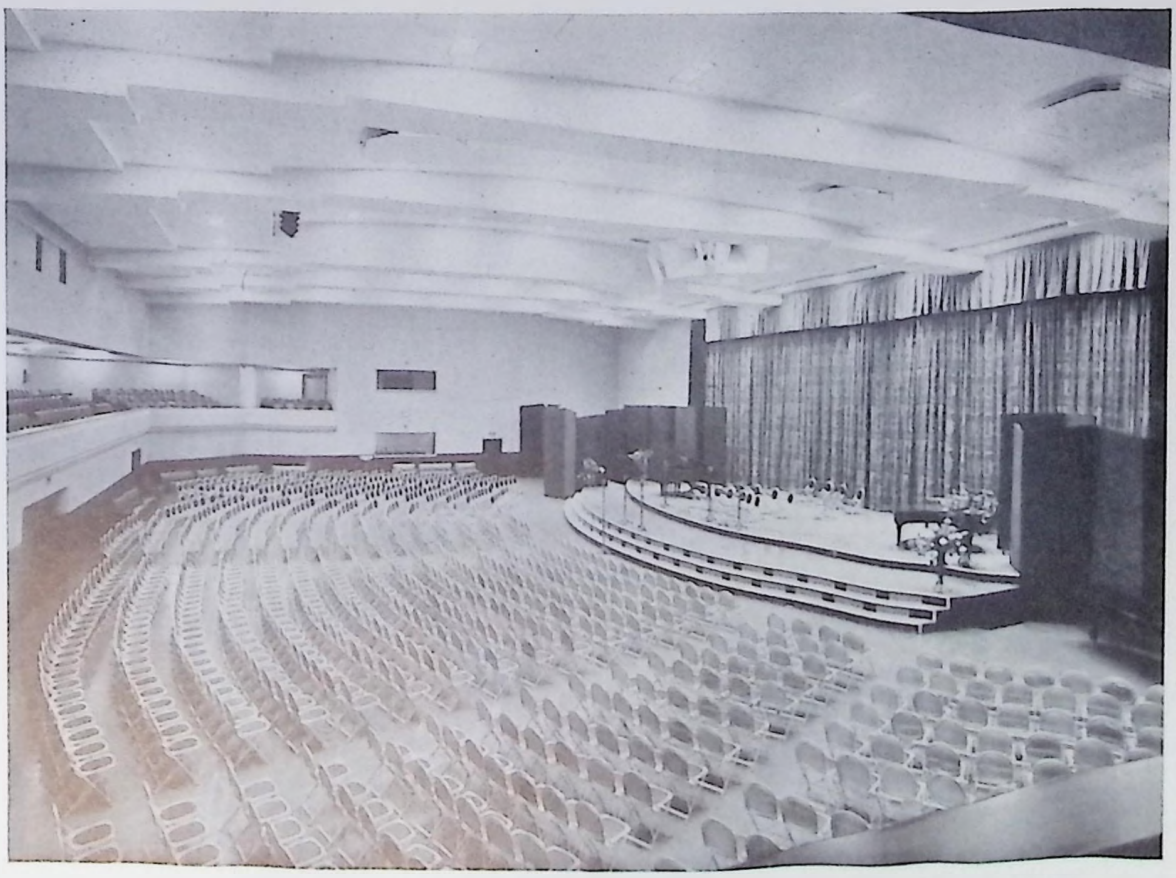
In broadcasting and sound picture studios, the problem of acoustical control is a difficult one. Reverberation must be reduced at all frequencies. Otherwise, intensified fundamentals or harmonics and the impression of an unbalanced orchestra will result. Good absorption of the lower frequencies is necessary to prevent a predominance of the bass, the so-called booming effects. Yet, a certain amount of high frequency reverberation is desirable to give brilliance to the studio and fidelity to the program.

Authorities, in general, agree that the average period of reverberation for broadcasting studios should range between 0.5 and 1.0 second, according to the volume. The modified reverberation formula, $T = \frac{.05\,V}{-S \log_e (1-a)}$, is used for application to rooms with a high ratio of absorption to volume (dead rooms). In this formula T equals the reverberation time in seconds; V, the volume of the interior in cu. ft.; S, the total surface; and a, the average coefficient of all reflecting surfaces, taking into account the relative area of each type.

During the past fifteen years, Johns-Manville engineers have studied and recorded reverberation characteristics of such rooms. They have designed and constructed studios, and have investigated their satisfactory operation in actual practice. As a result of these observations and studies, Johns-Manville recommends the correction of studios for an average reverberation over six frequencies, namely 128, 256, 512, 1024, 2048 and 4096 cycles.

To meet such a condition, the acoustical material used must have sound-absorbing efficiency over the entire range from 128 to 4096 cycles, and a frequency characteristic that approximates the complement of the equal loudness contours.

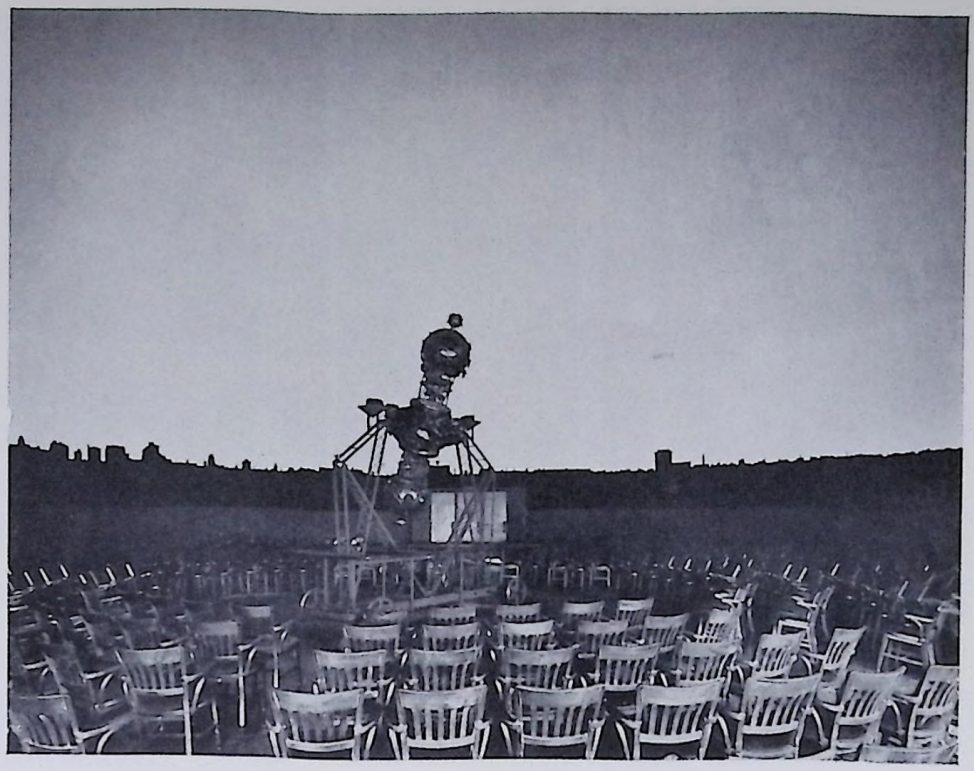
The desired correction may be obtained with J-M Broadcasting Studio Treatment, a construction which consists of a rigid Studio Element, finished with decorated sheets of perforated Transite. In addition, various thicknesses of rock wool, covered with perforated metal or Transite, are frequently used for special acoustical results.



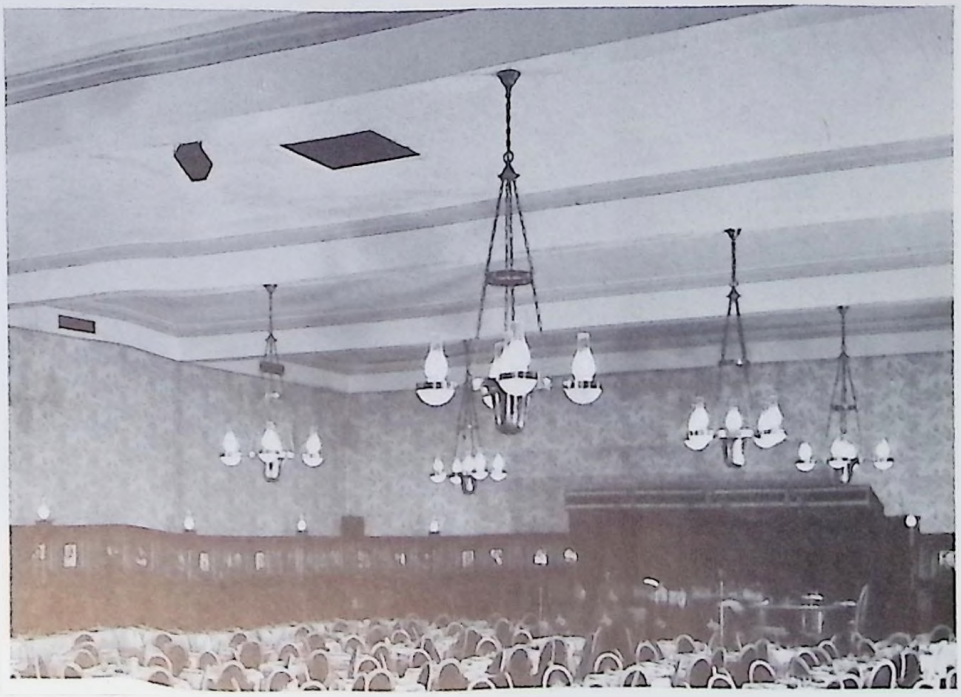
The world's largest broadcasting studio, located in Radio City, New York, is finished in fabric-covered Transite Acoustical Panels and completely treated with the J-M System of Sound Isolation (Photograph, courtesy of the National Broadcasting Co.)

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Stainless steel Sanacoustic Panels over the entire dome afforded the solution of the difficult acoustical conditions produced by the necessary hemispherical ceiling of the Fels Planetarium. The indirect lighting was shielded by a cut-out metal simulation of the Philadelphia sky-line, topping the high wainscoting of additional acoustical treatment



This Johns-Manville installation assures comfort to the patrons of Jack Dempsey's Restaurant, New York, N. Y. In places where people gather to enjoy food and music, sound control treatment performs a dual service. It corrects acoustical difficulties which are especially pronounced where sound amplification is used; also it diminishes the noise of conversation and the clatter of dishes

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Noise Quieting



Sanacoustic has brought relief from distracting noise to hundreds of busy workers of this large general office of the Prudential Life Insurance Company, Newark, N. J.

Noise reduction, as applied to offices, banks, schools, hospitals, restaurants and factories, does not involve the preservation of the character of sound as produced. Rather, it deals with the absorption of unwanted noise. The deleterious effects of such noise upon the human individual and the importance of control over its disturbing influence have received much attention.

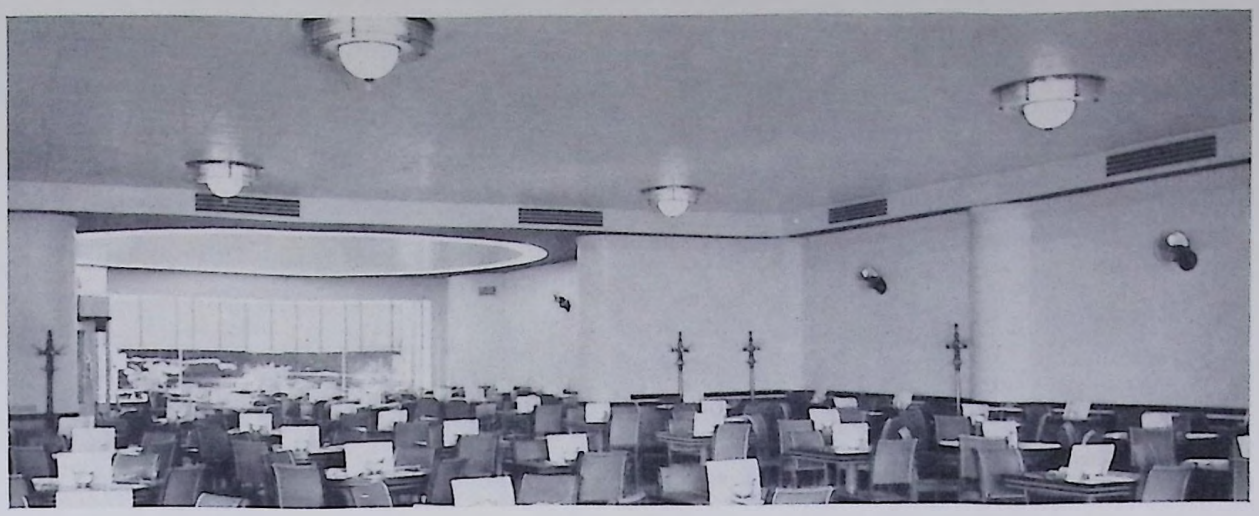
Careful research has revealed that if noise energy is absorbed as rapidly as it is produced, preventing its reinforcement and accumulation, the nerve-wracking intensity of noise can be eliminated. The installation of sound-absorbing materials on the ceilings or walls of room interiors has proved to be the solution to the problem with regard to air-borne sound. Transmitted noise requires additional treatment.

Johns-Manville's acoustical engineers are equipped to investigate noise problems and recommend the appropriate treatment to rectify the condition. With the use of electrical noise-measuring instruments and after consideration of the size and furnishings of the room, they can make definite recommendations and predict what the treatment will do. After the installation, the prediction is verified by means of the noise meter which registers the loudness of sound.

The unit most commonly used for denoting the loudness of a sound is the "decibel," abbreviated "db." The loudness of a given sound expressed in decibels is ten times the common logarithm of the quotient obtained by dividing the intensity of the given sound by the intensity of a barely audible sound of the same pitch. One decibel corresponds roughly to the slightest change in loudness that can be distinguished by the human ear.

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The J-M Sanacoustic ceiling in Child's Restaurant, Peel Street, Montreal, P. Q., contributes to the pleasant, quiet atmosphere so conducive to enjoyable dining

Hospitals and Sanitariums

In hospitals and sanitariums the difficulty results mainly from noises originating in diet kitchens, corridors, etc. Relative to the need for quieting treatment in such locations, Dr. L. F. Barker, of Johns Hopkins, made the following statement:

"When one goes to sleep it is much easier to cut off the sensory stimuli which arrive through the eye than those which arrive through the ear. We can put out the light and we can close our eyes, but there is no satisfactory way of closing our ears to extreme stimulation, and noises in the street, building or house, act on the brain and prevent sleep. When the body is strong and healthy, it is possible, as a rule, to grow accustomed to go to sleep and continue sleeping despite considerable noise. Most of us who live in cities learn this, but nervous people who are very delicately organized are often super-sensitive to sound. Almost all sick persons are in a state of pathological fatigue and loud, disagreeable noises increase this fatigue to a danger point."



Quiet, so important in hospitals, is made possible with Sanacoustic. Allegany Hospital, Pittsburgh, Pa.

Sanacoustic, tile design, closely meets all the requirements for silence in hospitals. In addition it meets the essential need for sanitation as set forth by Mr. C. F. Neergaard, noted hospital consultant, before Sanacoustic even existed. He recommended that a sound-absorbing material "be an inorganic, highly porous tile, smooth finished, even glazed perhaps, and tinted, never needing to be painted, and everlastingly washable."

Restaurants and Cafeterias

Comfort in restaurants and cafeterias is largely dependent upon quiet surroundings. The din usually incidental to the serving of food must be eliminated if comfort is to be assured. It has been proved that quieting treatments of Sanacoustic and other J-M sound-absorbing materials have paid excellent dividends by making dining hours more restful. When the kitchen is adjacent to the dining room, the clatter of dish-washing and serving usually necessitates the treatment of the kitchen as well.

Acoustical treatment also provides a solution to the problem that arises when luncheons and banquets are followed by speeches.

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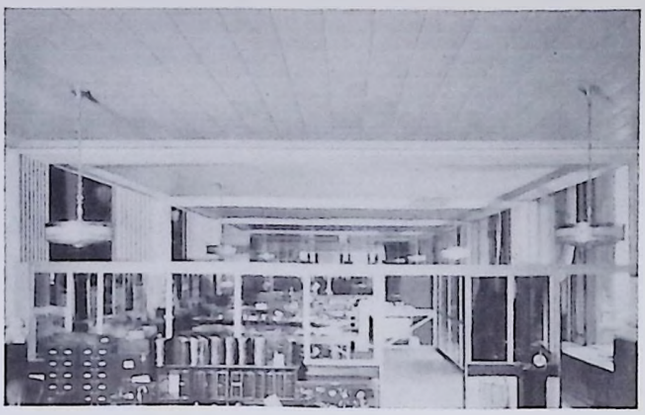
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Schools and Colleges

Noises from the corridors, typewriter rooms, music rooms, gymnasiums and classrooms constitute the major sound control problem in schools. The noises are usually carried from the point of origin through the reverberant corridors into the adjacent classrooms or study halls, causing interference with instruction and distraction from studies.

The disturbing influence of noise hinders the students' efforts to concentrate. It also tends to cause nervousness in the instructors because of their inability to command and hold attention. An apparent dullness in students can frequently be traced to distraction caused by extraneous noises.

Noise reduction by absorption in the offending rooms, and particularly in corridors, makes concentration possible and furthers co-operation between students and instructors.



The tellers' cages of the First National Bank, Chicago, Ill., are noise-quieted with Sanacoustic

Offices and Factories

Business organizations have come to recognize that the comfort and health of their employees are matters of vital consequence, not alone from the standpoint of furthering amicable relations beween management and employees but also from the point of increased output. Discussing the effect of noise upon workers of all kinds, Babson's Reports make the following comment:

"The increasing seriousness of industrial noise as a drag on efficiency, presents a problem to which most clients have paid little attention. Both in the factory and in the office the increasing volume and intensity of sound has reached a point where it ceases to be merely a nuisance and becomes a definite economic liability. As a result, efficiency has been reduced and production slowed up. Wherever office-quieting treatments have been installed there has been a decided improvement in efficiency. Wherever brains are active, noise costs money. We urge clients to examine the acoustic conditions in the various rooms of their offices and plants. Noise is today on every employer's payroll. Much of it can and should be removed."



Corridor of Thomas Edison School, Boston, Mass., with a ceiling treatment of Sanacoustic, tile design

Noise, in business offices and banks, is the result of increased noise-producing apparatus, the grouping together of large numbers of employees and the use of hard, dense interior finishes which are excellent sound reflectors and very poor absorbers.

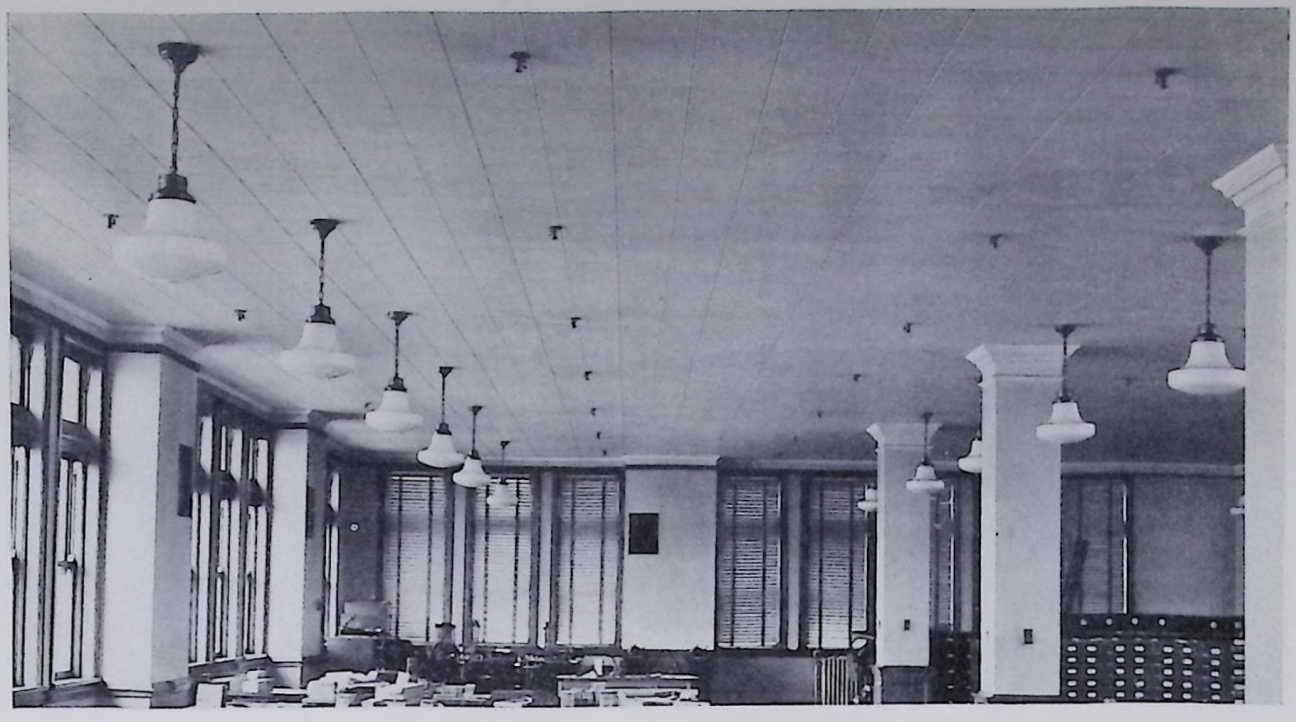
Leading psychologists have shown that considerably more energy is required to do a given amount of work in a noisy room than in one which is quiet. The average office worker knows what a relief it is when the hum, rattle and clamor of office work ceases. This is due to the relaxing of the pressure on the brain and strain on the nervous system which results from noise.



Sanacoustic, one of the most adaptable treatments, moderates distracting influences in this directors' room Mississippi Trust Company, St. Louis, Mo.

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A Sanacoustic ceiling in the general office of the Caterpillar Tractor Company, Peoria, Ill.
By reducing office noise, sound control increases efficiency

Results of Noise Reduction: As an example of what may be accomplished through the abatement of noise, reference may be made to the results obtained from acoustical treatment installed in several large business offices. Properly applied sound-absorbing treatment in many cases represents a considerable investment, but one that returns a high dividend in the efficiency, contentment and health of workers. The following table shows the dividend-paying results obtained by the Western Union Telegraph Company in its telephone operating room.

Records on production, errors and costs were maintained for a period of four weeks before and after J-M sound-absorbing materials were installed. The following tabulation reveals the saving in the cost of messages and the reduction in errors after the installation of the noise-quieting treatment.

Weekly Average	Message load	Cost per message*	Errors, percent
4 weeks before installation	33781	1.016	0.427
4 weeks after installation	34503	0.985	0.246

*These figures are on a relative basis only. Cost during the first week of test was designated at 1.000 per message. Thus the savings per message amounted to 3.05 percent of all the messages transmitted. The reduction in errors amounted to 42.4 percent.

On the basis of savings, the annual return on the investment in sound-absorbing materials (Sanacoustic, tile design), after charging off the depreciation and interest, amounted to 67 percent. The savings effected paid for the installation in 1½ years.

Another detailed study of the benefits derived from J-M sound-absorbing materials was made by the Rike-Kumler Company. In this case, the record of production was made for a period of six months before and four months after the installation in the large general office. The reduction of errors amounted to 24.5 percent. Compared with the advantages derived, the cost of the sound-absorbing installation was really very small. The daily cost per person was estimated at $0.016, based on a conservative depreciation of 5 percent and conventional interest charges.

The Rike-Kumler Company, however, contended that the cost of correcting errors was negligible, compared to the loss of customer good will if, for example, the error was made in a customer's statement. This, one of the most important advantages, could not be evaluated in terms of money.

