35

JOHNS-MANVILLE

# PACKINGS


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# Johns-Manville
# PACKINGS

**JOHNS-MANVILLE**
EXECUTIVE OFFICES:
22 EAST 40th STREET
NEW YORK, N. Y.

# CONTENTS
## at a glance

FRONT YELLOW PAGES

PAGE

Introduction . . . . . 2
The Story of Packing . . . . . 3
Recommendation Tables . . . . . 6

WHITE PAGES

Rod, Plunger & Valve Stem Packing . . . . . 13
*Sea Rings* . . . . . 13
*Asbestos Fabric* . . . . . 17
*Braided and Twisted Asbestos* . . . . . 23
*Rubber and Duck* . . . . . 37
*Flax and Jute* . . . . . 43
*Flexible Metallic* . . . . . 47
*Plastic* . . . . . 51
Moulded Packing . . . . . 55
Piston Packing . . . . . 63
Sheet Packing . . . . . 67
Gaskets & Groove Packing . . . . . 77
Asbestos Wick, Rope & Cord . . . . . 89
Other J-M Products . . . . . 97

BACK YELLOW PAGES

How to Get Best Results from Packing . . . 106
Engineering Tables . . . . . 110
J-M Sales Offices . . . . . 115
Alphabetical Index . . . . . 116
Numerical Index . . . . . 117


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# Introduction

This catalog has been designed to present, in the most convenient form, information on the complete line of Johns-Manville Packings, as well as recommendations which indicate the most efficient and economical material to use for various packing requirements.

To obtain the most satisfactory service, packings should be selected with the same care as is exercised with any other vital machine part. The cost of packing is, in most cases, the smallest item of expense in a re-packing job. Labor, idle equipment and general shut-down expense are the real items to consider. Therefore, the highest quality packing is usually the most economical in the long run.

A careful study of service conditions and the selection of the most satisfactory packing for that service is the best guarantee of efficient operation and long life. The recommendation tables on pages 6 to 12 of this catalog are based on Johns-Manville's 70 years of packing experience. We believe that you will find these recommendations helpful in keeping re-packing costs at a minimum.

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# Johns-Manville
# PACKINGS

UNTIL a relatively few years ago, packing was considered quite unimportant. It was called "stuffing"—anything pliant that could be stuffed in around joints or moving pistons to minimize leakage. Machines operated at low pressures and speeds; demands on the packing were so slight that cotton wicking or hemp rope served the purpose well enough.

Today, however, the situation is entirely different. Greatly increased operating pressures, high speed and high temperature service conditions place demands upon packing that were literally undreamed of 70 years ago. As a result, the manufacture of packing has become a highly specialized industry with large research laboratories and extensive manufacturing facilities devoted to its needs.

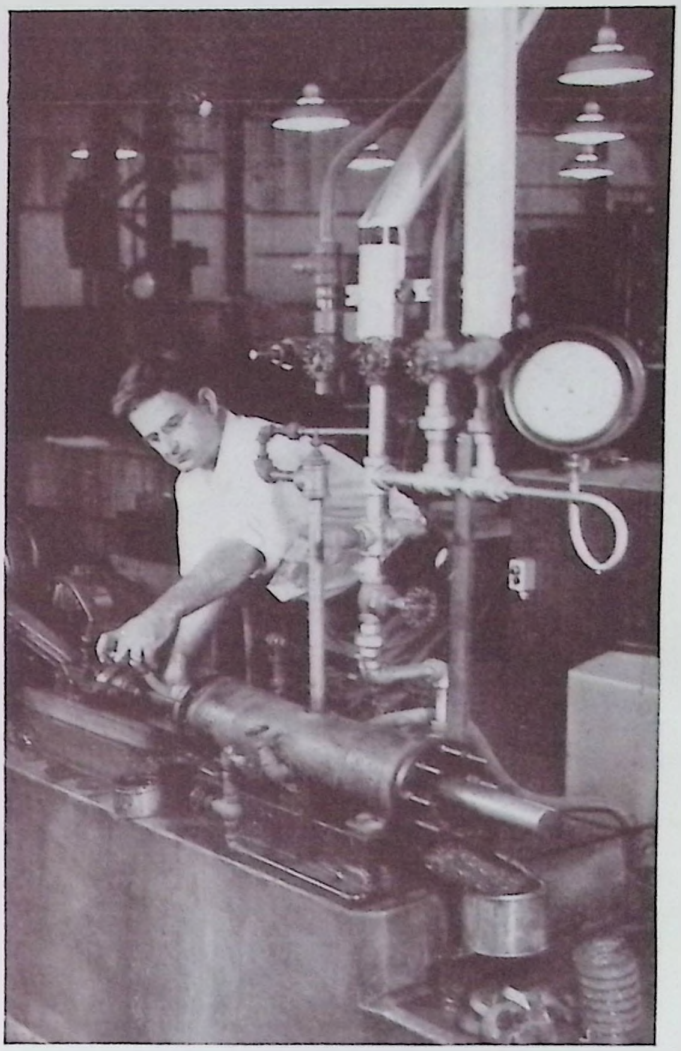
### History of Packing

During the early part of the 1870's, the H. W. Johns Company, which has since become the Johns-Manville Corp., began pioneering in the development and manufacture of asbestos packing.

Only "hornblende," a brittle variety of asbestos, not suitable for braiding, was then available in the United States. Therefore, to manufacture the first asbestos packing ever made, cotton wicking was first saturated with lard oil and then covered with a coating of asbestos dust. For gaskets, asbestos millboard, soaked in oil or coal tar, was supplied.

Needless to say, these early asbestos packings were not much good, but their improved heat resistance, greater efficiency and longer life did prove that the H. W. Johns Company was on the right track.

The first real advance in asbestos packing came during the latter part of the 1870's when huge deposits of long fibre, easily woven Chrysotile asbestos were discovered in Canada. Remarkably strong and



Virtually every condition found in industry can be duplicated in the J-M Laboratory. Above is a reciprocating rod machine used for testing packings under accurately controlled conditions.

tough, Chrysotile made it possible to produce new types and forms of asbestos packings that were far superior to any previously available. The H. W. Johns Co. purchased a large part of this deposit and soon started the development of asbestos packing along the road to its present high state of advancement.

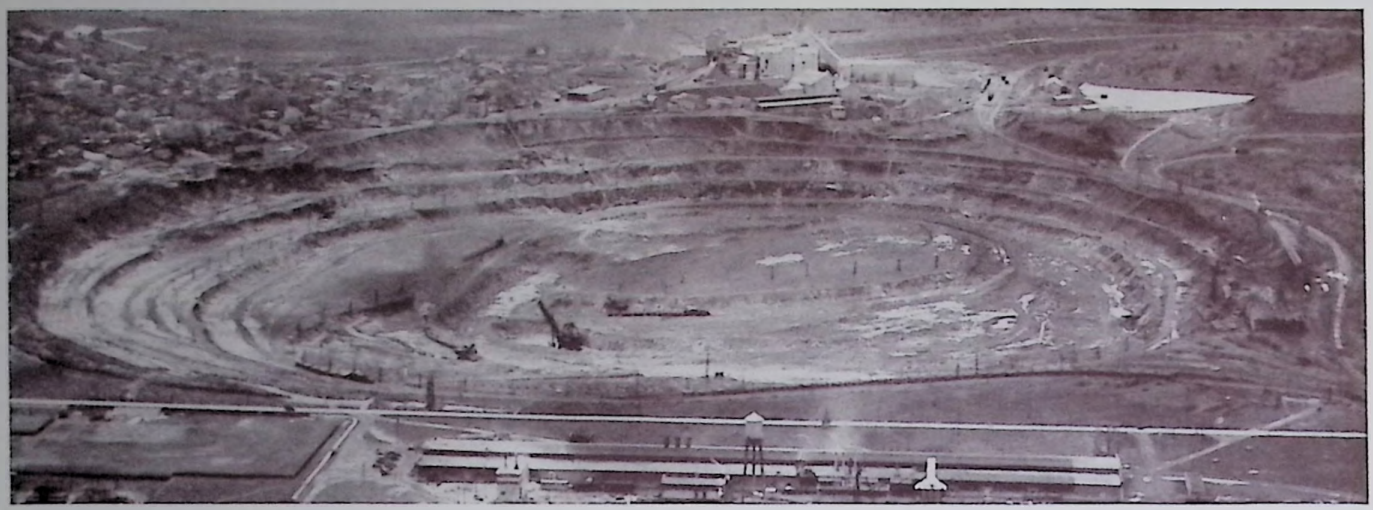
An asbestos "sock" was woven over a core of pure asbestos to form the first all-asbestos packing. Pure asbestos fibre was twisted into wick to replace the asbestos-coated cotton wicking that had been used.

Other developments came quickly. With the rapid change in industrial manufacturing methods bringing greater operating pressures and higher temperatures, packing became a vitally important factor contributing to efficient operation.

Ever since, the J-M Packing Research Laboratory has continually kept pace with industrial demands—de-



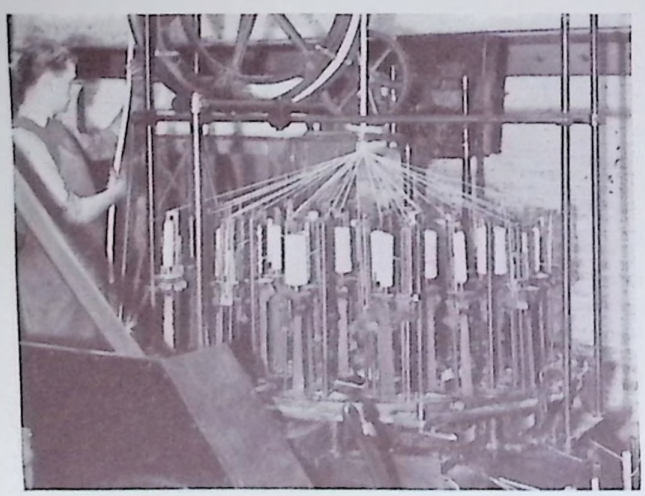
Johns-Manville Packings (1941)
ACL Doc 13710 · Page 4 of 117
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The Johns-Manville mine at Asbestos, Quebec, produces more asbestos fibre than any other mine in the world—about 40 per cent of all the asbestos fibre mined in Canada. The pit is now more than a mile in diameter and approximately 350 feet deep.



An air view of the huge Johns-Manville plant at Manville, New Jersey. A twin of this plant is located at Waukegan, Ill.



Interlocked Braided Packing, a development of the J-M Packing Laboratory, is braided square to form a strong, firmly interwoven material that lasts longer without re-packing.

veloping new packings and improving old ones to meet increasingly severe operating conditions.

### Constant Improvement Through Research

One of the many outstanding contributions of the J-M Packing Research Laboratory in recent years has been the creation of an entirely new development in braided packing—J-M Interlocked. In this method of braiding there are no heavy plaits to flatten and no jackets to wear through—all the asbestos yarns are firmly interwoven to form a strong, integral structure. Introduced only a few years ago, J-M Interlocked Braided Asbestos Packing has already proved to be the solution to many packing problems.

Today, a major portion of the research activities in the J-M Packing Laboratories is devoted to the study of proper lubricants for packing exposed to all types of severe service conditions such as acids, alkalies, oils, gasoline and superheated steam.

In addition, hundreds of special packing problems (either originated in the laboratory or by J-M customers) have been followed to their solution. As a result, friction has been minimized and the efficiency and life of packing greatly increased, resulting in important savings in every branch of industry.

### World's Largest Asbestos Mine

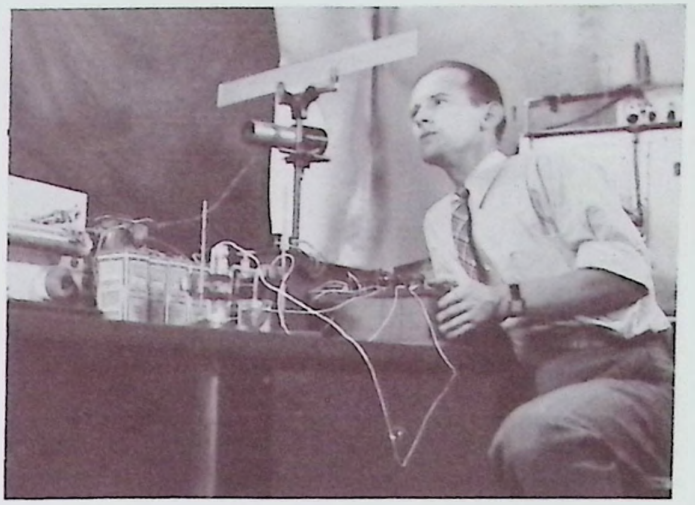
Complete control over the quality of J-M Packings begins with the raw material, for at Asbestos, Quebec, Johns-Manville owns and operates the world's largest asbestos mine. Control follows through in the J-M factories, where skillful workmanship, backed by rigid manufacturing specifications, eliminates all guesswork from the manufacture of packing.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 5 of 117
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A corner of the Inspection and Control Laboratory where engineers constantly check the quality of J-M Packings.



All J-M Packings are tested to eliminate any possible corrosion effect in service. Here an engineer measures electrolytic action.

In making many types of packing, asbestos fibre is first carded into roving of various sizes, then spun into yarns both with and without fine metal wire insertions.

From some of these yarns braided packings are made in a wide range of sizes and styles, including interlocked, braid-over-braid and plaited.

Other yarns are woven into asbestos cloth, or asbestos-metallic cloth, from which numerous hand-formed asbestos fabric packings and gaskets are made.

Many of these packings are impregnated with special compounds while being braided or folded and almost all must undergo finishing operations, including calendering or forming, lubricating and graphiting.

Some styles of sheet packing are also made from felted asbestos or impregnated asbestos cloth, both with and without wire insertions.

In addition, there are many other important types of packing in the J-M line. These include braided flax and jute, rubber and duck, flexible metallic, plastic and moulded packings of various kinds. All of these are particularly adapted by their composition and method of manufacture to provide long, efficient operation in the service for which they are designed.

### Rigid Control of Quality

Entirely separate and apart from both the Packing Research Department and the Manufacturing Department is a third organization whose sole responsibility is the constant checking and re-checking of the finished packing. Known as the Inspection and Control Department, it includes a large staff of inspectors and engineers who devote their full time to the testing and inspection of packing and gaskets.

Maintaining their own completely equipped testing laboratory and working independently of every other group, these men subject each lot of J-M Packing to a rigid series of tests to determine its uniformity and conformance to specifications. Any lot that differs in any respect from pre-determined standards is immediately rejected and withheld from shipment.

In testing sheet packing, for example, sample pieces are taken during every stage of the run—from the beginning through to the end. These samples are tested for tensile strength, weight, dimensions, tearing strength and other qualities required by the specifications under which the sheet is made.

Rod, plunger and valve stem packings, piston packings, gaskets and every other type of packing are tested in a similarly thorough fashion, both from the standpoint of materials used in their manufacture and the accuracy of every detail of their construction.

### The J-M Engineering Service

At times, due to unusual or very specialized conditions, packing problems arise which call for careful analysis and study before a remedy can be applied.

For this reason, the Johns-Manville Packing Engineering Service is available to every user of Packing. This service provides the assistance of a large staff of highly trained engineers and research specialists, an organization of experienced field engineers and the facilities of the J-M Packing Research Laboratory.

Whenever you are faced with a difficult packing problem, these J-M Engineers will welcome an opportunity to study the problem thoroughly and recommend the most practical and economical solution. To take advantage of this free service, simply contact the nearest Johns-Manville Office listed on page 115.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 6 of 117
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# Johns-Manville Packing Recommendations

JOHNS-MANVILLE Packings have been developed to meet all types of industrial packing requirements. Coupled with their high quality and efficiency is the prompt service afforded by more than 400 convenient distribution points.

In buying packing, it is well to keep in mind that coil and spiral are the most economical for maintenance purposes when the desired style is furnished in those forms. Rings to fit many different stuffing boxes can be cut from the same coil or spiral, thus reducing the number of sizes that must be stocked and minimizing the danger of running out of one size while over-stocked with another.

The following recommendation tables are based on Johns-Manville's many years of packing experience and should prove helpful in selecting the right packing for every service. For special or unusual conditions, Johns-Manville has available engineers who will be glad to study the requirements and submit specific recommendations.

**THE FIRST MATERIAL LISTED** for each condition in the following table is the best recommendation for that service, except Sea Rings, which are the first recommendation for any service and condition under which they can be used.

**SEA RINGS** are an automatic packing for reciprocating rods and plungers of 3/4" diameter or over, operating against steam, water, air, gas and oil, where the rod is in line, true and not scored, and where the packing space is not less than 5/16" nor more than 1-1/4". (See pages 13-16.)

## ROD, OUTSIDE-PACKED PLUNGER AND VALVE STEM PACKING

| Service | Reciprocating Rods and Plungers | | Centrifugal and Oscillating Rods | Valve Stems |
|---|---|---|---|---|
| | Large Packing Space | Small Packing Space | | |
| **Steam** Over 500° F. | #167 Superheat, *p. 20*<br>#6 Rajah, *p. 29*<br>#5 High Temperature, *p. 36*<br><br>#391 Flexible Metallic, *p. 50*<br>#392 Flexible Metallic, *p. 50* | #6 or #2 Rajah, *p. 29*<br>#5 High Temperature, *p. 36*<br><br>#391 Flexible Metallic, *p. 50*<br>#392 Flexible Metallic, *p. 50* | | #14 Jowett, *p. 28*<br>#2 or #6 Rajah, *p. 29*<br>#5 High Temperature, *p. 36*<br>#45 Conopac, *p. 60*<br><br>#391 Flexible Metallic, *p. 50*<br>#392 Flexible Metallic, *p. 50* |
| **Steam** 350° to 500° F. | #166 Kearsarge, *p. 18*<br>#32 Universal Rod, *p. 21*<br>#6 Rajah, *p. 29*<br><br>#360 Flexible Metallic, *p. 48*<br>#350 Flexible Metallic, *p. 49* | #6 or #2 Rajah, *p. 29*<br>#223 or #222 Mogul, *p. 26*<br>#255 or #257 Interlocked, *p. 25*<br><br>#360 Flexible Metallic, *p. 48*<br>#350 Flexible Metallic, *p. 49* | | #2 or #6 Rajah, *p. 29*<br>#222 or #223 Mogul, *p. 26*<br>#10 Jowett, *p. 28*<br><br>#360 Flexible Metallic, *p. 48* |
| **Steam** Under 350° F. | #166 Kearsarge, *p. 18*<br>#32 Universal Rod, *p. 21*<br>#6 Rajah, *p. 29*<br>#10 Jowett, *p. 28*<br>#223 Mogul, *p. 26*<br>#255 Interlocked, *p. 25*<br>#271 Cross Diagonal, *p. 38*<br>#171 Duro, *p. 40*<br><br>#360 Flexible Metallic, *p. 48*<br>#350 Flexible Metallic, *p. 49* | #223 or #222 Mogul, *p. 26*<br>#255 or #257 Interlocked, *p. 25*<br>#6 or #2 Rajah, *p. 29*<br>#10 Jowett, *p. 28*<br><br>#360 Flexible Metallic, *p. 48*<br>#350 Flexible Metallic, *p. 49* | | #222 or #223 Mogul, *p. 26*<br>#193 Mogul, *p. 26*<br>#2 or #6 Rajah, *p. 29*<br>#10 Jowett, *p. 28*<br><br>#360 Flexible Metallic, *p. 48*<br>#350 Flexible Metallic, *p. 49* |
| **Water-Hot** | #271 Cross Diagonal, *p. 38*<br>#32 Universal Rod, *p. 21*<br><br>#360 Flexible Metallic, *p. 48*<br>#360 & #362 Flexible Metallic Combination, *p. 48*<br>#350 Flexible Metallic, *p. 49* | #223 or #222 Mogul, *p. 26*<br>#255 or #257 Interlocked, *p. 25*<br>#6 or #2 Rajah, *p. 29*<br>#10 Jowett, *p. 28*<br><br>#360 Flexible Metallic, *p. 48*<br>#350 Flexible Metallic, *p. 49* | #7 or #11 Contripac, *p. 30*<br>#255 or #257 Interlocked, *p. 25*<br>#223 or #222 Mogul, *p. 26*<br>#10 Jowett, *p. 28*<br><br>#360 Flexible Metallic, *p. 48*<br>#350 Flexible Metallic, *p. 49*<br>#610 Plastic, *p. 53*, with end rings of #360 Flexible Metallic, *p. 48* | #222 or #223 Mogul, *p. 26*<br>#193 Mogul, *p. 26*<br>#10 Jowett, *p. 28*<br><br>#360 Flexible Metallic, *p. 48*<br>#350 Flexible Metallic, *p. 49* |
| **Water-Cold** Over 500-lb. pressure | #188 or #240 Flax, *p. 41*<br>#188 or #240 Flax with end rings of #33 Universal, *p. 61*, #182 Aqua, *p. 65* or #280 Braided Copper, *p. 50* | #188 or #240 Flax, *p. 41*<br>#188 or #240 Flax with end rings of #33 Universal, *p. 61*, #182 Aqua, *p. 65* or #10 Jowett, *p. 28* | #11 Contripac, *p. 30*<br>#257 Interlocked, *p. 25*<br>#10 Jowett, *p. 28*<br><br>#360 Flexible Metallic, *p. 48*<br>#350 Flexible Metallic, *p. 49* | #10 Jowett, *p. 28*<br>#223 Mogul, *p. 26*<br><br>#360 Flexible Metallic, *p. 48*<br>#350 Flexible Metallic, *p. 49* |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 7 of 117
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# Johns-Manville Packing Recommendations—continued