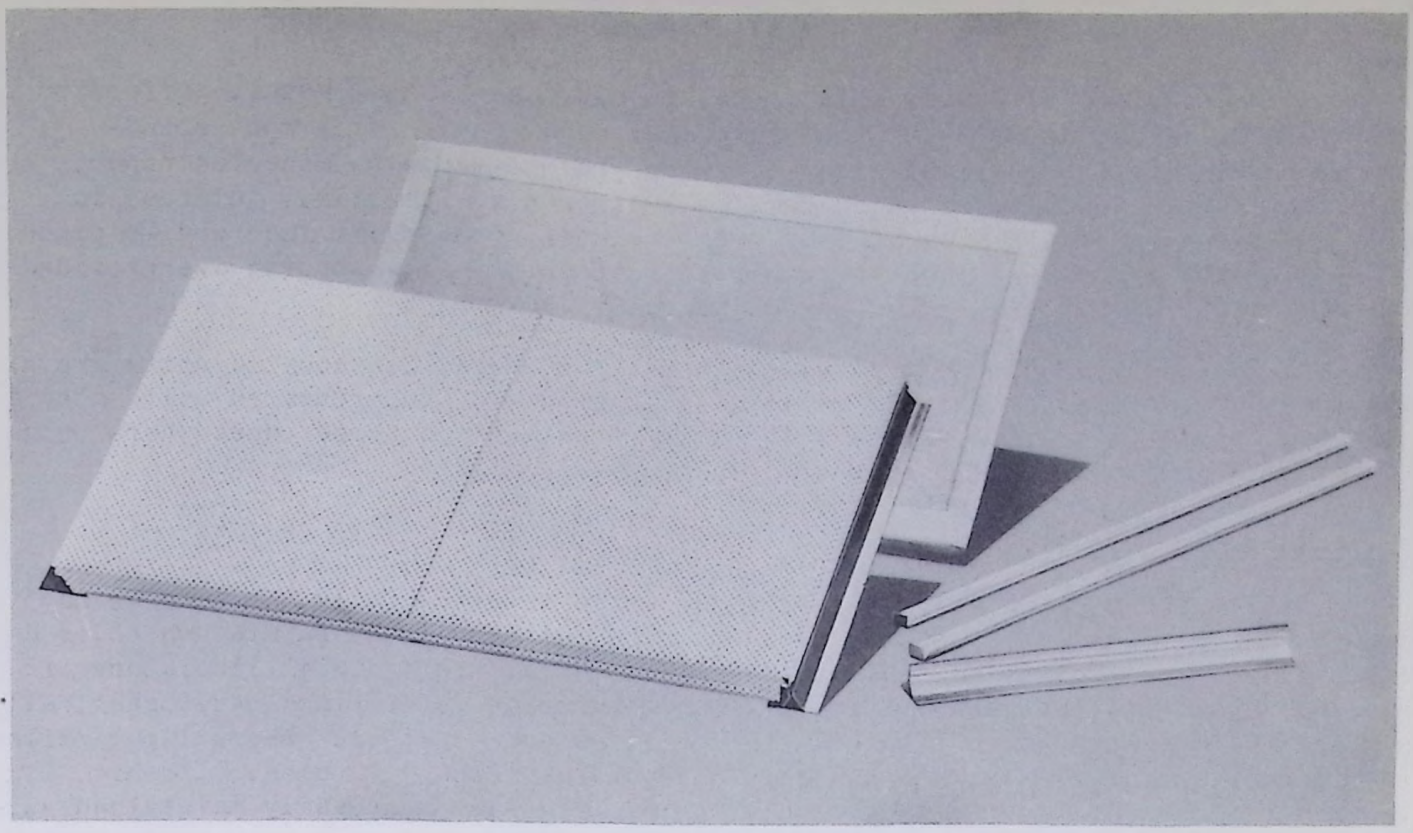
The records of many companies indicate an increase in efficiency and a reduction in errors of clerical workers when located in quieted offices. Creative workers, executives and others whose duties require the exercise of keen discrimination are effected by noisy surroundings even more than clerical workers—and a mistake in judgment is much more costly than a clerical error.

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SANACOUSTIC



Sanacoustic with sound-absorbing pad and supports

The extensive range of Sanacoustic installations has proved this material to be adaptable for almost any type of acoustical application requiring an effective sound-absorbent. Offices, hospitals, banks, restaurants and classrooms are obvious locations for noise-quieting Sanacoustic ceilings. Surfaces of court rooms, school auditoriums, churches and countless other places where the improvement of audition was considered necessary have also been treated with this material.

The following technical points of importance have been incorporated in the design and construction of Sanacoustic, tile design:

1. High sound-absorption efficiency.
2. Resistance to fire: Made of metal and rock wool, there is no fire hazard.
3. Permanent and excellent light reflection compatible with economical maintenance.
4. Low cost of maintenance: Washable and paintable.
5. Removability: Entire ceiling may be removed and relocated without loss of materials.
6. Units mechanically fastened: No danger of units falling because of adhesive failure.
7. Attractive appearance.
8. Sanitary: The materials that compose Sanacoustic do not support vermin.

Description:

Sanacoustic is available in standard white or standard cream enamel, in wood grain finish and in polished or enameled aluminum. Standard sizes are 12" x 12", 16" x 16" and 12" x 24". The 12" x 24" size may be furnished scored to give a 12" x

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Sanacoustic		(BMS-92)

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12" tile pattern, half the size of the complete unit. Attractive pre-decorated designs are also available in the 16" x 16" size.

The surface of Sanacoustic is No. 26 U.S. gauge sheet metal, perforated with holes 0.068" in diameter. Each unit contains a special rock wool sound-absorbing element, the back and sides of which are encased with asbestos paper. The face, exposed to the perforated metal, is covered with muslin. In order to space the sound-absorbing element away from the perforated metal face and to place the load of the pad on the face at points of suspension, pad supports are provided with each unit.

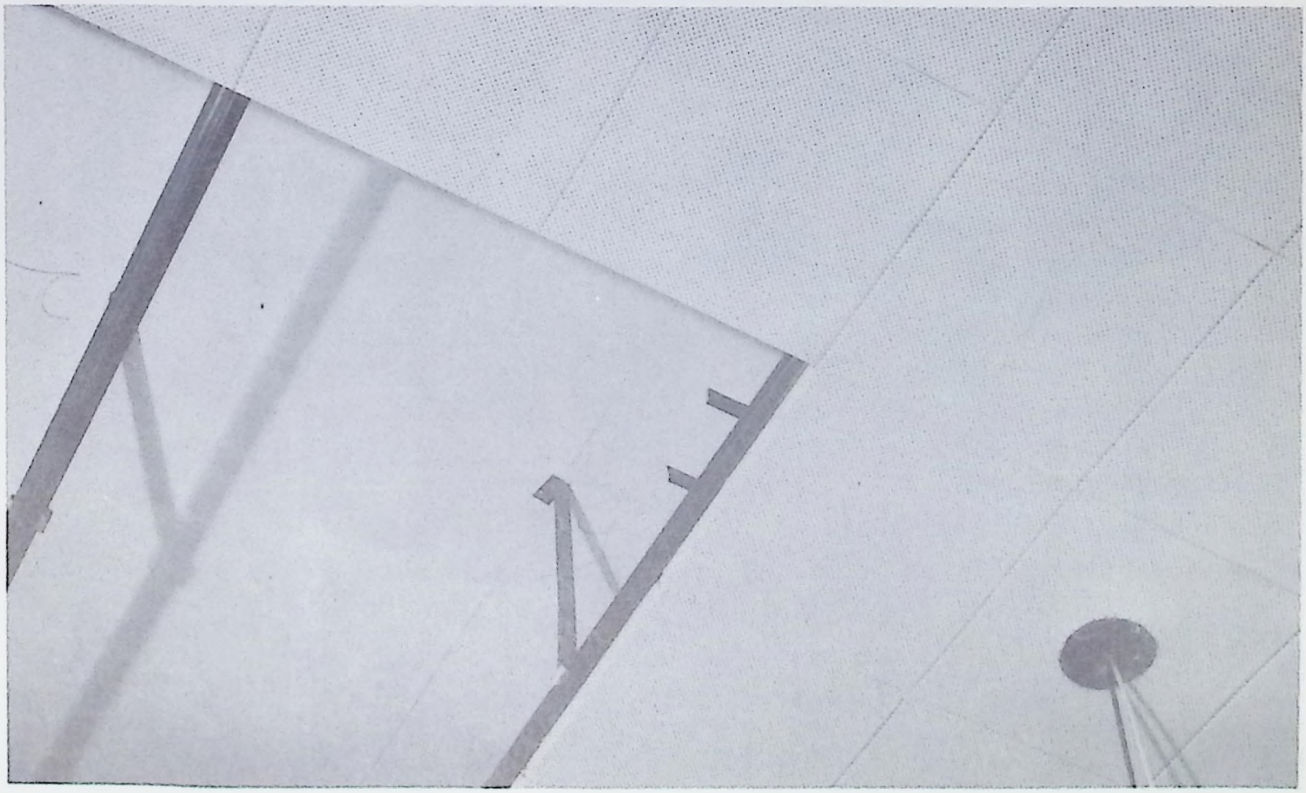
For use in laying out panels with plain borders, Sanacoustic units are furnished unperforated in the 12" x 24" size. The use of unperforated units also make it possible to provide an overall ceiling treatment in those cases where only a portion of the surface is required to be sound-absorbing.

Maintenance:

Since the exposed surface of Sanacoustic is essentially the same as any baked-enamel product, it is easily cleaned. The ceiling may be painted whenever a change in color scheme is desired. Tests conducted at the official laboratory of the Acoustical Materials Association show that numerous repaintings have practically no effect on the sound-absorbing efficiency of the construction. Where light reflection is of prime importance, the standard white finish should be used. Its high light-reflection factor is exceptional for a durable, permanent and easily maintained surface.

Installation:

Installation and removal of the units are easily and quickly accomplished with very little inconvenience. The individual units, consisting of perforated metal casings containing rock wool sound-absorbing elements, snap into copper-bearing steel tee bars which have been secured to the surface being treated.

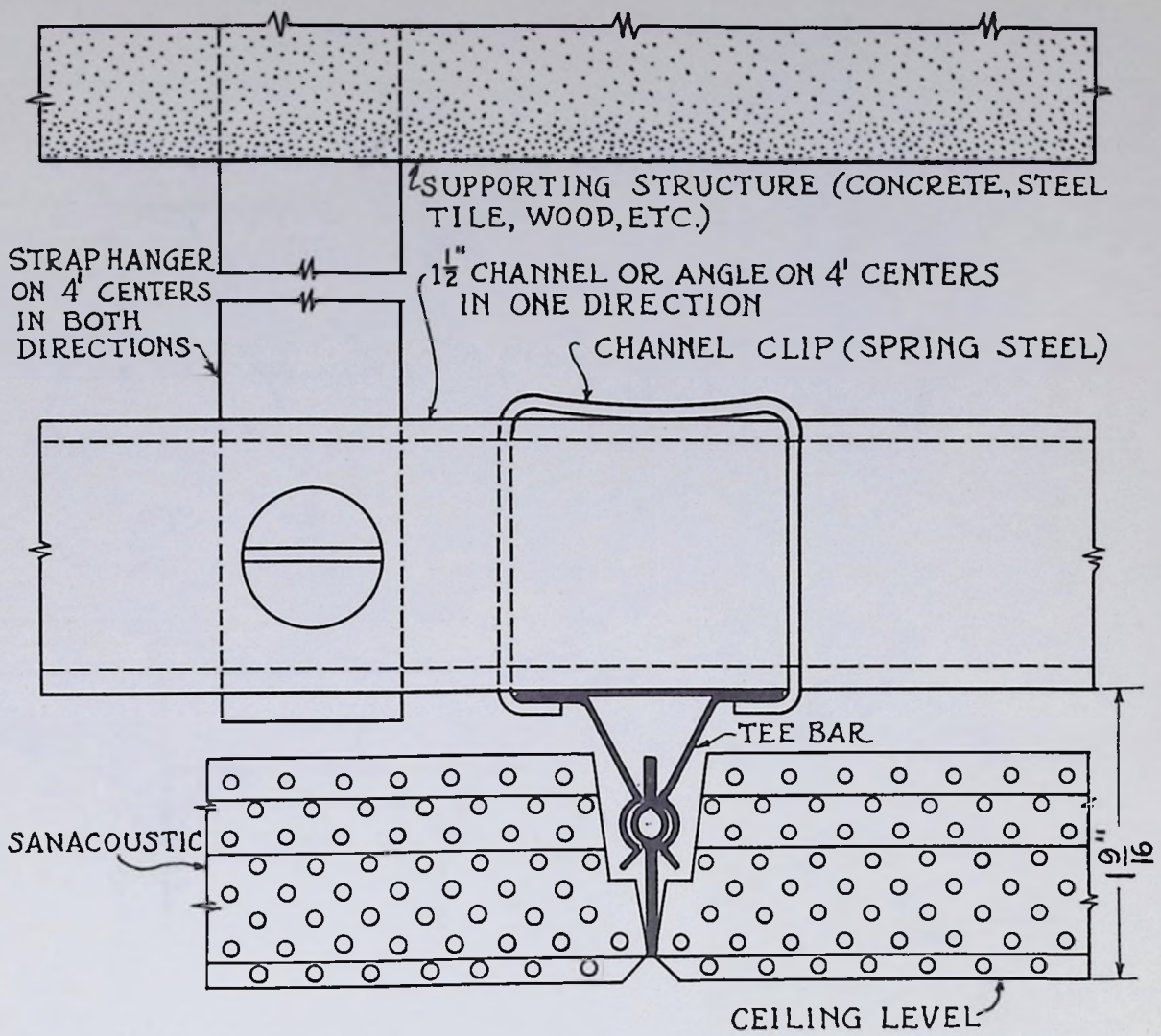


An installation of Sanacoustic, 12" x 24", showing the metal tee bars suspended about 18" from the original ceiling. This construction shows a neatly inserted outlet box supported in place by two small channels, ready to receive the lighting fixture. Note the main tee bars fastened to the ceiling with 1" straps

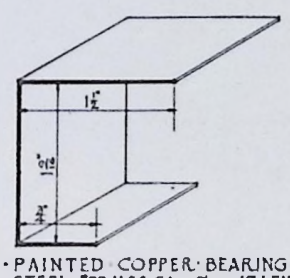
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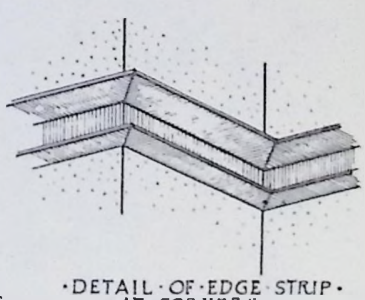
This design increases salvage value and gives the advantage of flexibility in arrangement and accessiblity to any portion of the installation. The finished surface is level and true, making the final effect neat and workmanlike. In the case of new work, this type of construction obviates the use of metal lath and plaster.



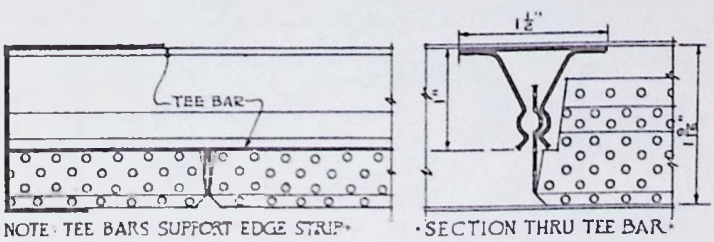
The drawing above is another typical suspended Sanacoustic ceiling showing the method of suspending the 1-1/2" channels, the method of fastening the tee bars to the channels and the manner in which the Sanacoustic units are inserted.



·PAINTED COPPER·BEARING STEEL·#22·U.S.S.GA.·8' AND 10' LENGTHS·



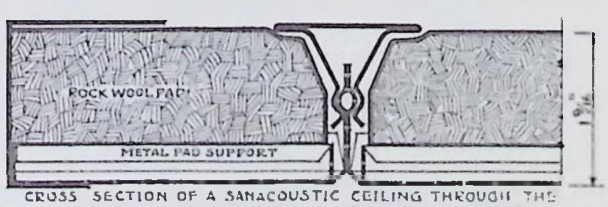
·DETAIL·OF·EDGE·STRIP· AT CORNERS·



NOTE· TEE BARS SUPPORT EDGE STRIP·

·SECTION THRU TEE BAR·

DETAIL WHERE TEE BAR MEETS EDGE STRIP



CROSS SECTION OF A SANACOUSTIC CEILING THROUGH THE ROCK WOOL PADS SHOWING THE METAL PAD SUPPORT EDGE STRIP IS ALSO INDICATED ALONG ONE EDGE

SECTION SHOWING PAD AND PAD SUPPORTS WHERE EDGE STRIP PARALLELS TEE BAR

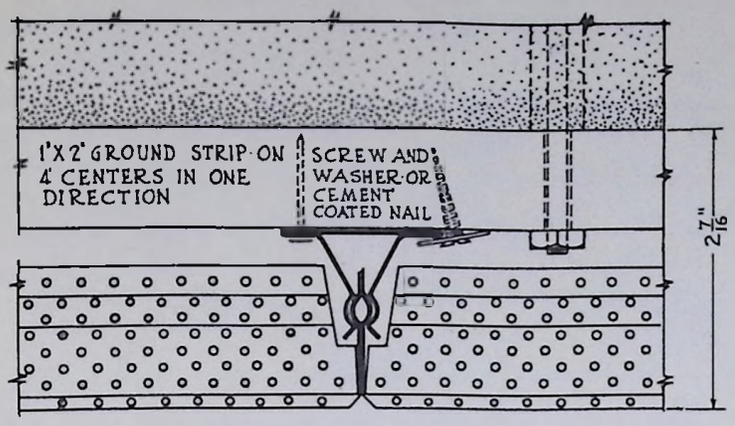
JOHNS-MANVILLE	Sound Control	DATE February, 1938
Sanacoustic		(BMS-93)

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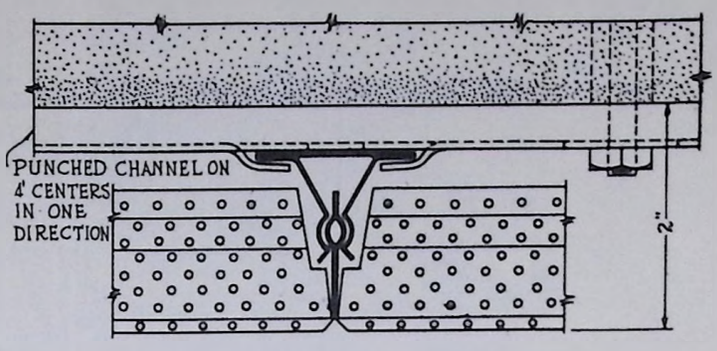
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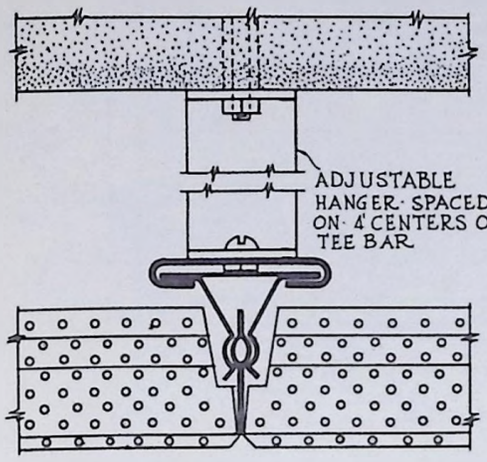
METHODS OF ATTACHING SANACOUSTIC TO EXISTING SURFACES



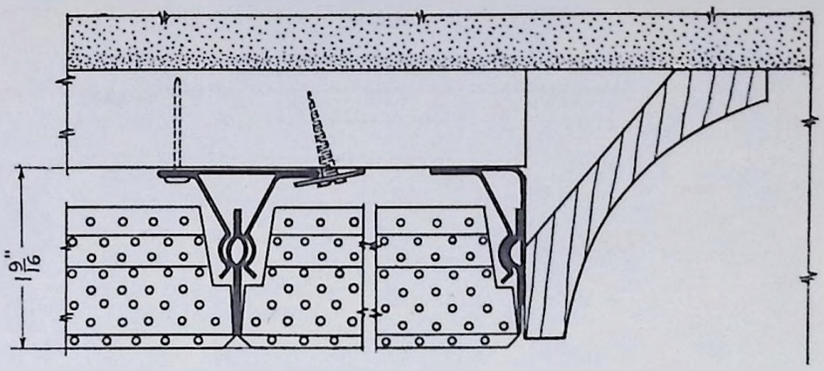
ON WOOD GROUNDS



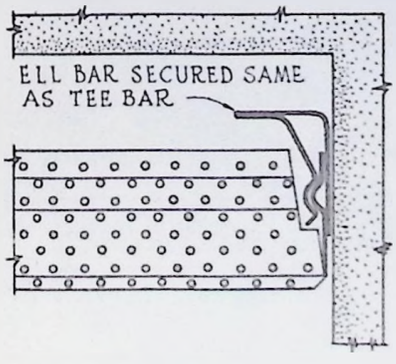
ON METAL GROUNDS



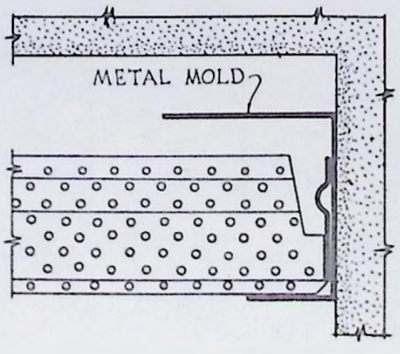
SUSPENDED BY ADJUSTABLE HANGER



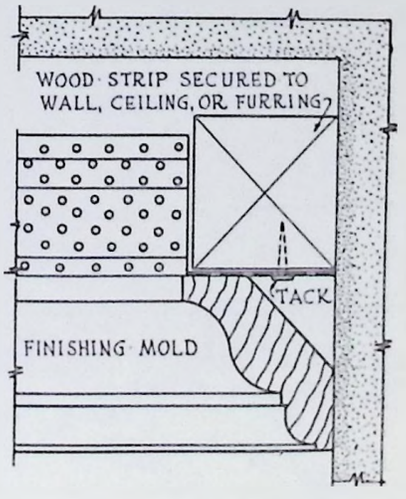
WITH COVE MOLD AT EDGE OF PANEL



WITH ELL BAR AT INTERSECTING SURFACES



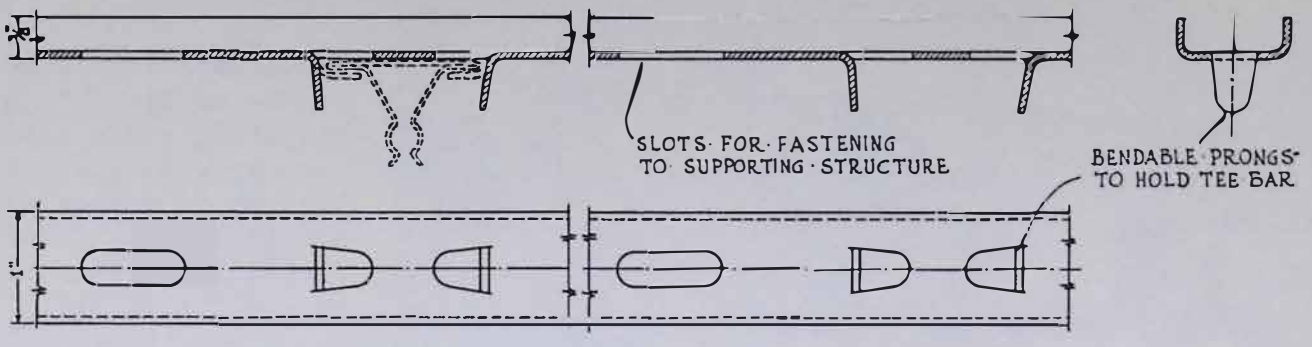
WITH METAL MOLDING AT INTERSECTING SURFACES



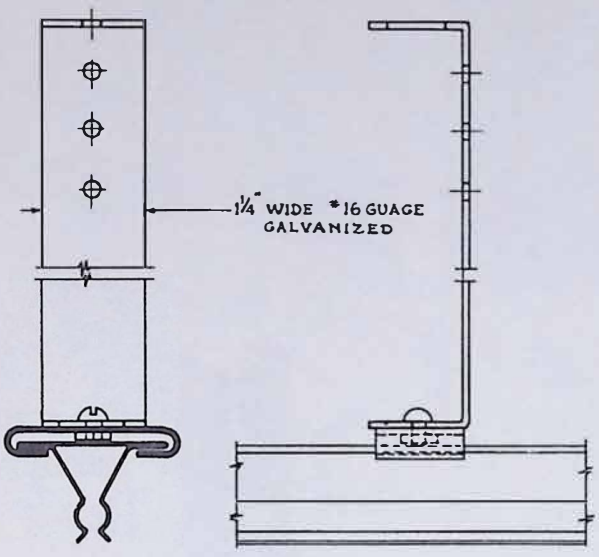
WITH WOOD MOLD AT INTERSECTING SURFACES

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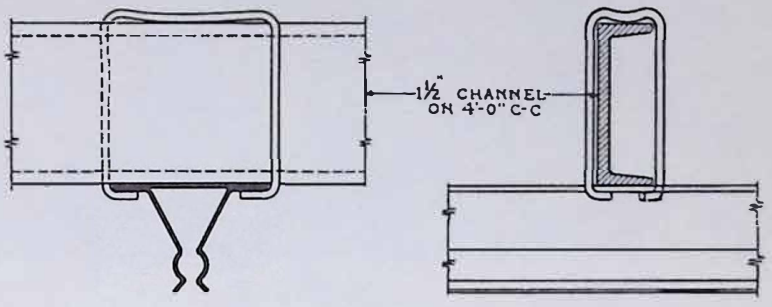
SANACOUSTIC TEE BAR SUPPORTS



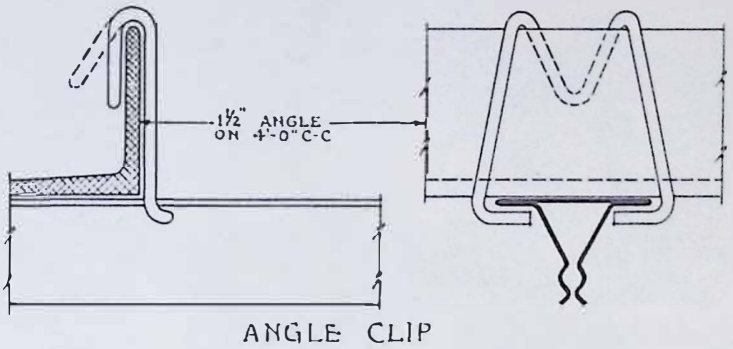
1" PUNCHED CHANNEL



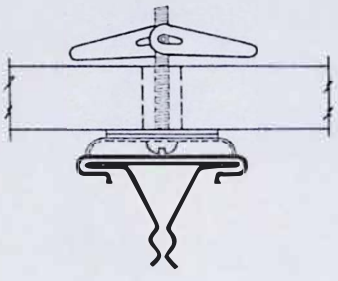
ADJUSTABLE HANGER



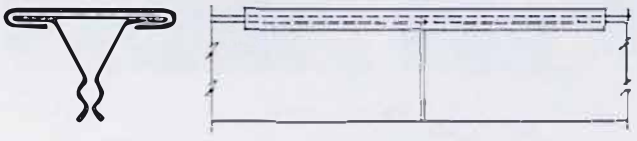
CHANNEL CLIP
(OR KEYES CLIP)



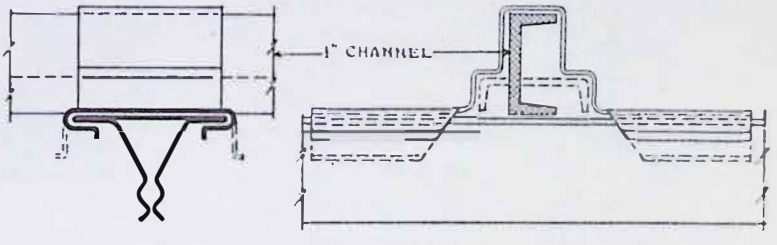
ANGLE CLIP
(OR BREIDY CLIP)



SHIM CLIP



JOINT CLIP



SADDLE CLIP

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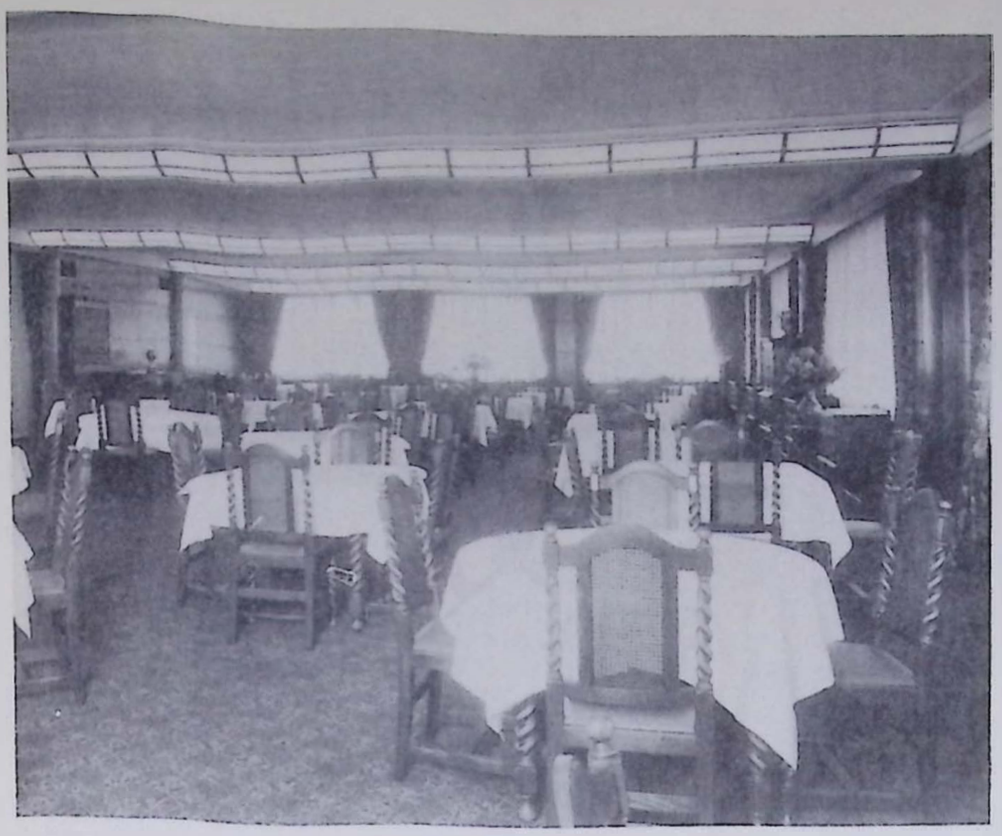
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Sanacoustic		(BMS-94)

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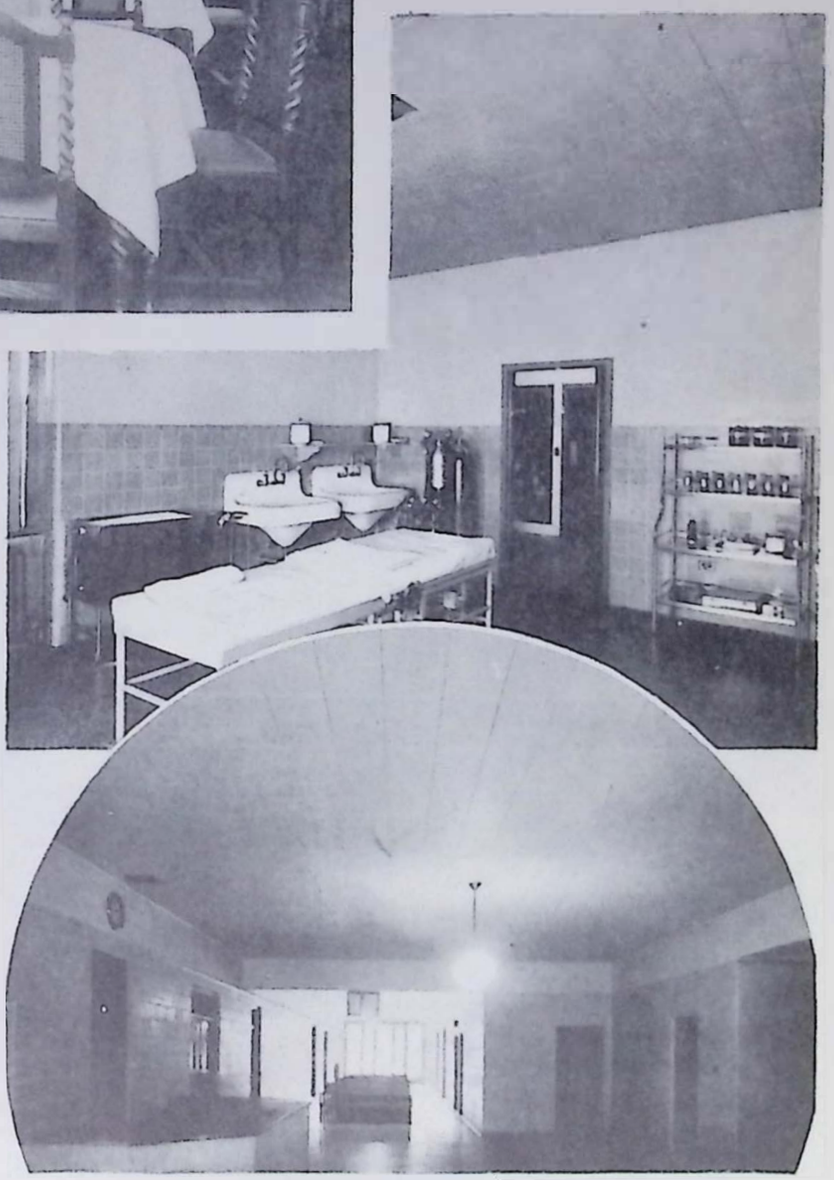
INSTALLATIONS OF SANACOUSTIC



Sanacoustic, tile design, on the ceiling of this beautiful staff dining room effectively reduces the hum of conversation and the noise of serving. Imperial Life Assurance Co., Victoria St., Toronto



This office of the United Drug Co. laboratory, Boston, Mass. is quieted with J-M Sanacoustic



The out-patient department and delivery room pictured above have Sanacoustic ceilings. Allegheny General Hospital, Pittsburgh, Pa.

The unusual properties of Sanacoustic are of varying importance in different locations as, for example, its remarkable acoustical efficiency in school corridors, light reflection in offices, and sanitation in hospitals. Restaurants, in which the kitchen is close to the dining room, use this material to effectively reduce the din and clatter of dishwashing and serving. Virtually the only product with so wide a range of application, Sanacoustic should receive first consideration wherever the control of sound is essential.

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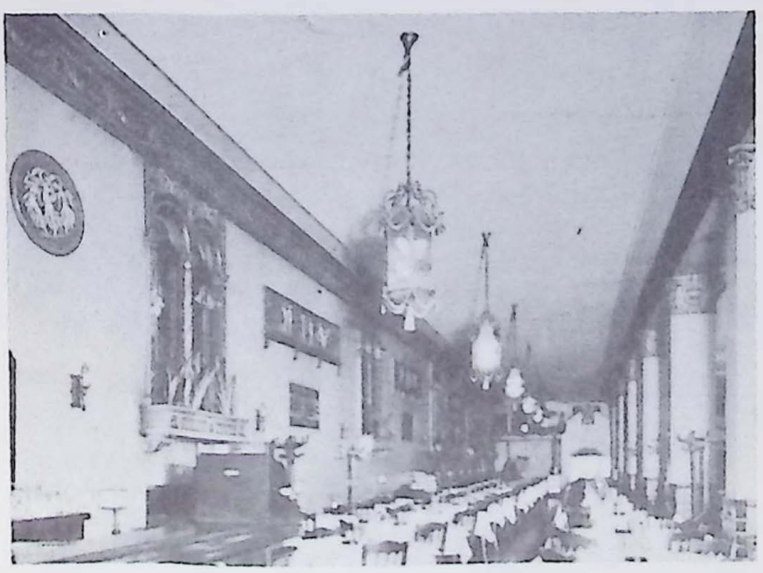
CARE AND MAINTENANCE OF SANACOUSTIC

Maintenance is one of the important factors to consider when selecting a sound-absorbing material. Hospital walls and ceilings are usually washed quarterly or semi-annually and painted every year or two. Schools are freshly decorated every three to five years, whereas tenant changes usually govern the frequency of office painting. Hence, the net cost of a sound-control installation over a period of years is affected by the ease and economy with which it can be washed or painted.



The enameled surface of Sanacoustic can be easily, economically painted or cleaned

The smooth, baked enamel surface of Sanacoustic makes it as washable as an enameled dish and renders costly painting for maintenance purposes unnecessary. The tough, permanent, smooth and impervious baked enamel film does not become as readily soiled as does the surface of any acoustical treatment which has been brush or spray-painted with a lead and oil paint. The smoothness of the enameled surface does not allow such dirt, as accumulates, to become ingrained as it does in the roughness, brush marks and more pervious texture of ordinary paint film. It is true that Sanacoustic can be painted repeatedly without impairing its sound-absorbing efficiency.



If a change is ever desired in the color scheme of Manns Rainbow Tavern, Chicago, Ill., no loss of acoustical efficiency will result by painting the Sanacoustic ceiling

Where special colors or a change in color scheme is desired, Sanacoustic may readily be painted; but painting is a choice, not a necessity.

The following methods of cleaning and painting Sanacoustic units have been used successfully throughout the country and should prove satisfactory under all normal conditions.

Cleaning: For ordinary cleaning, the use of any popular brand of mild soap or soap flakes that easily lathers is recommended. A good, heavy lather should be worked up in a pail of water and then be painted on the ceiling with a wide brush. This method of applying only soap-froth to the ceiling enables the suds and brush bristles to penetrate the cracks between the units and loosen any dirt lodged there. After the lather is painted on the ceiling, it should be

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Care and Maintenance of Sanacoustic		

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wiped off with a moist sponge that has been rinsed in clean water. It is important to change the water as soon as it becomes even slightly dirtied with dislodged dust. Sponging the units with any but clear water will result in a smudged and dirt-streaked surface.

To be most effective, this cleansing process should be comparatively dry. If, while painting the ceiling with lather, the brush is dipped into the water, it should be squeezed fairly dry against the side of the pail. The sponge used in removing the lather should be moist, not excessively laden with water.

Occasionally ceilings, as those in kitchens, become coated not only with dirt but with grease. Similarly, ceilings such as those in brokerage offices are discolored because of excess tobacco smoke. Should a strong soap be desired to cut the grease and tobacco or other stains, Fels-Naptha, used in the manner described, produces excellent results.

Akoustikal Kleansor, manufactured by the Franklin Research Company, 5134 Lancaster Avenue, Philadelphia, Pa., is also serviceable on ceilings exposed to excessively dirty conditions. The makers recommend that Kleansor be diluted with water in the proportion of one part to three. The solution should be applied with a cheese cloth, rubbing in a parallel direction, not circularly. The rubbing should be followed by wiping the units with a piece of clean cheese cloth, dipped in clean water and well wrung out. For badly soiled spots, equal parts of Kleansor and water can be used. For new installations, one part Kleansor to five of water will usually be sufficient.

For very dirty and discolored installations, Gold Dust and Clorox can be used in strengths depending upon the extent of soil. These may be used separately or in combination and should be applied with cloths, and afterward sponged with clean water. Gold Dust and Clorox are strong solvents and may attack the painted surface. They should be used only as a last resort and then as weak as possible.

Painting: It is good painting practice first to wash surfaces which are to be re-painted. When painting Sanacoustic, it is not necessary to use special paints or painting technique. Any ready-mixed paint, such as Sherwin-Williams "Flatone"; Pittsburgh Plate Glass Co. "Wallhide"; or Dupont "Flat Wall Paint" is recommended. These paints should be thinned to the usual working consistency. In application, the brush should be scraped on the edge of the paint container to preclude too much paint being applied in one spot at the first stroke of the brush.



Being easily and thoroughly cleaned with mild-soap lather, the Sanacoustic ceiling installed in the State Hospital at Manteno, Ill., is an invaluable aid in maintaining hospital sanitation

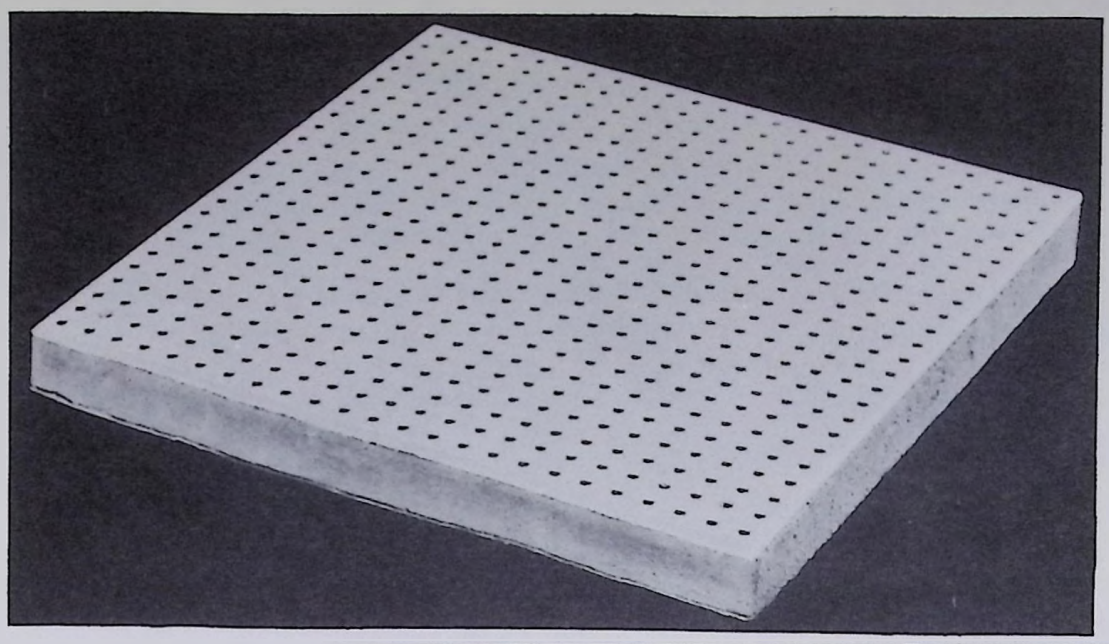


The installation of Sanacoustic provides noise-reduction and maximum light reflection - both of which are essential to business efficiency. The original high coefficient of light reflection is not impaired since the inevitable deposits of dust and dirt can quickly and easily be removed

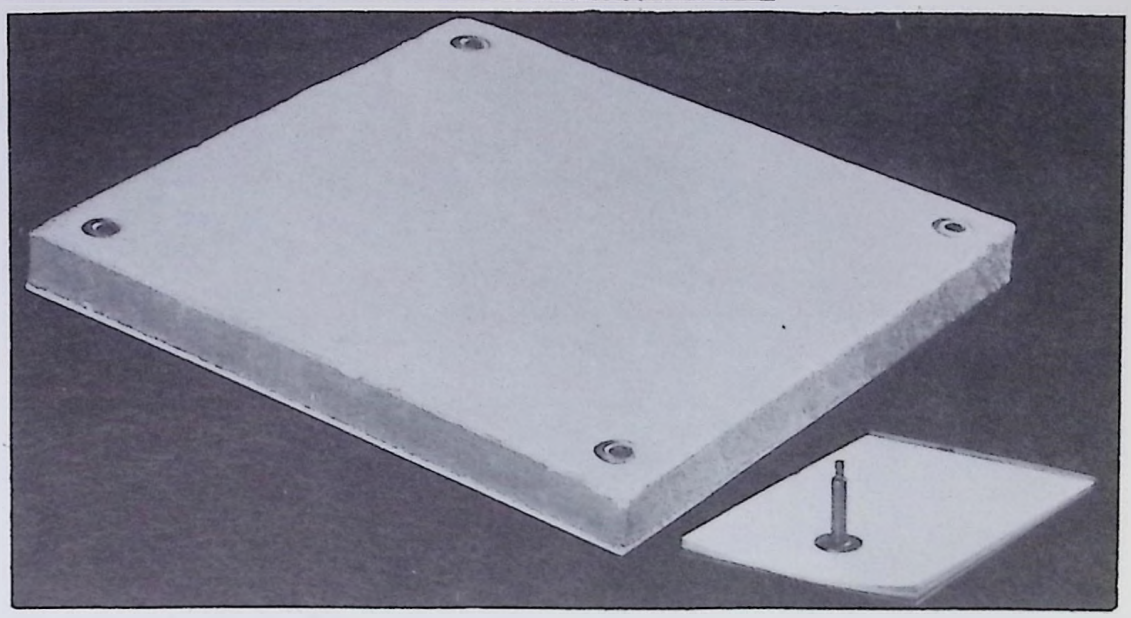
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TRANSITE ACOUSTICAL UNITS



Transite Acoustical Units consist of a perforated Transite facing and a Rock Wool absorbing element, which has a backing of asbestos paper



Rear view of a unit showing the grommets that permit nailing to the furring strips

Transite Acoustical Units are efficient sound-absorbing elements, especially serviceable for treating surfaces that are subjected to excessive moisture, steam or corrosive fumes. The nature of this material makes it admirably suited for swimming pools, kitchens, dishwashing rooms, or other locations of high humidity - also gymnasiums and fireproof buildings of all types.

Transite Acoustical Units, made entirely of inorganic materials, are non-combustible and durable. Each unit consists of a perforated Transite covering fastened to the sound-absorbing medium which is backed with a sheet of asbestos paper. The Transite facing, which protects the sound absorbent, is composed of asbestos fibre and portland cement which is united under tremendous pressure into a monolithic material of unusual strength and rigidity. The units are furnished 12" x 12" x 1-1/8" thick in standard finishes of buff and cream white.

A ceiling composed of Transite Acoustical Units can be economically maintained by merely washing the exposed surface. The ceiling can also be painted without loss of sound-absorbing efficiency.

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Transite Acoustical Units		BMS-120

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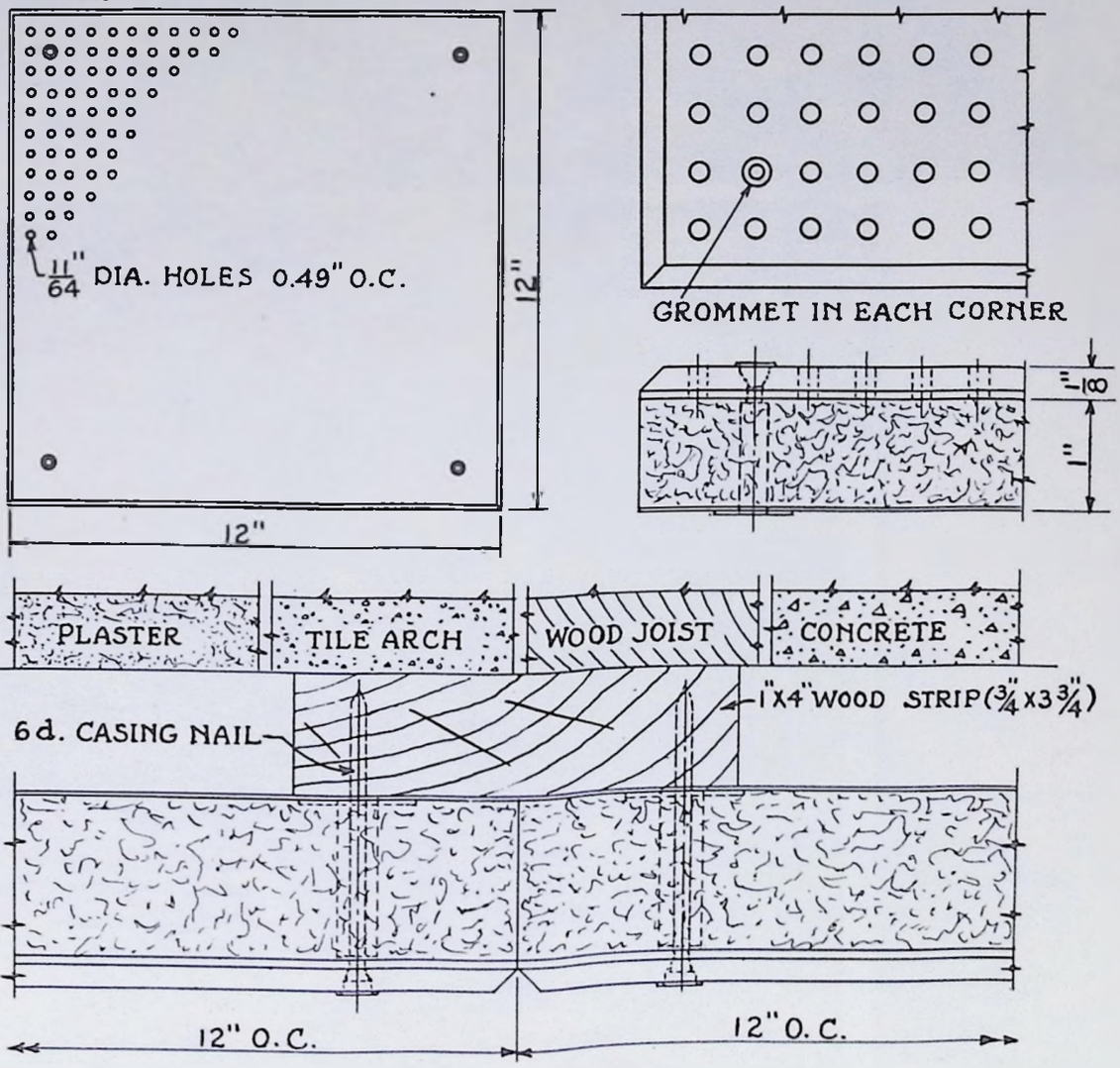
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Sound-Absorbing Efficiency: Results of tests by the Official Laboratory of the Acoustical Materials Association with the material installed on furring strips in the conventional manner indicate excellent absorbing characteristics - particularly in the middle and low frequencies.

Erection: 1" x 4" wood strips (dressed to 3/4" x 3-3/4") may be nailed, wired, toggle-bolted or expansion-bolted on 12" centers to the structural ceiling or wall. To these furring strips, the units are nailed with 6d casing nails, though finishing nails may be used if desired.

When this material is used in swimming pools, kitchens, etc., where the relative humidity is likely to be high, the furring should be cypress or creo-dipped; and brass Helyx Drive Screws, manufactured by Hillwood Manufacturing Company, are recommended for attaching the unit. These screws resemble a threaded nail and are hammer-driven.



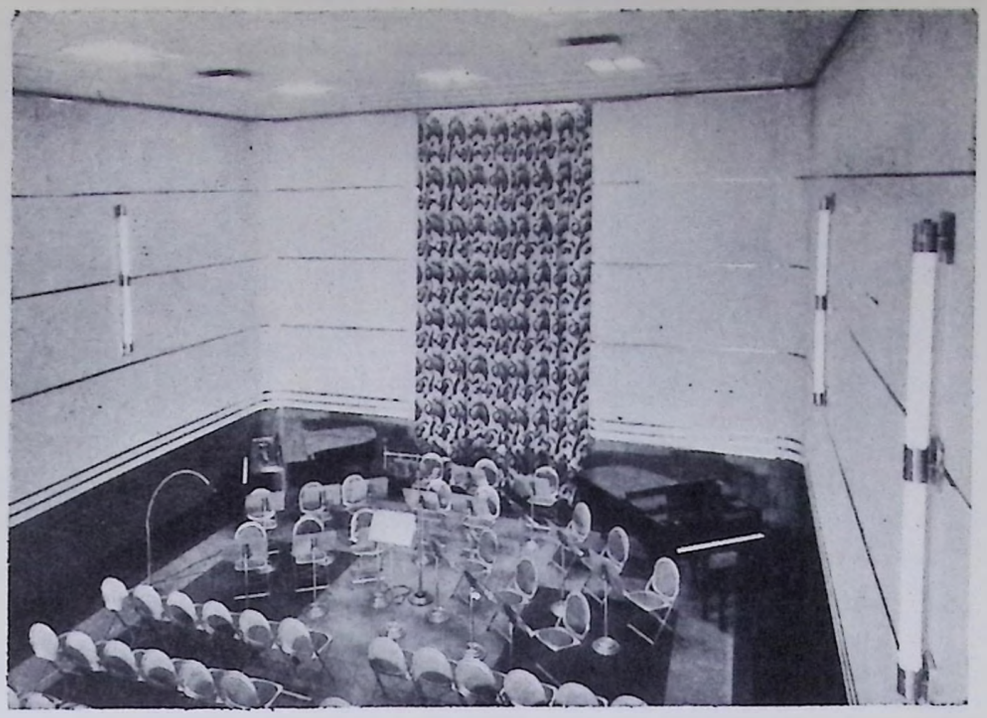


This ceiling of Transite Acoustical Units, erected to quiet the offices of the Chicago Sugar Company is permanent, fireproof and easy to maintain

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TRANSITE ACOUSTICAL PANELS



Transite Acoustical Panels form the sound-absorbent walls of this WWJ Studio, Detroit, Mich. They assure correct acoustics and enable a striking and harmonious, decorative scheme to be effected

Transite Acoustical Panels, a large-sized, sound-absorbent material, are especially adaptable where expansive and continuous areas must be acoustically treated. This material fulfills the requirements for acoustically treating broadcasting studios and has been utilized by almost all the larger radio stations. It affords the correct acoustical background necessary in broadcasting and the rugged Transite facing, which protects the sound-absorbing element, withstands the damaging effects that are likely to accompany the moving of sets, pianos or other large fixtures. Transite Acoustical Panels are likewise recommended in commercial installations where the sound control treatment will be subjected to unusual abuse. The panels also are used wherever tile lines or joints are not desired. In addition to the above characteristics, Transite lends itself to various types of decorative treatment.