## ROD, OUTSIDE-PACKED PLUNGER AND VALVE STEM PACKING

| Service | Reciprocating Rods and Plungers | | Centrifugal and Oscillating Rods | Valve Stems |
|---|---|---|---|---|
| | Large Packing Space | Small Packing Space | | |
| **Water-Cold** 100 to 500-lb. pressure | #188 or #189 Flax, *p. 44*<br>#32 Universal Rod, *p. 21*<br>#10 Jewett, *p. 28*<br>#360 Flexible Metallic, *p. 48*<br>#363 Flexible Metallic, *p. 49*<br>#360 & #363 Combination<br>#610 Plastic, *p. 53* with end rings of #360 Flexible Metallic, *p. 48* | #188 or #189 Flax, *p. 44*<br>#10 Jewett, *p. 28*<br>#223 or #222 Mogul, *p. 26*<br>#255 or #257 Interlocked, *p. 25*<br>#360 Flexible Metallic, *p. 48*<br>#610 Plastic, *p. 53* with end rings of #360 Flexible Metallic, *p. 48* | #7 or #11 Centripac, *p. 30*<br>#255 Interlocked, *p. 25*<br>#223 or #222 Mogul, *p. 26*<br>#360 Flexible Metallic, *p. 48*<br>#350 Flexible Metallic, *p. 49*<br>#610 Plastic, *p. 53* with end rings of #360 Flexible Metallic, *p. 48* | #222 or #223 Mogul, *p. 26*<br>#10 Jewett, *p. 28*<br>#360 Flexible Metallic, *p. 48*<br>#610 Plastic, *p. 53* with end rings of #360 Flexible Metallic, *p. 48* |
| **Water-Cold** Fresh or Salt under 100 lbs. pressure | #189 Flax, *p. 44*<br>#2000 Flax, *p. 44*<br>#32 Universal Rod, *p. 21*<br>#360 Flexible Metallic, *p. 48*<br>#363 Flexible Metallic, *p. 49*<br>#360 & #363 Combination<br>#610 Plastic, *p. 53* with end rings of #360 Flexible Metallic, *p. 48* | #223 or #222 Mogul, *p. 26*<br>#255 or #257 Interlocked, *p. 25*<br>#189 Flax, *p. 44*<br>#2000 Flax, *p. 44*<br>#360 Flexible Metallic, *p. 48*<br>#360 & #363 Combination<br>#610 Plastic, *p. 53* with end rings of #360 Flexible Metallic, *p. 48* | #7 Centripac, *p. 30*<br>#255 Interlocked, *p. 25*<br>#223 or #222 Mogul, *p. 26*<br>#360 Flexible Metallic, *p. 48*<br>#350 Flexible Metallic, *p. 49*<br>#610 Plastic, *p. 53* with end rings of #360 Flexible Metallic, *p. 48* | #222 or #223 Mogul, *p. 26*<br>#193 Mogul, *p. 26*<br>#10 Jewett, *p. 28*<br>#360 Flexible Metallic, *p. 48*<br>#350 Flexible Metallic, *p. 49*<br>#610 Plastic, *p. 53* with end rings of #360 Flexible Metallic, *p. 48* |
| **Brine** | #240 or #181 Flax, *p. 44*<br>#188 or #189 Flax, *p. 44*<br>#360 Flexible Metallic, *p. 48*<br>#360 & #363 Combination<br>#610 Plastic, *p. 53* with end rings of #360 Flexible Metallic, *p. 48* | #240 or #181 Flax, *p. 44*<br>#188 or #189 Flax, *p. 44*<br>#360 Flexible Metallic, *p. 48*<br>#610 Plastic, *p. 53* with end rings of #360 Flexible Metallic, *p. 48* | #7 Centripac, *p. 30*<br>#255 Interlocked, *p. 25*<br>#360 Flexible Metallic, *p. 48*<br>#350 Flexible Metallic, *p. 49*<br>#610 Plastic, *p. 53* with end rings of #360 Flexible Metallic, *p. 48* | #222 or #223 Mogul, *p. 26*<br>#193 Mogul, *p. 26*<br>#10 Jewett, *p. 28*<br>#360 Flexible Metallic, *p. 48*<br>#350 Flexible Metallic, *p. 49*<br>#610 Plastic, *p. 53* with end rings of #360 Flexible Metallic, *p. 48* |
| **Ammonia** | #172 Besta-Monia, *p. 40*<br>#172-D. C. and #172-S. C. Besta-Monia Combination Rings, *p. 40*<br>#271 Cross Diagonal, *p. 38*<br>Combination of #172, *p. 40* or #271, *p. 38*, with #7 Centripac, *p. 30* or #223 Mogul, *p. 26* | #172 Besta-Monia, *p. 40*<br>#271 Cross Diagonal, *p. 38*<br>Combination of #172, *p. 40* or #271, *p. 38* with #7 Centripac, *p. 30* or #223 Mogul, *p. 26* | #7 Centripac, *p. 30*<br>#255 Interlocked, *p. 25*<br>#223 or #222 Mogul, *p. 26*<br>#360 Flexible Metallic, *p. 48* | #222 or #223 Mogul, *p. 26*<br>#193 Mogul, *p. 26*<br>#360 Flexible Metallic, *p. 48* |
| **Air** N. Y. & Westinghouse Air Pumps. | #15-55 Combination Rings, *p. 19* and *p. 36* | #222 or #223 Mogul, *p. 26*<br>#10 Jewett, *p. 28* | | |
| Air Compressors, Vacuum Pumps Air Compressors, "two-stage" | #15 Kearsarge, *p. 18*<br>#166 Kearsarge, *p. 18*<br>#55 Air Packing, *p. 36* | #222 or #223 Mogul, *p. 26*<br>#10 Jewett, *p. 28* | #7 Centripac, *p. 30*<br>#255 Interlocked, *p. 25*<br>#223 or #222 Mogul, *p. 26* | #222 or #223 Mogul, *p. 26*<br>#10 Jewett, *p. 28* |
| **Acid—(Strong)** (For best results give all conditions of service.) | #2017 Acid, *p. 32*<br>#2015 Acid, *p. 32*<br>#2010 Acid, *p. 32*<br>#640 Plastic, *p. 53* with end rings of #379 Flexible Metallic, *p. 49* (for Sulphurous or Sulphuric)<br>#645 Plastic, *p. 53* with end rings of #2017, *p. 32* (for acids that react with lead) | #2017 Acid, *p. 32*<br>#2015 Acid, *p. 32*<br>#2010 Acid, *p. 32*<br>#640 Plastic, *p. 53* with end rings of #379 Flexible Metallic, *p. 49* (for Sulphurous or Sulphuric)<br>#645 Plastic, *p. 53* with end rings of #2017, *p. 32* (for acids that react with lead) | #2018 Acid, *p. 32*<br>#2015 Acid, *p. 32*<br>#2010 Acid, *p. 32*<br>#640 Plastic, *p. 53* with end rings of #379 Flexible Metallic, *p. 49* (for Sulphurous or Sulphuric)<br>#645 Plastic, *p. 53* with end rings of #2018, *p. 32* (for acids that react with lead) | #2017 Acid, *p. 32*<br>#2016 Acid, *p. 32*<br>#640 Plastic, *p. 53* with end rings of #379 Flexible Metallic, *p. 49* (for Sulphurous or Sulphuric)<br>#645 Plastic, *p. 53* with end rings of #2017, *p. 32* (for acids that react with lead) |
| **Acids—(Weak)** | #223 Mogul, *p. 26*<br>#255 Interlocked, *p. 25*<br>#350 Flexible Metallic, *p. 49*<br>#360 Flexible Metallic, *p. 48*<br>#640 Plastic, *p. 53* with end rings of #379 Flexible Metallic, *p. 49* (for Sulphurous or Sulphuric)<br>#645 Plastic, *p. 53* with end rings of #2017, *p. 32* (for acids that react with lead) | #223 Mogul, *p. 26*<br>#255 Interlocked, *p. 25*<br>#350 Flexible Metallic, *p. 49*<br>#360 Flexible Metallic, *p. 48*<br>#640 Plastic, *p. 53* with end rings of #379 Flexible Metallic, *p. 49* (for Sulphurous or Sulphuric)<br>#645 Plastic, *p. 53* with end rings of #2017, *p. 32* (for acids that react with lead) | #7 Centripac, *p. 30*<br>#255 Interlocked, *p. 25*<br>#350 Flexible Metallic, *p. 49*<br>#360 Flexible Metallic, *p. 48*<br>#640 Plastic, *p. 53* with end rings of #379 Flexible Metallic, *p. 49* (for Sulphurous or Sulphuric)<br>#645 Plastic, *p. 53* with end rings of #2018, *p. 32* (for acids that react with lead) | #222 or #223 Mogul, *p. 26*<br>#640 Plastic, *p. 53* with end rings of #379 Flexible Metallic, *p. 49* (for Sulphurous or Sulphuric)<br>#645 Plastic, *p. 53* with end rings of #2017, *p. 32* (for acids that react with lead) |
| **Food Products, Alcohol, Caustic, Weak Acids** (To prevent discoloration) | #2035 White Lubricated, *p. 31*<br>#630 Plastic, *p. 53* with end rings of #2035 White Lubricated, *p. 31* | #2035 White Lubricated, *p. 31*<br>#630 Plastic, *p. 53* with end rings of #2035 White Lubricated, *p. 31* | #2036 White Lubricated, *p. 31*<br>#630 Plastic, *p. 53* with end rings of #2036 White Lubricated, *p. 31* | #2035 White Lubricated, *p. 31*<br>#630 Plastic, *p. 53* with end rings of #2035 White Lubricated, *p. 31* |
| **Caustic (Strong)** | #2020 Caustic, *p. 33*<br>#2022 Caustic, *p. 33*<br>#630 Plastic, *p. 53* with end rings of #2022 Caustic, *p. 33* | #2020 Caustic, *p. 33*<br>#2022 Caustic, *p. 33*<br>#630 Plastic, *p. 53* with end rings of #2022 Caustic, *p. 33* | #2021 Caustic, *p. 33*<br>#2022 Caustic, *p. 33*<br>#350 Flexible Metallic, *p. 49*<br>#360 Flexible Metallic, *p. 48*<br>#630 Plastic, *p. 53* with end rings of #2022 Caustic, *p. 33* | #2020 Caustic, *p. 33*<br>#2022 Caustic, *p. 33*<br>#630 Plastic, *p. 53* with end rings of #2022 Caustic, *p. 33* |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 8 of 117
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# Johns-Manville Packing Recommendations—continued

## ROD, OUTSIDE-PACKED PLUNGER AND VALVE STEM PACKING

| Service | Reciprocating Rods and Plungers | | Centrifugal and Oscillating Rods | Valve Stems |
|---|---|---|---|---|
| | Large Packing Space | Small Packing Space | | |
| **Caustic (Weak)** | #223 Mogul, *p. 26*<br>#255 Interlocked, *p. 25*<br>#350 Flexible Metallic, *p. 49*<br>#360 Flexible Metallic, *p. 48*<br>#630 Plastic, *p. 53* with end rings of #2022 Caustic, *p. 33* | #223 Mogul, *p. 26*<br>#255 Interlocked, *p. 25*<br>#350 Flexible Metallic, *p. 49*<br>#360 Flexible Metallic, *p. 48*<br>#630 Plastic, *p. 53* with end rings of #2022 Caustic, *p. 33* | #7 Centripac, *p. 30*<br>#255 Interlocked, *p. 25*<br>#350 Flexible Metallic, *p. 49*<br>#360 Flexible Metallic, *p. 48*<br>#630 Plastic, *p. 53* with end rings of #2022 Caustic, *p. 33* | #222 or #223 Mogul, *p. 26*<br>#630 Plastic, *p. 53* with end rings of #2022 Caustic, *p. 33* |
| **Vegetable Oil** | #223 or #222 Mogul, *p. 26*<br>#255 or #257 Interlocked, *p. 25*<br>#10 Jowett, *p. 28* | #223 or #222 Mogul, *p. 26*<br>#255 or #257 Interlocked, *p. 25*<br>#10 Jowett, *p. 28* | #7 or #11 Centripac, *p. 30*<br>#255 or #257 Interlocked, *p. 25*<br>#350 Flexible Metallic, *p. 49*<br>#223 or #222 Mogul, *p. 26*<br>#10 Jowett, *p. 28*<br>#360 Flexible Metallic, *p. 48* | #222 or #223 Mogul, *p. 26*<br>#193 Mogul, *p. 26*<br>#10 Jowett, *p. 28* |
| **Natural Gas** Over 500-lb. pressure | Sea Rings, *p. 14*<br>#789 Thermo, *p. 36* | | | |
| **Natural Gas** Under 500-lb. pressure | #15 Kearsarge, *p. 18*<br>#223 Mogul, *p. 26*<br>#10 Jowett, *p. 28* | #223 or #222 Mogul, *p. 26*<br>#10 Jowett, *p. 28* | | |
| **Crude Oil** over 350° F. | #270 Interlocked, *p. 35*<br>#789 Thermo, *p. 36*<br>#731 Rod, *p. 36*<br>#6 Rajah, *p. 29*<br>#5 Rod *p. 36*<br>#620 Plastic, *p. 53* with end rings of #270 Interlocked, *p. 35* | #270 Interlocked, *p. 35*<br>#789 Thermo, *p. 36*<br>#731 Rod, *p. 36*<br>#6 or #2 Rajah, *p. 29*<br>#5 Rod, *p. 36*<br>#620 Plastic, *p. 53* with end rings of #270 Interlocked, *p. 35* | #270 Interlocked, *p. 35*<br>#789 Thermo, *p. 36*<br>#5 Rod, *p. 36*<br>#731 Rod, *p. 36*<br>#392 Flexible Metallic, *p. 50*<br>#620 Plastic, *p. 53* with end rings of#270 Interlocked, *p. 35* | #270 Interlocked, *p. 35*<br>#789 Thermo, *p. 36*<br>#2 or #6 Rajah, *p. 29*<br>#5 Rod, *p. 36*<br>#731 Rod, *p. 36*<br>#392 Flexible Metallic, *p. 50*<br>#620 Plastic, *p. 53* with end rings of #270 Interlocked, *p. 35* |
| **Crude Oil** 100° to 350° F. | #10 Jowett, *p. 28*<br>#223 Mogul, *p. 26*<br>#255 or #257 Interlocked, *p. 25*<br>#6 Rajah, *p. 29*<br>#620 Plastic, *p. 53* with end rings of #270 Interlocked, *p. 35* | #10 Jowett, *p. 28*<br>#223 Mogul, *p. 26*<br>#255 or #257 Interlocked, *p. 25*<br>#6 Rajah, *p. 29*<br>#620 Plastic, *p. 53* with end rings of #270 Interlocked, *p. 35* | #7 Centripac, *p. 30*<br>#255 or #257 Interlocked, *p. 25*<br>#350 Flexible Metallic, *p. 49*<br>#10 Jowett, *p. 28*<br>#223 Mogul, *p. 26*<br>#360 Flexible Metallic, *p. 48*<br>#620 Plastic, *p. 53* with end rings of #360 Flexible Metallic, *p. 48* | #222 or #223 Mogul, *p. 26*<br>#10 Jowett, *p. 28*<br>#360 Flexible Metallic, *p. 48*<br>#620 Plastic, *p. 53* with end rings of #360 Flexible Metallic, *p. 48* |
| **Crude Oil** Under 100° F. | #10 Jowett, *p. 28*<br>#223 Mogul, *p. 26*<br>#255 or #257 Interlocked, *p. 25*<br>#188 or #240 Flax, *p. 44*<br>#620 Plastic, *p. 53*, with end rings of #10 Jowett, *p. 28*, or #255 Interlocked, *p. 25* | #10 Jowett, *p. 28*<br>#223 Mogul, *p. 26*<br>#255 or #257 Interlocked, *p. 25*<br>#188 or #240 Flax, *p. 44*<br>#620 Plastic, *p. 53* with end rings of #10 Jowett, *p. 28*, or #255 Interlocked, *p. 25* | #7 Centripac, *p. 30*<br>#255 or #257 Interlocked, *p. 25*<br>#10 Jowett, *p. 28*<br>#223 Mogul, *p. 26*<br>#360 Flexible Metallic, *p. 48*<br>#620 Plastic, *p. 53* with end rings of #360 Flexible Metallic, *p. 48* | #222 or #223 Mogul, *p. 26*<br>#10 Jowett, *p. 28*<br>#620 Plastic, *p. 53* with end rings of #360 Flexible Metallic, *p. 48* |
| **Gasoline Distillate Butane Propane** | #323 Gasoline Rod, *p. 34*<br>#259 Interlocked, *p. 25*<br>#361 Flexible Metallic, *p. 48* | #323 Gasoline Rod ,*p. 34*<br>#259 Interlocked, *p. 25*<br>#361 Flexible Metallic, *p. 48* | #18 Centripac, *p. 30*<br>#323 Gasoline Rod, *p. 34*<br>#361 Flexible Metallic, *p. 48*<br>#620 Plastic, *p. 53* with end rings of #361 Flexible Metallic, *p. 48* | #323 Gasoline rod, *p. 34*<br>#293 Gasoline Rod, *p. 34*<br>#361 Flexible Metallic, *p. 48*<br>#620 Plastic, *p. 53* with end rings of #361 Flexible Metallic, *p. 48* |
| **Fuel and Lubricating Oils** | #223 Mogul, *p. 26*<br>#10 Jowett, *p. 28*<br>#255 Interlocked, *p. 25*<br>#620 Plastic, *p. 53* with end rings of #223, *p. 26*, #255, *p. 25* or #10, *p. 28* | #223 Mogul, *p. 26*<br>#10 Jowett, *p. 28*<br>#255 Interlocked, *p. 25* | #223 Mogul, *p. 26*<br>#7 Centripac, *p. 30*<br>#360 Flexible Metallic, *p. 48*<br>#620 Plastic, *p. 53* with end rings of #360, *p. 48*, #223, *p. 26* or #7, *p. 30* | #223 Mogul, *p. 26*<br>#360 Flexible Metallic, *p. 48*<br>#620 Plastic, *p. 53* with end rings of #360, *p. 48*, #223, *p. 26* or #7, *p. 30* |
| **Asphaltic and Heavy Oils** 350° to 500° F. | #789 Thermo, *p. 36*<br>#10 Jowett, *p. 28*<br>#11 Centripac, *p. 30*<br>#350 Flexible Metallic, *p. 49* | #789 Thermo, *p. 36*<br>#10 Jowett, *p. 28*<br>#11 Centripac, *p. 30*<br>#350 Flexible Metallic, *p. 49* | | #10 Jowett, *p. 28* |
| **Asphaltic and Heavy Oils** Under 350° F. | #10 Jowett, *p. 28*<br>#11 Centripac, *p. 30*<br>#350 Flexible Metallic, *p. 49* | #10 Jowett, *p. 28*<br>#11 Centripac, *p. 30*<br>#350 Flexible Metallic, *p. 49* | | #10 Jowett, *p. 28* |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 9 of 117
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# Johns-Manville Packing Recommendations—continued

## INSIDE-PACKED PISTON OR PLUNGER PACKING

| | |
|---|---|
| Hot Water<br>Cold Water<br>Crude Oil<br>Gasoline under 400° F.<br>Mineral Seal Oil | #33 Universal, *p. 61*; #295 Light Weight Hydraulic, *p. 66*<br>#182 Aqua, *p. 65*; #290 Square Hydraulic, *p. 66* |
| Hydraulic or Air | Moulded Packing Cups, *p. 56* |

## SHEET PACKING

| | |
|---|---|
| All Conditions | #60 Service, *p. 68* |
| Hot Oils | #60 Service, *p. 68*; #70 Asbestos, *p. 70* |
| Cold Oil or Gasoline | #711 Seigelite, *p. 72* |
| Hot Caustic | #70 Asbestos, *p. 70* |
| Low-Pressure Water, Steam, Air | #107 Liberty, *p. 76.* |

Note: Use #100 Kearsarge, *p 73.*, or #101 Mobilene, *p. 73* for rough or uneven flanges against steam and gas

## EXPANSION JOINTS

| | |
|---|---|
| All Conditions | See Standard Rod and Plunger recommendations |

## GASKETS

| | |
|---|---|
| All conditions | #60 Service, *p. 68* |
| Hot Oil | #60 Service, *p. 68*; #70 Asbestos, *p. 70* |
| Cold Crude Oil or Gasoline | #711 Seigelite, *p. 72* |
| Hot Caustic | #70 Asbestos, *p. 70* |
| Boiler handhole or manhole | #116 Kearsarge, *p. 78*; #142 Spirotallic, *p. 81* |
| Boiler tube plate: B. & W., Heine, Edge Moor | #118 Kearsarge Jointless, *p. 78*; #116 Kearsarge, *p. 78*; #142 Spirotallic, *p. 81* |
| All other tube plates | #116 Kearsarge, *p. 78*; #142 Spirotallic, *p. 81* |
| Emergency manhole or handhole of round cross-section | #124 Kearsarge Tubular Gasketing, *p. 88* |
| Surfaces too uneven or rough for #60 Service | #116 Kearsarge *p. 78*; #100 Kearsarge, *p. 73* |
| Odd or irregular gaskets | #120 Kearsarge Gasketing Tape, *p. 81* |

## PUMP VALVES

| | |
|---|---|
| Hot Water — Maximum 300-lb. pressure, 300° F. | #424, *p. 62* |
| Cold Water — Pressure up to 200 lb. | #416, *p. 62* |
| Cold Water — 200 to 400-lb. pressure | #415, *p. 62* |
| Condenser | #420, *p. 62* |
| Oil, Ammonia, Syrups, etc.— Maximum 300-lb. pressure; 300° F. | #430, *p. 62* |
| Hot or cold oil, gasoline, naphtha, etc., paraffin, hot or cold water, weak acids and weak alkalis. Limit 300° F., all pressures | #300, *p. 62* |

## PULP AND PAPER MILL SPECIAL PACKING RECOMMENDATIONS

| Service | Reciprocating Rods and Plungers | | Centrifugal and Oscillating Rods | Valve Stems |
|---|---|---|---|---|
| | Large Packing Space | Small Packing Space | | |
| **Mechanical Pulp (Ground Wood)** | | | | |
| Pocket Grinder Cylinders<br>Cold Water Rods | #189 Flax, *p. 44*<br>#271 Cross Diagonal, *p. 38* | #189 Flax, *p. 44*<br>#271 Cross Diagonal, *p. 38* | | |
| Pistons | #182 Aqua, *p. 65*; #33 Universal, *p. 61*; Moulded Packing Cups, *p. 56* | | | |
| Pulp Pumps | #253 Interlocked, *p. 25*<br>#19 Centripac, *p. 30*<br>#240, #181 Flax, no Graphite, *p. 44* | #253 Interlocked, *p. 25*<br>#19 Centripac, *p. 30*<br>#240, #181 Flax, no Graphite, *p. 44* | #253 Interlocked, *p. 25*<br>#19 Centripac, *p. 30*<br>#240, #181 Flax, no Graphite, *p. 44* | |
| Hydraulic Pumps and Accumulators | #240 or #181 Flax, *p. 44*<br>#240 Flax, *p. 44*, with end rings of #280 Flexible Metallic, *p. 50* | #240 or #181 Flax, *p. 44* | #240 or #181, Flax *p. 44* | #222 or #193 Mogul, *p. 26* |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 10 of 117
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# Johns-Manville Packing Recommendations—continued

## PULP AND PAPER MILL SPECIAL PACKING RECOMMENDATIONS—continued

| Service | Reciprocating Rods and Plungers | | Centrifugal and Oscillating Rods | Valve Stems |
|---|---|---|---|---|
| | Large Packing Space | Small Packing Space | | |
| **Sulphite Pulp** | | | | |
| Acid Pumps Valves Digester Pumps and Valves | #2017 or #2015 Acid, *p. 32* #640 Plastic, *p. 52*, with end rings of #379 Flexible Metallic, *p. 49* | #2017 or #2015 Acid, *p. 32* #640 Plastic, *p. 52*, with end rings of #379 Flexible Metallic, *p. 49* | #640 Plastic, *p. 52*, with end rings of #379 Flexible Metallic, *p. 49* #2018 or #2015 Acid, *p. 32* | #640 Plastic, *p. 52*, with end rings of #379 Flexible Metallic, *p. 49* #2018 or #2015 Acid, *p. 32* |
| **Sulphate and Soda Pulp** | | | | |
| Caustic Pumps and Valves Digester Pumps and Valves | #2020 or #2022 Caustic, *p. 33* #630 Plastic, *p. 52*, with end rings of#2022 Caustic, *p. 33* | #2020 or #2022 Caustic, *p. 33* #630 Plastic, *p. 52*, with end rings of #2022 Caustic, *p. 33* | #630 Plastic, *p. 52*, with end rings of #2021 Caustic, *p. 33* #2021 or #2022 Caustic, *p. 33* | #630 Plastic, *p. 52*, with end rings of #2022 Caustic, *p. 33* #2020 or #2022 Caustic, *p. 33* |
| **Recovery Process** | | | | |
| Black Liquor Pumps Evaporators Green and White Liquor Pumps and Valves | #2020 or #2022 Caustic, *p. 33* #630 Plastic, *p. 52*, with end rings of #2022 Caustic, *p. 33* | #2020 or #2022 Caustic, *p. 33* #630 Plastic, *p. 52*, with end rings of #2022 Caustic, *p. 33* | #630 Plastic, *p. 52*, with end rings of #2021 Caustic, *p. 33* #2021 or #2022 Caustic, *p. 33* | #630 Plastic, *p. 52*, with end rings of #2022 Caustic, *p. 33* #2020 or #2022 Caustic, *p. 33* |
| **Bleach Room** | | | | |
| Bleach Liquor Pumps & Valves | #2020 or #2022 Caustic, *p. 33* #630 Plastic, *p. 52*, with end rings of #2022, *p. 33* | #2020 or #2022 Caustic, *p. 33* #630 Plastic, *p. 52*, with end rings of #2022, *p. 33* | #2021 or #2022 Caustic, *p. 33* #630 Plastic, *p. 52*, with end rings of #2021, *p. 33* | #2020 or #2022 Caustic, *p. 33* #630 Plastic, *p. 52*, with end rings of #2022, *p. 33* |
| Chlorine Pumps and Valves | #2017 Acid, *p. 32* #645 Plastic, *p. 52*, with end rings of #2017 Acid, *p. 32* | #2017 Acid, *p. 32* #645 Plastic, *p. 52*, with end rings of #2017 Acid, *p. 32* | #2018 Acid, *p. 32* #645 Plastic, *p. 52*, with end rings of #2018 Acid, *p. 32* | #2017 Acid, *p. 32* #645 Plastic, *p. 52* |
| **Machine Room** | | | | |
| White Water Stock Pumps | #253 Interlocked, *p. 25* #19 Centripac, *p. 30* | #253 Interlocked, *p. 25* #19 Centripac, *p. 30* | #253 Interlocked, *p. 25* #19 Centripac, *p. 30* | #253 Interlocked, *p. 25* #19 Centripac, *p. 30* |
| Jordans and Refiners Stock Chests | | | #253 Interlocked, *p. 25* #19 Centripac, *p. 30* | #253 Interlocked, *p. 25* #19 Centripac, *p. 30* |

## GAS MANUFACTURING PLANT SPECIAL PACKING RECOMMENDATIONS

| Service | Reciprocating Rods and Plungers | | Centrifugal and Oscillating Rods | Valve Stems |
|---|---|---|---|---|
| | Large Packing Space | Small Packing Space | | |
| Warm Water—Seal Box and Scrubber | #10 Jowett, *p. 28* | #10 Jowett, *p. 28* | #7 Centripac, *p. 30* #360 Flexible Metallic, *p. 48* | #222 or #193 Mogul, *p. 26* |
| Crude, Fuel and Gas Oil, Gas Tar, Oil & Tar, Oil & Tar Drips, Tar Water, Gas & Tar, Gas Exhauster Shafts | #10 Jowett, *p. 28* #360 Flexible Metallic, *p. 48* | #10 Jowett, *p. 28* #360 Flexible Metallic, *p. 48* | #7 Centripac, *p. 30* #360 Flexible Metallic, *p. 48* | #222 or #193 Mogul, *p. 26* |
| Naphthalene | #361 Flexible Metallic, *p. 48* #323 Gasoline Rod, *p. 34* | #361 Flexible Metallic, *p. 48* #323 Gasoline Rod, *p. 34* | #18 Centripac, *p. 30* #361 Flexible Metallic, *p. 48* #323 Gasoline Rod, *p. 34* | #18 Centripac, *p. 30* #323 Gasoline Rod, *p. 34* |
| Ammonia, Water and Ammonia, Tar and Ammonia | #271 Cross Diagonal, *p. 38* | #271 Cross Diagonal, *p. 38* | #360 and #362 Flexible Metallic Combination, *p. 48* | #222 Mogul, *p. 26* |
| Oil Splash Lubricated Engines | #223 Mogul, *p. 26* or #223 Mogul and #360 Flexible Metallic, *p. 48*, Combination | | | |
| Special Packing Conditions | Purifier Box Cover and Door Seals ..... #129 Groove Packing, *p. 86* Hot Valves: Generator to Carburetor ..... #10 Jowett, *p. 28* Generator Ash and Clinker Doors ..... #216 Generator Door, *p. 86* #566 or #787 Braided Asbestos Rope, *p. 94* | | | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 11 of 117
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# Johns-Manville Packing Recommendations—continued