Transite Acoustical Panels are similar in characteristics to Transite Acoustical Units in that they are efficient, durable and non-combustible. They can be economically maintained merely by washing and may be painted without affecting their sound-absorbing efficiency.

Sizes of Panels: The panels are available with beveled or square edges, in natural finish buff and with beveled edges in a cream white finish. Standard sizes are 12" x 12", 12" x 24", 24" x 24" and 24" x 48".

The standard Transite panels have either slightly beveled edges or, are square-edged panels, with an unperforated border. When a continuous panel effect is desired, showing an unbroken field of perforations, the beveled edges or unperforated margins are trimmed off the two largest-sized panels. The resultant sizes, 23-7/8" x 23-7/8" and 23-7/8" x 47-3/4" should be specified to secure the continuous perforated surface.

Thickness of Sound Absorbent: Transite Acoustical Panels are used most frequently in studio work with a 2" thickness of rigid Studio Elements, or with Sound Isolation Blanket MK, 22" wide x 25 ft. long in thickness of 2". Additional low frequency absorption is obtained by using multiple layers such as a 2" MK blanket

JOHNS-MANVILLE	Sound Control	DATE February, 1938 (Cancelling BMS-122 dated March, 1937)
Transite Acoustical Panels		BMS-122

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over a 2" MK blanket resulting in a total thickness of 4". A 1" blanket is standard thickness on commercial work.

Erection: The drawings on this and other pages illustrate the construction method for the 23-7/8" x 23-7/8" or 24" x 24" panels. Other size panels are similarly erected, except the 12" x 12" size which are applied to 12" vertical furring only. Where wood stripping will show through the perforations, it should be painted or stained black. Additional details which follow will be made clear by reference to the drawings.

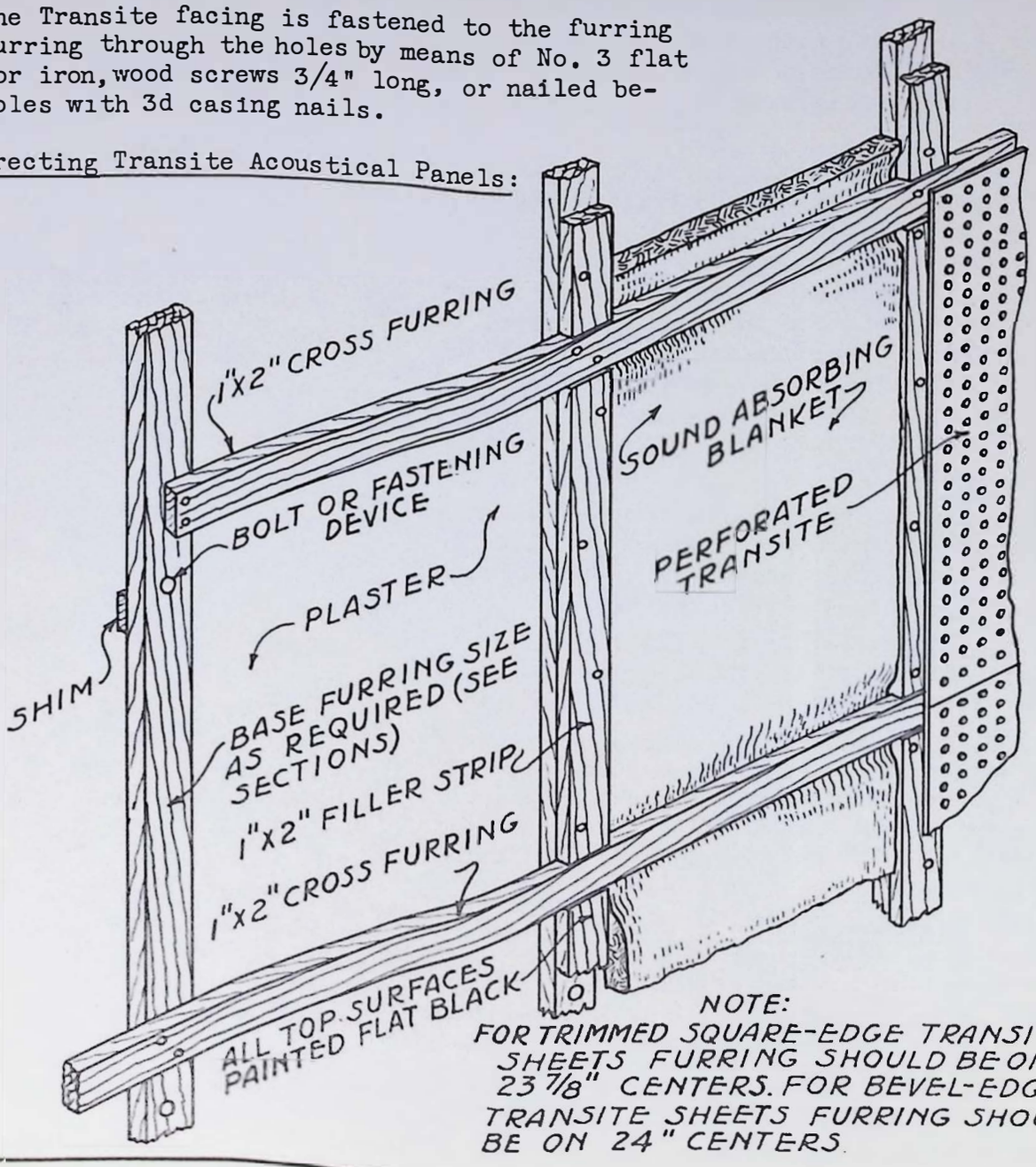
Furring strips are first fastened in place and leveled with shims made of cedar shingles.

1", 2", or 4" blanket treatment is installed between the furring strips and held in place by lacing or by temporary cross furring, after which the permanent cross furring can be installed. When lacing (No. 5 Mason's Cord) is used, common nails shall be driven into the furring on 6" centers, leaving a sufficient length exposed to fasten the lacing cord. The nails are then driven home to assist in tightening the cord. The 4" blanket treatment consists of two 2" blankets and is installed in the same manner as above. Each 2" blanket is laced separately.

Studio Elements are installed in two 1" thicknesses between the furring. One edge is held by the filler strip which is applied off center on the furring, and the other edge by toe nailing. Cross furring is applied over the Studio Elements.

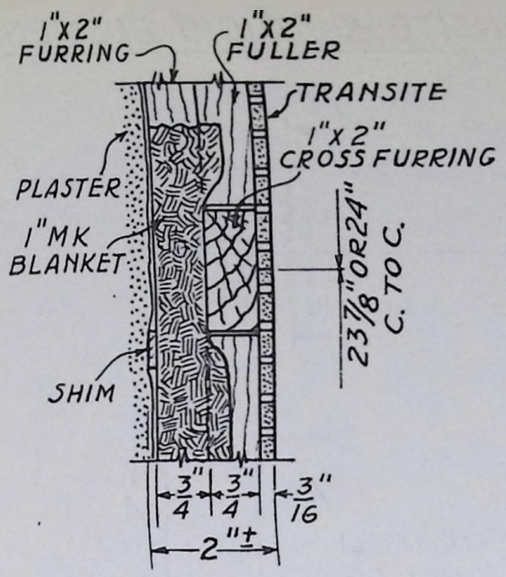
The Transite facing is fastened to the furring and cross furring through the holes by means of No. 3 flat head brass or iron, wood screws 3/4" long, or nailed between the holes with 3d casing nails.

Method of Erecting Transite Acoustical Panels:

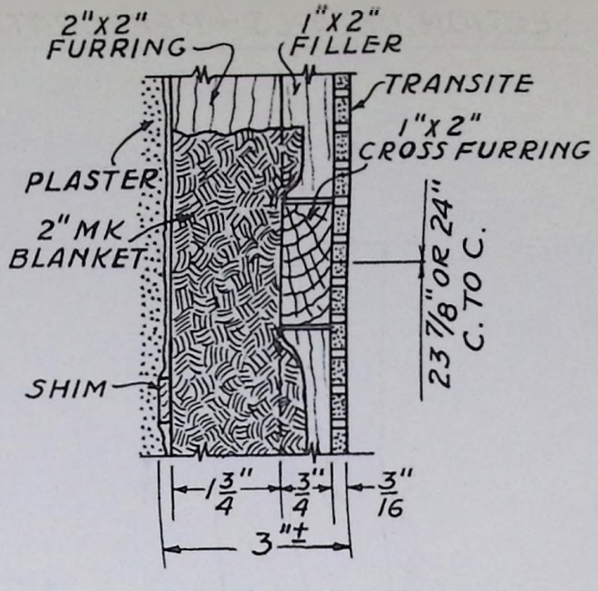


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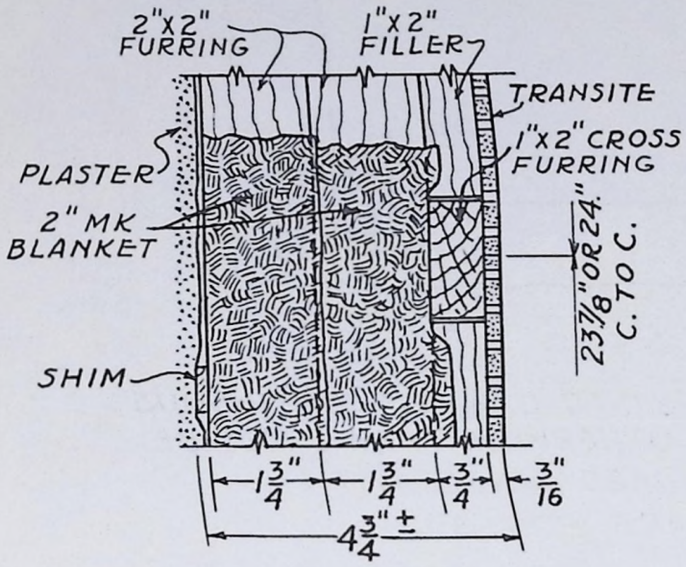
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1" BLANKET



2" BLANKET



4" BLANKET

SECTION DETAILS OF PERFORATED TRANSITE & SOUND ISOLATION BLANKET TREATMENT



As pleasingly decorative as it is correct acoustically is Studio A, WDBJ, Roanoke, Va. Transite Acoustical Panels are used on both walls and ceilings

JOHNS-MANVILLE Sound Control

Transite Acoustical Panels

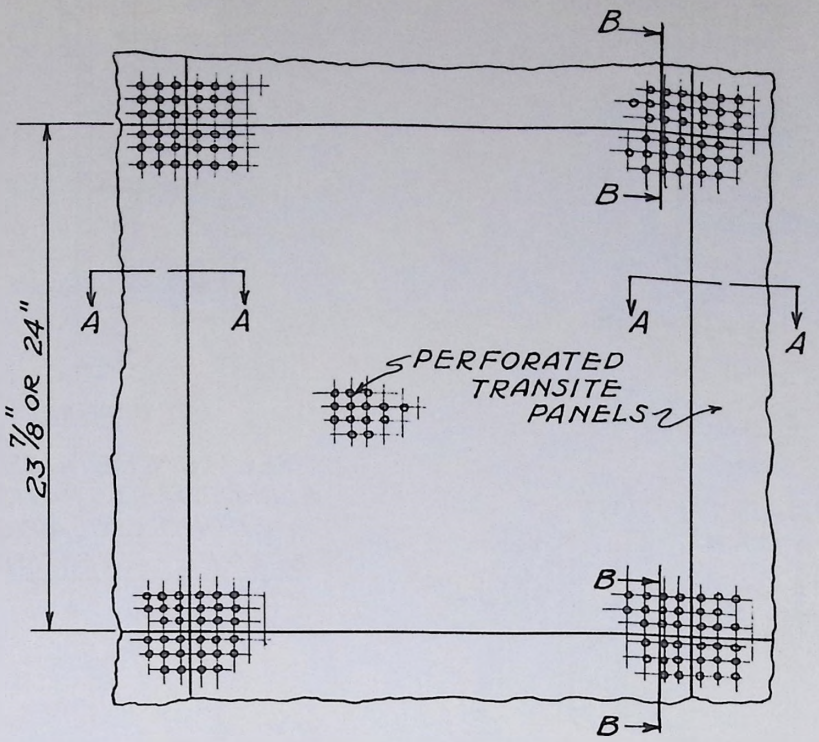
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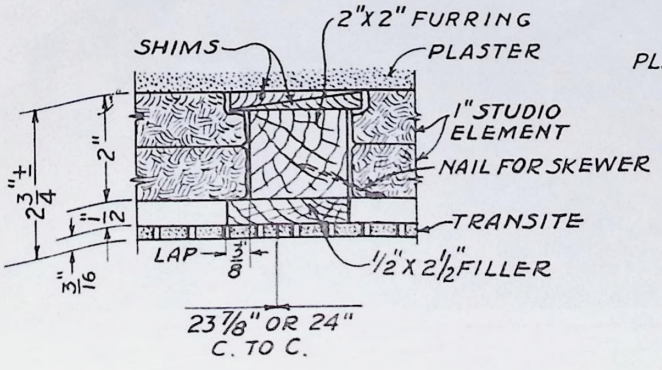
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SECTION DETAILS – PERFORATED TRANSITE & STUDIO ELEMENT

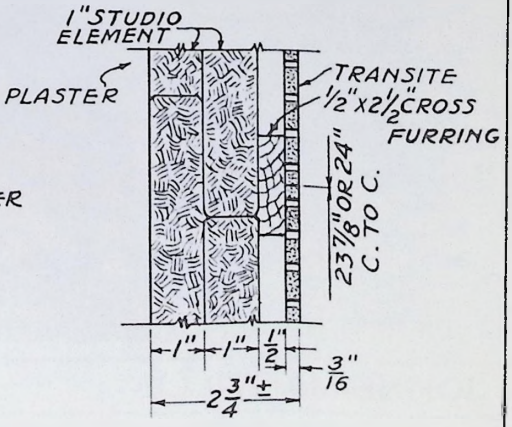


SPACING OF ALL FURRING 23 7/8" C. TO C WHEN CONTINUOUS PERFORATIONS ARE DESIRED. OTHERWISE THEY SHALL BE 24" C. TO C. FOR STANDARD PANELS WITH BEVEL OR SQUARE EDGES.

PART WALL ELEVATION



PLAN SECTION A-A



SECTION B-B

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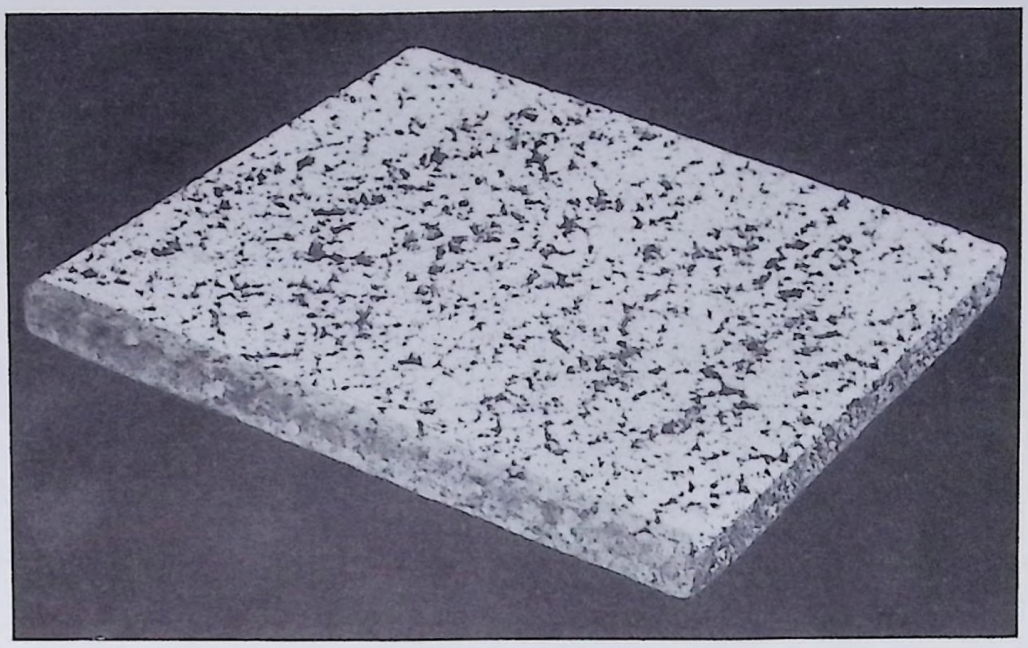
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ROCKOUSTILE TYPE A

Rockoustile Type A is an efficient acoustical tile, manufactured of mica that has been expanded by the application of heat to a mass having a volume many times greater than the original. The sound-absorbing properties of the material are due to the interstices within the expanded mica particles themselves.

The material can be painted without affecting its efficiency - an important feature in office installations. It can also be washed, sanded or vacuum cleaned, although washing must be reserved for tile that has been painted.

A damp-proofing agent is incorporated in the tile during manufacture, but it is not suited for installation in swimming pools, dishwashing rooms or other humid locations.



Rockoustile Type A is attractive, fire resistant, moisture resistant, paintable and has excellent sound absorbing qualities. This leaves little to be desired in an acoustical material

Finishes: The natural color of this product is an iridescent golden ecru but the material is also available painted an ivory cream. On special order it may be had in light-reflecting flat white and in slightly-varying pastel shades of gray, buff, blue and pink. The application of selected colors by brush or spray painting after erection is also recommended.

The texture of the tile is enhanced by many voids which give character to the material. An open texture of this nature is necessary for ceilings of churches, monumental buildings or decorative offices, since close textured materials appear plain and flat when viewed from a distance.

Sizes and Weights: The tile is produced in 1" thickness and in sizes 6" x 12", 12" x 12" and 12" x 24", either with square-cut edges or with a 3/16" bevel on the face. The weight of the tile is about 1 lb. per board foot.

Erection: Rockoustile Type A is installed by spot-cementing and nailing. No. 132 Acoustical Cement is applied in approximately 1/4" thickness and 9 sq. in. area on each corner of the 6" x 12" or 12" x 12" tile. Six spots should be used for the 12" x 24" tile. Water paints and calcimine should be washed off of the ceiling surface and oil-base paints scored before the tile is cemented in place.

JOHNS-MANVILLE Sound Control	DATE August, 1936
Rockoustile Type A	(Cancelling sheet dated November, 1932)
APPROVED:	8-B-30 (BMS-130)

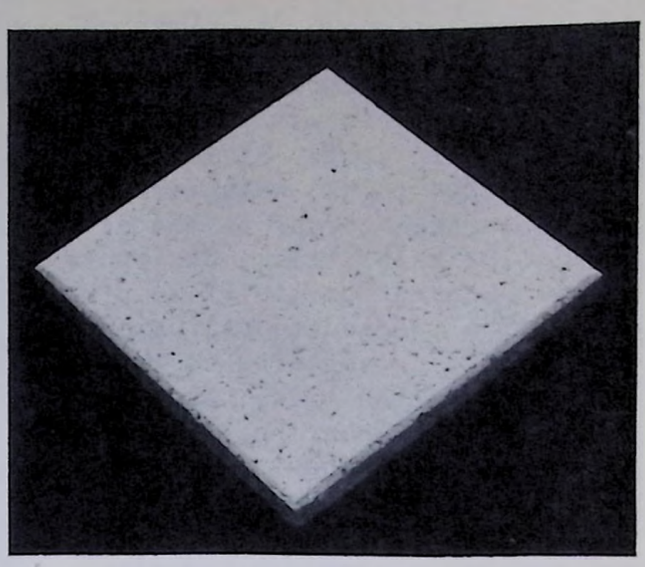
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PERMACOUSTIC

Genuine hard-burned ceramic tile appeals to many as an ideal interior surfacing not only for monumental structures such as churches, libraries, auditoriums and public buildings, but also for offices, restaurants, schools and other much-used spaces like courtrooms, banks and theatres. Therefore, the Johns-Manville Research Laboratories undertook the development of a ceramic tile that, in addition to good sound absorption qualities, had a pleasing appearance. The result of years of work toward this end is J-M Permacoustic.



The pleasing texture of Permacoustic provides interesting variations of shading

The Acoustical Materials Association has tested Permacoustic and found the sound absorption excellent - which recommends this product for those locations where a ceramic acoustical material would be preferred. In beauty of texture, it is unlikely that any acoustical material excels Permacoustic. The interesting character of the surface, combined with the tile's warm shade of natural cream color, lends an inviting softness to areas which would otherwise appear hard and flat. If other color effects are desired, the surface of the tile may be primed and spray-painted without destroying acoustical properties. Moisture has no deteriorating effect on this material and it may be cleaned by means of a brush, vacuum cleaner or damp sponge. The use of a calcimine brush with soap and water is also found very successful.

In point of economy and fire-resistance, Permacoustic stands supreme. It would be difficult to find a material which will provide more acoustical correction per dollar invested. Permacoustic is similar in composition and equal in fire-resistance to JM-20 Brick, a refractory which is used at temperatures to 2000 deg. F.

Other Physical Properties:

Permacoustic is moulded from rock wool and clay, then fired at high temperature. Like all ceramic products, reasonable care should be exercised in handling the units during installation. Compared with other ceramic materials, Permacoustic is light in weight per unit volume. Though it has a modulus of rupture of 90 lb., it weighs only 2.1 to 2.5 lb. per board foot. The light reflection of this product is 60 percent which is exceptionally high for a material of this type.

Sizes and Shapes:

Permacoustic is furnished 1" thick in sizes 12" x 12", 9" x 9" and 9" x 18", combinations of which permit a wide variety of patterns. The 9" x 18" tile is particularly adaptable for wall work in the creation of stone effects. Exposed edges of each size have a 1/8" bevel, though square-edge tile are available on special order.

Packaging:

Permacoustic is protected by specially designed cartons which contain 24 pieces of 12" x 12", 40 of 9" x 9" and 20 of the 9" x 18" tile. The shipping weights of the above packages, including the tile, are approximately 74 lb. for the 12" size and 70 lb. for the other two.

JOHNS-MANVILLE	Sound Control	DATE September, 1938
Permacoustic		BMS-132

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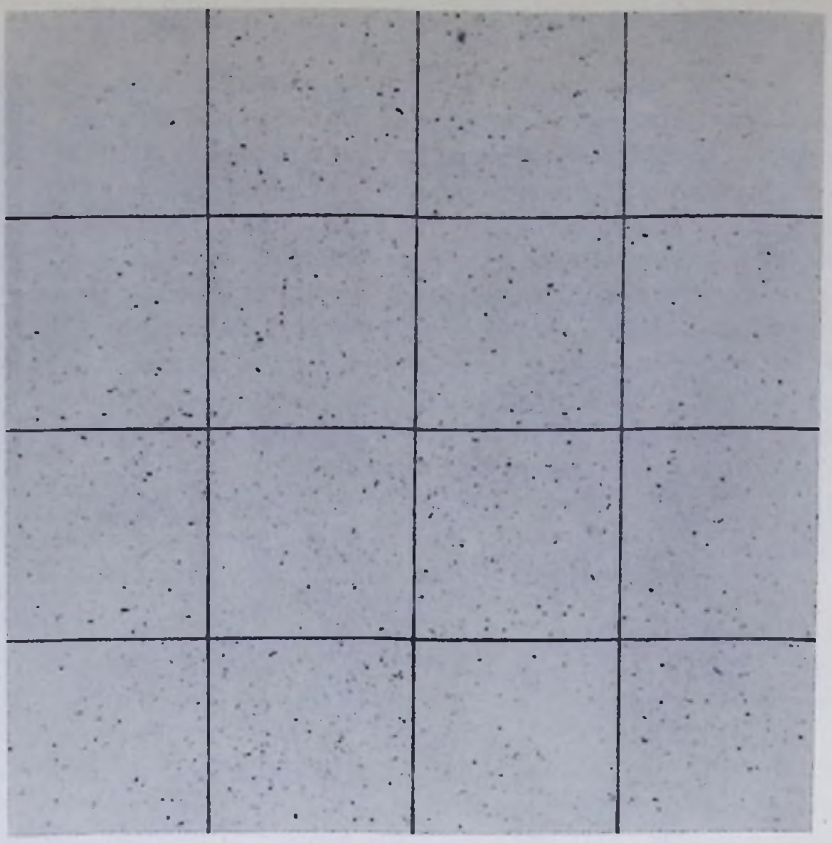
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Erection:

A ceiling of Permacoustic is installed by spot-cementing the tile to the structural surface. No. 132 Acoustical Cement is applied in spots, 3" in diameter, by 1/4" thick, which are placed in each corner of the 9" x 9" and 12" x 12" tile. Six spots should be used for the 9" x 18" size. The two additional cement dabs should be centered on the long side of the tile. The edge of the cement when the tile is in place should be about 1" to 1-1/2" from the edge of the tile. This results in equal distribution of the cementing strength and also prevents the adhesive from soiling the tile by running down the edge and onto the face.