## OIL FIELD SPECIAL PACKING RECOMMENDATIONS

| | |
|---|---|
| Swivel | #7 Centripac, *p. 30*<br>#255 Interlocked, *p. 25*, with end rings of #33 Universal, *p. 64*<br>Combination of #166 Kearsarge, *p. 18*, and #32 Universal Rod, *p. 21*, with end rings of #33 Universal Piston, *p. 64* for the wash pipe and of #10 Jewett, *p. 28*, for top and bottom oil<br>#184 Low-Pressure Diagonal Ring, *p. 39* |
| Polish Rod Stuffing-Box | #373 Polish Rod Ring, *p. 41* |
| Slush Pump | Fluid End: #474 Slush Pump Ring, *p. 41*<br>#184 Low-Pressure Diagonal Ring, *p. 39*<br>#476 Combination Slush Pump Set (Two #474 rings and one #184 ring), *p. 41*<br>Steam End: #166 Kearsarge, *p. 18*<br>#156 Oil Field Spiral, *p. 41*<br>#271 Cross Diagonal, *p. 38* |

## PIPE LINE STATION SPECIAL PACKING RECOMMENDATIONS

| | |
|---|---|
| Reciprocating Pipe Line Pumps | Sea Rings, *p. 14*—special for pipe line work<br>#188, #240, #189 Flax or #181 W. P. H. Flax, *p. 44* |
| Centrifugal Pipe Line Pumps | #7 Centripac, *p. 30*; #255 Interlocked, *p. 25*; #350 or #360 Flexible Metallic, *p. 48*; #630 Plastic, *p. 52*, with end rings of flexible metallic or braided packing |
| Cooling Pumps | #271 Cross Diagonal, *p. 38* |
| Suction Pumps | #295 Light Weight Hydraulic, *p. 66*, or #33 Universal, *p. 61* |

## OIL REFINERY SPECIAL PACKING RECOMMENDATIONS

| | |
|---|---|
| Bubble Towers | #733 or #873 Braided Rope, *p. 94* |
| Scraper Rod | #128 Groove Packing, *p. 87*; #166 Kearsarge, *p. 18*, or #731 Rod, *p. 36* |
| Tank Car Dome Gaskets | #116 Kearsarge, *p. 78*, or #60 Service, *p. 68* |
| Tank Car Outlet Cap Gaskets | #60 Service, *p. 68*, or #711 Seigelite (wax-dipped), *p. 72* |
| Fire, Steam or Pressure Stills | #60 Service, *p. 68*, or #219 Felted Asbestos, *p. 71* |
| Filterhead (percolating filters) | #787 Braided Asbestos Rope, *p. 94* |

## STEEL MILL SPECIAL PACKING RECOMMENDATIONS

| | |
|---|---|
| Hot Blast Stove cleanout doors, Boiler explosion doors, etc. | #790 Groove Packing, *p. 86* |
| Converter bottoms | #177 Groove Packing, *p. 86* |
| Butterfly valves | #872 Groove Packing, *p. 87* |
| Benzol, Tar, Wash Oil, Ammonia Liquor | Sea Rings, *p. 14* |
| Service Water (Sheet packing) | #60 Service, *p. 68*, or #107 Liberty, *p. 76* |

## LUMBER SPECIAL PACKING RECOMMENDATIONS

| | |
|---|---|
| Shot Guns<br>Feed Engines<br>Kickers<br>Niggers<br>Donkey Engines<br>Log Turners<br>Loaders | Top and bottom rings of #280 Braided Copper, *p. 50*, together with #166 Kearsarge, *p. 18*, #32 Universal, *p. 21*, or #271 Cross Diagonal, *p. 38*; or combinations of #166, #32, or #271 |

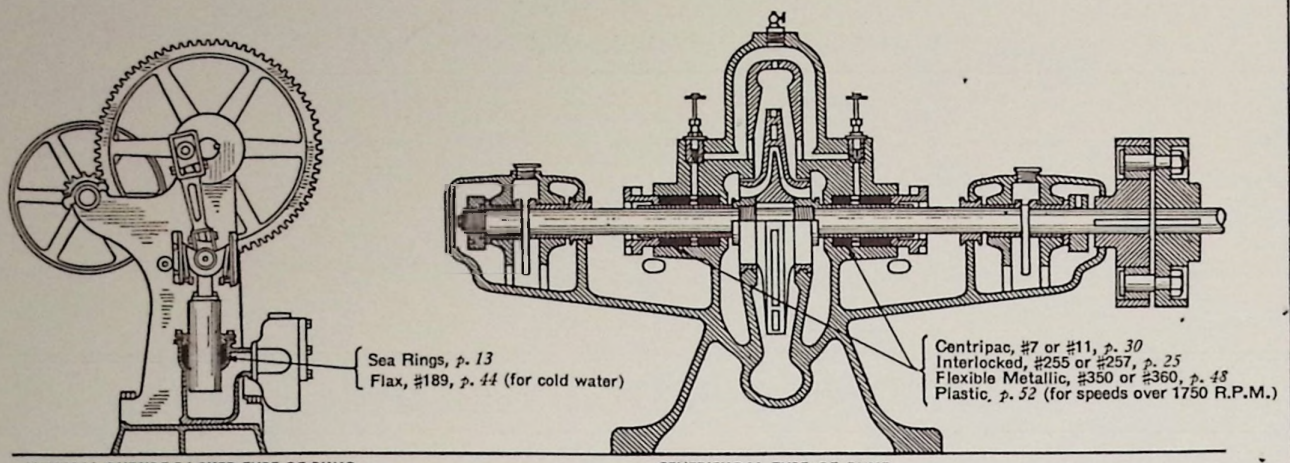
## MISCELLANEOUS SPECIAL PACKING RECOMMENDATIONS

| | |
|---|---|
| Steam Hammers<br>Accumulators | Rods: #32 Universal, *p. 21*; #271 Cross Diagonal, *p. 38*; #166 Kearsarge, *p. 18*; or combinations of #32, #271 and #166<br>Plungers: #33 Universal, *p. 64*, and #240 Flax, *p. 44*; or top and bottom rings of #33 Universal with #240 Flax |
| Milk Homogenizers and Viscolizers | Sea Rings, *p. 14*<br>#32 Universal, *p. 21* |
| Food Products | #2035 or #2036 White Lubricated, *p. 31*; #630 Plastic, *p. 52*, with end rings of flexible metallic or braided packing |
| Oxygen | #873 Pure Braided Asbestos Rope, (no lubrication) *p. 94* |
| Ceramic Slip Pumps and Tunnel Kiln Pushers | Sea Rings, *p. 14* |



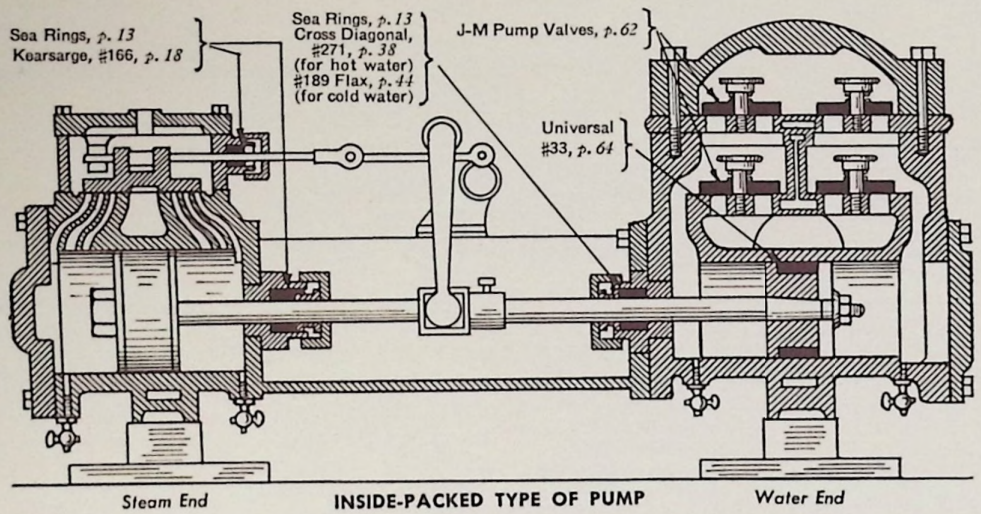
*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 12 of 117
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# Johns-Manville Pump Packing Recommendations

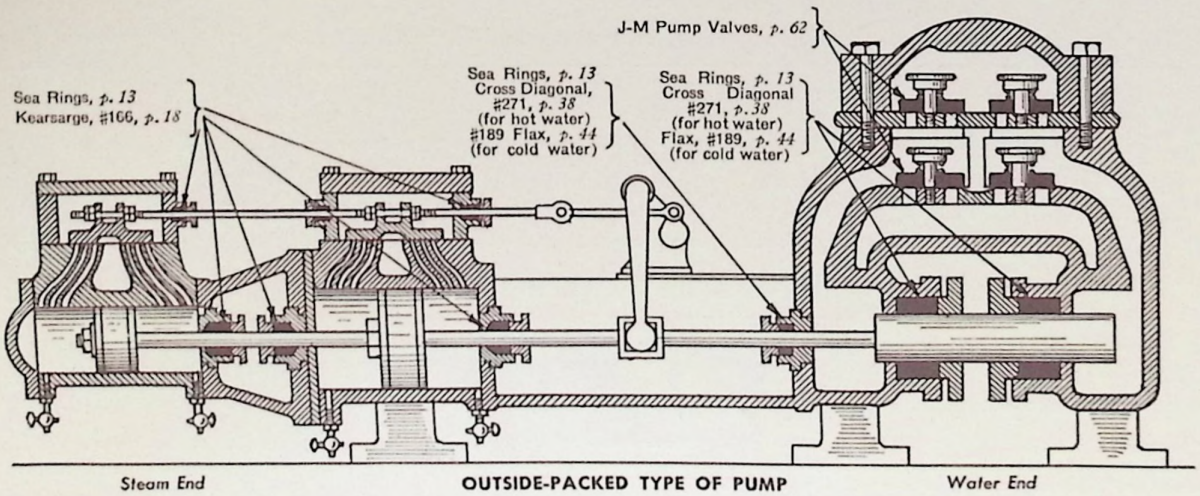



VERTICAL OUTSIDE-PACKED TYPE OF PUMP

CENTRIFUGAL TYPE OF PUMP




Steam End — INSIDE-PACKED TYPE OF PUMP — Water End




Steam End — OUTSIDE-PACKED TYPE OF PUMP — Water End



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 13 of 117
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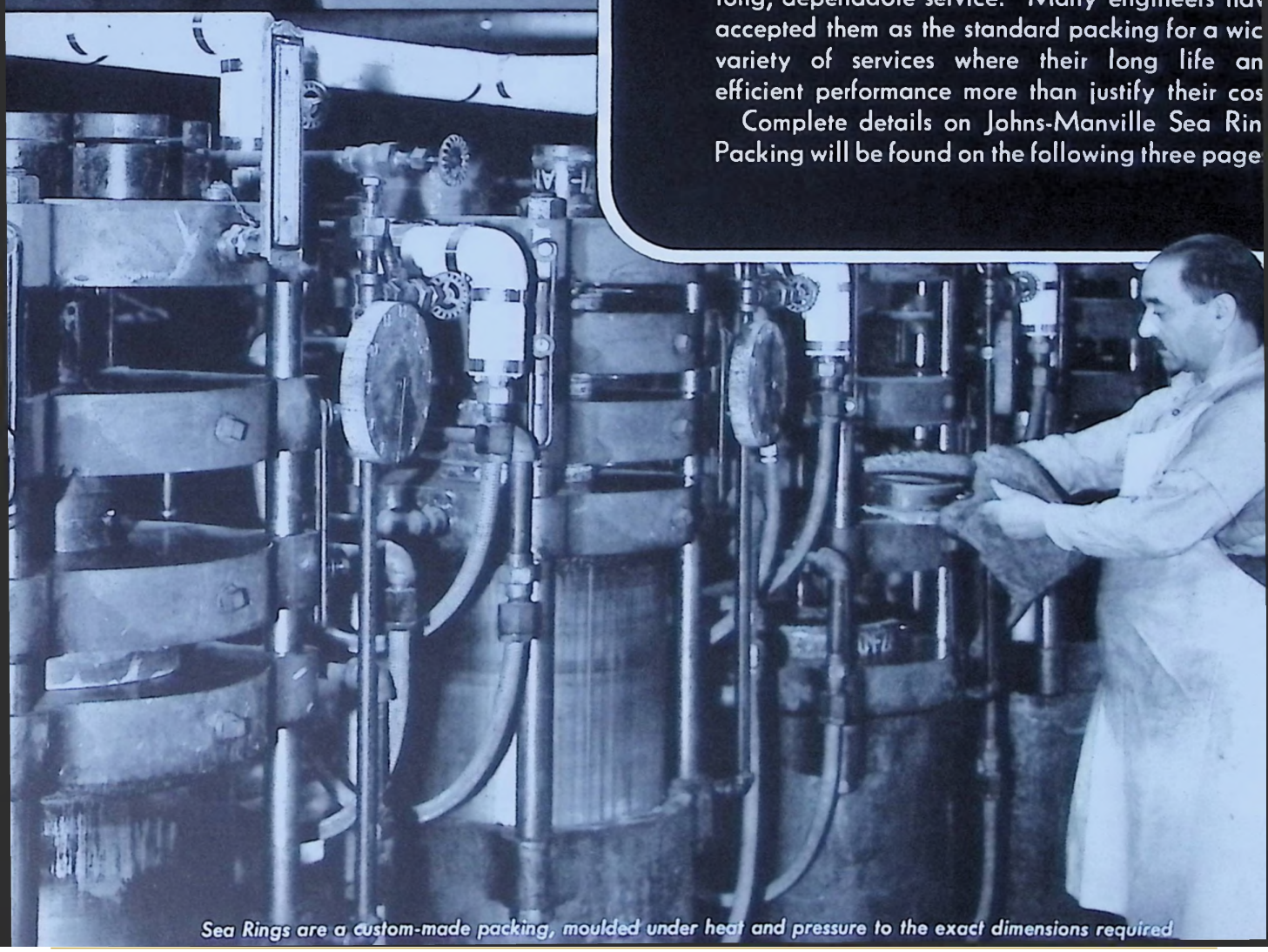
Before shipping, every Sea Ring is accurately tested in a try mould

# Johns-Manville
# SEA RING
## ROD AND PLUNGER PACKING

In selecting a packing for rods and plung care should be exercised to make sure it provic a minimum of friction. Otherwise, high pov consumption and excessive wear on rod and pac ing will result. At the same time, the packi must provide a tight seal that effectively prevei leakage. J-M Sea Rings have been designed do this job efficiently and economically. Th automatic action of self adjustment causes tl flexible lip of the packing to hug the shaft tight on the work stroke but release on the return, th reducing friction.

During more than a quarter-century of use, Se Rings have established an enviable record f long, dependable service. Many engineers hav accepted them as the standard packing for a wic variety of services where their long life an efficient performance more than justify their cos

Complete details on Johns-Manville Sea Rin Packing will be found on the following three page



Sea Rings are a custom-made packing, moulded under heat and pressure to the exact dimensions required


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# J-M Sea Rings

***Entirely automatic, Johns-Manville Sea Rings are recognized as the best packing ever developed for use on reciprocating rods and plungers.***

SEA RINGS are custom-made to exact specifications in both composition and construction, to fit the individual operating conditions to be encountered. Specially designed to provide a tight, leak-proof seal with an absolute minimum of friction, they are the ideal packing to use on reciprocating rods and plungers in good condition where the rod is not less than 3/4″ in diameter and the packing space is not less than 5/16″. When used against steam, hot or cold water, air, brine, vegetable and mineral oils, gasoline, kerosene and many other fluids and chemicals Sea Rings assure long, highly efficient service and virtual freedom from costly maintenance expense. Unlike ordinary packing, they are not dependent upon gland pressure to make them function.

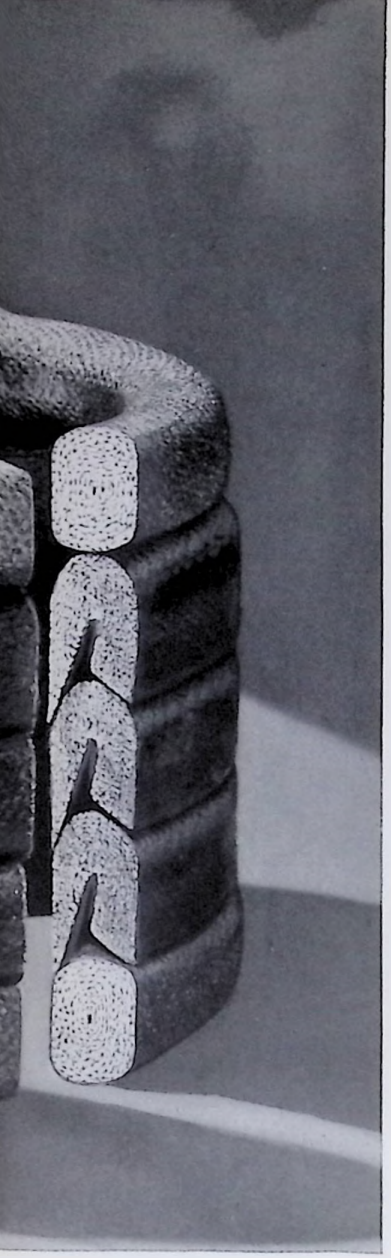
It must be noted, however, that Sea Rings are a precision packing constructed to very close tolerances and will not operate at maximum efficiency on rods that are worn, scored or out of line.

### Construction Details

J-M Sea Rings are formed by hand in accordance with rigid manufacturing specifications and are com-



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 15 of 117
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posed of laminated plies of high quality asbestos fabric or duck, or a combination of the two. After forming, they are impregnated with heat and oil-resisting compounds especially selected to withstand the particular service condition to be encountered, then moulded under the proper temperature and pressure into a strong and durable, yet semi-flexible packing of the correct size and shape to fit the rod and stuffing box accurately.

### Seals Automatically

An important feature of this construction is the flexible tapered lip. The action of this lip is entirely automatic in that it is held tightly to the rod on the work stroke by the pressure of the fluid, but is automatically released on the return, thereby eliminating unnecessary friction, reducing wear on the rod and minimizing the amount of power required. Furthermore, because of the automatic action of this flexible lip, wear on the packing itself is greatly reduced, longer life is assured and replacements, with the attendant costly shut-down of equipment, are minimized.

### Installation Suggestions

Sea Rings should be installed with the lip pointing toward the pressure, except when packing against vacuum, in which case the last ring should be reversed.

A set of Sea Rings usually consists of one header, two or more Sea Rings and one follower ring. However, when the depth of the stuffing box is not sufficient to accommodate a full set, the follower ring may be omitted. To determine the minimum depth required for two Sea Rings and one header ring, deduct 1/2 of the width of the packing space from the minimum depth of the box. For example, if the width of the packing space is 3/4", deduct 3/8" from the minimum depth to allow for not using a follower ring.

When packing rods or plungers against oil, best results are generally obtained by using not more than three Sea Rings, plus one header and one follower ring. However, if the stuffing box is so long, or the gland is so short that this number does not fill the stuffing box after allowing 1/2" for gland adjustment or "take up," a metallic filler ring should be used instead of a fourth Sea Ring.

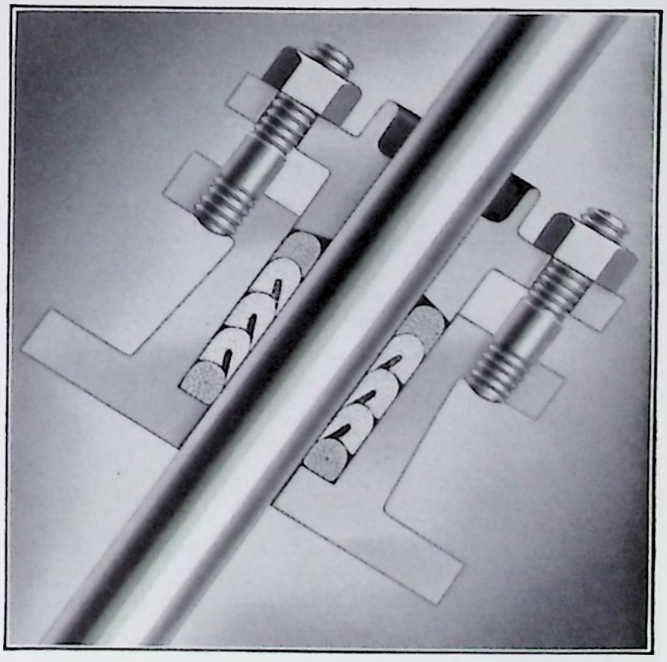
This filler ring, made of babbitt metal and machined to fit the stuffing box and rod, should be placed in the top of the stuffing box after the Sea Ring set is installed. These rings are furnished cut in halves so they may be installed without disconnecting the piston rod.

**NOTE:** For additional information on the installation of Sea Rings, see page 109.

### Sizes and Packaging Information

J-M Sea Rings are made to fit any reciprocating rod and stuffing box where the rod is not less than 3/4", and the width of packing space is not less than 5/16".

Sea Rings are furnished in sets only, usually one header ring, two or more Sea Rings, and one follower ring, packed one or more sets per box, depending upon their size, and properly marked for identification. In ordering Sea Rings, it is essential to furnish complete and accurate information as outlined on the Sea Ring Packing Data Sheet shown on the next page, in order that the set may be properly constructed for the service conditions under which it will be used.



The flexible lips of the Sea Rings are forced flat against the rod by the pressure on the work stroke. On the return stroke, however, as the pressure is removed, the lips automatically release, thus reducing friction and rod wear.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 16 of 117
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**MINIMUM DEPTH OF STUFFING BOX REQUIRED FOR ONE SET, INCLUDING 2 SEA RINGS, 1 HEADER AND 1 FOLLOWER RING, AS WELL AS EXTRA DEPTH REQUIRED FOR EACH ADDITIONAL SEA RING.**

| Width of Packing Space | Depth of Stuffing Box | Added depth needed for each additional Sea Ring |
|---|---|---|
| 5/16" | 1 1/2" | 3/8" |
| 11/32" | 1 11/16" | 13/32" |
| 3/8" | 1 13/16" | 7/16" |
| 13/32" | 1 7/8" | 15/32" |
| 7/16" | 1 15/16" | 15/32" |
| 15/32" | 2 1/16" | 1/2" |
| 1/2" | 2 1/4" | 17/32" |
| 17/32" | 2 9/16" | 19/32" |
| 9/16" | 2 3/4" | 21/32" |
| 19/32" | 2 13/16" | 23/32" |
| 5/8" | 2 15/16" | 3/4" |
| 21/32" | 3 1/4" | 13/16" |
| 11/16" | 3 5/16" | 27/32" |
| 23/32" | 3 3/8" | 7/8" |
| 3/4" | 3 1/2" | 15/16" |
| 25/32" | 3 7/8" | 31/32" |
| 13/16" | 4" | 1" |
| 27/32" | 4 1/8" | 1 1/32" |
| 7/8" | 4 1/4" | 1 1/16" |
| 29/32" | 4 3/8" | 1 3/32" |
| 15/16" | 4 1/2" | 1 1/8" |
| 31/32" | 4 3/4" | 1 3/16" |
| 1" | 4 7/8" | 1 1/4" |
| 1 1/32" | 5 3/16" | 1 9/32" |
| 1 1/16" | 5 3/16" | 1 5/16" |
| 1 3/32" | 5 1/4" | 1 11/32" |
| 1 1/8" | 5 1/2" | 1 7/16" |
| 1 5/32" | 5 5/8" | 1 15/32" |
| 1 3/16" | 5 3/4" | 1 1/2" |
| 1 7/32" | 6" | 1 1/2" |
| 1 1/4" | 6 1/8" | 1 9/16" |

Copies of the Sea Ring Packing Data sheet shown at right may be obtained from any Johns-Manville salesman or packing distributor.

Form X-200 Printed in U. S. A.

Order No. _____

JOHNS-MANVILLE _____ District

Customer's Name _____

Address _____

# Johns-Manville Sea Ring Packings

The following information is required on all orders for Sea Rings.

FILL OUT VERY CAREFULLY

This form must accompany all orders

1. Service for which Rings are to be used _____

State whether it is steam, hot water, cold water, air, oil, etc. Do not state, for instance: "Hot Water Pump", because this does not indicate whether the rings are intended for the steam end of the pump or the water end.

2. Machine on which Rings are to be used _____ { Reciprocating _____ / Rotating

State briefly whether it is a high speed engine, low speed engine, hot water pump, cold water pump, air compressor, plunger elevator, etc. If possible, state name of manufacturer. It is not necessary to give any manufacturer's serial number or sizes of cylinder, etc.

3. Condition of Rod _____

State definitely if in good condition and runs true or if scored and runs out of true. If the latter, state how bad it is.

4. How is rod lubricated? _____

5. Pressure to come on Packing in Lbs. per sq. in. _____
Such as steam pressure at the engine, hydraulic pressure, per sq. in. etc.

6. Temperature of liquid or gas (in case of pump or compressor) _____

7. Does Packing work under Vacuum or Suction, and how much? _____

If used on pumps, that lift or engines running condensing the packing may be subject to vacuum part of the time.

8. Diameter of Rod _____

If rod is worn or has been turned down, be sure that measurement is correct for all that portion which moves through the stuffing box.

9. Inside Diameter of Stuffing Box _____

Get this accurately. Do not give the outside diameter of gland follower, or calculate the diameter by adding the nominal size of packing to be used to the diameter of rod.

10. Shortest Depth of Box _____

This means if bottom of box is concaved, take measurement along the wall of the box and not along the rod. If it is not possible to measure this, have the customer give you the approximate depth and so enter it on the signed order In case Gland Follower Ring is used, make allowance for its entrance into Box.