The different sizes of Permacoustic permit a variety of patterns

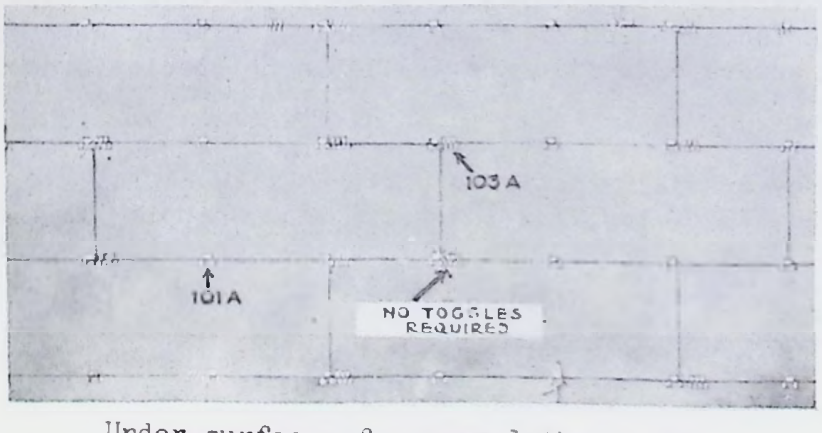
In installing Permacoustic, each properly-cemented unit should be placed on the ceiling as near as possible to its intended location, then worked back and forth 1/2" to 3/4" and finally pushed into its permanent position. This procedure insures the priming of the ceiling surface on the identical spots where the cement on the tile will actually rest.

Water paints and calcimine should be washed off before work is started. The washed surface, however, should be permitted to dry thoroughly before cementing Permacoustic. Similarly, units should not be cemented to concrete or any other type of surface until the moisture has dried out. Grease, oil and smudges must be removed with a degreasing solution and the surface cleaned and allowed to dry.

Permacoustic must not be applied to oil-base painted surfaces without scoring the paint coating and permitting the cement to adhere properly to the solid surface beneath.

Permacoustic may be cut with a carpenter's handsaw if the tile must be fitted into odd-shaped niches along the ceiling line. If desired, a skillsaw or similar device employing a carborundum disc may be used.

Suspended Ceiling Construction:



Under-surface of gypsum lath, ready for Permacoustic

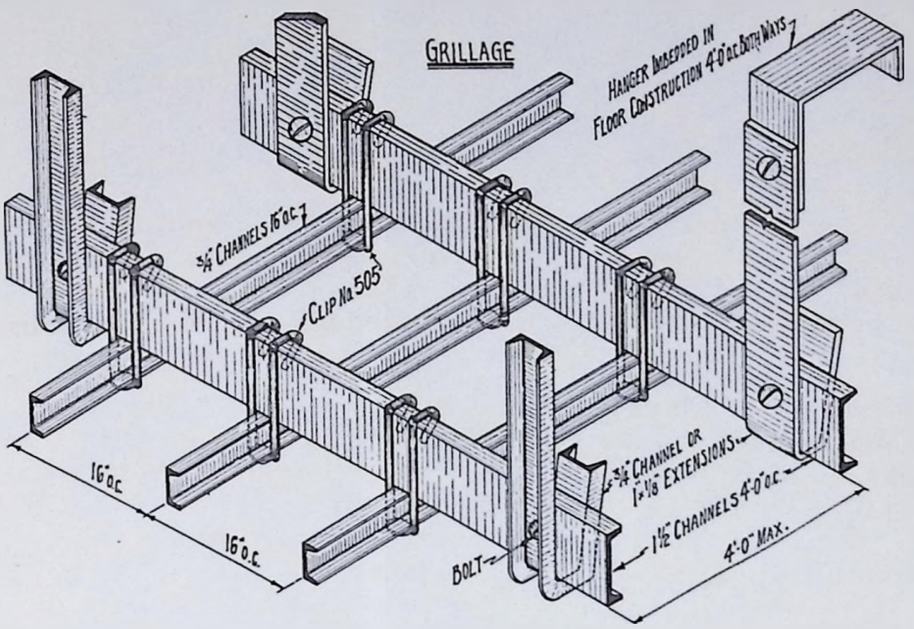
To obtain the structural surface for cementing Permacoustic where suspended ceiling construction is employed, a very satisfactory method is provided by the "clip-on" system of the National Gypsum Company, using their gypsum lath. These materials may be obtained through dealers who can be located by applying to the National Gypsum Company, Atlanta, Boston, Buffalo, Chicago, Dallas, Kansas City, Minneapolis, Philadelphia and St. Louis or by writing to their New York office.

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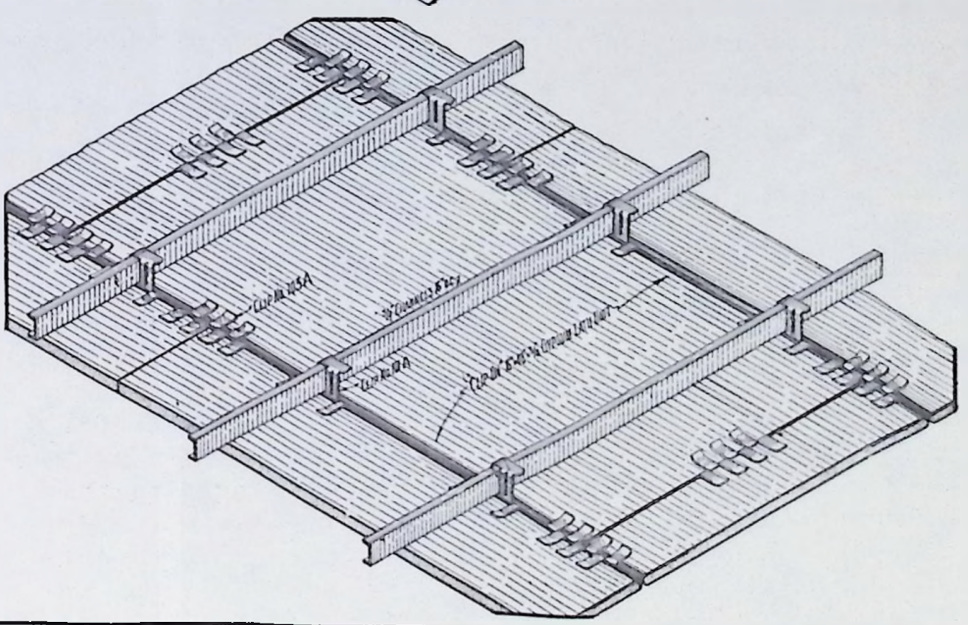
The preparation of the "grillage" for the above system is shown in the drawing reproduced herewith. Hangers, placed 4 ft. on centers both ways, are provided in the floor construction. To these hangers are bolted 1" x 1/8" flats or 3/4" channel extensions of sufficient length to reach the desired level. The exact level of the 1-1/2" runner channels is established and they are bolted or tied rigidly to the extensions. Any portion of the extension projecting below the runner channel is bent upward. The 3/4" furring channels, spaced not more than 16" on centers, are attached to the 1-1/2" runner channels with hairpin clip No. 505, bent and drawn tightly down over the top flange of the runner channel.

The gypsum lath, 16" x 48", is clipped at right angles to the bottoms of the 3/4" furring channels, using No. 101A lath clips. At the ends and intersections of the lath, the No. 103A lath clip is employed. These clips, especially designed for acoustical work, are supplied with flat legs on the bottom side. No toggles or "cornerites" are necessary where Permacoustic is to be used. The only additional requirement is that lath joints be pointed or taped to prevent "breathing".

The illustrations at the bottom of this and the previous page show both top and bottom views of the lathed ceiling, ready for cementing of the Permacoustic.



"Grillage" used to support the suspended ceiling construction



Top-surface of suspended ceiling construction

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Permacoustic		BMS-133

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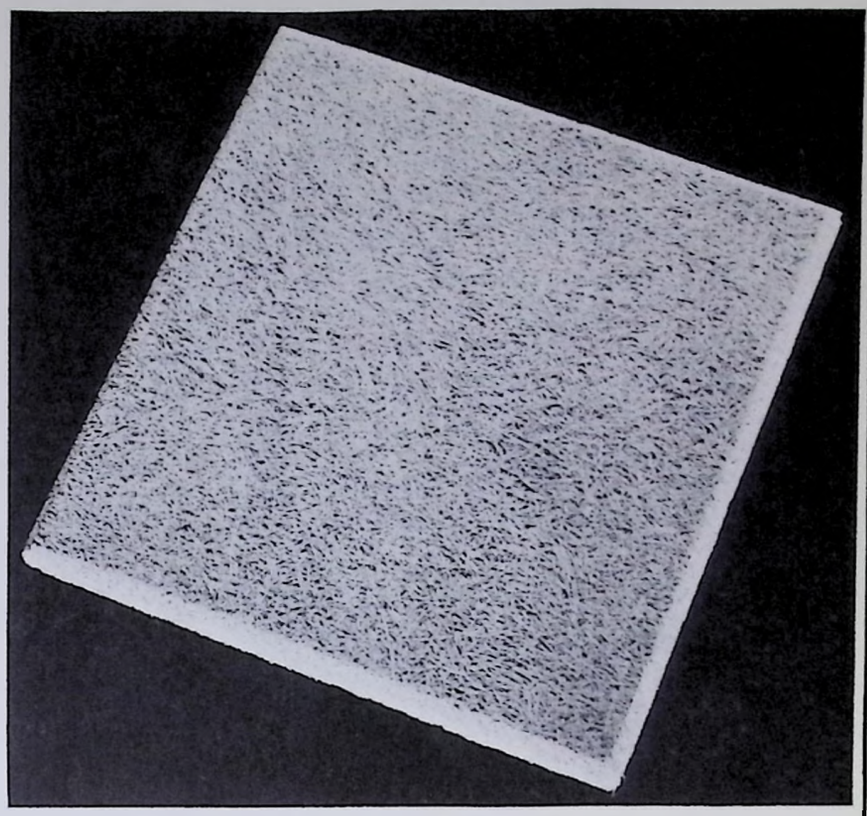
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ACOUSTEX

Acoustex is an incombustible, moisture-resisting acoustical product, which, as proved by official A. M. A. Laboratory tests, is especially effective in absorbing the noise of the average business office. The material consists of highly compressed wood fibre with a binder of magnesium sulphate and magnesium carbonate. Innumerable minute voids formed by the interlacing wood fibres give Acoustex maximum absorption efficiency for sounds in the middle and upper frequency range. This meets requirements for average conditions where noise is a problem.



Face view of a 12" x 12" Acoustex Type R Unit. The fibrous texture creates the innumerable sound absorbing voids

Acoustex is produced in large slabs from which standard or special size units are cut. The process of manufacture gives the material structural strength which permits using it in wall treatments where less sturdy materials might be damaged by bumping or other physical causes. In spite of its rugged nature, Acoustex weighs only slightly more than 2 lb. per board foot.

Acoustex is sanitary because it can be cleaned simply by brushing, repainting or often by merely using a damp cloth. Since it is also moisture-resistant and odorless, the material will not mold and does not attract or sustain vermin and bacteria.

Finishes of Acoustex:

Acoustex is attractive in appearance and has a high light-reflection coefficient either in its natural unfinished color, which is a shade off white approximating a light cream, or in any of the standard light finishes. It is supplied unpainted or in standard colors of white, light buff, medium buff, dark buff, light gray or apple green. Other colors may be obtained on special order. Acoustex may be painted on the job by either brush or spray. Spray-painting is preferred because of greater ease in application and more uniform results. To facilitate painting, Acoustex is also supplied with a prime coat of color O (light buff) paint. This treatment seals the raw fibres and makes painting much easier, especially where brush application will be used.

ACOUSTEX, TYPE R:

Acoustex, Type R, is the homogeneous material furnished with beveled or square edges and in the standard sizes of 6" x 12", 12" x 12", 12" x 18", 6" x 24", 12" x 24" and 24" x 24". It is also furnished in standard rectangular shapes in widths of 6", 12" or 24", and in lengths up to 96". Standard thicknesses and corresponding type designations are as follows:

5/8"	3/4"	7/8"	1"	1-1/8"
3OR	4OR	5OR	6OR	7OR

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Acoustex		BMS-135

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SUSPENDED CEILING ACOUSTEX:

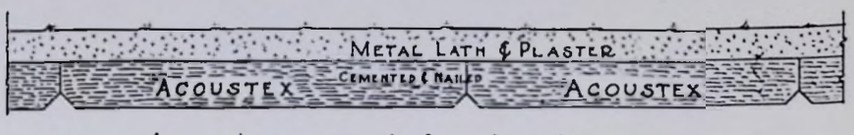
Suspended Ceiling Acoustex is available in widths of 24" and in lengths of 24" to 96". It consists of the standard 7/8" and 1-1/8" thick homogeneous Acoustex, slotted on all four edges to permit insertion of a tee section. This tee section can be obtained locally as it is a stock item in most steel warehouses.

Packaging:

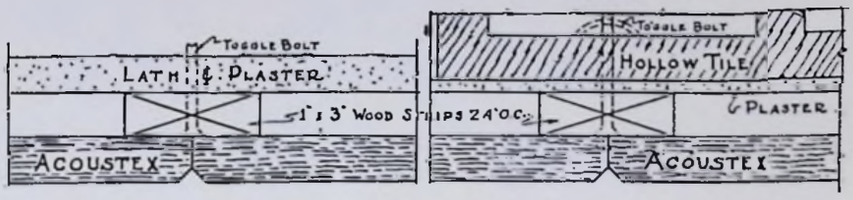
Acoustex, 7/8" Suspended Ceiling Type is shipped crated in all sizes. Other Acoustex items in plank sizes are shipped in crates; the balance of the standard sizes are shipped in cartons.

Installation of Acoustex

The great adaptability of Acoustex is reflected in its use for different types of ceilings. Economical to erect, this material can give appealing beauty, at the same time correcting room acoustics.



Acoustex cemented and nailed to plaster ceiling



Acoustex cemented and nailed to wood furring strips

Construction Methods:

Acoustex is installed by spot-cementing and nailing. No. 132 Acoustical Cement is applied in approximately 1/4" thickness and 9 sq. in. area on each corner of the 6" x 12" or the 12" x 12" units. Six spots should be used for a 12" x 24" unit.

Water paints and calcimine should be washed off the ceiling surface and oil-base paints scored before the Acoustex is cemented in place, and the area to be treated should be prepared for cementing using ordinary precautions to insure the effectiveness of the adhesive.

Sharp-pointed cut nails should be used for nailing to lath and plaster surfaces. When applying to wood, cement-coated box nails should be employed, particularly with the 1-1/8" thickness.

Exposure of the large nailheads may be avoided by nailing through the vertical edge of the unit. Smaller headed nails may be used with the lighter weight units, such as the 5/8" thickness, providing sufficient holding power can be obtained.

Suspended Ceiling Construction:

In erecting Suspended Ceiling Acoustex, furring channels should be suspended from the ceiling on centers not exceeding 4 ft. Tee sections are then wired to the furring channels on 24" centers. Cross tees, 22-3/4" long, used to eliminate the infiltration of air at the joints, butt against the main tees. Installation details will be made clear by reference to the drawings.

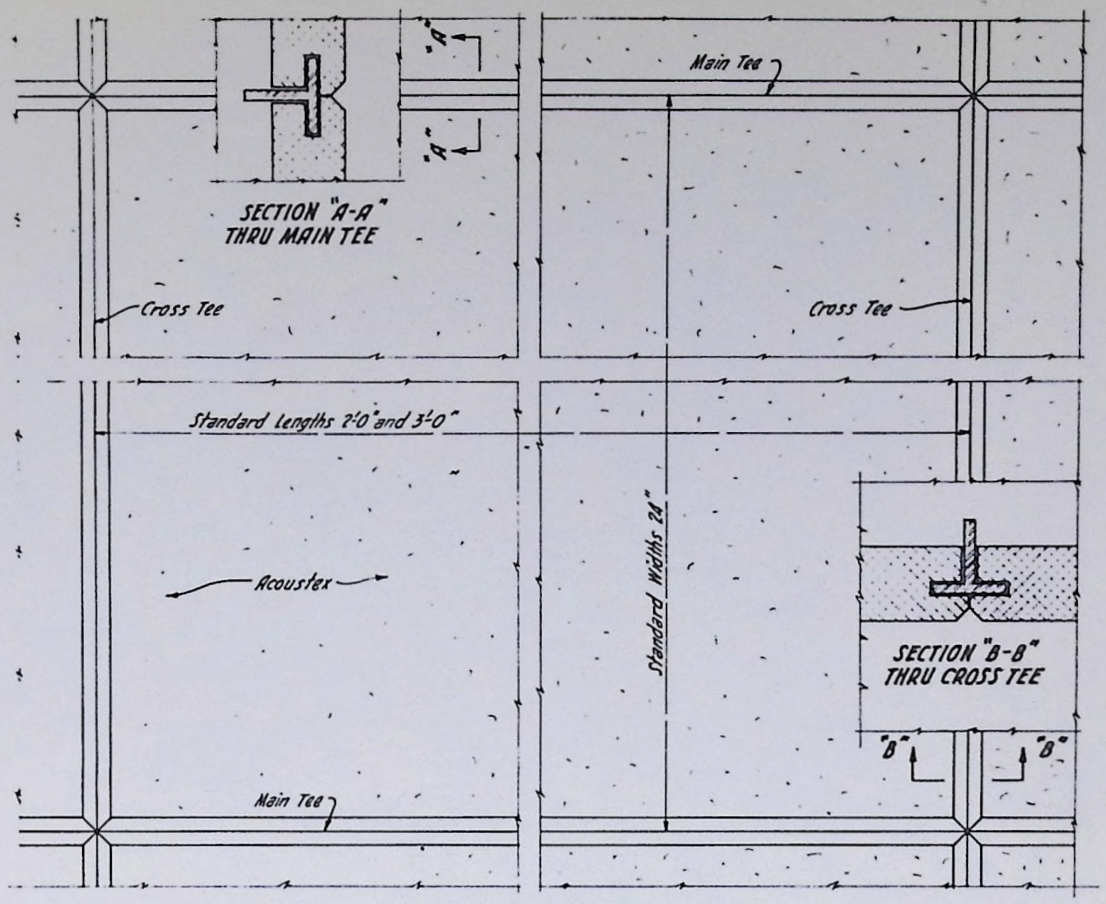
It is best to start the installation at one side of the room, slightly spreading the main tees to insert the unit. This action is repeated until an initial row of Acoustex is in place the full length of the first pair of tee bars. The second, and all subsequent rows are installed in the same manner. Cross tees between rows should be inserted in the unit as the work progresses.

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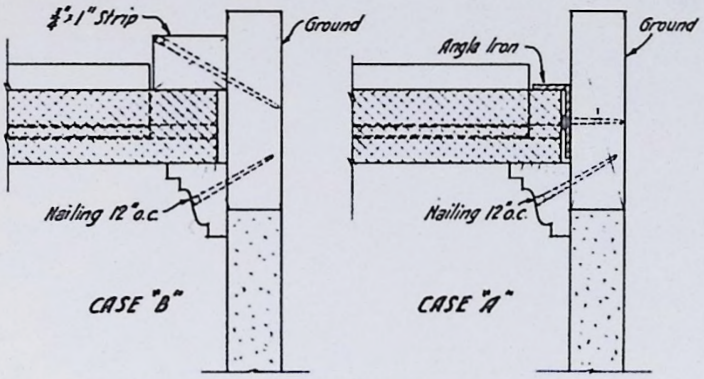
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ACOUSTEX INSTALLATION DETAILS

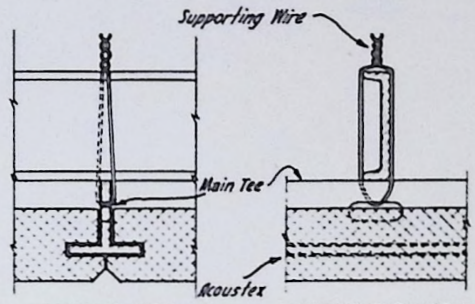


TYPICAL REFLECTED CEILING PLAN



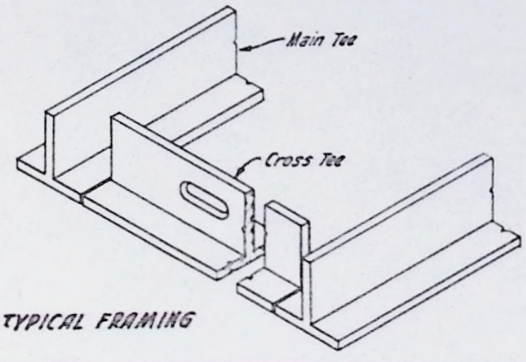
TYPICAL WALL SECTIONS

These Views show alternate methods of fastening Acoustex: either by Angle-Iron (case "A") or by Wood Strip (case "B")

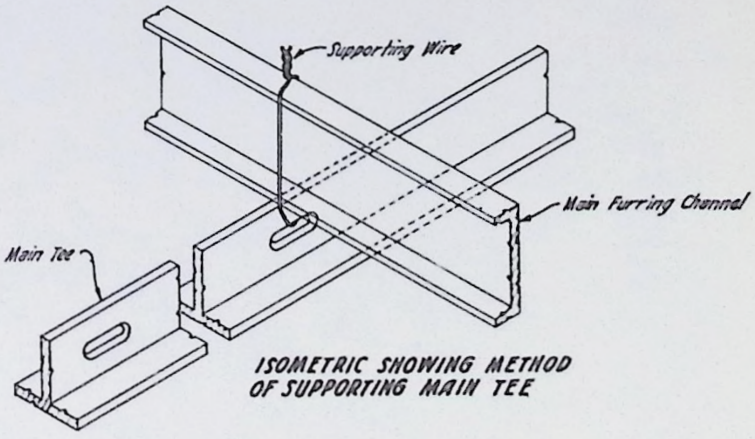


SECTION THRU MAIN TEE **SECTION THRU MAIN FURRING CHANNEL**

These Views show condition that exists where Supporting Wire is passed thru hole in Tee 8'-0" o.c. (see Sect. "A-A" on Plan)



TYPICAL FRAMING



ISOMETRIC SHOWING METHOD OF SUPPORTING MAIN TEE

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Acoustex Installation Details		(BMS-137)

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LIGHT REFLECTION

Surfaces receiving light from any source absorb a certain amount and reflect the balance. For a given kind of light, this effect is determined by the nature of the surface and its color. The proportion of incident light reflected is given by the light reflection coefficient, expressed as a decimal or a percentage.

Light-Reflection Coefficients for J-M Sound Control Materials

Material	Paint	Coefficients percent
Acoustex	Natural	70
	Light Buff (No. 1)	73
	Std. White	75.5
Nashkote	This material is usually painted on the job	Same light reflection coefficient as that of the paint used
Rockoustile	Golden Ecru	Average 26.5
	Std. Ivory Cream	Average 65.5
Sanacoustic (Perforated)	Std. Cream	55.5
	Std. White	64
	White Sunflex	80
Sanacoustic (Unperforated)	Std. Cream	67.5
	Std. White	77
Transite Acoustical Units	Natural Buff	37.5
	Cream Enamel	56.5
	White Sunflex	81.5

Percentage coefficients for various J-M Sound Control Materials are set forth in the above table. These figures were obtained by the Electrical Testing Laboratories, New York City. Tungston light was used in all cases.

The reflectivity of acoustically-treated surfaces is naturally important in transmitting indirect light from ceilings and walls to the working plane. Theoretically, it is possible to so treat the ceiling surface that nearly 100 percent light reflection results. Practically, about 80 percent is the highest that can be obtained without glare and mirroring. Furthermore, the maintenance of a coefficient as high as 80 percent is a serious difficulty because of dust collection and discoloration of the paint vehicle.

All J-M Sound Control Materials are available with light-reflection factors bordering on the upper practicable limit. They can be made still higher in reflectivity but this is not deemed advisable for reasons noted above.

A white surface is the most efficient reflector for every color of light. However, where light of a predominent hue is to be reflected, white can be no more efficient than a reflecting material of the same hue as the light. Tungston light is encountered on most jobs of illumination and this has a pronounced yellow component. Thus it is that cream and buff show almost as high a reflection factor as does white. These colors can therefore be used instead of white, when Tungston Lighting is em-

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ployed, with very little decrease in efficiency and very great increase in architectural effect and ease of maintenance.

On many installations of J-M Sound Control Materials, architectural considerations may very desirably dominate the situation to the acknowledged detriment of lighting efficiency. This is true in theatres and churches where the light reflection of Golden Ecru Rockoustile at 26.5 percent may be desirable. Contrasted with this are working spaces such as offices, banks and schools, where light reflection of a high order is necessary, and where Standard White Sanacoustic, tile design, at 64 percent is usually specified.