11. Bottom of Box—Flat or concaved? _____

12. Gland Follower—Flat or concaved? _____

13. Length of Part of Gland entering stuffing Box _____
This means distances from stuffing box end of gland to inside face or shoulder of gland.

14. No. sets to be furnished according to this data sheet.

15. Any Remarks? _____ If so, use other side of sheet.

DATE _____

SALESMAN _____

CUSTOMER'S SIGNATURE _____



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 17 of 117
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*Asbestos fabric rolled upon itself is one method of producing J-M Asbestos Fabric Packing*

# Johns-Manville
# ASBESTOS FABRIC
## ROD, PLUNGER AND VALVE STEM PACKING

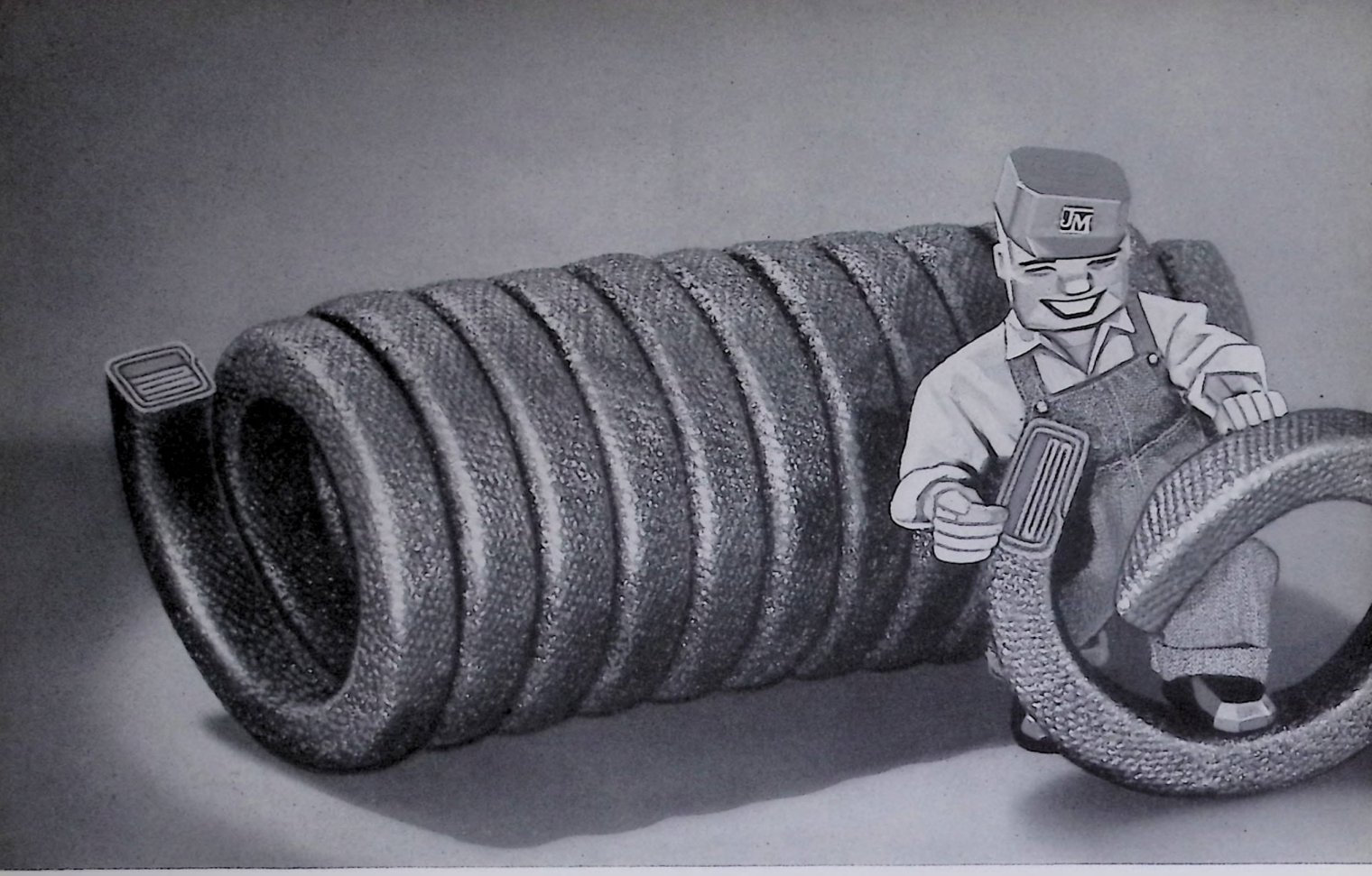
Johns-Manville Asbestos Fabric Packings are usually recommended for use against severe conditions in reciprocating service. As compared with most common braided types, asbestos fabric packings generally provide a more durable, longer-wearing surface with a minimum number of individual fibres exposed to wear. Furthermore, this fabric construction, with a sealing compound between the plies, assures a solid, resilient packing that is impervious to the penetration of liquids.

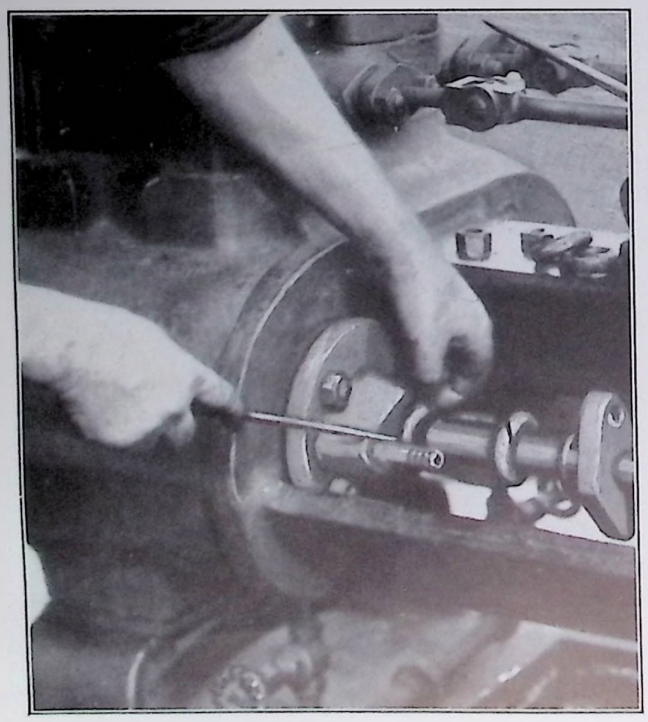
The long life and efficient performance of asbestos fabric packings make their use an economical investment in the services for which they are recommended, even though their first cost is usually slightly more than that of the braided types.

Complete details on the various styles of Johns-Manville Asbestos Fabric Packings will be found on the following pages.

*On this huge J-M loom long fibre asbestos yarns are woven into durable, heat-resisting fabric for use in Johns-Manville Packings*


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Kearsarge Rod Packing is highly recommended for use on the steam end of pumps, engines, compressors, etc. Many engineers have accepted it as standard for this service.

# J-M Kearsarge

***A high quality, long-wearing rod and plunger packing for service against temperatures up to 500° F.***

THE long life and lasting efficiency of J-M Kearsarge Rod Packing have earned for this material an enviable record in service against high pressure steam at temperatures up to 500° F. It may also be used against air and gas. Two of its most outstanding features are great durability and the ability to retain its original pliability and resiliency under continuous high temperature and high pressure service.

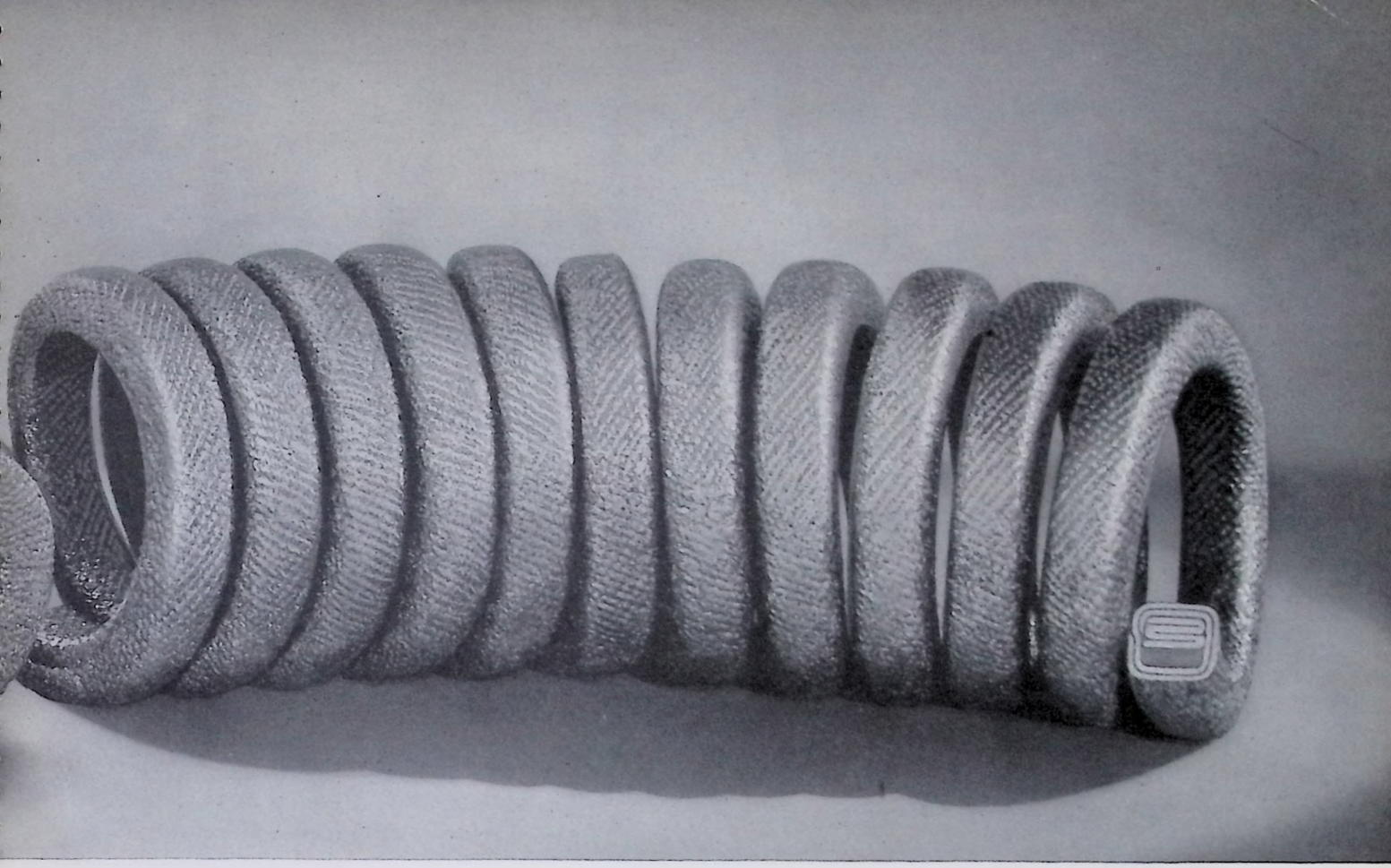
Kearsarge Rod Packing is specially recommended for use on reciprocating rods of steam engines, pumps, compressors and similar equipment where the packing space is 3/8" and more.

### Construction Details

The unique, hand-formed construction of Kearsarge Rod Packing is directly responsible for its highly satisfactory service. It is made with an accordion-folded center block of asbestos cloth and a non-hardening



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 19 of 117
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# Rod Packing

rubber expansion back. Over this center block is wrapped a double wearing surface of asbestos cloth made from tightly twisted, long fibre asbestos yarn.

This folded construction, with the folds parallel to the axis of the rod, provides a naturally resilient construction and a reservoir for the preserving lubricant with which it is impregnated to keep the packing pliable in service. Resistance to wear is assured by the double wrapping of the right type of asbestos cloth. Additional resiliency is provided by the red rubber expansion back in the center block.

In sizes 9/16″ and under, a center core of asbestos replaces the folded block, since the folded construction is not practical in the smaller sizes.

### Styles and Forms

**STYLE No. 166** *(with rubber expansion cushion)* is made in sizes 1/4″ and up and is usually furnished in spiral form, Style No. S-166, impregnated with a heat-resisting lubricant and graphited. It is also available in ring form, Style No. R-166; and in coil form, Style No. C-166, which is furnished either with or without lubricant and graphite finish. Unless otherwise specified, it is supplied lubricated and graphited.

**STYLE No. 15** is the same as Style No. 166 except that it contains no rubber cushion. It is furnished in sizes 1/4″ and up, in spiral form, Style No. S-15; coil form, Style No. C-15 and in ring form, Style No. R-15.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approx. weight, lbs. per 100 lin. feet | | | | | | Form of Package | | |
|---|---|---|---|---|---|---|---|---|---|
| | 3/8″ | 1/2″ | 5/8″ | 3/4″ | 7/8″ | 1″ | Coil | Spiral | Rings |
| **166** with rubber cushion | 11 | 17.5 | 30 | 42 | 56 | 72 | 12½ ft. lengths in boxes weighing: up to 1/2″—5 to 6 lbs. 5/8″ to 1/4″— 8 to 10 lbs. 7/8″ to 1″—10 to 14 lbs. | One 12½ ft. length per box | Packed in boxes weighing: up to 1″ I.D.— 3 lbs. 1″ to 2″ I.D.— 5 lbs. 2″ to 3″ I.D.—10 lbs. 3″ to 4″ I.D.—15 lbs. Over 4″ I.D.—20 lbs. |
| **15** no rubber cushion | 10.5 | 16 | 28 | 36 | 51 | 62 | | | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 20 of 117
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# J-M Superheat Steam Rod Packing

***A resilient, high quality packing for use against superheated steam on rods, plungers and valve stems.***

AS THE name implies, J-M Superheat Steam Packing, Style No. 167, provides long, highly efficient service when used on reciprocating rods and plungers operating against high temperature steam between 500° F. and 750° F. Superheat is also the ideal packing for high temperature valve stem service. It is made to the proper density and quality for such service and contains only the necessary amount of high heat-resistant lubricant, with no excess to carbonize in use.

Furthermore, with this packing, no excessive gland pressure is required to prevent leakage, and because it contains no rubber core or other material that will harden in high temperature service, Superheat retains its resiliency and efficiency long after the time when ordinary packings fail and require replacement.

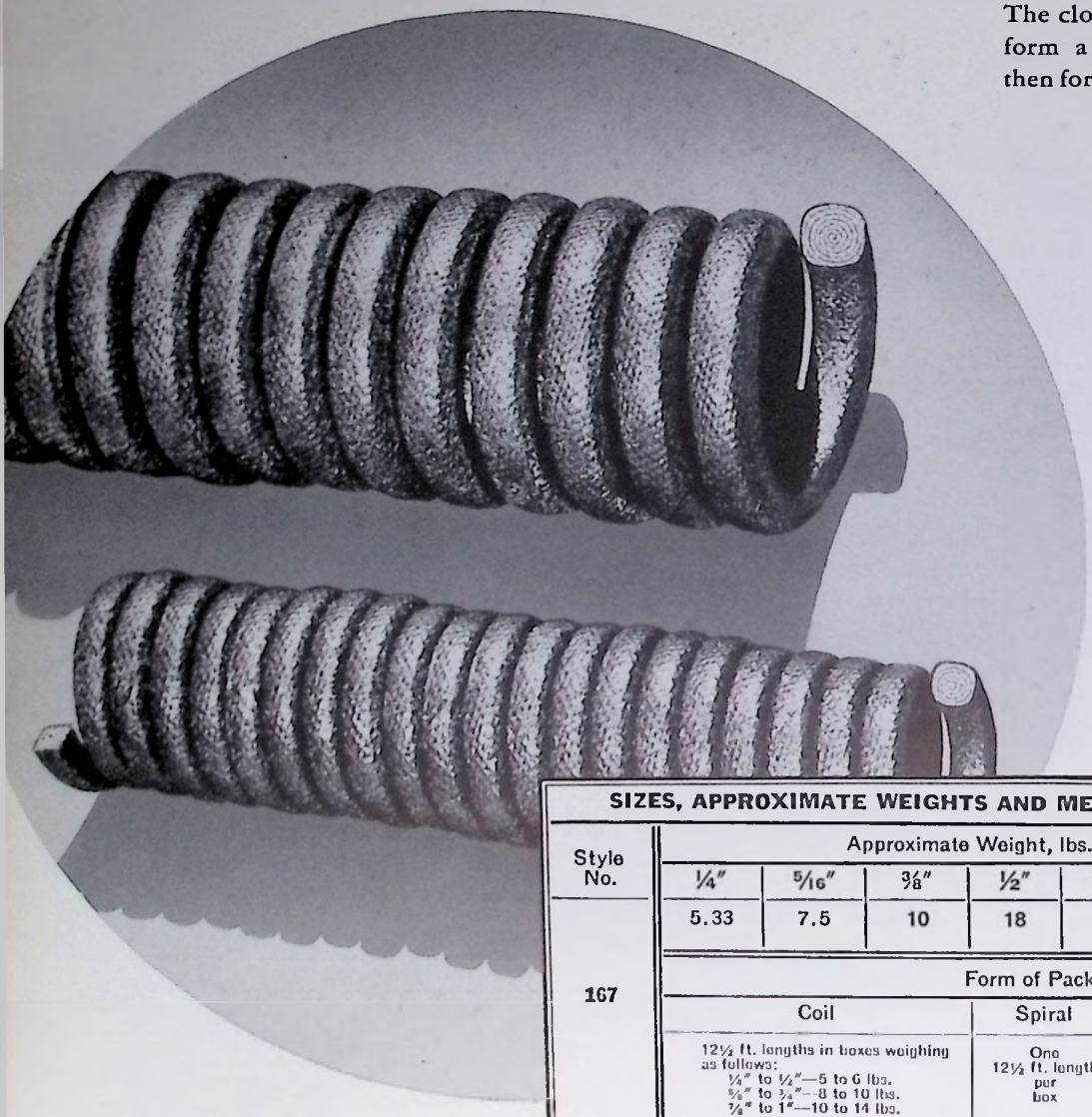
### Construction Details

Superheat Steam Packing is made of high-quality tightly woven pure asbestos cloth, frictioned with a resilient, heat-resisting compound. The cloth is wrapped around itself to form a firm, yet resilient structure, then formed square, impregnated with a special heat-resistant lubricant and graphited.

It is this woven cloth structure and the high quality of all materials used in its construction, that make Superheat such a long-wearing, trouble-free packing for all superheated steam services.

### Styles and Forms

Superheat Steam Packing is furnished in sizes 1/4" and up, in spiral form, Style No. S-167; coil form, Style No. C-167; and ring form, Style No. R-167.



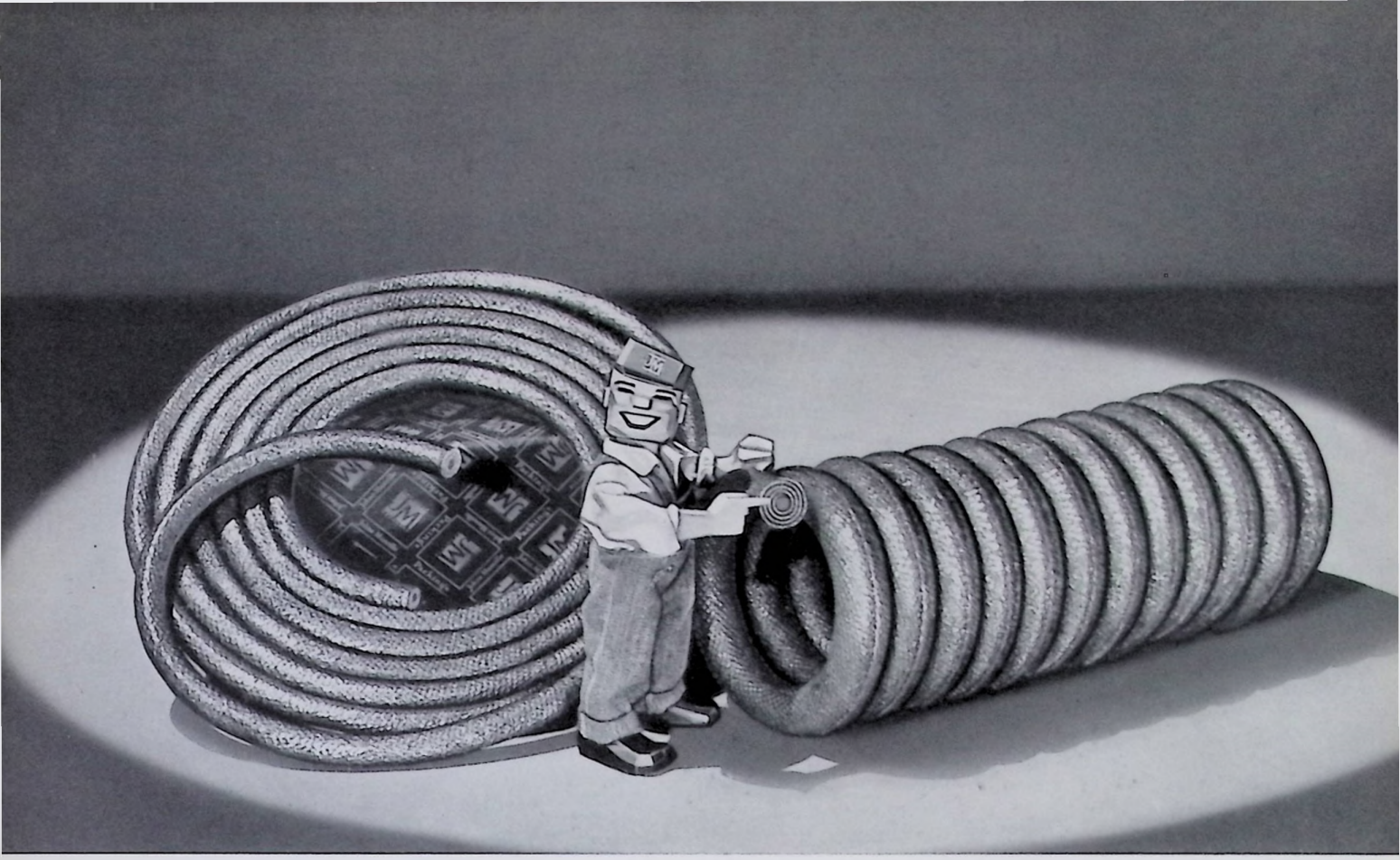
**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate Weight, lbs. per 100 lin. feet | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" |
| 167 | 5.33 | 7.5 | 10 | 18 | 27 | 43 | 53 | 69 |

| Style No. | Form of Package | | |
|---|---|---|---|
| | Coil | Spiral | Ring |
| 167 | 12½ ft. lengths in boxes weighing as follows:<br>1/4" to 1/2"—5 to 6 lbs.<br>5/8" to 3/4"—8 to 10 lbs.<br>7/8" to 1"—10 to 14 lbs. | One 12½ ft. length per box | Packed in boxes weighing as follows:<br>1" to 2" I.D.— 5 lbs.<br>2" to 3" I.D.—10 lbs.<br>3" to 4" I.D.—15 lbs.<br>over 4" I.D.—20 lbs. |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 21 of 117
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# J-M Universal Rod Packing

***An exceptionally resilient packing for wet steam conditions and for rods that are scored or out of line.***

UNIVERSAL Rod Packing, Style No. 32, provides long, efficient service against saturated steam up to 500° F. and pressures up to 300 pounds per square inch, especially where condensation is present in considerable quantity. It may also be used against hot or cold water, varying hot and cold water and air. Furthermore, because Universal Rod Packing easily adapts itself to irregularities of the packing space, it is highly recommended for use on rods that are worn, scored or out of alignment.

In addition, Universal is often used in expansion joints where great resilience is required, and in combination with other types of packing as alternate rings.

### Construction Details

Universal Rod Packing is made of high quality asbestos and cotton fabrics, frictioned with a resilient, heat-resisting rubber compound, wrapped around a non-hardening round rubber core, then lubricated and graphited. The thin layer of resilient compound between the wrappings of fabric makes Universal Packing impervious to the penetration of fluids.

### Styles and Forms

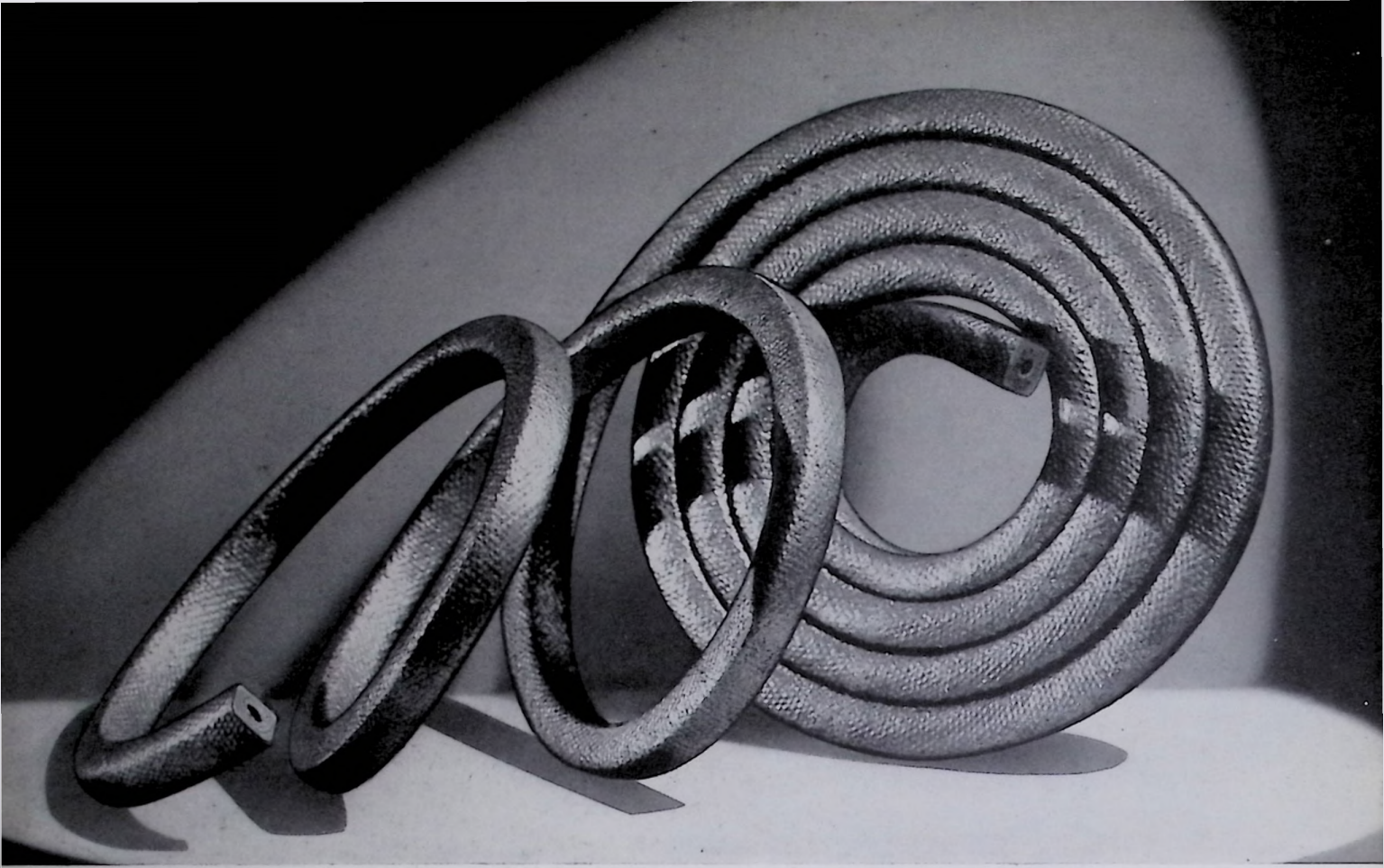
Made in sizes 1/4" and up, Universal Rod Packing is furnished in spiral form, Style No. S-32; coil form, Style No. C-32; and ring form, Style No. R-32.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. feet | | | | | | | | Form of Package | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" | Coil | Spiral | Ring |
| 32 | 5 | 8 | 10 | 17 | 24 | 32 | 43 | 61 | 12½ ft. lengths in boxes weighing:<br>1/4" to 1/2"—5 to 6 lbs.<br>5/8" to 1"—8 to 10 lbs.<br>1 1/8" to 1"—12 to 14 lbs. | One 12½ ft. length per box | Packed in boxes weighing:<br>1" to 2" I.D.— 5 lbs.<br>2" to 3" I.D.—10 lbs.<br>3" to 4" I.D.—15 lbs.<br>over 4" I.D.—20 lbs. |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 22 of 117
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# J-M Asbestos Hollow Core Rod Packing

***An extremely resilient rod packing for use against high temperatures, particularly where considerable vibration or lateral motion of rods or plungers may be encountered.***

ASBESTOS Hollow Core Rod Packing, Style No. 385, is designed for service against hot water and low pressure steam, especially where great resilience is required. Because of its hollow core it easily adjusts itself to both expansion and contraction. It may be used against considerably higher temperatures than Rubber and Duck Hollow Core Rod Packing described on page 42.

### Construction Details

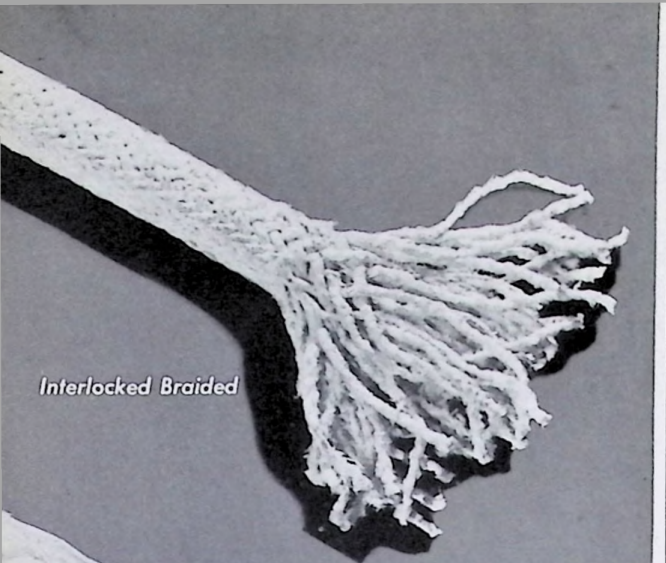
J-M Style No. 385 is made of high quality asbestos cloth wrapped with a hollow core or center, then formed square, lubricated and graphited. It is furnished in sizes 1/4" and up in coil form, Style No. C-385, spiral form, Style No. S-385 and ring form, Style No. R-385.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approx. weight, lbs. per 100 ft. | | | | | | | | Form of Package | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" | Coil | Spiral | Rings |
| 385 | 4 | 6 | 8 | 15 | 22 | 30 | 40 | 52 | 12 ft. lengths in boxes weighing: 1/4" to 1/4"—5 to 6 lbs.; 5/16" to 1/4"—8 to 10 lbs.; 7/8" to 1"—10 to 14 lbs. | One 12-ft. length per box | Packed in boxes weighing: 1" to 2" I.D.— 5 lbs. 2" to 3" I.D.—10 lbs. 3" to 4" I.D.—15 lbs. Over 4" I.D.—20 lbs. |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 23 of 117
Published by AsbestosClaims.Law
asbestosclaims.law/library/13710/23



Interlocked Braided



Square Plaited Braid



Braid-over-Braid



Twisted

# Johns-Manville
# BRAIDED & TWISTED ASBESTOS

## ROD, PLUNGER AND VALVE STEM PACKING

J-M Braided and Twisted Packings are made in the following types of construction as illustrated at the left.

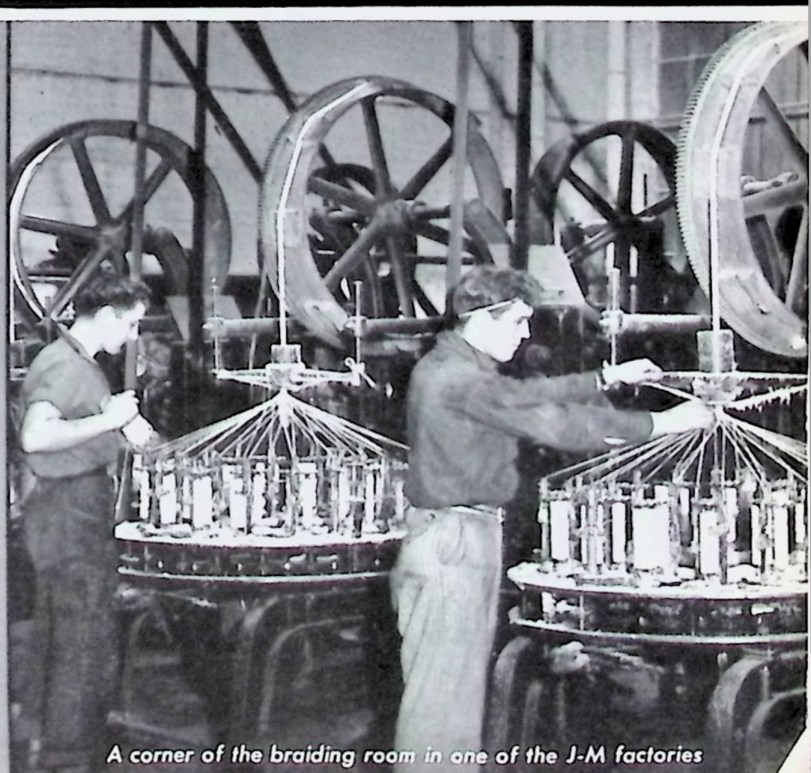
INTERLOCKED BRAIDED—The most recent advance in braided packing—a development of the J-M Packing Research Laboratory. All the asbestos yarns are firmly interlocked to form a solid, square braid that cannot ravel or come apart in service.

SQUARE PLAITED BRAID—Made from a number of yarns or rovings gathered into a braiding strand. Eight of these strands are then plaited into square cross-section.

BRAID-OVER-BRAID—Made by braiding tubular jackets one over the other. When a square cross-section is required, the packing is run through calender rolls.

TWISTED—These are made by twisting long fibre asbestos yarns together until the proper size is reached. They can easily be untwisted to form any size desired.

Complete details on J-M Braided and Twisted Packings will be found on the following pages.



A corner of the braiding room in one of the J-M factories


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*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 25 of 117
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# J-M Interlocked Braided Rod Packing

***The greatest single improvement ever made in braided packing, J-M Interlocked is braided solid—cannot ravel or come apart in service.***

AN entirely new and unique method of braiding asbestos yarn, exclusive with Johns-Manville, is employed in the construction of Interlocked Packing. There are no jackets to wear through or come apart, and no plaits to become loose. All the long fibre asbestos yarns extend back into the body of the packing and are strongly interlocked to form a solid integral structure that cannot ravel or come apart in service.

Interlocked Packing is unusually flexible and resilient. And, because it is braided square, rather than pressed into shape, it presents a better contacting area, and provides a tight seal with minimum gland pressure and take-up.

Interlocked Packing is suitable for either reciprocating or rotating service.

### Styles and Forms

J-M Interlocked Packing is made in a variety of styles to meet a wide range of operating conditions. All of these styles have the same interlocked braided construction but are made with various types of impregnations and asbestos yarns.

**STYLES No. 255 (no wire) and No. 257 (wire-inserted) FOR GENERAL SERVICE**—These two materials are the general utility packings of the Interlocked line, providing efficient service against either saturated or superheated steam up to 500° F; hot or cold, fresh or salt water, oils, weak acids and caustics. Lubricated with a high heat-and-moisture-resistant compound, and graphited, they remain soft and resilient throughout their long service life.

Style No. 255 is made from long-fibre asbestos yarn without wire and is furnished in coil form, Style No. C-255, and ring form, Style No. R-255.

Style No. 257 is made from asbestos yarns and is of the same construction as No. 255 but with a fine copper wire insertion to give added strength and resistance to pressure. Furnished in coil form, Style No. C-257, and ring form, Style No. R-257.

**STYLE No. 253 — FOR PULP AND PAPER MILL SERVICE** — This material is specially designed for packing against white water and stock on reciprocating and centrifugal pumps. It has also proved its superiority for packing Jordans.

Style No. 253 is made of high quality asbestos yarns and impregnated with a special lubricant that will not stain the stock. It is furnished ungraphited in coil form, Style No. C-253, and ring form, Style No. R-253.

**STYLE No. 256 — FOR SERVICE AGAINST BEER** — This packing is particularly recommended for service against beer and other beverages and liquid foods. It is made of asbestos yarn impregnated with a tasteless, odorless lubricant. Furnished ungraphited in coil form, Style No. C-256, and ring form, Style No. R-256.

**STYLE No. 259—FOR SERVICE AGAINST GASOLINE** — This material may be used with highly satisfactory results against gasoline, kerosene, benzene, naphtha and other refined oils. It is made of asbestos yarn, lubricated throughout with a special long-lasting gasoline-resistant lubricant and graphited. Furnished in coil form, Style No. C-259, and ring form, Style No. R-259.

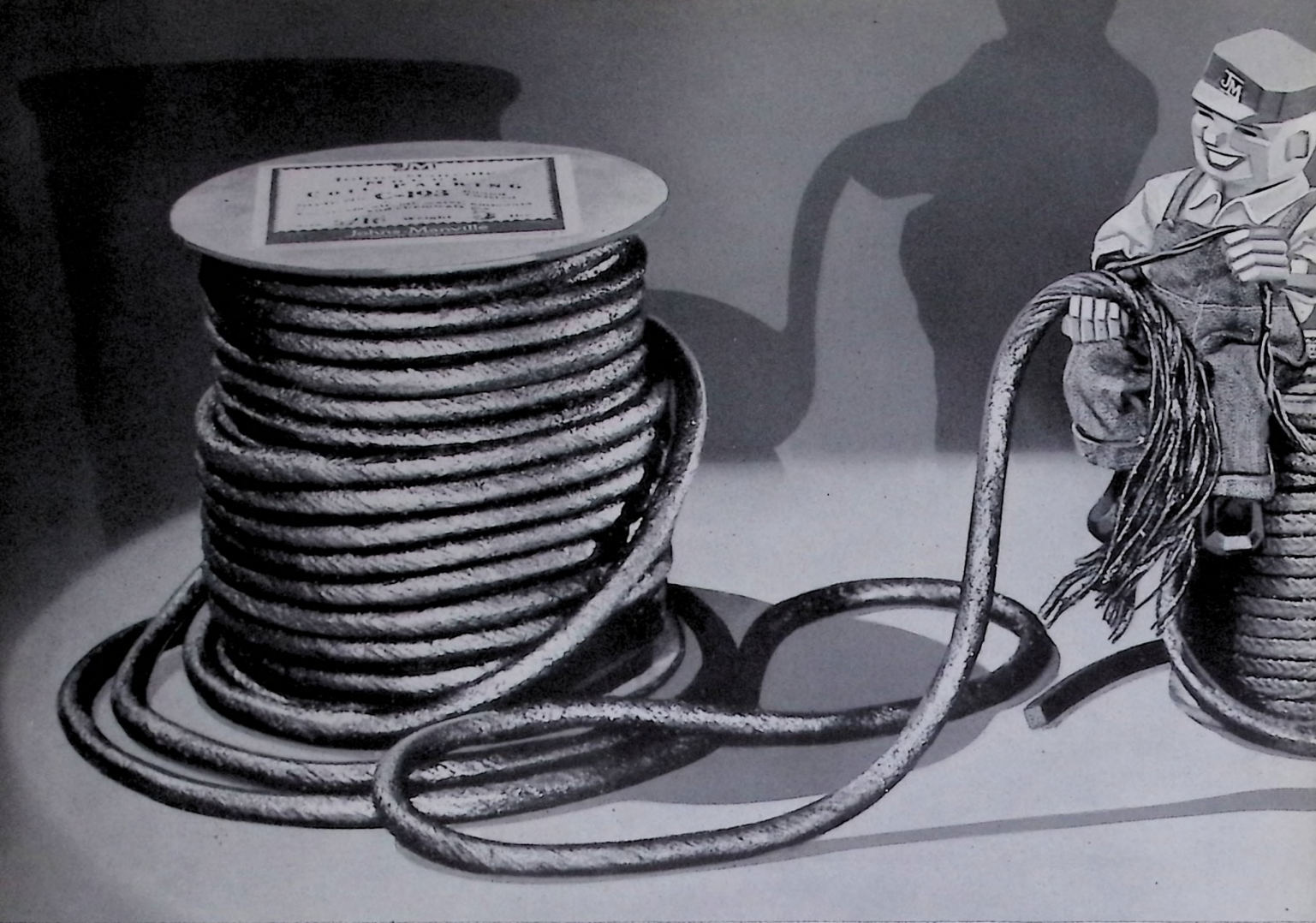
**NOTE:** J-M Interlocked Packing, Style No. 270, for hot oil service is described on page 35; Style No. 2010, for acid service, on page 32.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | Form of Package | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ¼″ | 5/16″ | 3/8″ | ½″ | 5/8″ | ¾″ | ⅞″ | 1″ | Coil | Rings |
| 253 | 4.5 | 7 | 10 | 18 | 24 | 32 | 46 | 65 | All sizes on reels weighing 5, 10, 25 and 50 lbs. or Sizes up to and including ½″ on 1 lb. spools. or Sizes up to and including ½″ in 5 lb. boxes, sizes larger than ½″ in 10 lb. boxes. | Packed in boxes weighing: 1″ to 2″ I.D.— 5 lbs. 2″ to 3″ I.D.—10 lbs. 3″ to 4″ I.D.—15 lbs. Over 4″ I.D.—20 lbs. |
| 255 | 4.5 | 7 | 10 | 18 | 24 | 32 | 46 | 65 | | |
| 256 | 4.5 | 7 | 10 | 18 | 24 | 32 | 46 | 65 | | |
| 257 | 6 | 9 | 13 | 23 | 32 | 42 | 62 | 86 | | |
| 259 | 4.5 | 7 | 10 | 18 | 24 | 32 | 46 | 65 | | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 26 of 117
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# J-M Mogul Rod and Valve Stem Packing

***An exceptionally adaptable general utility rod and valve stem packing that remains permanently soft and resilient throughout its long service life.***

J-M MOGUL PACKING may be specified with definite assurance of receiving a superior packing as perfect in manufacture and service as scientific research and 70 years of packing experience can provide. It is primarily a general utility packing that assures long, economical, highly efficient service when used on valve stems, reciprocating rods with small packing spaces, and centrifugal pumps, in service against air, water, ammonia, oil, chemicals and other general conditions where a soft, pliable packing without rubber is required.

### Construction Details

Manufactured in both round and square braided as well as twisted styles, Mogul Packing is made of a combination of selected long fibre asbestos yarns, impregnated with the proper type of lubricant and graphited during the process of construction. This application of graphite to the inside as well as the outside of Mogul, eliminates internal stresses of friction in the packing itself, thus assuring long life and highly efficient service.

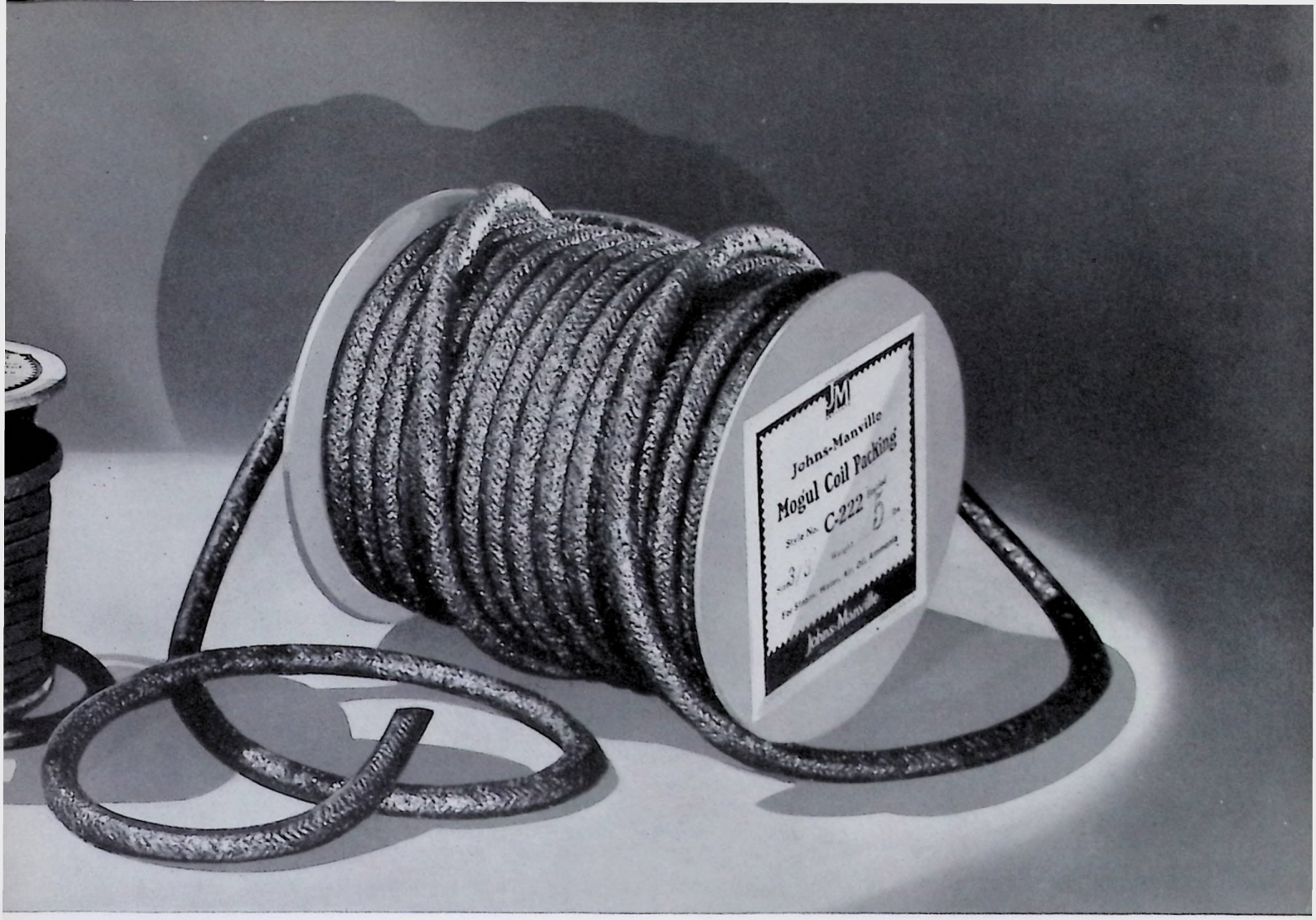
The lubricating compound is of very high quality and of such characteristics as to impart exceptional pliability and low friction to the packing. Furthermore, because it contains no wax, Mogul retains its density without "wilting" when subjected to the sustained heat of the stuffing box.

### Styles and Forms

**STYLE No. 193** *(Twisted)* — This is the handiest packing for all general conditions. By untwisting the strands, packing of any desired smaller size may be



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 27 of 117
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obtained. This is a great convenience because one size packing can easily fill the needs of many different sized valve stem stuffing boxes. It is furnished in coil form only in sizes 1/16″ and up.

**STYLE No. 222** (Braided Round) — This is a high-quality, solid-braided asbestos packing recommended for use in valves and reciprocating service where the packing space is small. It has the right body for such service, being firmer than the twisted style, and retains the lubrication exceptionally well, even under very high temperatures and severe service conditions. Furnished in coil form only, sizes 1/8″ and up.

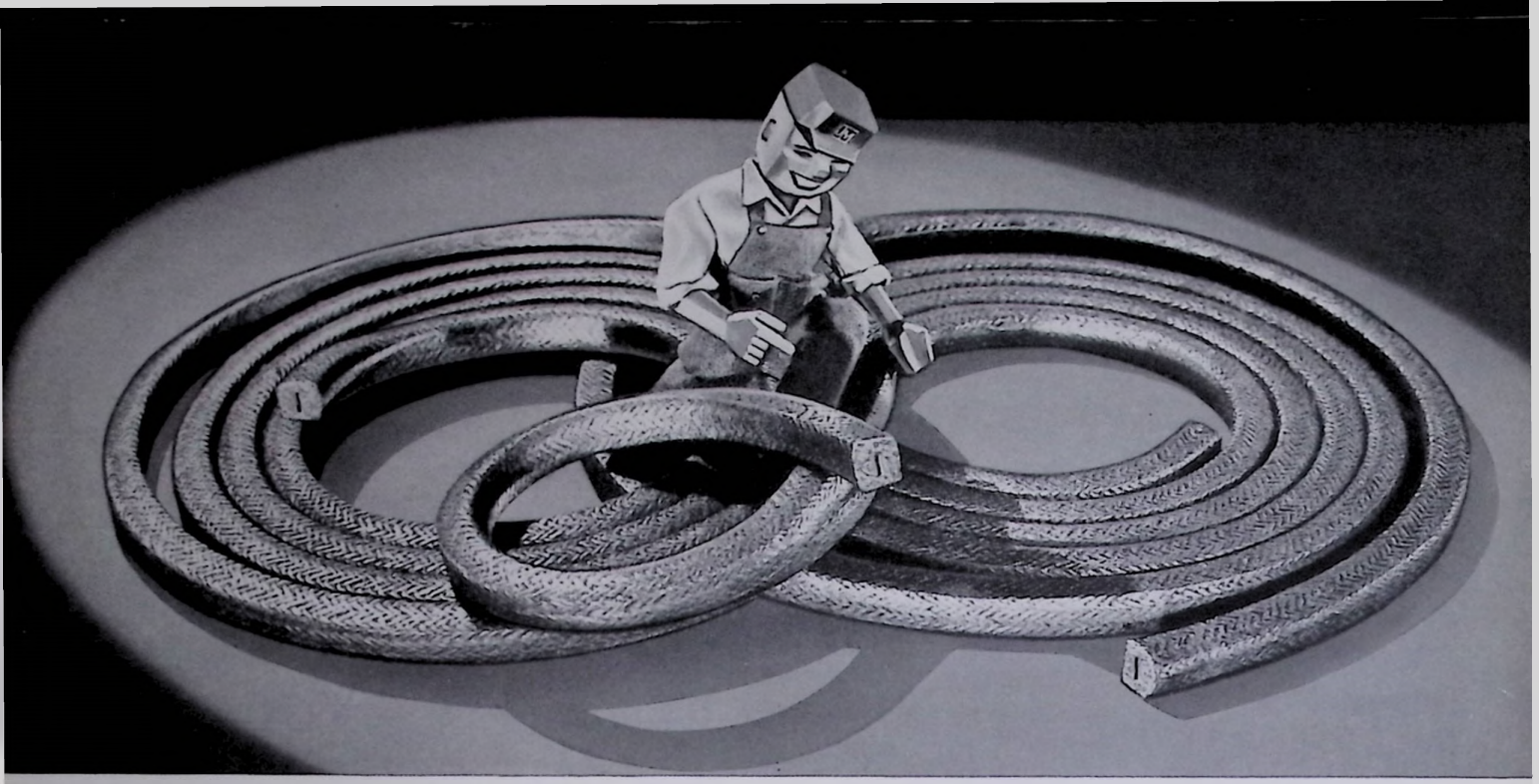
**STYLE No. 223** (Braided Square) — This is made of the same high quality asbestos yarn and by the same construction method as Style No. 222, but is formed square after braiding. Particularly recommended for packing small stuffing boxes in reciprocating and centrifugal service where flat-bodied packing is preferred. Furnished in sizes 3/16″ and up, in coil form, Style No. C-223 and ring form, Style No. R-223.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | | | | Form of Package | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/16″ | 1/8″ | 3/16″ | 1/4″ | 5/16″ | 3/8″ | 1/2″ | 5/8″ | 3/4″ | 7/8″ | 1″ | Coil | Rings (Style No. 223 only) |
| **193** twisted round | 0.4 | 1 | 2.5 | 4 | 5.5 | 8 | 13 | 21 | 32 | 36 | 50 | On reels weighing 5, 10, 25 and 50 lbs. or on 1 lb. spools in sizes 1/8″ to 1/2″. | Packed in boxes weighing: 1″ to 2″ I.D.— 5 lbs. 2″ to 3″ I.D.—10 lbs. 3″ to 4″ I.D.—15 lbs. Over 4″ I.D.—20 lbs. |
| **222** braided round | — | 1 | 2 | 3.5 | 5.25 | 7 | 12.5 | 20 | 28 | 40 | 53 | | |
| **223** braided square | — | — | 3.5 | 5.25 | 7 | 12.5 | 20 | 28 | 40 | 53 | 67 | | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 28 of 117
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# J-M Jewett Rod and Valve Stem Packing

***A strong, durable rod, plunger and valve stem packing that stands up well under heavy duty service.***

JEWETT PACKING is an unusually strong, tough packing for severe heavy duty service against crude and heavy oils, tar, molasses and other heavy, gummy fluids. It is also suitable for service against steam; fresh or salt, hot or cold water; air, gas and some chemicals requiring a packing free from rubber.