J-M Sound Control Materials offer a variety of characteristics which can be made to suit the requirements of any interior. Advice as to the adaption of these products to a particular installation can be obtained by applying to any Johns-Manville office.



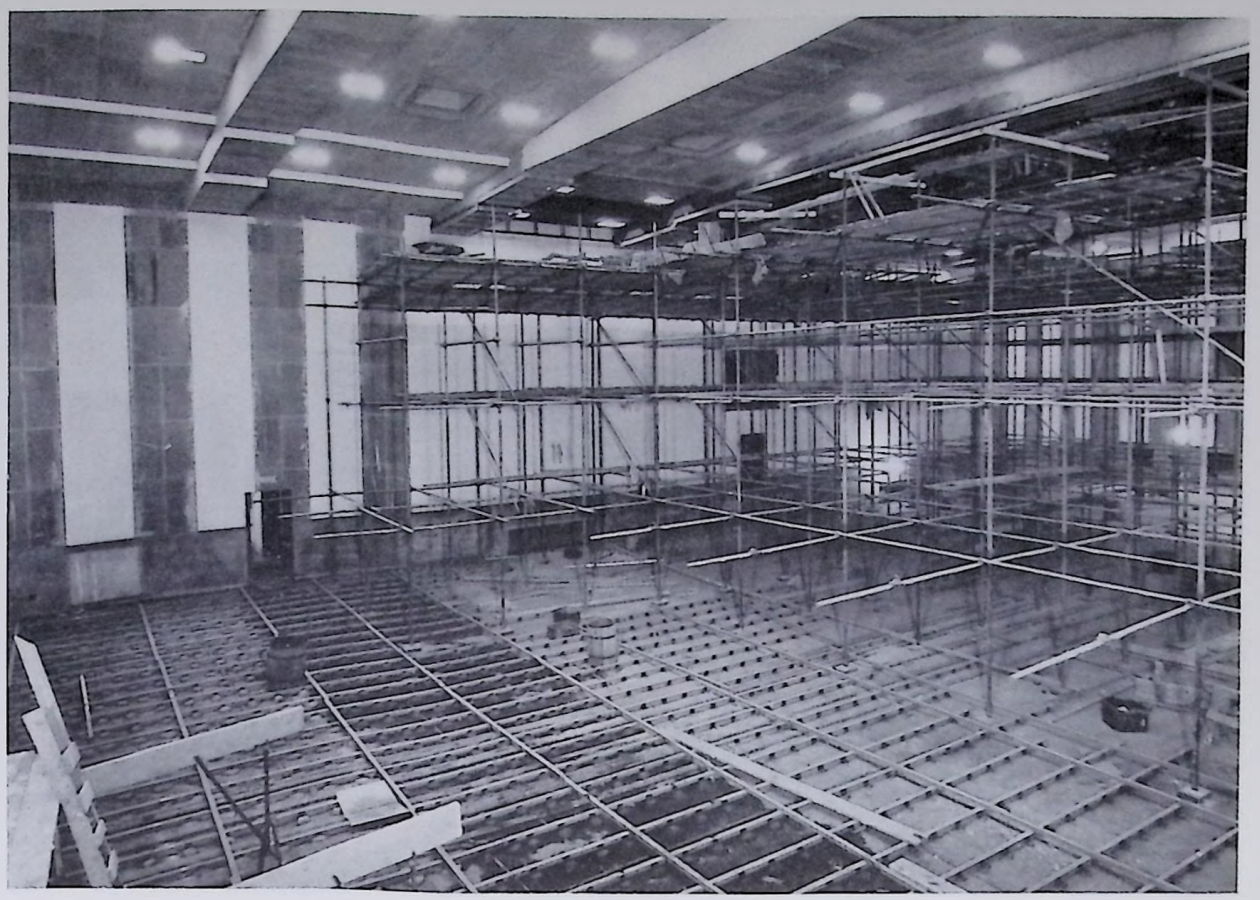
The Sanacoustic ceiling installed in this music room affords not only better acoustics but also the benefits derived from a high light-reflection coefficient. Gilbert Stuart Junior High School, Providence, R. I.



The baked enamel surface of Sanacoustic presents a sanitary, light-reflecting ceiling indispensable in an operating room. Chicago Lying-In Hospital, Chicago, Illinois.

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Sound Isolation



The floor, walls and ceiling of this auditorium studio are being sound-isolated from the building structure to prevent outside noises from interfering with broadcasting activities. Photograph, courtesy of National Broadcasting Co.

The continuing rise in the noise levels of all large cities has a serious effect on health, comfort and efficiency. This truth, fast being realized by the public, requires that the problem of reducing noise and vibrations in buildings be given more attention by architects and building engineers.

In every structure, mechanical equipment is utilized to save time and effort of the occupants and to add to their comfort. The increasing use of elevators, air-conditioning apparatus, vacuum cleaners and other motorized equipment, while supplying these needs, leads to the generation of considerable noise and vibration. This, together with the fact that people are becoming more noise conscious, has necessitated the development of methods for the isolation of sound.

Sound which is transmitted by structural vibration can definitely be controlled. Light-weight and specially constructed floors, walls and ceilings can be entirely divorced from the building structure by means of felted isolators. This floating interior can be designed to have no rigid contact with the outer solid structure and the isolators arranged to absorb the impact of sound waves and mechanical shock so that noise will not be transmitted. This method by which the continuity of structural vibration is broken, is known as the J-M System of Sound Isolation.

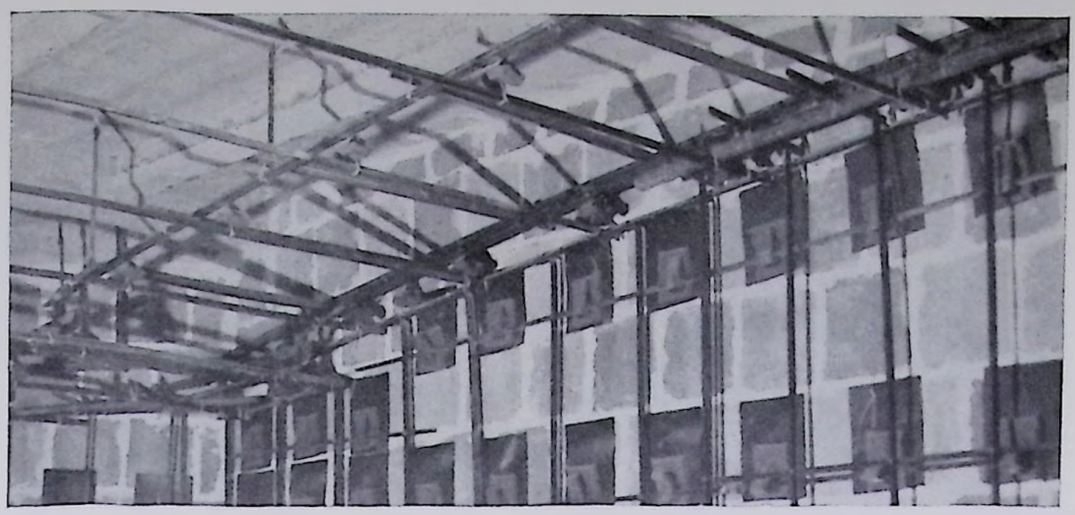
A well directed investment in sound control is good insurance against obsolescence of the building and dissatisfaction of its occupants. Commercial buildings may be used for more varied types of businesses and have a longer useful life. In other words, the installation of sound isolation provides a means of obtaining maximum revenue. Higher rents may be charged for apartments that eliminate the necessity of listening to the neighbor's radio and other activities overhead. It is reasonable to expect that tenants will appreciate and pay a premium for the additional comfort and privacy afforded by a sound-treated apartment.

Sound Isolation also permits many economies in design and construction such as locating ventilating

J-M SOUND ISOLATION
September, 1938 (Cancelling sheet dated March, 1934) [BMS-300]

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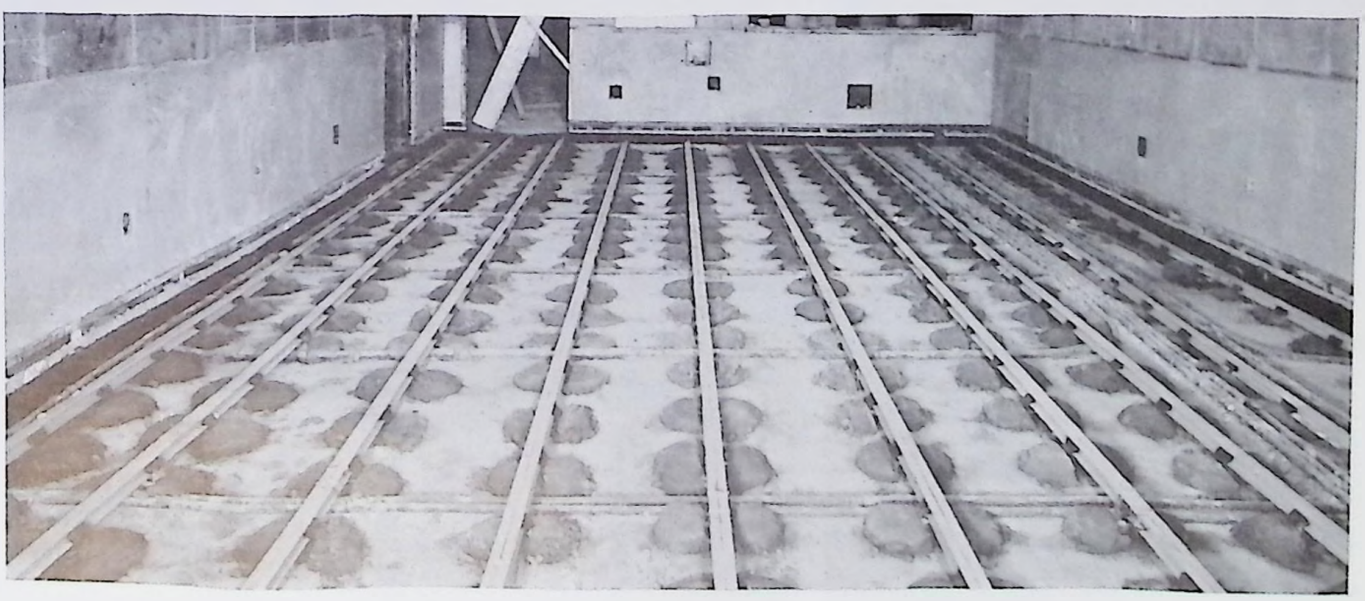
The J-M System of Sound Isolation applied to wall and ceiling surfaces, ready to receive metal lath and plaster. Note felt-lined isolators on which steel furring is supported

fans and motor generator sets where they are needed. These as well as other noise-producing service activities may be conveniently placed and sound isolated instead of grouped in out-of-the-way places. Theatres may be built next to bowling alleys and billiard rooms next to ballrooms if measures are taken to prevent the transmission of sound between them.

Sound Isolation treatments are advantageously installed in clubs or lodge buildings, in hotels, hospitals, libraries and industrial buildings where light manufacturing is conducted adjacent to office spaces. Where mass drills and games are in continuous session, the isolation of school gymnasiums makes possible the use of nearby classrooms for lectures, recitation and study. Music instruction, band or orchestra practice rooms particularly require a sound isolation treatment.

Radio broadcasting studios must be completely isolated in order to permit accurate reproduction of music and speech. It is imperative that extraneous sounds originating in corridors, control rooms or other studios be kept from the microphone. Guarding against these noises necessitates studio isolation which actually constitutes a "room within a room."

Paralleling the requirements of radio studios are sound-proof test rooms for factories or laboratories where noise in manufactured products is investigated and controlled. Reliable studies of this nature depend, first, upon the ability of the isolated, quiet room



The cushioned isolators of this sound-isolated floor are grouted to the building structure. The next operation is to spread Sound Isolation Fill, a sound-damping medium, between the stringers to prevent drum action

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to eliminate background noise coming from the adjacent factory or laboratory. Secondly, they are contingent upon the removal of reverberation and the resultant fictitious noise level as compared to the true noise of the product being tested.

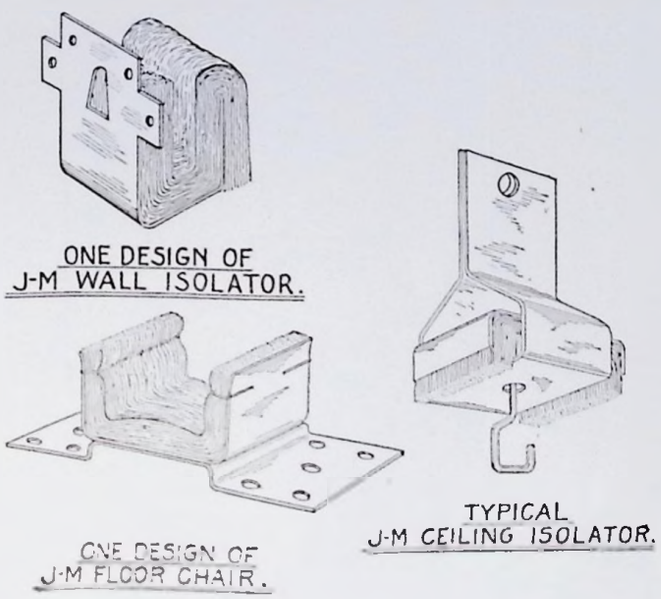
In addition to sound-isolating properties, floors treated with the J-M System have the added advantage of resiliency. This desirable factor is of importance in gymnasiums or ballrooms as it is possible to walk, run or dance on these floors with a minimum of fatigue.

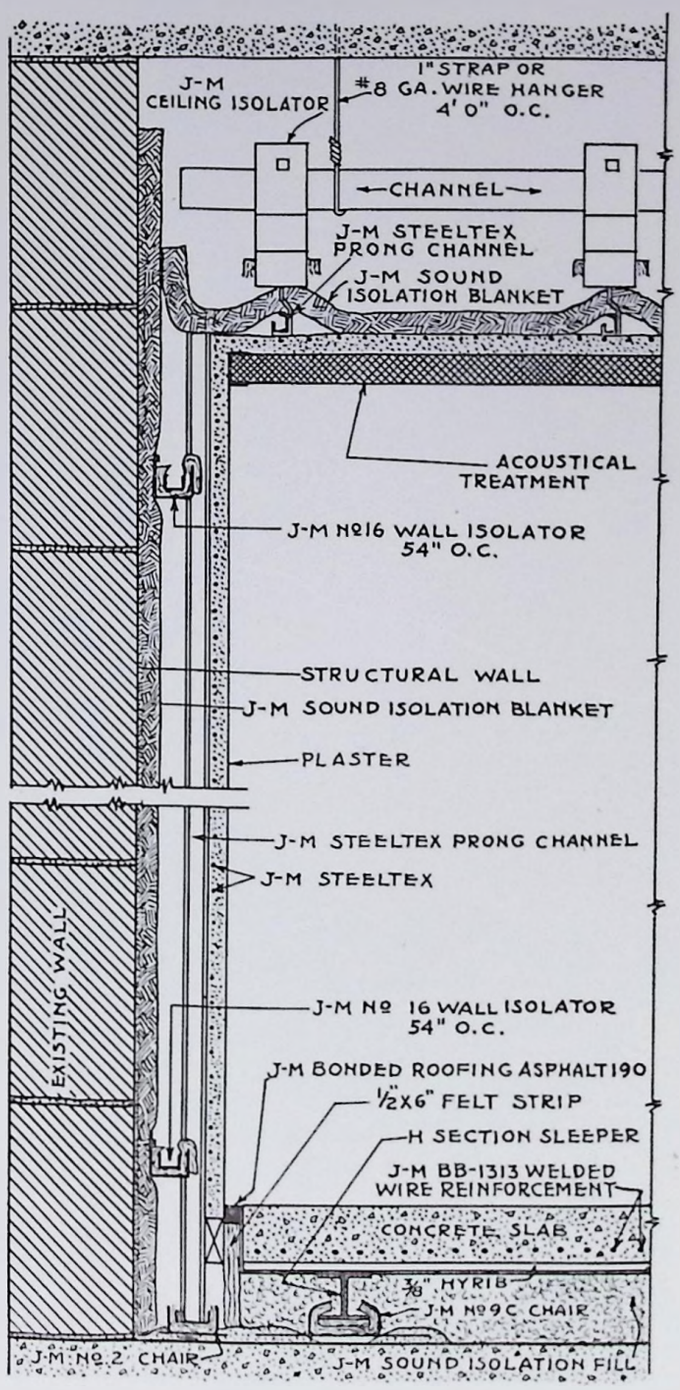
Vibration Control

Overcoming the passage of sound and vibrations from one room to another is an entirely different problem from the control of air-borne sound by absorption. Obviously, no purpose is served by making a room acoustically perfect if there are disturbing noises of large magnitude present in an adjoining room. It might seem reasonable just to put sound-deadening treatment in the offending room. Experience has shown, however, that the interfering noise must be reduced to a very low level before it ceases to be troublesome. Acoustical materials alone may not be able to accomplish this result. On the other hand, an effective means of vibration control may not eliminate the need for sound-absorbing materials.

Sound goes through a partition either by finding its way through crevices and cracks or by setting the wall, itself, in vibration. Therefore, when isolating a partition, it is first necessary to see that there are no openings and that windows and doors fit tightly.

The amount of sound transmitted through single walls, floors or ceilings by vibration may be roughly stated to be inversely proportional to the weight per square foot; that is, the heavier the partition, the less sound will be transmitted. Although dense, massive constructions resist the passage of air-borne sound, they are susceptible to the transmission of impact and machine vibrations. Even if heavy materials were effective vibration insulators, their use would be contrary to modern structural design which attempts to utilize materials of maximum strength consistent with





Johns-Manville System of Sound Isolation as applied to walls, ceilings and floors in fireproof construction

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lowest economic weight. For this reason, the reduction of sound transmission by increasing the weight and density of the building materials is not practical.

The erection of double walls separated by an air space or by materials differing greatly in density is sometimes advocated as a means of sound isolation. Walls of this nature waste space, present structural difficulties and their efficiency is much reduced by the necessity of having solid through-connections.

J-M System of Sound Isolation

The principle of the J-M System of Sound Isolation is based on the erection of a light weight interior which is within, yet completely separated from, the rest of the structure. This is accomplished by means of shock-absorbing isolators. No solid, through-connections are used.

In this system, isolators, cushioned with hair felt, are installed at specified points to take up the impulses which otherwise would be transmitted through the construction. J-M Floor, Wall and Ceiling Isolators intercept the sounds, transform them into mechanical energy, and then absorb the energy.

The shock-absorbing units, called "chairs" or "isolators," types of which are illustrated on the front of this sheet, consist of metal supports or containers which are fastened both to the structure of the "outside room" and the "inside room." Held by the metal shape, between the two fastening elements, are one or more layers of heavy cushioning felt. Thus, as shown in the drawing, a means is provided for securing the finished interior surfaces to the structural wall, ceiling or floor by isolators which do not permit contact of solid materials that would conduct vibrations.

The sound impulse, when it reaches the isolator, dissipates most of its energy in the resilient felt which thereby constitutes a barrier between the source of the sound and the structure beyond. J-M Sound Isolation Blanket or Fill adds a sound-damping medium sometimes needed to prevent drum action in the hollow space around the isolators.

Where sounds are produced on both sides of a structural wall and special conditions necessitate quiet in each room, it is advisable to install sound isolation in both rooms, supplemented, however, with a sound-absorbing material for acoustical purposes. This type of treatment is used in such locations as broadcasting studios and music rooms.

Adaptability

The J-M System also has the advantage of providing structural unity. Because of this it is adaptable to a large variety of uses in buildings, from simple frame construction to the most modern fireproof designs. The treatment is easily applied and can best be installed during the erection of the building with little change in the schedule of operations. It is possible, however, to apply corrective measures at any time.

Constructions isolated by Johns-Manville years ago have been tested over long periods and have been found to retain their original efficiency. The present design of the various parts, which is the result of this experience, assures satisfactory installations with minimum cost and maximum sound isolation value.

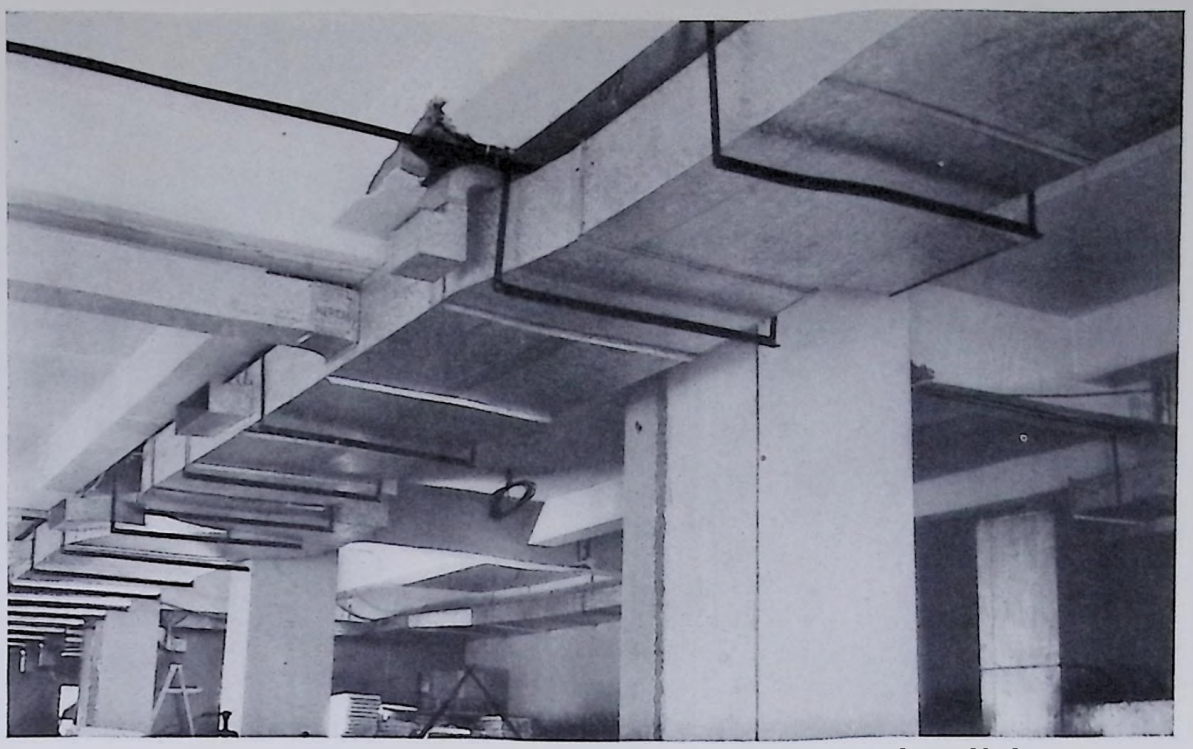


A J-M sound-isolated dance floor, as shown under construction, is one of the necessary adjuncts to the modern ballroom, as well to provide resiliency as to prevent transmission of sound

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Sound Control of Mechanical Equipment



In modern building construction, air-conditioning ducts are everywhere in evidence. Mechanical noise and conversation carried through these air-ways result in the most annoying irritation and loss of privacy, unless the ducts are lined with effective sound absorbents at strategic locations. Air-Acoustic Sheets were developed by Johns-Manville especially for this purpose

Mechanical equipment, introduced into both residences and working spaces, has caused the occupants to become increasingly conscious of the growing amount of noise. Air conditioning, the use of individual power plants, the ubiquitous elevator, pumps and allied mechanical equipment, all involve the use of power and moving parts. Unless steps are taken to confine the resulting noise, dissatisfied customers, with attendant complaints and loss in revenue, are the inevitable consequence.

The control of machine noise, so damaging to human comfort and efficiency, often proves to be complex and quite different from ordinary problems of both room acoustics and vibration control. Occasionally it is purely a matter of controlling either air-borne sound or machine vibrations, more often the problem involves both sound absorption from the air and sound isolation. The difficulty of treatment is further enhanced by limitations of design which often restrict the application of sound control materials.

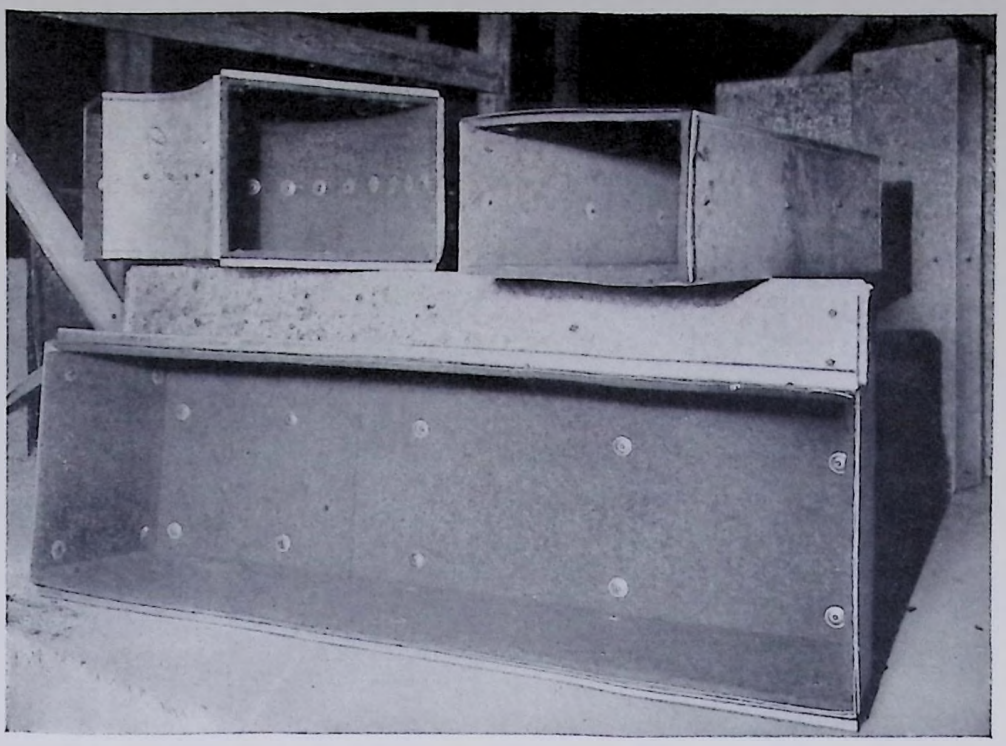
Care in planning, manufacturing and testing of mechanical appliances is undoubtedly the most fruitful means of avoiding noise problems arising from such equipment. Once originated, the noise can be somewhat controlled but the best job of all is one that can be performed in the mechanical division of a manufacturer's plant. Careful design and alignment of moving parts and the proper use of lubricants, combined with routine inspection based on laboratory analysis, offers an almost complete solution to many an annoying noise condition.