### Construction Details

Jewett Packing is made of high-quality, long-fibre asbestos yarn containing a fine copper wire insertion to give added strength and durability. This wire-inserted yarn is braided jacket-over-jacket over a thin lead ribbon core, then formed square, treated with a special heat-resisting lubricant and graphited. The great mechanical strength of Jewett Packing prevents it from tearing apart in the stuffing box, particularly after shut-downs of pumps handling viscous liquids.

### Styles and Forms

**STYLE No. 10** is the most popular Jewett Packing. The lubricant used in this style has sufficiently heavy body to be retained in the packing without bleeding in heavy duty service. Coil form, Style No. C-10 and ring form, Style No. R-10, in sizes 1/8″ and up.

**STYLE No. 9** has a lighter bodied lubricant and flows into place in the stuffing box more readily, making it especially suited for use on bibs and faucets where the packing must adapt itself to occasional irregularities in the brass castings. Coil form, Style No. C-9 and ring form, Style No. R-9, in sizes 1/8″ and up.

**STYLE No. 14,** for high temperatures, is made from pure asbestos with a special high temperature lubricant and without the lead ribbon center. Coil form, No. C-14; ring form, No. R-14; sizes 1/8″ and up.

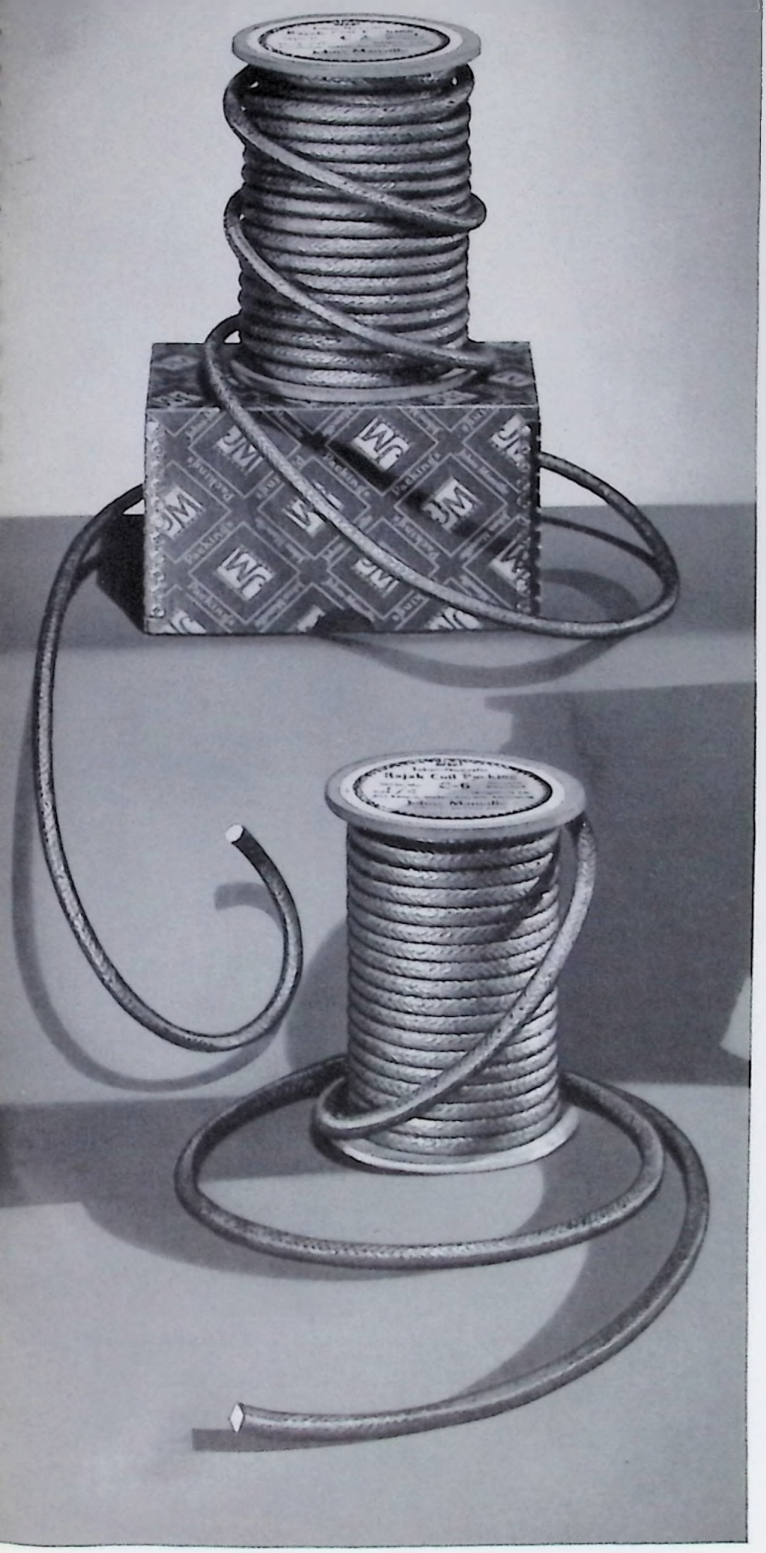
**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No | Approximate weight, lbs. per 100 lin. feet | | | | | | | | | | Form of Package | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/8″ | 3/16″ | 1/4″ | 5/16″ | 3/8″ | 1/2″ | 5/8″ | 3/4″ | 7/8″ | 1″ | Coil | Rings |
| 9 | 2.75 | 4.5 | 5.5 | 8.75 | 12 | 17.5 | 27.5 | 42 | 57 | 68 | On reels weighing 5, 10, 25 and 50 lbs. or in 12½ ft. lengths in boxes weighing: up to 1/4″— 5 to 6 lbs. 5/16″ to 3/4″— 8 to 10 lbs. 7/8″ to 1″—12 to 16 lbs. | Packed in boxes weighing: up to 1″ I.D.— 3 lbs. 1″ to 2″ I.D.— 5 lbs. 2″ to 3″ I.D.—10 lbs. 3″ to 4″ I.D.—15 lbs. over 4″ I.D.—20 lbs. |
| 10 | 2.5 | 4 | 5 | 8 | 11 | 16 | 25 | 36 | 52 | 62 | | |
| 14 | 1.5 | 3 | 4.5 | 7.5 | 10.5 | 15.5 | 24 | 33 | 50 | 60 | | |




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# J-M Rajah Rod and Valve Stem Packing



***A dense, heat-resisting rod and valve stem packing for use against superheated steam and other high temperature conditions.***

THE two major characteristics of J-M Rajah Packing are impenetrability and great resistance to elevated temperatures. It is a dependable, highly efficient material for packing valve stems and reciprocating rods and plungers against superheated steam, and other high temperature conditions. It may also be used against hot or cold oil or water. Rajah is one of the oldest packings in the J-M line and has established an enviable performance record during many years of outstandingly successful service.

### Construction Details

Rajah Packing is made of the highest quality, long-fibre asbestos yarn, frictioned with a special heat-resisting compound and braided solid. It is surface-treated with a heat-resisting lubricant and graphited.

This construction results in a durable, resilient packing that is impervious to penetration and highly resistant to all types of high temperature conditions.

### Styles and Forms

J-M Rajah Packing is manufactured in the following styles, both round and square cross-section, to meet every type of service condition.

**STYLE No. 2 (ROUND)** — Designed for use on valve stems and reciprocating rods and plungers against high temperature conditions where a packing of round cross section is desired. It is furnished in coil form only (Style No. C-2), in sizes of 1/8" and up.

**STYLE No. 6 (SQUARE)** — This is the same as Style No. 2 except that it is formed square after braiding. It is furnished in coil form, Style No. C-6 and ring form, Style No. R-6, in sizes of 3/16" and up.

**SIZES, APPROX. WT. AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/8" | 3/16" | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" |
| 2 round | .75 | 1.33 | 2.5 | 3.33 | 5.5 | 8.33 | 13.33 | 22 | 25 | 33.33 |
| 6 square | — | 2.5 | 3.33 | 5.5 | 8.33 | 13.33 | 22 | 25 | 33.33 | 46 |

| Form of Package | |
|---|---|
| Coil | Rings (Style No. 6 only) |
| On reels weighing 5, 10, 25 and 50 lbs. or on 1 lb. spools in sizes 1/8" to 1/4". | Packed in boxes weighing:<br>1" to 2" I.D.— 5 lbs.<br>2" to 3" I.D.—10 lbs.<br>3" to 4" I.D.—15 lbs.<br>Over 4" I.D.—20 lbs. |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 30 of 117
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# J-M Centripac Rod Packing

***A high-quality packing designed for centrifugal pumps and other rotating or oscillating rods.***

FOR many years Centripac has been widely used for packing centrifugal pumps and other rotating and oscillating rods and shafts in service against fresh or salt, hot or cold water, oil, ammonia, brine, gasoline and some weak acids and chemicals.

### Construction Details

Centripac is plaited square from long-fibre asbestos yarn, with or without wire in each strand depending on the style, and thoroughly lubricated and graphited. This square section presents a full surface contact between the moving part and the packing, providing a tight seal and minimum friction. Sizes 3/16" and up.

### Styles and Forms

**STYLE No. 7—FOR GENERAL SERVICE**—Made from asbestos yarn containing no wire, this is a soft packing, yet it is dense enough to stand up well in service. Coil form, Style No. C-7, and ring form, Style No. R-7.

**STYLE No. 11—FOR HEAVY DUTY SERVICE**—Made from asbestos yarns, reinforced with fine, soft copper wire, Style No. 11 is recommended for use against heavy fluids or wherever mechanical strength is required. Coil form, Style No. C-11, and ring form, Style No. R-11.

**STYLE No. 18—FOR GASOLINE SERVICE** — Recommended for service against hot or cold gasoline, naphtha, benzine and other petroleum solvents, this is made without wire with a gasoline-resistant lubricant. Coil form, Style No. C-18, and ring form, Style No. R-18.

**STYLE No. 19 — FOR PULP AND PAPER MILL SERVICE**—Designed for packing white water and stock pumps, Jordans and Refiners, Style No. 19 is made of asbestos yarn, without wire or graphite, and specially impregnated with a stainless lubricant. Coil form, Style No. C-19, and ring form, Style No. R-19.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | | Form of Package | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3/16" | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" | Coil | Rings |
| **7** no wire | 2.5 | 4.5 | 7 | 10 | 17 | 24 | 35 | 47 | 65 | On reels weighing 5, 10, 25 and 50 lbs. or on 1 lb. spools in sizes up to and including 1/2" or packed in boxes weighing: up to and including 1/2"—5 lbs.; over 1/2"—10 lbs. | Packed in boxes weighing: 1" to 2" I.D.— 5 lbs. 2" to 3" I.D.—10 lbs. 3" to 4" I.D.—15 lbs. Over 4" I.D.—20 lbs. |
| **11** wire-inserted | 2.8 | 5 | 8.25 | 11.5 | 19.5 | 27 | 40 | 55 | 72 | | |
| **18** gasoline | 2.5 | 4.5 | 7 | 10 | 17 | 24 | 35 | 47 | 65 | | |
| **19** paper mills | 2.5 | 4.5 | 7 | 10 | 17 | 24 | 35 | 47 | 65 | | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 31 of 117
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# J-M White Lubricated Rod Packing

***For use against food products and other fluids that must be kept free of color, taste and odor.***

J-M WHITE LUBRICATED PACKING is made with one purpose in mind—to provide a durable packing that will not impart color, taste or odor to the fluid against which it is used. Because it is odorless and tasteless and contains no colored lubricant or other contaminating material, it is recommended for use against all types of food products, beverages, white soaps, paper pulp and a wide variety of similar materials. It may also safely be used against alcohol, caustics and weak acids and chemicals.

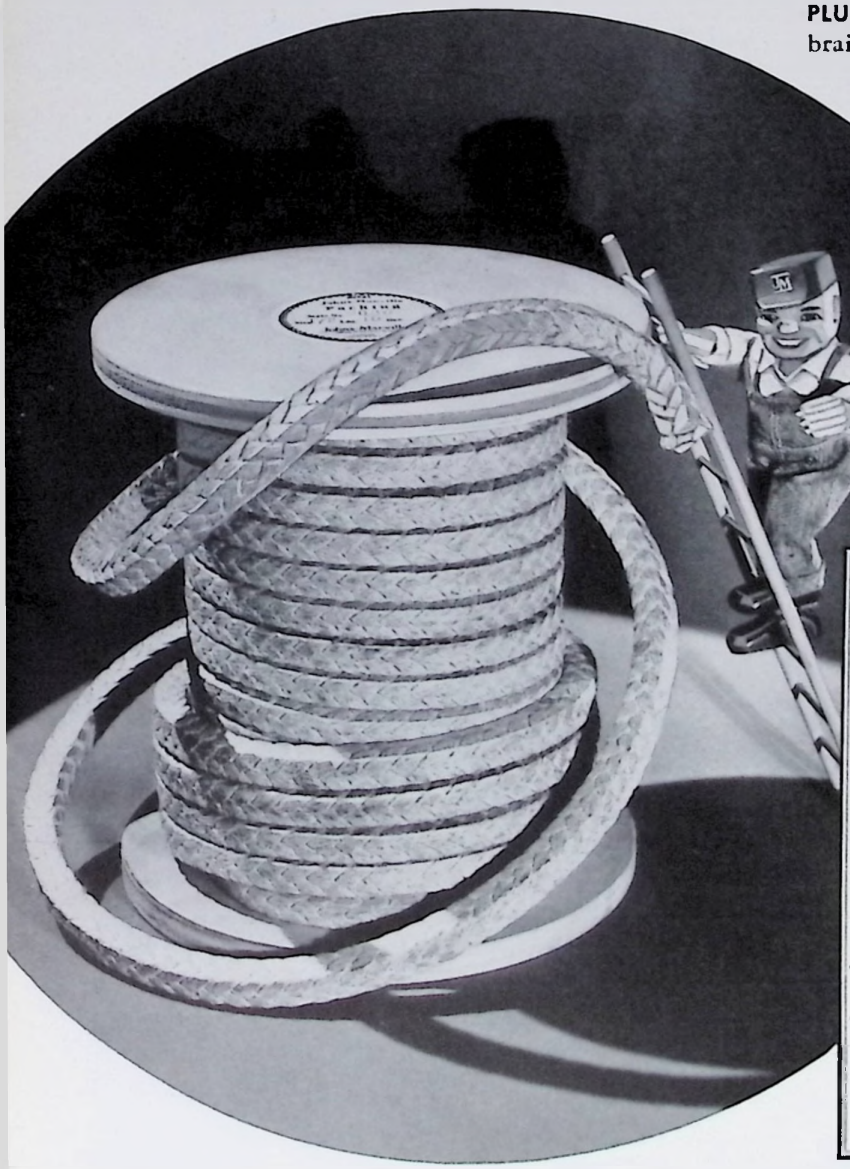
### Construction Details

Made of pure long-fibre asbestos yarns, braided or plaited according to the style, J-M White Lubricated Packing is impregnated with a special colorless lubricant that stands up well under all general service conditions and will not discolor the fluid being pumped.

### Styles and Forms

**STYLE No. 2035 — FOR RECIPROCATING ROD OR PLUNGER AND VALVE STEM SERVICE.** This is braided by the jacket-over-jacket method, then formed square and lubricated. Furnished in sizes 1/4" and up, in coil form, Style No. C-2035, and ring form, Style No. R-2036.

**STYLE No. 2036 — FOR CENTRIFUGAL SERVICE.** Plaited square and lubricated. Furnished in sizes 1/4" and up, in coil form, Style No. C-2036, and ring form, Style No. R-2036.



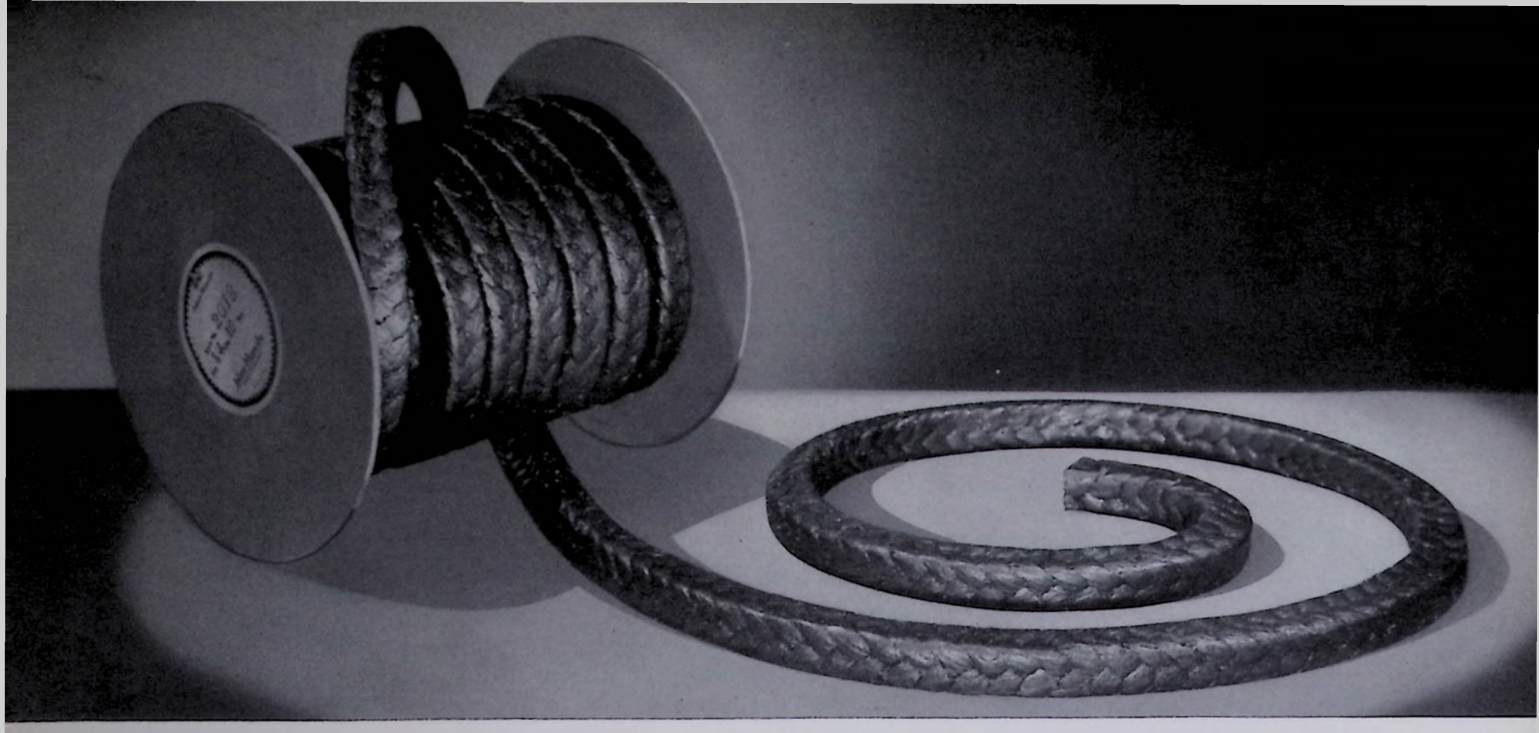
**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" |
| **2035** braided | 3.75 | 6.5 | 8.75 | 14 | 24 | 32 | 48 | 58 |
| **2036** plaited | 4 | 7 | 9.25 | 15 | 26 | 35.5 | 50 | 60 |

| Form of Package | |
|---|---|
| Coil | Rings |
| On reels weighing 5, 10, 25 and 50 lbs. or in 10 to 12 lb. boxes in sizes 1/4" to 1". | Packed in boxes weighing:<br>1" to 2" I.D.— 5 lbs.<br>2" to 3" I.D.—10 lbs.<br>3" to 4" I.D.—15 lbs.<br>Over 4" I.D.—20 lbs. |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 32 of 117
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# J-M Acid-Resisting Rod Packing

THE special acid-resisting rod packings described below are made from Blue African Crocidolite asbestos fibre which, from a chemical standpoint, is more acid-resisting than the Chrysotile asbestos from which most J-M Packings are made.

It is important to note, however, that Crocidolite fibre is more harsh and abrasive than Chrysotile. Such Chrysotile packings as No. 255 Interlocked *(page 25)*, No. 223 Mogul *(page 26)*, or No. 7 Centripac *(page 30)* are easier on the rod and should be tried wherever the conditions are mild. Whenever possible, mechanical lubrication is advisable in acid service.

J-M Acid Packings are braided, plaited or twisted, and impregnated with acid-resisting lubricant during manufacture. All styles are furnished 1/4" and up.

### Styles and Forms

**STYLE No. 2017 FOR RECIPROCATING RODS, PLUNGERS AND VALVE STEMS**—Braided jacket-over-jacket and formed square. Contains no metal. Furnished in coil form, Style No. C-2017, and ring form, Style No. R-2017.

**STYLE No. 2018 FOR CENTRIFUGAL SERVICE**—Plaited square without metal. Furnished in coil form, Style No. C-2018, and ring form, Style No. R-2018.

**STYLE No. 2010 (INTERLOCKED)**—Braided square, with no metal, for all general services. Furnished in coil form, Style No. C-2010, and ring form, Style No. R-2010.

**STYLE No. 2016 FOR VALVE STEMS** — Twisted, round and contains no metal. May be untwisted to make any size. Furnished in coil form, Style No. C-2016.

**STYLE No. 2015** — Used against acids, such as sulphuric and sulphurous, which do not affect lead alloys. Plaited square from a combination of blue asbestos yarns and non-abrasive lead alloy. Furnished in coil form, Style No. C-2015, and ring form, Style No. R-2015.

**NOTE:** Also see Plastic Packing, Styles No. 640 and 645, Page 53.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | Form of Package | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" | Coil | Rings |
| 2010 | 4 | 6.5 | 8.75 | 15 | 25 | 35 | 50 | 60 | 5, 10, 25 and 50 lb. reels or in 10 to 12 lb. boxes for sizes 1/4" to 1". Larger sizes in proportionate sized boxes or on 50 lb. reels. (Style No. 2016 furnished in 5, 10, 25 and 50 lb. reels only.) | Packed in boxes weighing: 1" to 2" I.D.— 5 lbs. 2" to 3" I.D.—10 lbs. 3" to 4" I.D.—15 lbs. Over 4" I.D.—20 lbs. (Style No. 2016 not furnished in ring form.) |
| 2015 | 19 | 23 | 35 | 46 | 75 | 102 | 135 | 165 | | |
| 2016 | 3.5 | 6 | 8 | 14 | 22 | 32 | 44 | 55 | | |
| 2017 | 3.75 | 6.5 | 8.75 | 16 | 24.5 | 37 | 49 | 59 | | |
| 2018 | 5 | 7 | 9.25 | 19 | 28 | 43 | 52 | 64 | | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 33 of 117
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# J-M Caustic-Resisting Rod Packing

***Recommended for service against caustic soda and similar corrosive chemicals.***

CAUSTIC conditions represent one of the most difficult of all packing problems. The J-M line of Caustic-Resisting Packings was developed as the result of a major research program in the Johns-Manville Packing Laboratory. Today, these materials are recognized for their superior performance against caustic liquors in both reciprocating and rotating service.

### Construction Details

J-M Caustic-Resisting Packings are made of high quality asbestos yarns, braided and squared or plaited square, impregnated with a specially compounded caustic-resisting lubricant and graphited. The types of asbestos fibre and lubricant used in making these packings were selected because of their superior resistance to the corrosive action of caustics.

### Styles and Forms

**STYLE No. 2020 FOR RECIPROCATING ROD, PLUNGER AND VALVE STEM SERVICE** — Braided jacket-over-jacket and formed square. Furnished in sizes 1/4″ and up, in coil form, Style No. C-2020, and ring form, Style No. R-2020.

**STYLE No. 2021 FOR CENTRIFUGAL SERVICE** — Plaited square, in sizes 1/4″ and up, in coil form, Style No. C-2021, and ring form, Style No. R-2021.

**STYLE No. 2022 FOR HEAVY DUTY SERVICE**—Plaited square, in sizes 1/4″ and up, from an asbestos yarn and non-abrasive metal. Furnished in sizes 1/4″ and up, in coil form, Style No. C-2022, and ring form. Style No. R-2022.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | Form of Package | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/4″ | 5/16″ | 3/8″ | 1/2″ | 5/8″ | 3/4″ | 7/8″ | 1″ | Coil | Rings |
| 2020 | 3.75 | 6.5 | 8.75 | 14 | 24 | 32 | 48 | 58 | 5, 10, 25 and 50 lb. reels or in 10 to 12 lb. boxes for sizes 1/4″ to 1″. | Packed in boxes weighing: 1″ to 2″ I.D.— 5 lbs. 2″ to 3″ I.D.—10 lbs. 3″ to 4″ I.D.—15 lbs. Over 4″ I.D.—20 lbs. |
| 2021 | 4 | 7 | 9.25 | 15 | 26 | 35.5 | 50 | 65 | | |
| 2022 | 19 | 23 | 35 | 46 | 75 | 102 | 135 | 165 | | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 34 of 117
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# J-M Gasoline-Resisting Rod Packing

***A versatile packing for general service against gasoline and other non-lubricating mineral oils.***

SERVICE against gasoline offers a difficult packing problem unless special care is taken in selecting the right material for the job. J-M Gasoline-Resisting Rod Packing is made to withstand this exacting service and has proved highly successful in use on rods and valve stems of equipment handling gasoline and other non-lubricating petroleum products.

### Construction Details

Made of selected, long fibre asbestos yarns, impregnated with a special lubricating compound, Gasoline-Resisting Packing is twisted or braided into coil form and graphited. It contains no rubber or other material that is affected by gasoline. The lubricating compound is insoluble in gasoline and will not wash out in service, yet possesses sufficient body to seal the pores of the packing, effectively preventing seepage without excessive gland pressure.

### Styles and Forms

**STYLE No. 293 (TWISTED.)** — This is the handiest style of J-M Gasoline-Resisting Packing. In general construction it is similar to Mogul Packing, Style No. 193 *(page 26)* and can be untwisted to form any desired size. Furnished in coil form only in sizes 1/8″ and up.

**STYLE No. 322 (BRAIDED ROUND)** is recommended for all general gasoline-resisting service where a more solidly constructed packing than the twisted style is desired. It is braided jacket-over-jacket and furnished in coil form only in sizes 1/8″ and up.

**STYLE No. 323 (BRAIDED and SQUARED)** is of denser construction, preformed into square cross-section to completely fill the packing space. Recommended for reciprocating pumps in gasoline service. Furnished in sizes 3/16″ and up, in coil form, Style No. C-323, and ring form, Style No. R-323.

**NOTE:** Also see Style No. 18 Centripac, page 30, and No. 259 Interlocked, page 25.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

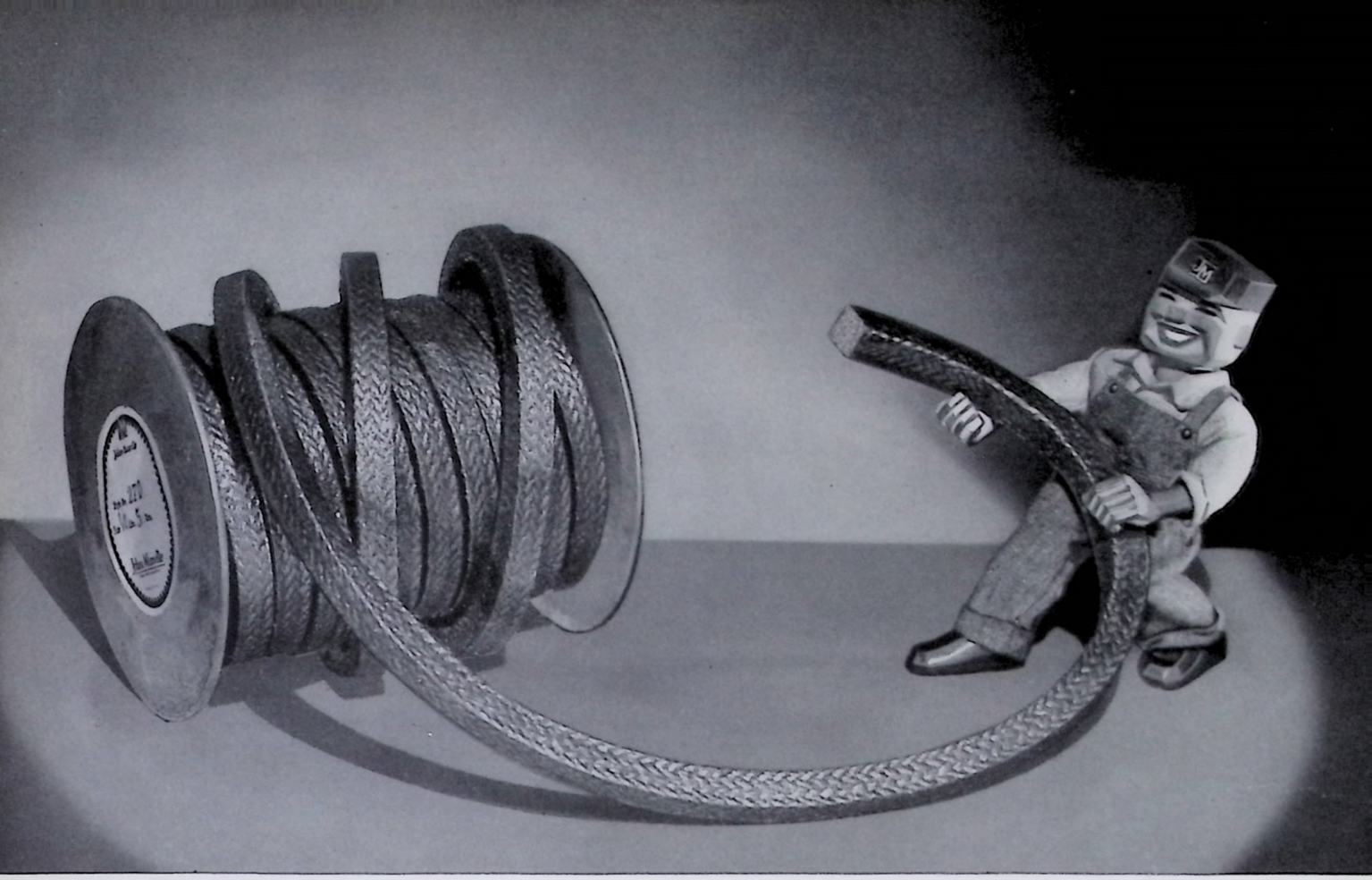
| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/8″ | 3/16″ | 1/4″ | 5/16″ | 3/8″ | 1/2″ | 5/8″ | 3/4″ | 7/8″ | 1″ |
| 293 twisted round | 1 | 2.5 | 4 | 5.5 | 8 | 13 | 21 | 29 | 40 | 52 |
| 322 braided round | 1 | 2 | 3.5 | 5.25 | 7 | 12.5 | 20 | 28 | 38 | 50 |
| 323 braided square | — | — | 5.25 | 7 | 12.5 | 20 | 28 | 38 | 50 | 67 |

| Form of Package | |
|---|---|
| Coil | Rings (Style No. 323 only) |
| On reels weighing 5, 10, 25 and 50 lbs. or on 1 lb. spools in sizes up to 1/2″. | Packed in boxes weighing:<br>1″ to 2″ I.D.— 5 lbs.<br>2″ to 3″ I.D.—10 lbs.<br>3″ to 4″ I.D.—15 lbs.<br>Over 4″ I.D.—20 lbs. |






*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 35 of 117
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# J-M No. 270 Interlocked Rod Packing

***A resilient, high quality rod and plunger packing for all general services against hot oil.***

J-M NO. 270 INTERLOCKED ROD PACKING is widely recognized as a highly efficient material in high temperature oil service. It is particularly recommended for use on reciprocating pumps and as end rings or alternate rings with J-M Plastic Packings on centrifugal pumps.

### Construction Details

Made of pure asbestos yarn by the patented J-M Interlocked braiding method and bonded with a special synthetic rubber compound, Style No. 270 provides an oil proof packing which cannot ravel or come apart in service. (A detailed description of the Interlocked braid is given on page 25.)

Impregnated with special high temperature lubricant and coated with pure flake graphite. A dense, resilient packing especially adapted to the severe conditions encountered in hot oil service.

### Forms Available

J-M No. 270 Interlocked Rod Packing is furnished in sizes from 1/4" up, in coil form, Style No. C-270, and ring form, Style No. R-270.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | Form of Package | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" | Coil | Rings |
| 270 | 4.25 | 7 | 9.5 | 19.5 | 24 | 32 | 51.5 | 69.5 | On reels weighing 5, 10, 25 or 50 lbs. or in boxes weighing: Sizes up to and including 1/4", 5 lbs.; over 1/4", 10 lbs., or in 1 lb. spools for sizes up to and including 1/4". | Packed in boxes weighing: 1" to 2" I.D.— 5 lbs. 2" to 3" I.D.—10 lbs. 3" to 4" I.D.—15 lbs. Over 4" I.D.—20 lbs. |




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# J-M Thermo Rod Packing

**FOR HIGH TEMPERATURE OILS AND GASES**

THIS is a heavy duty packing for service against hot oils, gases and steam on reciprocating rods and plungers. It is not intended for ordinary conditions and should be used only in the services for which it is designed.

Thermo Rod Packing, Style No. 789, is constructed with a center core of pure twisted asbestos containing annealed iron wire. Over this core is braided one or two jackets of pure asbestos yarn, depending upon the size. Between the jackets is a small amount of special heat-resisting sealing compound.

Furnished in coil form, Style No. C-789, and ring form, Style No. R-789, either square or round, with or without lubricant and graphite finish. Unless otherwise specified, this packing will be supplied square, without lubricant or graphite. For service against superheated steam it should be ordered lubricated. Furnished in sizes 1/4″ and up.

# J-M Air Packing

AS the name indicates, J-M Air Packing, Style No. 55, is designed for service against air, particularly on the air end of compressed-air pumps. It is made in square cross-section, braid over braid, from long fibre asbestos yarn reinforced with fine copper wire, impregnated with a special lubricant, and graphited.

Furnished in coil form, Style No. C-55 and ring form, Style No. R-55 in sizes 1/4″ and up. The ring form is also furnished in combination with Kearsarge, Style No. R-15, for air compressor packing sets, Style No. R-15-55. When ordering combination sets, the make and size of the air pump should be specified.

# J-M No. 5 Rod Packing

**FOR HOT OIL AND SUPERHEATED STEAM**

RECOMMENDED for use on valve stems against hot oil or superheated steam, J-M Style No. 5 is plaited square from copper wire-inserted pure asbestos yarns, and is lubricated with a special heat-resisting compound. Furnished in sizes 1/4″ and up, in coil form, Style No. C-5, and ring form, Style No. R-5.

# J-M No. 731 Rod Packing

**FOR GENERAL HOT OIL SERVICE**

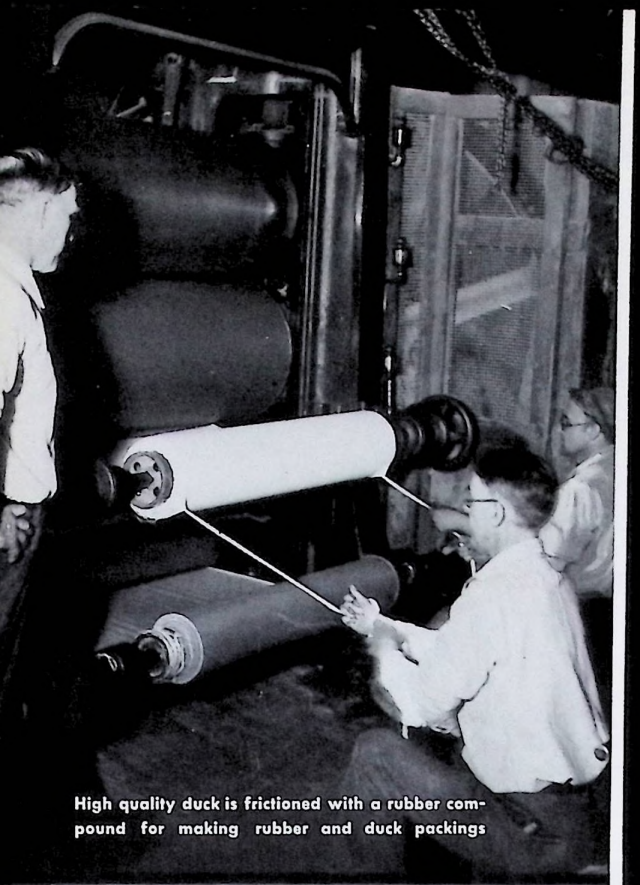
RECOMMENDED as a general utility rod and plunger packing for service against hot oil, J-M Style No. 731 is a dense packing made by the braid-over-braid method from commercially pure asbestos-yarn, with a sealing compound between the jackets. It is treated with a heat and oil resisting lubricant and graphited. When specified, however, it can be supplied without lubricant or graphite. Furnished in sizes 1/4″ and up, in coil form, Style No. C-731, and ring form, Style No. R-731.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | Form of Package | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/4″ | 5/16″ | 3/8″ | 1/2″ | 5/8″ | 3/4″ | 7/8″ | 1″ | Coil | Rings |
| 789 | 4 | 7 | 11 | 17.5 | 28 | 44 | 54 | 75 | On reels weighing 5, 10, 25 and 50 lbs. | Packed in boxes weighing: 1″ to 2″ I.D.— 5 lbs. 2″ to 3″ I.D.—10 lbs. 3″ to 4″ I.D.—15 lbs. Over 4″ I.D.—20 lbs. |
| 55 | 6 | 8 | 12 | 26 | 33 | 46 | 65 | 85 | | |
| 5 | 5.5 | 7 | 11 | 24 | 32 | 44 | 60 | 80 | | |
| 731 | 3 | 5 | 9 | 14 | 20 | 25 | 34 | 50 | | |



Johns-Manville Packings (1941)
ACL Doc 13710 · Page 37 of 117
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High quality duck is frictioned with a rubber compound for making rubber and duck packings

# Johns-Manville
# RUBBER AND DUCK

## Rod, Plunger and Valve Stem Packing

Generally speaking, rubber and duck packings are recommended for use against hot water and low pressure steam. Some styles, however, may also be used for other services such as light oils, ammonia, cold water, etc. The ability of rubber and duck packings to outlast other materials in hot water service has been proved over a period of many years. The natural resiliency of this type of construction compensates for the swelling tendency in hot water service.

All J-M Rubber and Duck Packings are made from new, first-quality duck, laminated with pure rubber that is specially compounded to suit the particular conditions for which each style is recommended. Complete details on the various styles of J-M Rubber and Duck Packings will be found on the following pages.



The rubber used in J-M Rubber and Duck Packings is carefully compounded to meet rigid manufacturing specifications


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# J-M Cross-Diagonal Rod Packing

***Because it allows expansion in either direction, J-M Cross Diagonal provides a tight seal against hot water even on rods that are slightly out of line.***

THIS is one of the most widely used rubber and duck packings. Because of its three outstanding features —resiliency, impenetrability and the desired quality of expansion—J-M Cross Diagonal, Style No. 271, is ideal for hot water service. It may also be used against cold water, low pressure steam, ammonia, light oils and mineral seal oil on reciprocating rods and plungers where the packing space is 1/4" or more.

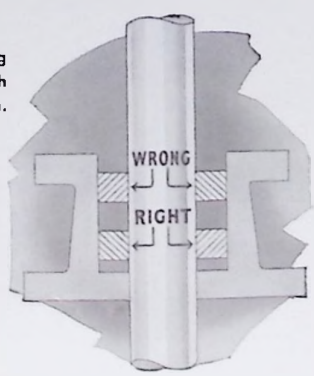
### Construction Details

J-M Cross Diagonal Rod Packing is made of plies of first quality duck, laid diagonally, bonded with a high grade rubber compound and graphited. It is this diagonal construction, plus the high quality compound, that allows for the unusual expansion incident to hot water and ammonia service.

Cross Diagonal Rod Packing should always be installed with the plies pointing toward the pressure as shown in the drawing below.

### Styles and Forms

J-M Cross Diagonal Rod Packing is furnished in spiral form, Style No. S-271; coil form, Style No. C-271; and ring form, Style No. R-271, in sizes 1/4" and up.




**Cross Diagonal Rod Packing should always be installed with plies pointing toward the pressure.**

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approx. weight, lbs. per 100 lin. ft. | | | | | | | | Form of Package | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" | Coil | Spiral | Rings |
| 271 | 4 | 6.5 | 8.75 | 15 | 27 | 35 | 48 | 60 | 12½ ft. lengths in boxes weighing: 1/4" to 1"—10 to 12 lbs. Larger sizes in proportionate sized boxes. | One 12½ ft. length per box | In boxes weighing: 1" to 2" I.D.— 5 lbs. 2" to 3" I.D.—10 lbs. 3" to 4" I.D.—15 lbs. Over 4" I.D.—20 lbs. |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 39 of 117
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# J-M H-P Diagonal Rod Packing



***A utility packing for worn equipment in service against medium or low pressure steam.***

J-M H-P Diagonal Rod Packing, Style No. 183, is designed to compensate for the irregularities of rods that are worn, scored or out of alignment. It is particularly intended for service against medium and low-pressure steam.

### Construction Details

This is a combination packing made of diagonally cut wedges of first grade rubber-frictioned laminated duck and a round rubber and duck cushion, both held in place by a braided cotton jacket and all thoroughly lubricated and graphited. The advantage of this construction is that the packing can easily adapt itself to the irregularities of worn rods by automatic shifting of the individual units without distorting or damaging the basic structure of the material.

### Styles and Forms

J-M H-P Diagonal Rod Packing is made in sizes 3/8″ and up in coil form, Style No. C-183; spiral form, Style No. S-183; and ring form, Style No. R-183. *{The muslin wrapping, which is used for protection in shipping, should be removed before using.}*

# J-M L-P Diagonal Rod Packing

J-M L-P Diagonal Rod Packing, Style No. 184, is particularly recommended for service against cold water as well as low pressure steam on rods and plungers in poor mechanical condition.

The construction is the same as that of H-P Diagonal, except that the round cushion is made of plaited jute instead of rubber and duck. It provides the same general advantages but will not withstand quite as high pressures as the H-P Diagonal Rod Packing.

J-M L-P Diagonal Rod Packing is furnished in sizes 3/8″ and up, in coil form, Style No. C-184; spiral form, Style No. S-184; and ring form, Style No. R-184. *{The muslin wrapping, which is used for protection in shipping, should be removed before using.}*

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | Form of Package | | |
|---|---|---|---|---|---|---|---|---|---|
| | 3/8″ | 1/2″ | 5/8″ | 3/4″ | 7/8″ | 1″ | Coil | Spiral | Rings |
| **183** H-P Diagonal | 18 | 33 | 50 | 66 | 89 | 112 | 10 to 12 lb. boxes in sizes up to 1″. Over 1″ in proportionate sized boxes. Sizes up to 1/4″ in continuous lengths. Sizes over 1/4″ in 20 ft. lengths. | One length per box. Sizes under 1/4″—12 ft. Sizes 1/4″ and over—10 ft. | Packed in boxes weighing: 1″ to 2″ I.D.— 5 lbs. 2″ to 3″ I.D.—10 lbs. 3″ to 4″ I.D.—15 lbs. Over 4″ I.D.—20 lbs. |
| **184** L-P Diagonal | 14 | 28.5 | 41 | 60 | 86 | 108 | | | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 40 of 117
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***A durable, first-quality laminated rubber and duck packing.***

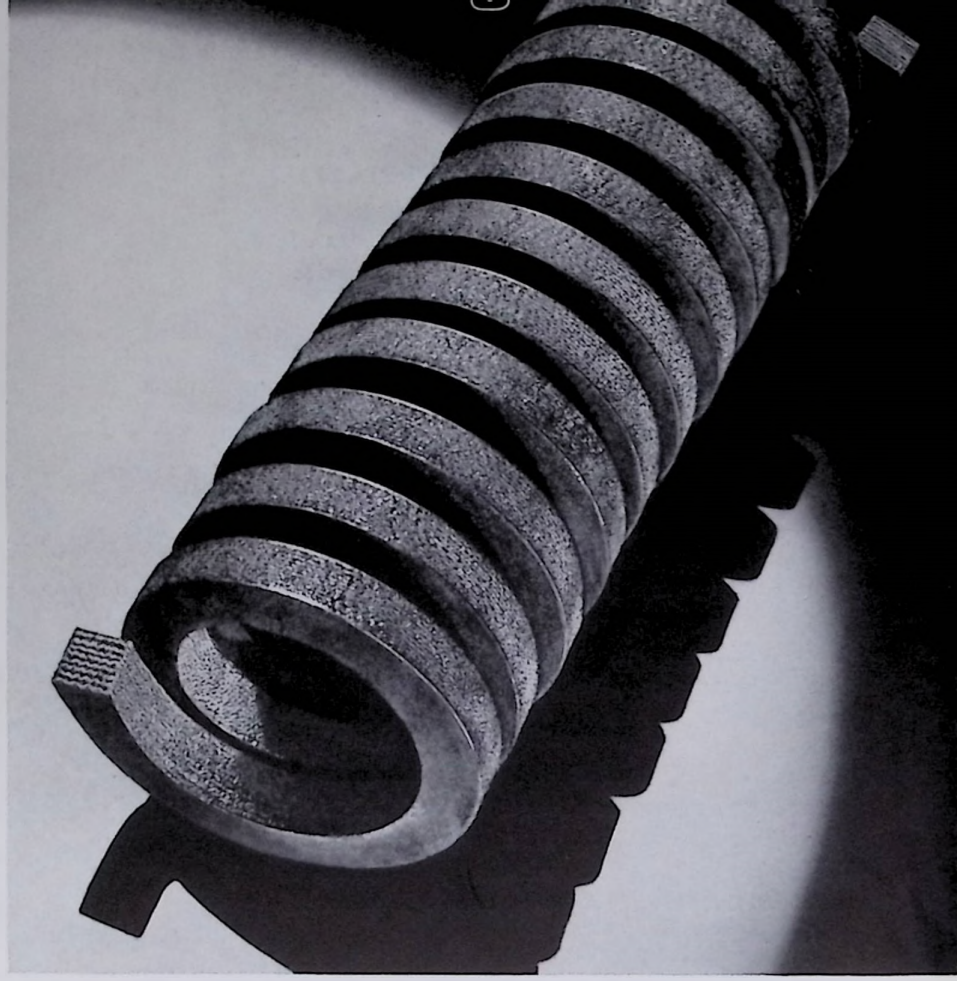
DURO ROD PACKING, Style No. 171, is a good, dependable material for service against low pressure hot or cold water and steam where temperatures are not excessive. It will give satisfactory service on piston rods and valve rods on many types of reciprocating engines and pumps.

### Construction Details

It is made in laminated form from plies of heavy duck bonded together with a strong, non-hardening rubber friction compound, then thoroughly lubricated and graphited.

### Styles and Forms

J-M Duro is furnished in sizes 1/4" and up, in spiral form, Style No. S-171 and ring form cut from slab stock, Styles No. R-171 *(solid rings)*, No. R-171-S.C. *(Sectional Cut Rings)* and No. R-171-D.C. *(Diagonal Cut Rings)* in standard thickness of 1/2". Also furnished in rings cut from coil, Style No. R-171-C.



# J-M Besta-Monia Rod Packing

SPECIALLY designed for service against ammonia, Besta-Monia, Style No. 172, is recommended for reciprocating rods and plungers where the packing space is 1/4" or more. It is made of plies of closely woven, first quality duck, bonded with a special ammonia-resisting compound, lubricated and graphited.

Furnished in sizes 1/4" and up in spiral form, Style No. S-172, and ring form cut from slab stock, Styles No. R-172 *(Solid Rings)*, No. R-172-S.C. *(Sectional Cut Rings)* and No. R-172-D.C. *(Diagonal Cut Rings)* in standard thickness of 1/2". Also furnished in rings cut from coil, Style No. R-172-C.