Assuming that the best possible mechanical job has been done, the problem becomes one of air-borne sound or vibration or both. The one form of energy is readily transformed into the other and thus arise the difficulties of quieting mechanical equipment.

If vibration is being transmitted to foundation or housing, the latter may act as a sounding board. In this case, the isolating or divorcing of the vibration-provoking mechanism from the rest of the unit may alone provide the required degree of quiet. Vibration of the smaller mechanical units is less frequently a cause of difficulty now than it was a few years ago because of the attention given to this problem by equipment manufacturers. However, the sound which the mechanical part itself radiates to the air may be so great and the barrier provided by the conventional sheet metal housing so inadequate that the problem is

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Air-Acoustic Sheets are readily installed in all types of sheet metal duct construction. Note how smoothly the material is fitted into a typical bend

principally one of absorbing air-borne sound. In the case of either vibration or air-borne sound, the purpose of sound control methods is to allow but a fraction of the original energy to remain for ultimate and inevitable transmission to other parts of the structure.

An important refinement to the above two main classifications of treatment consists in reducing sounding-board action of housings by applying suitable materials to induce a damping effect. The housing may act as a sounding board by re-creating as noise the vibrations resulting either from air-borne sounds or from direct structural contact. The damping effect of the treatment not only reduces the noise but changes its character and often eliminates objectionable tinny sounds frequently present with sheet metal casings.

Still another phenomenon, known as resonance, sometimes aggravates the difficulty of quieting mechanical equipment. Most often it is purely a matter of design to prevent sound originating in the mechanism from "building-up" and by subsequent repetitions, reinforcing the sound energy still undissipated. Where a change of design cannot be made to effectuate this purpose, resonance is attacked by applying materials to bring about selective frequency absorption or by changing volumes and inertias. Usually, the quieting methods referred to in the foregoing paragraphs will also rectify a resonant condition.

All of the noise problems arising in connection with mechanical equipment are susceptible of scientific analysis. In fact, when confronted by a new type of noise problem, this is the only satisfactory way in which it can be approached. Experimentation is expensive and guessing is futile. Seemingly simple noise problems are often complex and, to untangle the elements of trouble, noise must be measured and frequencies analyzed. However, once a given type of noise problem has been studied by scientific methods, experience will usually indicate the treatment necessary. Johns-Manville Acoustical Engineers are trained to make recommendations based on such experience.

Air-Conditioning Units and Duct Systems:

Quiet operation is a most important consideration with all air-conditioning systems. Mechanical design, however carefully executed, is seldom sufficient for reducing noise to a point acceptable to the consumer.

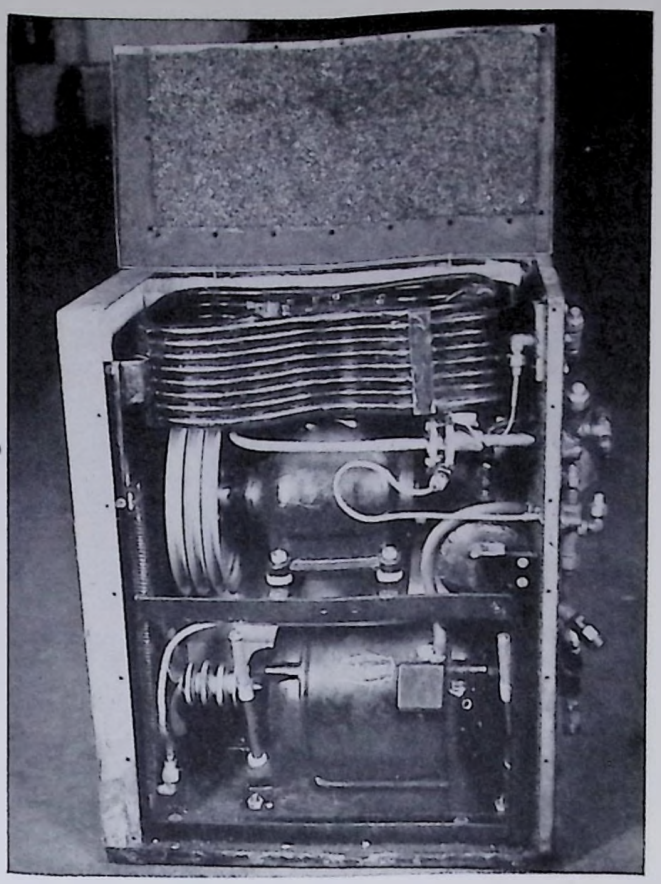
Self-contained units, serving only one or two rooms, should have the mechanical plant sound isolated from its housing, which should usually be constructed of metal panels lined with an efficient sound-absorbent, such as Air-Acoustic Sheets, or Sound Isolation Blankets. Where panel damping is required, rather than sound-absorption, Pre-Cemented Silento Felt should be used.

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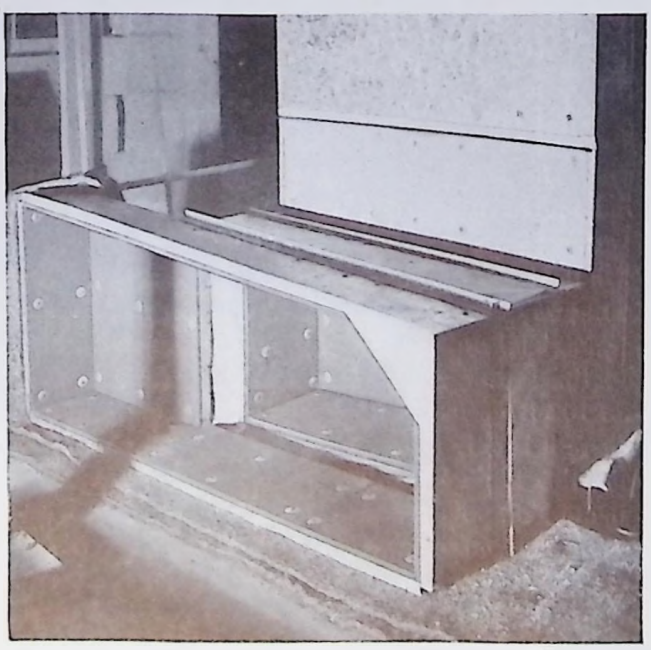
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In larger systems serving an entire floor or building, the air-conditioning equipment should be located in a separate room which has been sound-isolated and treated with sound-absorbent material. The mechanical units should be separately mounted on vibration isolation platforms. It is essential that canvas or flexible connections be provided between the fan or blower units and the duct systems. Otherwise, the vibration of the fan and motor may be converted to sound by these ducts and transmitted by them to all parts of the building. It is also desirable that all piping be isolated from the duct system and from the building structure.

It is not enough to quiet and isolate the mechanical and power elements of an air-conditioning system because there is noise in the air stream which is accumulated as it passes through fans, washers and cooling coils. Acoustically, a duct is nothing more than a large-size "speaking tube" and sounds entering it at the equipment end are very effectively transmitted to whatever registers or grilles it supplies. When two or more rooms are served by the same duct it frequently happens that sounds created in one room are transmitted through the duct to the other rooms with a consequent loss of privacy. The solution to these problems lies in the use of efficient sound-absorbing linings within the ducts to remove and dissipate sound as it passes through them.



Compressor unit of room conditioner, sound-treated with Sound Isolation Blankets and Akoustikos Felt where precision cuts were necessary. Standard Air Conditioning, Inc., division of American Radiator & Standard Sanitary Corp.



Quietness is essential in operating sensitive broadcasting equipment. The entire duct system of WGN Studios (Chicago Tribune) was therefore lined with Air-Acoustic Sheets. Over 15,000 sq. ft. were specified for this purpose

In the entire field of sound control there is no type of service which places such exacting requirements as does duct lining on a sound-absorbing material. A satisfactory material must be fire-proof,* highly sound-absorbent, moisture-resistant, and have a surface which will not materially increase friction losses in the duct system. These requirements may seem rigid but Air-Acoustic Sheets, developed solely for this type of work, meet the specifications completely.

The necessary extent of the lining naturally depends upon the intensity of the noise. Generally speaking, however, a very appreciable and, in most cases, satisfactory reduction can be effected by lining a duct for a distance of at least ten times the average of its cross-sectional dimensions. Thus, a duct 8″ x 12″ should be lined for a distance of at least 8 ft. 4″. In severe cases the entire duct must be lined, regardless of di-

* In discussing the desirable properties of duct-lining materials, emphasis must be placed on fire resistance. Bulletin No. 10 of the National Board of Fire Underwriters, dated January 22, 1935, describes several serious fires in which the combustible materials used for the lining of ducts caught fire and caused extensive damage. As a result, the National Board of Fire Underwriters has taken the stand that only fire-resisting materials shall be used for such purposes.

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mensions and length. In cases where ducts are unavoidably short, a honeycomb arrangement of sound-absorbing partitions must be used to divide large ducts into a number of smaller ones.

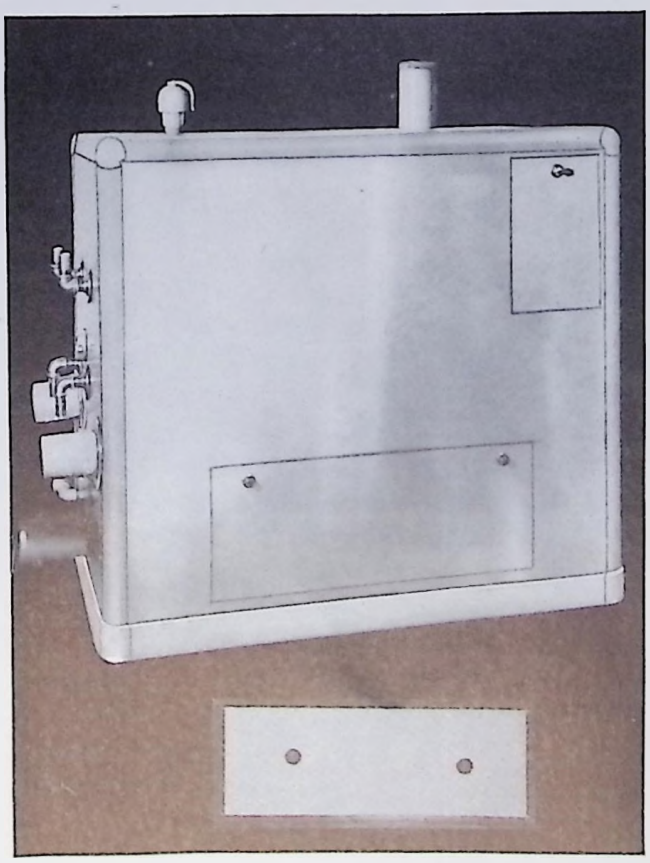
The ½″ thickness of Air-Acoustic Sheets is most economical to use except in cases where the additional low-frequency absorption and thermal insulation of the 1″ thickness are desirable.

Mechanical Refrigerators:

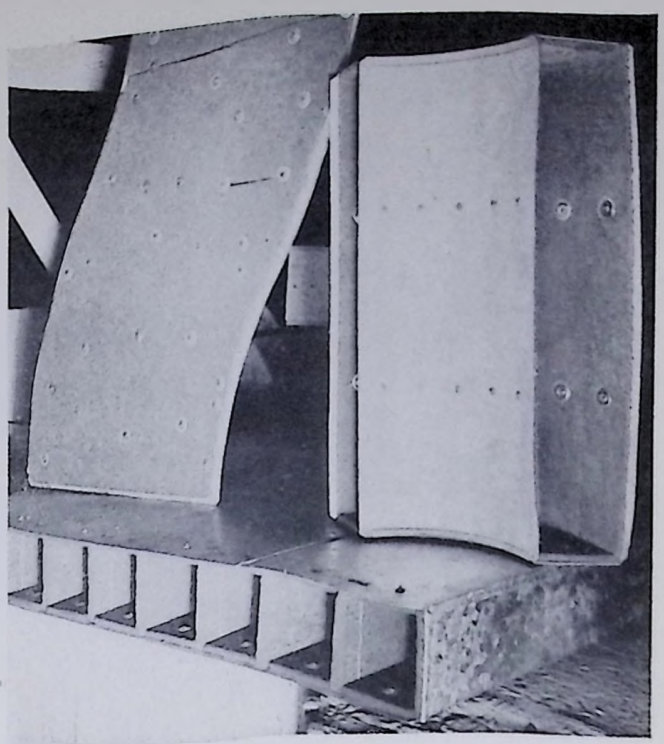
The manufacturers of such equipment as mechanical refrigerators usually provide an adequate vibration-isolating construction for the power unit. This leaves only the air-borne sound radiated from the machine, which could be largely confined within the cabinet except for openings necessary to provide ventilation for the motor and condenser.

These openings necessitate the reduction of noise level within the machine compartment, which is usually accomplished by applying efficient materials in the compartment to absorb noise near its source.

Air-Acoustic Sheets and Rock Wool Panels, Style No. 2111, are ideally suited to this kind of application. Also, Silento Felt and Johns-Manville Wool Deadening Felt often are applied to the inside surface of machine compartments.



Electrol oil burner and boiler, with No. 102 Banacoustic Blanket, 2″ thick, around the boiler and 1″ thickness elsewhere inside the housing. The insert shows the inside of the sound-treated access door



A duct, sub-divided by Air-Acoustic Sheets, for discharging air into the upper part of an auditorium. The ease of applying the Air-Acoustic material is illustrated in the sections shown above

Oil Burners:

So far as noise control is concerned, oil burners are of two general types. One is the complete unit, comprising both burner and boiler; the other is a conversion burner intended for application to an existing heating plant.

In the latter case, the most that can be accomplished in the way of noise reduction is to quiet the oil-burning mechanism by enclosing it in a sheet metal housing lined with an efficient sound-absorbent such as No. 102 Banacoustic Blankets or Air-Acoustic Sheets. Where it is only necessary to damp the housing vibration, this is accomplished by applying Pre-Cemented Silento Felt. Stack mufflers help to reduce the roar of combustion on conversion installations. It is also very effective to lath and plaster an unfinished ceiling above the unit and treat the surface with 1″ thick No. 100 Banacoustic Blankets.

In the case of complete, self-contained oil burner and boiler, the combustion roar can be controlled along with the noises of a mechanical nature. Such

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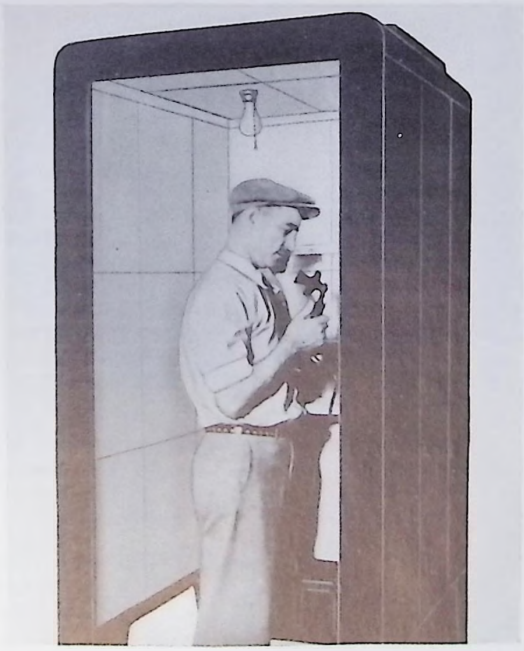
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units usually consist of a specially designed boiler containing the oil-burning unit and enclosed in a sheet metal cabinet. The recommended noise-control procedure is to prevent the vibration of the boiler from being transmitted to housing or cabinet and to cover the boiler assembly and line the interior of the cabinet with No. 102 Banacoustic Blankets. The 1″ thickness is usually recommended, although 2″ Blankets are often used to provide additional thermal insulation. Stack and ceiling treatments effect further quieting.

Metal Furniture:

In keeping with modern tendencies, metal furniture and fixtures are gaining wide acceptance in the home as well as in the commercial field. The practical advantages of metal filing cabinets, desks and book cases are now paralleled by attractive and utilitarian kitchen cabinets, tables, ranges and living-room furniture.

An important factor, which has retarded the more general use of metal furniture, is the noise which it provokes. To appreciate the significance of this noise problem, one has merely to close a metal file drawer or accidentally touch a metal desk with a chair. This has aroused prejudice, which, however, is now being eliminated by treating the furniture itself.



This doorless Acoustic Communication Booth, sold by Johns-Manville, provides free ventilation and comparative quiet



Interior of metal chest, with side panels damped by Pre-Cemented Silento Felt. One of many applications in the metal furniture made by the Simmons Company

The objectionable noise results from the vibrating metal panels radiating their energy through the air as sound. The solution lies in increasing the stiffness of the metal panel, damping its amplitude, and lowering its natural frequency of vibration, thus reducing the efficiency of the panel as a transformer of vibration into sound. This is accomplished by applying Pre-Cemented Silento Felt, which is rolled on after receiving a brush coat of the solvent.

Other Equipment:

Many other types of mechanical units, not mentioned in the foregoing, generate noise in varying degrees of seriousness. These are constantly being analyzed in the Johns-Manville Acoustical Laboratories and the accumulated experience utilized by J-M Acoustical Engineers in the solution of noise problems.

Unusual appliances such as airplane detectors, together with more prosaic equipment, such as business machines, compressor cabinets, humidifiers, elevator cabs, metal sinks and automatic stokers, have been made the subject of research reports that made possible satisfactory reductions in sound level.

Splendid facilities enable Johns-Manville to solve noise problems, not only for conventional designs, but also in newly developed units for which there is no standard of comparison. Inquiries should be addressed to Johns-Manville, 22 East 40th St., New York.

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Sound Control Materials for Mechanical Equipment Quieting

Acoustical Cement, No. 130, an adhesive for cementing Asbestos Akoustikos Felt and sometimes for applying Sound Isolation Blankets to metallic housings, is supplied in 1, 3, 5 and 50-gal. containers. For Akoustikos Felt application, one gallon, with 40 percent added alcohol, will cover 100 sq. ft. of smooth plaster; with 1 gallon added alcohol, it will cover 200 sq. ft. of sheet metal.

Acoustical Cement, No. 132, is used for spot-cementing rigid tiles. Furnished in 1, 3 and 5-gal. containers. One gallon accommodates about 30 to 40 sq. ft. of tiles.

Acoustical Size is used to set the surface of Akoustikos Felt and to secure the finishing membrane of muslin. Furnished in 1, 5 and 50-gal. containers. For sizing, one gallon, with one gallon added water, will cover 200 sq. ft. For applying muslin, one gallon, with 40 percent added water, will cover 100 sq. ft.

Air-Acoustic Sheets are non-combustible, moisture-resistant sound-absorbents which are used chiefly inside air-conditioning units and ducts. Manufactured in rigid form from rock wool and a suitable binder. Net weight, 1½ lb. per sq. ft., 1" thick. Furnished 24" x 36", in thicknesses of ½", 1" and 1½".

Asbestos Akoustikos Felt, made of asbestos fibre and specially selected hair, is particularly desirable where a flexible sound absorbent is necessary. Supplied in rolls of approximately 160 sq. ft., in ¼", ½", ¾" and 1" thicknesses. Respective net weight per roll is 40 lb., 68 lb., 98 lb. and 128 lb. Rectangular-cut or die-cut shapes furnished on special order.

Banacoustic Blanket, No. 100, is a fireproof acoustical blanket manufactured from 1" rock wool, faced on one side and all edges with flame-proofed muslin and secured between galvanized mesh and metal lath. Standard sizes are 2 ft. x 4 ft. and 2 ft. x 8 ft., weighing about 1.5 lb. per sq. ft., uncrated. This blanket is often used as a ceiling treatment above a noisy basement unit.

Banacoustic Blanket, No. 102, is made of long-fibre rock wool, felted between 1" wire mesh. Furnished 2 ft. x 4 ft. and 2 ft. x 8 ft. in 1", 1½" and 2" thicknesses. Available on special order faced with flame-proofed muslin under the wire mesh on one side and on all edges. Crated weight, approximately 1.5 lb. per sq. ft., 1" thick. Used in preference to Sound Isolation Blankets where greater rigidity is required. Cut pieces supplied on special order.

Plastic Silento is used where Pre-Cemented Silento Felt cannot be applied due to irregularities of the surface to be treated. It is either sprayed or brushed on, and is used in thickness of approximately 1/16". Furnished in 1, 5, 25 and 50-gal. containers. One gallon covers from 25 to 40 sq. ft.

Pre-Cemented Silento Felt. (See Silento Felt.)

Rock Wool Panels, Style No. 2111, are sound-absorbing units of long-fibre rock wool enclosed on the back and edges with chipboard and surfaced on the exposed side with wire fly-screening. Used in sound-treating small mechanical units such as refrigerators. Furnished ½", ¾" and 1" thick in sizes up to 24" x 42". Minimum width, 6"; minimum area, 72 sq. in. Net weight approximately 1.3 lb. per sq. ft. for the 1" thickness.

Silento Cement is used for attaching plain Silento Felt. Weighs about 12 lb. per gal. and is supplied in 1, 5 and 50-gal. containers. One gallon covers about 125 sq. ft.

Silento Felt (Pre-Cemented or plain) is a special asphalt-saturated product, approximately 1/16" thick, used for damping vibrations in sheet metal. Sometimes also used in the machine compartment of mechanical refrigerators. Pre-Cemented Silento Felt is supplied with a factory applied coating which is rendered adhesive by using the proper solvent. In place, the felt will withstand temperatures to 300 deg. F., without bleeding or slipping, and may be painted or oven-dried as required. Both types of Silento Felt are furnished in rolls of 100 lin. ft., in widths of 24", 32" and 36", and on order, in cut pieces. The approximate shipping weight of Pre-Cemented Silento Felt is 35 lb. per 100 sq. ft. Plain Silento Felt weighs about 25 lb. per 100 sq. ft.

Silento Solvents (standard and special) are volatile liquids which soften the cement coating on Pre-Cemented Silento Felt. The standard solvent is inflammable. The special solvent, not as efficient as the standard, is recommended only when the fire hazard must be minimized. One gal. covers 400 sq. ft. Supplied in 1, 5 and 50-gal. containers.

Sound Isolation Blankets (originally used in sound-isolating construction) often find application in lining air-conditioning units and oil burner housings. They are composed of ½", 1" and 2" rock wool stitched between sheets of various materials: Type KA has flame-proofed kraft paper on one side and asbestos paper on the other; Type KK has flame-proofed kraft paper on both sides; Type MK has flame-proofed muslin on one side and flame-proofed kraft on the other; Type MM has flame-proofed muslin on both sides. Types KA and KK are furnished 36" wide in rolls 65, 35 and 18 ft. long; the length of the roll decreases with increase in the thickness of the material. Types MK and MM are supplied in rolls of 22" and 36" and in thicknesses of ½", 1" and 2". The ½" and 1" blankets are available in lengths of 50 ft. and the 2" blanket in lengths of 25 ft. Net weight about 1.2 lb. per sq. ft., 1" thick. Furnished in special sizes on order.

Wool Deadening Felt is used for damping vibrations in sheet metal when the material does not have to go through drying ovens or when greatest efficiency is not required. It is an unsaturated rag felt, made in three weights: ¾ lb., 1 lb., and 1½ lb. per sq. yd. Packed in rolls, 36" wide, containing approximately 450 sq. ft. Respective weight per roll is 37½ lb., 50 lb. and 75 lb. Cut pieces supplied on special order.

Proper application of sound control materials is essential to secure maximum quieting efficiency. Johns-Manville Acoustical Engineers will be glad to offer advice as to approved methods which experience has shown to be most effective in accomplishing the desired result.

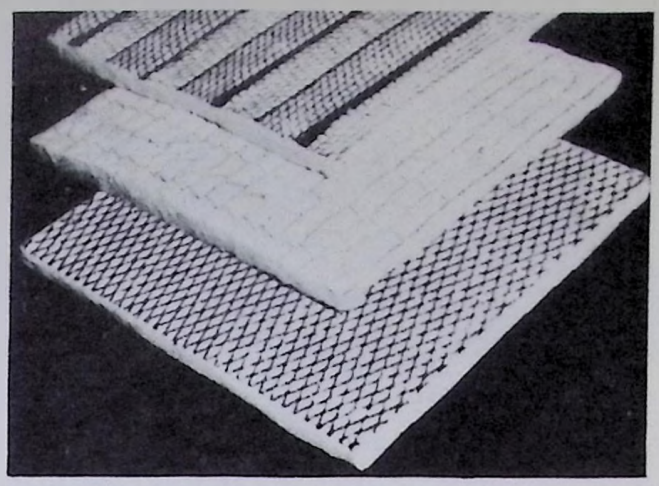
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BANACOUSTIC BLANKETS

J-M Banacoustic Blankets are large size, flexible, acoustical blankets composed of special annealed, long-fibre rock wool which is felted and secured between binders of various types. They are highly efficient and fireproof, sound-absorbing and noise-quieting mediums.



Various Banacoustic Blankets, showing metal fabrics used. Top, rib lath; center, wire mesh; bottom, expanded metal lath

The characteristics of Banacoustic Blankets make this material especially adaptable where large areas must be acoustically treated and appearance is not important. The blankets can be left bare; if desired, however, they can be covered with a decorative cloth or placed behind grilles. The large sheets, which are easily nailed, screwed or bolted to walls or ceiling, reduce the number of units to be erected, hence minimize installation costs.

Banacoustic Blankets are being successfully applied in modern hospitals, office buildings and apartment houses to absorb the noise generated by mechanical equipment. They are used to quiet operating elevators by fastening the blankets to the walls and and ceiling of the elevator machinery rooms and to the sides of the shafts. General equipment rooms and those housing blowers, refrigerating and other air-conditioning equipment are also treated to reduce mechanical noise.

To improve the acoustics in small theatres, it has been a conventional practice to install Banacoustic Blankets in the rear of the auditorium. This type of treatment and the application of the blankets to the backwalls of shallow stages, where sound equipment is used, reduces annoying echoes.

In industrial acoustical installations where appearance is not important, Banacoustic Blankets offer an economical and efficient acoustical treatment. The blankets can be used in quiet-rooms and testing laboratories. In this type of installation, they may be left without a covering. Mechanical equipment can also be quieted by enclosing the machinery in a sheet metal housing and lining the covering with Banacoustic Blankets.

The density of the rock wool in standard Banacoustic Blankets is approximately 1 lb. per sq. ft., 1" thick. Both density and thickness of the rock wool are carefully controlled so that the blankets will not run undersize when subjected to compression in shipping or handling thereby assuring full sound-absorbing value. Edges of the sheets are smooth, full and square.

Standard types of Blankets

Style No.	Type of Cover	Style No.	Type of Cover
100	1" wire mesh one side, 3" stucco lath with flame-proofed muslin other side	142-A*	Same as No. 142 except rib turned out
		152	1" wire mesh and ¾" rib lath
102	1" wire mesh both sides	152-A*	Same as No. 152 except rib turned out
112	1" wire mesh and metal lath	162	Metal lath and ¾" rib lath
122	Metal lath both sides	162-A*	Same as No. 162 except rib turned out
132	1" wire mesh and ⅜" rib lath	172**	⅜" rib lath both sides
132-A*	Same as No. 132 except rib turned out	182	Asbestos paper both sides
142	Metal lath and ⅜" rib lath	192	No. 12 mesh fly-screen wire both sides

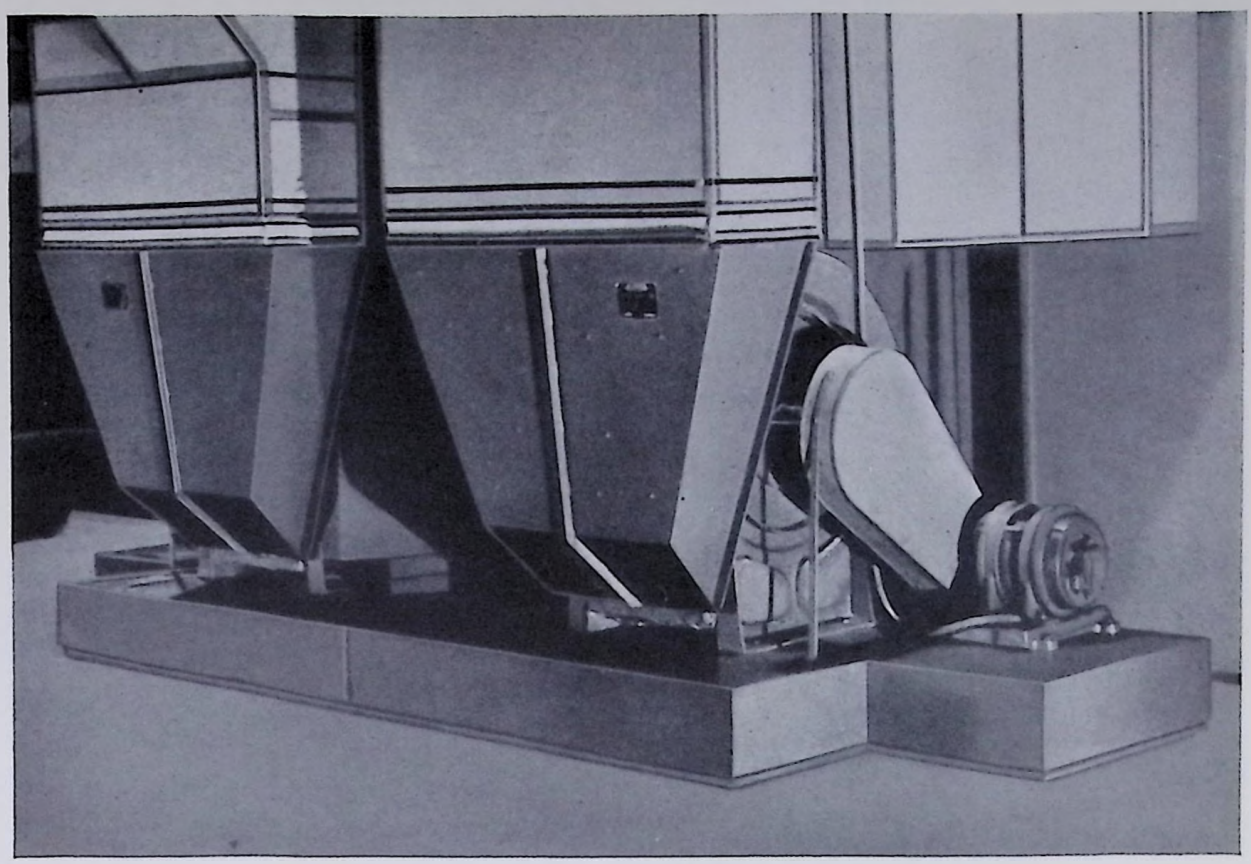
*On this type of blanket, the turned out rib provides an air space, where such an air space is desired.

**Ribs may be turned in or out, and run lengthwise or across the blanket, or at right angles to each other, as specified.

Standard sizes of Banacoustic Blankets are 24" x 48" and 24" x 96" (Style No. 182 available only in 24" x 48") in 1", 1½" and 2" thicknesses. They can be made in other sizes and thicknesses. Flame-proofed muslin on one side is standard only with Style No. 100; it may be had on other styles on special order and at additional cost.

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Anti-Vibration Platforms



A serious threat to the quality broadcasting of Station WWJ, Detroit, was the vibration created by the air-conditioning system. J-M engineers, however, confined these vibrations at their source by mounting the equipment on the specially designed A.V. Platform shown above

J-M Anti-Vibration Platforms are designed to isolate or divorce a vibrating mechanism from the building structure, in order to prevent the transmission of noise-producing vibrations. They make possible the allocation of machinery at points of economic advantage without creating an intolerable disturbance in adjoining parts of the building.

To isolate the vibration of all types of mechanical equipment, A.V. Platforms, made in a variety of designs, are specially fabricated to fit the needs of individual installations. Their general construction, however, consists of a platform top which is secured to the upper of two supporting tiers of stringers. The stringers, placed at right angles to each other, rest upon, and are separated by, heavily-felted, resilient chair sets. The spacing and the number of these sets are varied to accommodate load conditions. The types of chairs used are those that will best isolate the frequencies encountered.

A rock wool Sound Isolation Fill is placed between the stringers and partially fills the space between the floor and the platform top. An apron or skirting around the platform's base holds the fill in place.

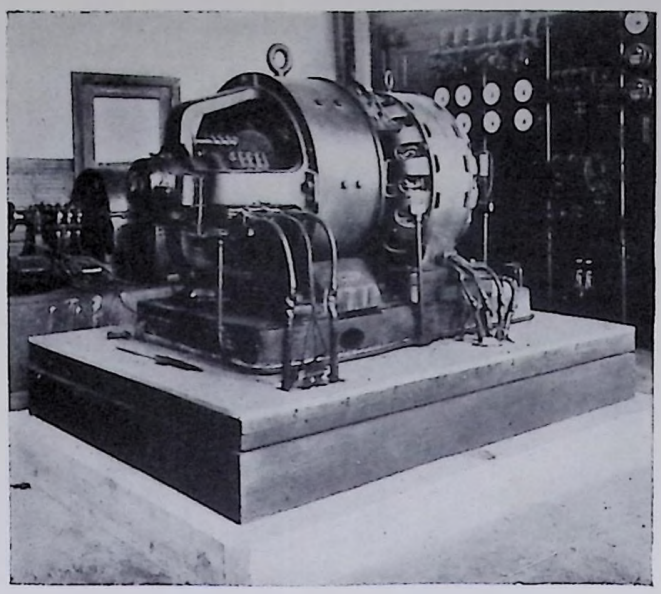
Effectiveness

The effectiveness of Johns-Manville construction is illustrated by the comments of the late Professor J. L. Arnold, then Head of the Department of Electrical Engineering at New York University. In a letter from which the following is a quotation, he refers to an installation in the Electrical Engineering Laboratory as "giving great satisfaction."

"As you know, the building is of extra heavy steel construction and has thick concrete floors for supporting our machinery. Our 75 Kw. motor-generator set . . . was pronounced . . . to be commercially balanced, and it rested on a solid concrete foundation on the main floor of the building. In spite of these facts, it

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Motor-generator set, referred to in the text, mounted on a J-M Anti-Vibration Platform at the Electrical Engineering Laboratory of New York University

caused us great annoyance. The vibration was felt all over the building, even to the farthest corner of the upper floor. The adjustment of precision instruments was quite out of the question and even a hundred feet away our mechanic found difficulty in lining up machines. In our offices the noise was worse than distracting. Necessary as our set is to all departments of the College of Engineering as their main source of direct current, it had come to be regarded as a general nuisance.

"Then you installed your platform, and all complaint ceased at once. The machine continues to vibrate as much as ever, but its operation can scarcely be heard except, of course, in the laboratory itself. In order to test the perfection of your apparatus in damping the vibration, I placed a dish of clean mercury on the floor beside the machine and sighted across its surface toward the light. Not a ripple of disturbance was visible.

"We therefore pronounce your installation a complete success."

Platform Design

Different types of vibration-producing machinery, with the resultant variations of base size, loading, and vibration characteristics, necessitate the use of different types and spacings of chairs in order that the load per chair will not exceed its vibration-absorbing capacity. If the floor is light in weight or susceptible to relatively large deflections under load, the platform will not be as effective as when the supporting structure has greater weight and inertia. The platforms must be light in relation to the floor and building structure.

The factor of greatest importance in the design of a platform is that the load center of gravity of the equipment be directly over the center of resistance of the platform. The isolation fill generally used is eliminated when the platform is below grade. If platforms are subject to excessive moisture or constant dripping, creosoted wood should be used throughout or the platform top covered with sheet metal, or both, depending on the condition. For certain types of equipment or where fire restrictions require, concrete tops are used. All aprons are of sheet metal.

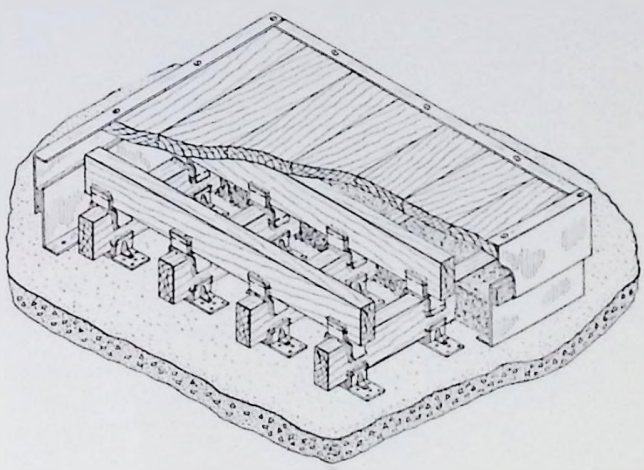
All pipes, ducts, conduit, etc., leading from the platform equipment, should be provided with flexible couplings or isolated from the structure to lessen the possibility of vibration transmission. All hose connections should be looped and installed vertically since straight hose couplings do not always isolate.

Where clearance is a limiting factor or where there are other special conditions, it is possible to support the vibrating units from the sides or hang the platforms from the ceiling or support them on wall brackets, if the load is not excessive.

In order to design a platform intelligently it is necessary to obtain the following information:

(1) Base sizes, spacing of equipment units with their respective weights, and location of load center of gravity.

(2) Description of the type of equipment, shape of platform, and the conditions to be met in the building.



Typical J-M Anti-Vibration Platform Construction

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SS–T–302

JUNE 17, 1935

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

TILE; ACOUSTIC

This specification was approved by the Director of Procurement, for the use of all departments and establishments of the Government, and shall become effective not later than February 15, 1936. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A–1. There are no other Federal specifications applicable to this specification.

A–2. Specification requirements of individual departments of the Government are noted in section H.

B. TYPES AND CLASSES

B–1. *Types.*—The acoustic tiles covered by this specification are of four types. (For cast acoustic products in the form of tile see Federal Specification SS–P–686.

I. Tile having a mechanically perforated surface, or a perforated facing.

II. Tile having a fissured surface.

III. Compressed wood fiber tile composed of wood fiber held together with a binder which makes the material fire retardant.

IV. Felted fiber or wood pulp tile which have an unperforated surface.

B–2. *Classes for auditorium treatment.*—

B–2a. For auditorium treatment acoustic tile shall be classified in regard to its sound absorbing qualities at 512 cycles per second. The limiting values of the sound absorption coefficients at this frequency for each class are as follows:

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Class	Coefficient at 512 cycles		Class	Coefficient at 512 cycles	
	Less than—	Equal to or more than—		Less than—	Equal to or more than—
A		0.90	I	0.55	0.50
B	.90	.85	J	.50	.45
C	.85	.80	K	.45	.40
D	.80	.75	L	.40	.35
E	.75	.70	M	.35	.30
F	.70	.65	N	.30	.25
G	.65	.60	O	.25	.20
H	.60	.55	P	.20	0

For a material to be acceptable the coefficient of sound absorption at 128 cycles must not be less than ⅛ of the coefficient at 512 cycles and the coefficient at 2,048 must not be less than ¾ that of the coefficient at 512 cycles. (See note I–3.)

B–3. *Classes for noise reduction.*—

B–3a. Where acoustic tile is applied to reduce the noise level, it shall be classified in regard to its sound absorbing qualities at the four frequencies 256, 512, 1,024, and 2,048 cycles. The average of the sound absorption coefficients at these four frequencies will be called the noise coefficient. For classification purposes the average will be taken to the nearest multiple of 0.05. The values of the noise coefficient for each class are as follows:

Class	Noise coefficient
Q	0.85 or 0.90
R	.75 or .80
S	.65 or .70
T	.55 or .60
U	.45 or .50
V	.35 or .40
W	.25 or .30

C. MATERIAL AND WORKMANSHIP

C–1. The acoustic tile shall consist of vegetable fiber or mineral fiber suitably felted together, or any other similar materials which shall be held together in a permanently effectual manner.

D. GENERAL REQUIREMENTS

D–1. All tile shall be free from surface defects.

D–2. All exposed plain surfaces of the acoustic tile, when it is in place, shall be reasonably straight and true to form. Corners and bevels shall be true and without marred or broken places.

D–3. The surface of type I shall be of such a nature that it can be either brush painted or spray painted with three coats of a washable oil base paint without decreasing the sound absorption coeffi-

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cient more than 5 percent. The surface of types II and III shall be of such a nature that it can be either brush painted or spray painted with three coats of a commercial brand of paint or nonbridging lacquer recommended by the tile manufacturer, without decreasing the sound absorption properties of the tile more than 5 percent. The surface of type IV shall be of such a nature that it can be decorated with a suitable dye without decreasing the sound absorption properties of the tile.

E. DETAIL REQUIREMENTS

E–1. Any special requirements of the individual departments of the Government are noted under section H.

E–2. The sound absorption coefficients at 512 cycles per second and noise coefficients for the several classes when determined on samples of 72 square feet area, in accordance with the methods used at the National Bureau of Standards, shall be within the limits specified in paragraph B–2a and B–3a. (See note I–2.)

E–3. *Type I.*—Tile having a mechanically perforated surface, or a perforated facing.

E–3a. Tiles shall consist of a sound absorbent pad covered with a perforated facing of a different material, or felted fiber tiles which have perforations extending into the material.

E–3b. Tiles shall be composed of either combustible, fire retardant, or incombustible material. If a fire retardant or incombustible tile is desired it should be so specified. (See note I–1.)

E–4. *Type II.*—Tile having a fissured surface.

E–4a. Tiles shall have a fissured surface resembling travertine.

E–4b. Tiles shall be either slow burning, fire retardant, or incombustible.

E–5. *Type III.*—Compressed wood fiber tile.

E–5a. Tiles shall be composed of wood fiber which is compressed and held together with an appropriate binder. If a fine fiber is desired it should be so specified. (See note I–1.)

E–5b. Tiles shall be fire retardant or incombustible.

E–6. *Type IV.*—Felted fiber or wood pulp tile.

E–6a. Tiles shall have a reasonably smooth surface and be composed of any kind of fiber or wood pulp which has been properly felted together.

F. METHOD OF SAMPLING, INSPECTION, AND TESTS

F–1. *Sampling.*—

F–1a. *Selection of sample for sound absorption test.*—Test samples may be taken before or after shipment at the discretion of the inspector. One or more samples of each 1,000 square feet shall be taken at random for test. The inspector shall place on each test specimen an identification mark. Each sample shall have dimensions of 1 foot by 4 feet or may be made up of smaller units such as 6 by 12 inches or 12 by 12 inches which will give an area of this shape and size.

F–1b. *Selection of sample for fire test.*—Representative material sufficient for the construction of two test samples 3 by 3 feet shall be supplied for each 50,000 square feet of surface to be covered by the material.

F–2. *Tests.*—

F–2a. *Sound absorption tests.*—The samples selected by the inspector from each lot shall be submitted to the Government for test to insure that the material complies with the requirement of this specification.

F–2b. The method of test currently used by the National Bureau of Standards can be obtained by applying to the National Bureau of Standards.

F–2c. *Fire tests.*—The sample shall be applied to an incombustible backing. Before the test the sample shall be dried to constant weight at a temperature not injurious to the material being tested. For test the sample shall be placed in a horizontal position with the surface to be exposed to the fire facing downward. It shall be supported on the flat surface of 2 by 2 by ⅛ inch steel angles framed to form a clear opening of 30 by 30 inches. The flame from a ¾ to ⅞ inch gas-air burner shall be directed against the center of the lower surface of the specimen. The top of the burner tube shall be 28¾ inches below the specimen. Temperature indications shall be obtained with a chromelalumel thermoelement made of no. 8 (B. & S. gage) wire placed in a 3-inch horizontal coil 1 inch below the center of the specimen. The wires shall be bare for a distance of 2 inches from the junction. Temperature readings shall be taken at intervals not exceeding 2 minutes.

For incombustible and fire retardant materials the test duration shall be 40 minutes and the flame shall be regulated to give temperature indications according to the "Columbia" time temperature curve in figure 1. The flame shall touch the specimen during the entire test period. Exceptions can be made for the first 5 minutes if required for proper temperature regulation. At no time during the test shall the flame cover a greater area on the specimen than a 12-inch diameter circle.

For slow-burning and combustible material the test duration shall be 20 minutes and the flame shall be regulated to give temperature indications according to the "Standard" time temperature curve in figure 1. The flame shall touch the specimen except during the first 7 minutes when exception may be made if required to prevent occurrence of temperatures higher than those prescribed. At no time during the test shall the flame cover an area on the specimen greater than a circle 8 inches in diameter.

The area under the time-temperature curve obtained from the thermoelement readings shall be within 5 percent of that of the reference curve being followed.

The tests shall be conducted in a room which is free from appreciable air currents and has a temperature between 60° F. and 85° F.

For incombustible, fire retardant, and slow-burning materials, the sample as a whole and the different units or portions thereof shall remain in place until the end of the prescribed flame exposure period. Exception is made for burned, charred, or disintegrated material falling in pieces having an area smaller than 50 square inches. No glow during or after the test shall progress to the edge of the 36 by 36 inches specimen at any point.

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SS–T–302
AMENDMENT—1
JUNE 1936

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

TILE; ACOUSTIC

This Amendment to Federal Specification SS–T–302 was approved by the Director of Procurement on June 9, 1936, and after promulgation shall form a part of that specification.

The following correction should be made in Federal Specification SS–T–302, dated June 17, 1935:

Page SS–T–302—3:

Paragraph E–3b:

First line—after "combustible" insert "slow burning,".

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F–2c (1). *Incombustible.*—When subjected to the test prescribed in F-2c no flame shall issue from the sample during or after flame application.

F–2c (2). *Fire retardant.*—When subjected to the test prescribed in F–2c no sustained flaming shall issue from the sample. Any flame which occurs shall be limited to intermittent short flames from the area directly exposed to the test flame. No flame from the specimen shall reach the angle frame at any point. No flaming shall occur more than 2 minutes after the test flame is discontinued.

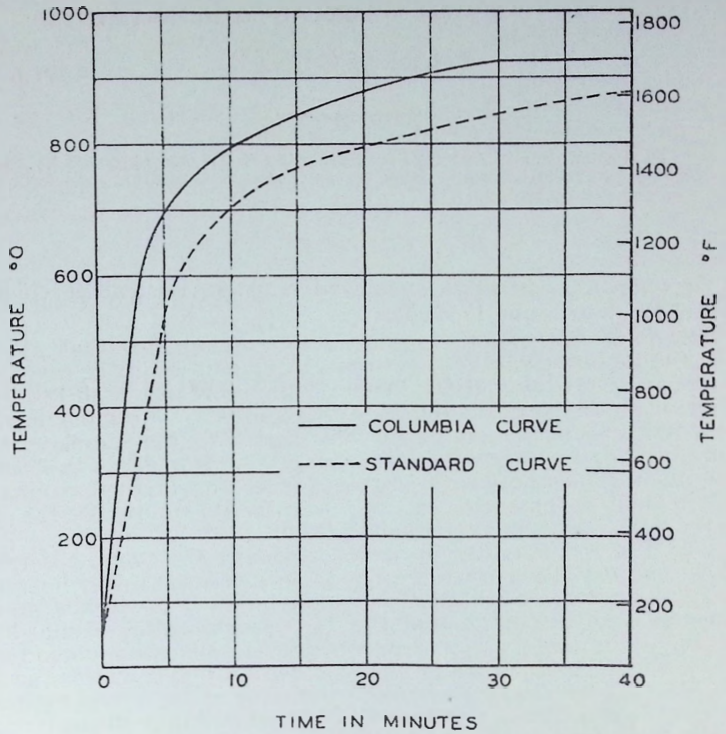


FIGURE 1.—Time-Temperature Curves.

F–2c (3). *Slow burning.*—When subjected to the test prescribed in F–2c no flame from the specimen shall reach the angle frame at any point during or after the flame application and all flaming shall cease within 5 minutes after the test flame is discontinued.

F–2c (4). *Combustible.*—Material not conforming with any of the above requirements shall be regarded as combustible.

G. PACKING AND MARKING

G–1. Any special requirements of individual departments are noted under section H.

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G–2. *Packing.*—The material shall be suitably crated or boxed to insure safe transportation by common carriers, at the lowest rate, to the point of delivery.

G–3. *Marking.*—Shipments shall be marked with the name of the material, the type and the quantity contained therein as defined by the contract or order under which shipment is made, the name of the contractor, and the number of the contract or order. Each shipment shall be certified as to origin.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H–1. The following departmental specifications, of the issue in effect on date of invitation for bids, shall respectively form a part of this specification.

H–1a. *Army.*—United States Army Specification No. 100–2B, Standard Specification for Marking Shipments.

H–1b. *Navy.*—General Specifications for Inspection of Materials (copies of which may be obtained without cost, upon application to the Bureau of Supplies and Accounts, Navy Department, Washington, D. C.).

I. NOTES

I–1. Attention is invited to options included in paragraph E–3b and E–5a.

I–2. It is the intention, but not a requirement, that all new material be tested for its sound-absorbing qualities in the reverberation room of a Government laboratory in accordance with the methods used at the National Bureau of Standards to determine in which class it would be placed. After this first test, the sample size required will be only 4 square feet; the intention is to check this sample against a representative 4 square feet of the original sample to determine if the characteristics of the material supplied are the same as those of the material originally tested.

I–3. The requirements in B–2a, regarding the sound-absorption coefficient at 128 cycles per second, have been made rather liberal, as there has not been sufficient data accumulated, up to the present time, to state definitely what this relative absorption should be in all cases. In many special cases, such as recording studios and rooms where sound motion-picture equipment or a public-address system is used, etc., the sound absorption coefficient at 128 cycles should be at least ¼ and possibly as much as ½ that of the coefficient at 512 cycles per second.

I–4. Attention is called to the desirability of fastening incombustible, fire retardant, and slow burning tile in such a manner that the means of support may be as fire retardant as the tile.

I–5. It is believed that this specification adequately describes the characteristics necessary to secure the desired material and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

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