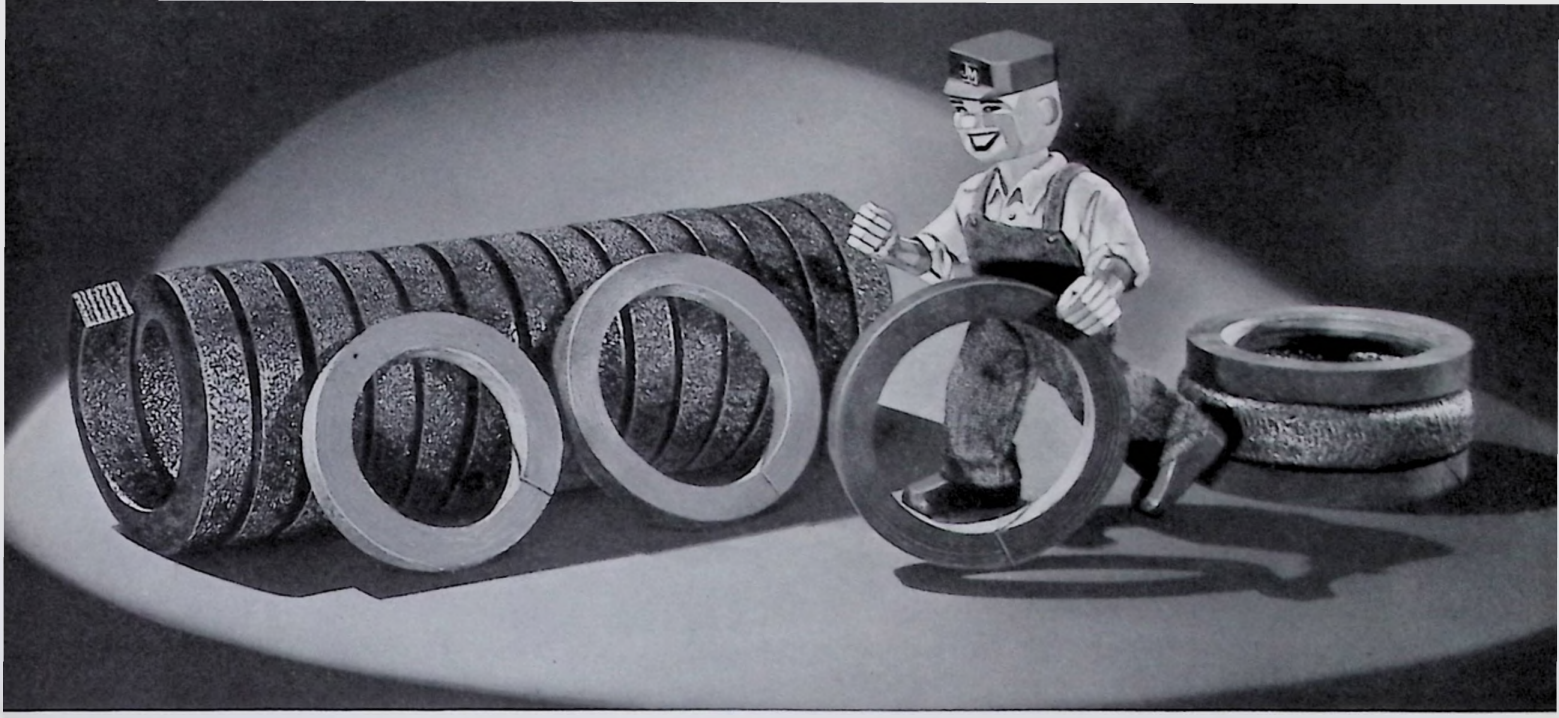
**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | Form of Package | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" | Spiral | Rings |
| **171** Duro | 4 | 6.5 | 8.75 | 15 | 27 | 36 | 48 | 60 | 12½ ft. lengths boxed as follows: Size 1/4"—4 lengths per box; size 5/16"—2 lengths per box; over 5/16"—1 length per box. | Packed in boxes weighing: 1" to 2" I.D.— 5 lbs. 2" to 3" I.D.—10 lbs. 3" to 4" I.D.—15 lbs. Over 4" I.D.—20 lbs. |
| **172** Besta-Monia | 4 | 6.5 | 8.75 | 15 | 27 | 36 | 48 | 60 | One 12½ ft. length per box. | |

Use each piece approx 90 pounds. Valve used for pump packing




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# J-M Special Oil Field Packing

***Designed for general service conditions encountered in oil field operations.***

**J-M OIL FIELD SPIRAL PACKING, STYLE No. S-156** — This material is primarily designed for use on the steam end of reciprocating slush pumps and has performed with very satisfactory results in this service. It is also used extensively as a general service packing in the oil fields.

It is made of plies of high-grade, closely woven duck, frictioned with best quality rubber and thoroughly lubricated and graphited. Furnished in spiral form only in sizes 1/4" and up.

**J-M POLISH ROD RING PACKING, STYLES No. R-373 and No. R-374** — As the name indicates, both these materials are designed for use on the pump rods of oil well drilling rigs. Style No. R-373 is made of a specially compounded rubber and graphite composition, while Style No. R-374 is made of a special rubber compound containing lead. Both styles are furnished in ring form only.

**J-M SLUSH PUMP RINGS, STYLE No. R-474** — These rings are designed for use on the fluid or mud end of slush pumps. Made of a durable rubber and graphite compound, they assure maximum life in this severe service. Furnished in ring form only.

**J-M SLUSH PUMP COMBINATION SETS, STYLE No. R-476** — These ring sets, used on the mud end of slush pumps, consist of two slush pump rings, Style No. R-474 *(see above)* and one L-P Diagonal Ring, Style No. R-184 *(described on page 39)*.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | Form of Package |
|---|---|---|---|---|---|---|---|---|---|
| | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" | Spiral Only |
| **156** Oil Field Spiral | 4 | 6.5 | 8.75 | 15 | 27 | 36 | 48 | 60 | 12½ ft. lengths boxed as follows: size 1/4"—4 lengths per box; size 5/16"—2 lengths per box; over 5/16"—1 length per box. |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 42 of 117
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# J-M Rubber and Duck Hollow Core Rod Packing



DESIGNED for general low-pressure steam and water service, J-M Rubber and Duck Hollow Core Rod Packing, Style No. 390, is particularly recommended for use on rods and plungers where extreme resilience is required.

This packing is made of first-quality, rubber-frictioned duck wrapped with a hollow core or center. It is formed into a square cross-section, and thoroughly lubricated and graphited.

The hollow core compensates for expansion and contraction and provides great resiliency and adaptability to temperature changes.

Furnished in sizes 1/4″ and up, it is made in coil form, Style No. C-390; spiral form, Style No. S-390; and ring form, Style No. R-390.

*Note:* For J-M Asbestos Hollow Core Rod Packing, Style No. 385, see page 22.

# J-M Victor Rod Packing



VICTOR Rod Packing, Style No. 173, is a good quality packing designed for low-pressure steam and hydraulic service. It is one of the oldest packings in the J-M line and is widely accepted for its dependable service.

Made in round cross-section only, J-M Victor Rod Packing is constructed of selected duck, frictioned with a special rubber compound and wound around a red rubber core, and thoroughly lubricated and graphited. The rubber core imparts desirable resiliency and permits the packing to adapt itself to variations in pressures and stuffing box conditions.

Furnished in sizes 1/4″ and up, in spiral form, Style No. S-173, and ring form, Style No. R-173.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | Form of Package | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/4″ | 5/16″ | 3/8″ | 1/2″ | 5/8″ | 3/4″ | 7/8″ | 1″ | Coil (Style No. 390 only) | Spiral | Rings |
| **390** Hollow Core | 3.5 | 5.5 | 8 | 14 | 22 | 26 | 35 | 48 | 12½ ft. lengths in boxes weighing: Sizes up to 1″—10 to 12 lbs.; larger sizes in proportionate sized boxes. | One 12¼ ft. length per box | Packed in boxes weighing: 1″ to 2″ I.D.— 5 lbs. 2″ to 3″ I.D.—10 lbs. 3″ to 4″ I.D.—15 lbs. Over 4″ I.D.—20 lbs. |
| **173** Victor | 3.5 | 5.5 | 8 | 13 | 20 | 28 | 40 | 50 | | | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 43 of 117
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asbestosclaims.law/library/13710/43

# Johns-Manville
# FLAX AND JUTE
## ROD AND PLUNGER PACKING

Flax and jute packings are generally recognized as standard for most cold water reciprocating services. Flax, of course, provides longer life and is otherwise superior to jute.

From an appearance standpoint, most flax packings look alike. The true quality, which is revealed in service, is largely governed by the quality and length of fibre as well as the type of impregnation used in their construction. Various grades of flax fibre are in common use. The two classifications most important in the manufacture of packings are "line" flax, which is the longest, highest-grade fibre and "tow" flax, which is shorter in length. The best grades of J-M Flax Packing are made from pure long line flax.

The complete line of Johns-Manville Flax and Jute Packings, including both regular-lubricated and W.P.H. lubricated (waterproof hydraulic) are described on the following pages. In every case, it is clearly indicated whether line flax, tow flax, blended flax or jute is used.



*Tow Flax*

*Line Flax*



*Flax packings are braided solid without centers or corners*


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# J-M Regular Lubricated Flax Packing

***Recognized as standard for cold water services, J-M Regular Lubricated Flax Packings are tough and resilient—assure long, economical service.***

J-M REGULAR-LUBRICATED FLAX PACKINGS are made in three different styles, all of which are recommended for service against fresh or salt cold water and brine. Their chief difference is the length of the fibre used in their manufacture.

All regular lubricated flax packings are furnished standard without graphite. However, when specified, a graphited finish can be supplied. J-M Flax Packings can also be furnished with more lubrication than standard if ordered D.D. *(double-dipped)*.

### Styles Available

**STYLE No. 188**—This is the finest regularly lubricated flax packing obtainable. All flax packings look very much alike, but their performance varies greatly, depending upon the quality of flax used. By ordering Johns-Manville Style No. 188, you can be sure of obtaining the most durable type of flax packing that can be made, since only the highest quality long line flax is used in its manufacture. Style No. 188 Flax Packing is braided solid, without centers or corners, and is impregnated with a special cold-water lubricant. Black diamond-shaped markings are braided into the construction for identification. Furnished in coil form, Style No. C-188, and ring form, Style No. R-188.

**STYLE No. 189**—A high quality regular lubricated flax packing that has proved satisfactory for normal service. It is braided solid, without centers and corners, from pure tow flax roving, thoroughly lubricated and marked with red diamond-shaped markings for identification. Furnished in coil form, Style No. C-189, and ring form, Style No. R-189.

**STYLE No. 2000**—A medium quality, blended flax and jute packing. The same care is exercised in braiding as in the better grades of J-M flax, thus assuring uniformity. Furnished in coil form only, Style No. C-2000.



# J-M W.P.H. Lubricated Flax Packing

***A denser type of flax packing specially designed for heavy duty hydraulic service.***

J-M W.P.H. *(Waterproof Hydraulic)* Flax Packings are made from the same flax fibres as J-M regular-lubricated flax packings. The primary difference is in the impregnation which, in the case of W.P.H. Flax, is harder and denser. Thus, W.P.H. Flax is more suitable for heavy-duty, high-pressure service such as that on accumulators, hydraulic presses, rams, etc.

Made in three styles as described below, all J-M W.P.H. Lubricated Flax Packings are available in three densities: hard *(–H)*, medium *(–M)* and soft *(–S)*. Unless otherwise ordered, medium density is furnished. For service where a graphite finish is objectionable, such as in use on paper stock pumps, white water pumps, etc., they can be furnished without graphite.

### Styles Available

**STYLE No. 240**—This is the highest quality W.P.H. flax packing. It is braided solid, without centers or corners, from the same pure long line flax roving used in J-M Style No. 188. Lubricated with a pure type of wax best suited for high pressure, cold water service, and graphited, it is much more dense and is marked for identification by small grooves on opposite sides. It is furnished in coil form, Style No. C-240; spiral form, Style No. S-240; and ring form, Style No. R-240.

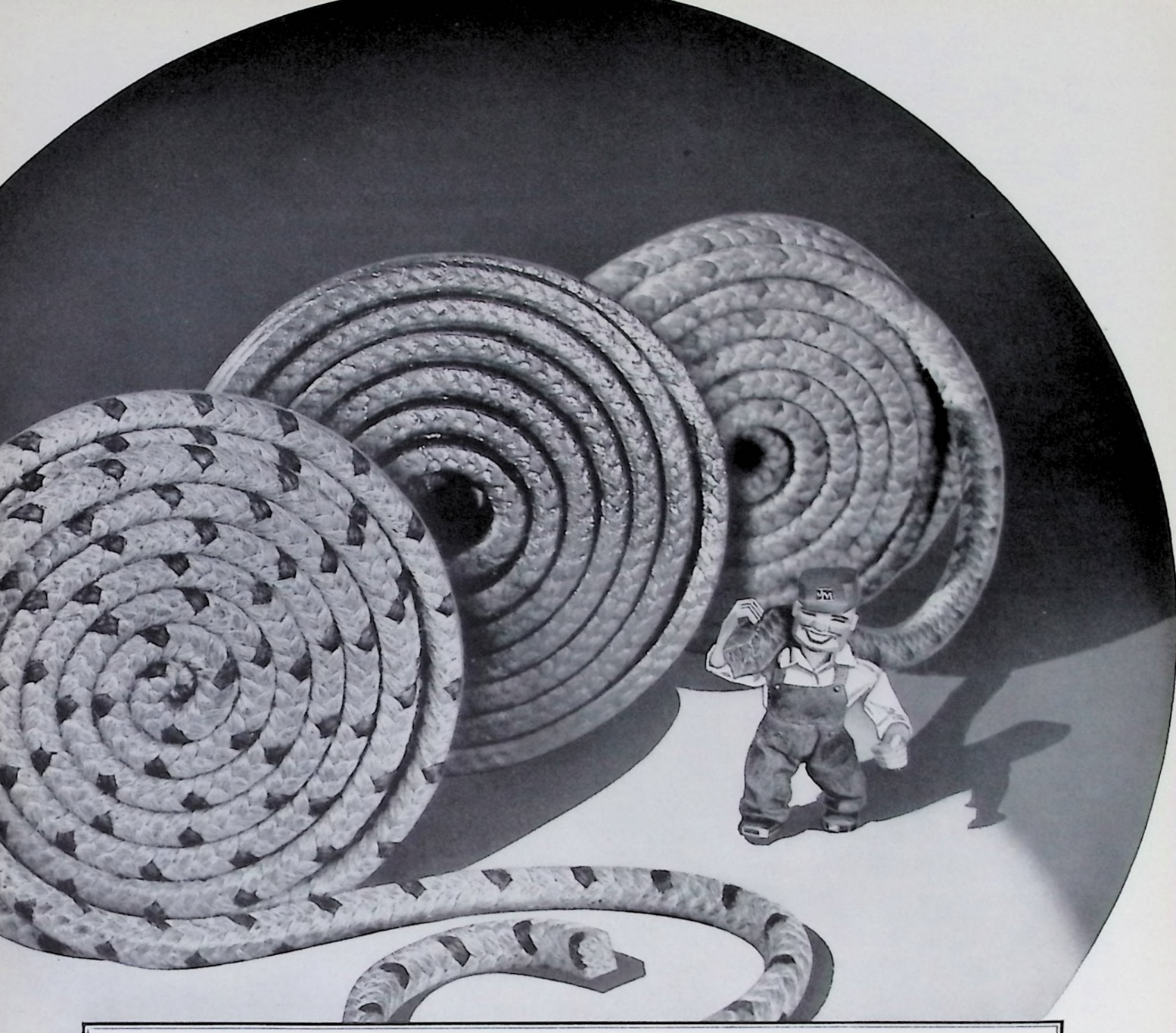
**STYLE No. 181**—Designed for moderately severe hydraulic service, Style No. 181 is a high grade W.P.H. flax packing braided solid from pure tow flax roving, lubricated with the same wax as Style No. 240, and graphited. Furnished in coil form, Style No. C-181; spiral form, Style No. S-181; and ring form, Style No. R-181.

**STYLE No. 3000**—Blended flax and jute with W.P.H. lubrication. Care is exercised in braiding to assure uniformity. Coil form only, Style No. C-3000.

NOTE: For certain stuffing box conditions, in order to break the pressure or prevent possible extrusion of even the best quality flax, it is advisable to use other packings as header and follower rings. For this purpose, No. 280 Braided Copper, No. 182 Aqua Hydraulic and No. 33 Universal are often used.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 45 of 117
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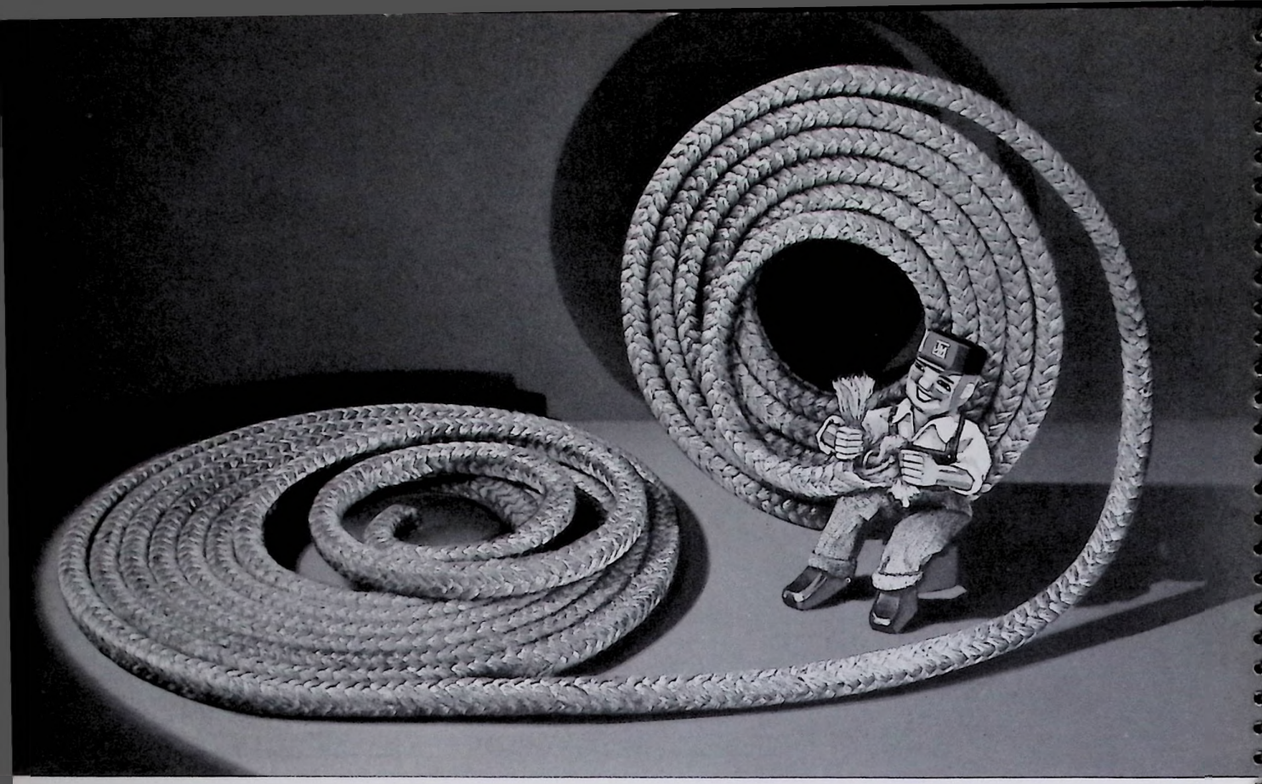
## SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ¼" | 5/16" | 3/8" | ½" | 5/8" | ¾" | 7/8" | 1" |
| **188** regular lubrication | 3.5 | 6 | 7.5 | 12 | 20 | 28 | 35 | 48 |
| **189** regular lubrication | 3.5 | 6 | 7.5 | 12 | 20 | 28 | 35 | 48 |
| **2000** regular lubrication | 3.5 | 6 | 7.5 | 12 | 20 | 28 | 35 | 48 |
| **240** W.P.H. lubrication | 4 | 6 | 8 | 14 | 22 | 32 | 42 | 53 |
| **181** W.P.H. lubrication | 4 | 6 | 8 | 14 | 22 | 32 | 42 | 53 |
| **3000** W.P.H. lubrication | 4 | 6 | 8 | 14 | 22 | 32 | 42 | 53 |

| Coil | Spiral | Rings |
|---|---|---|
| On reels weighing 25, 50 and 100 lbs. or in boxes weighing:<br>¼" to 5/16"— 6 to 10 lbs.<br>7/16" to 1" —10 to 14 lbs.<br>1 1/16" to 1¼"—12 to 15 lbs.<br>Over 1¼"—15 to 20 lbs. | Styles No. 188, 189 and 2000 not furnished in spiral form. | Packed in boxes weighing:<br>1" to 2" I.D.— 5 lbs.<br>2" to 3" I.D.—10 lbs.<br>3" to 4" I.D.—15 lbs.<br>Over 4" I.D.—20 lbs.<br>Style No. 2000 not furnished in ring form. |
| | One 12½ ft. length per box. (W.P.H. Styles only) | Packed in boxes weighing:<br>1" to 2" I.D.— 5 lbs.<br>2" to 3" I.D.—10 lbs.<br>3" to 4" I.D.—15 lbs.<br>Over 4" I.D.—20 lbs. |
| | Style No. 3000 not furnished in spiral or ring form. | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 46 of 117
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# J-M Jute Packings

***Low-cost, cold water packings for use where service conditions are not severe or where the cost and inconvenience of re-packing are not important factors.***

J-M JUTE PACKINGS are braided from first quality jute roving. While they are the best jute packings obtainable, it should be noted that jute fibres are coarser and more brittle than flax and, therefore, no jute packing will last as long as a flax packing.

Because of their low cost, J-M Jute Packings are often used on cold water pumps that are not operated continuously, or where re-packing involves no appreciable amount of time or labor.

**STYLE No. 4191 — REGULAR LUBRICATION** — This is braided from the highest quality jute, with center and corners of the same material, and lubricated with a special cold-water lubricant. When requested it can be supplied with more lubrication than standard if ordered D.D. *(double-dipped)*. It is furnished in coil form only, Style No. C-4191, as shown in the illustration above.

**STYLE No. 4181—W. P. H. LUBRICATION**—This is similar to Style No. 4191, except that it is treated with a W. P. H. *(Waterproof Hydraulic)* compound and graphited. It is used for heavier duty service than Style No. 4191. Furnished in coil form, Style No. C-4181.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | Form of Package |
|---|---|---|---|---|---|---|---|---|---|
| | ¼" | 5/16" | ⅜" | ½" | ⅝" | ¾" | ⅞" | 1" | Coil |
| **4191** regular lubrication | 3 | 4 | 6 | 11.5 | 18 | 26 | 33 | 42 | On reels weighing 25, 50 and 100 lbs. or in boxes weighing: ¼" to ⅜"— 6 to 10 lbs. 7/16" to 1" —10 to 14 lbs. 1⅛" to 1¼"—12 to 15 lbs. Over 1¼"—15 to 20 lbs. |
| **4181** W.P.H. lubrication | 4 | 6 | 8 | 14 | 22 | 32 | 42 | 53 | |





*High temperature aluminum packings are made by twisting graphited aluminum foil upon itself*

## Johns-Manville

# FLEXIBLE METALLIC

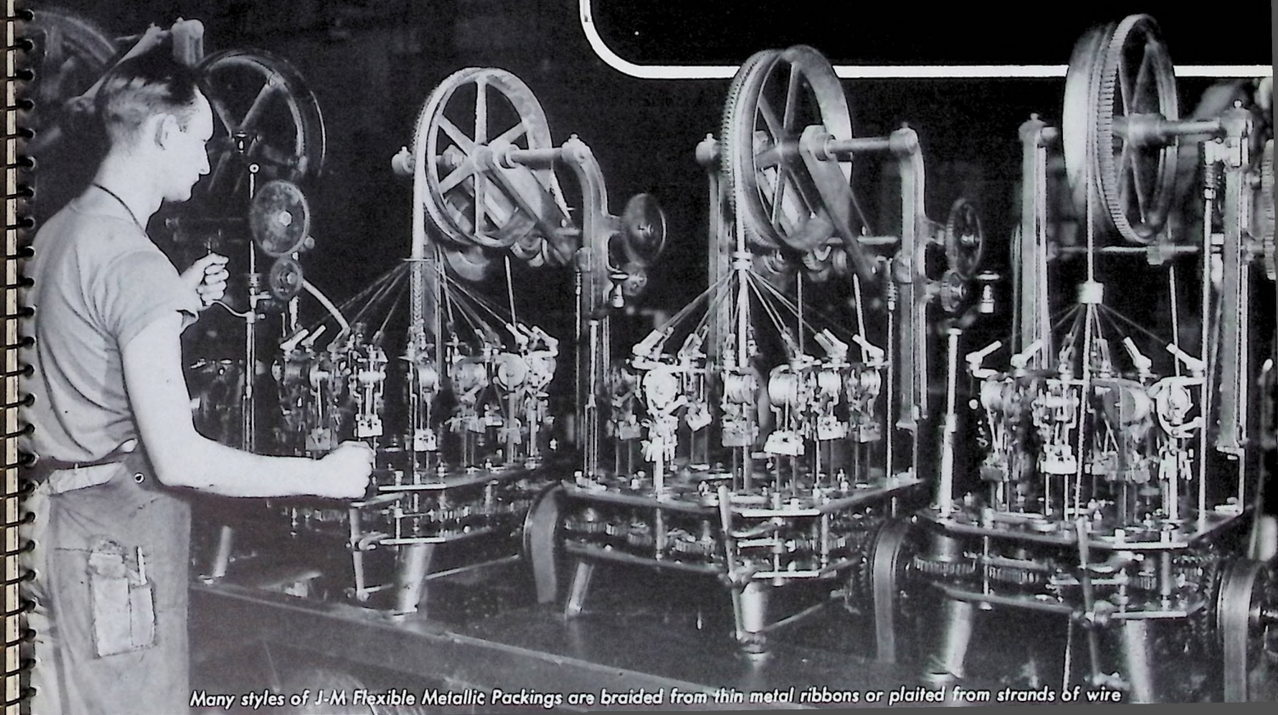
### ROD, PLUNGER AND VALVE STEM PACKING

Flexible metallic packings are the natural outgrowth of modern developments in industrial equipment. They are made to withstand severe service under high pressure and high temperature conditions on all types of reciprocating and rotating rods, shafts and plungers in good mechanical condition. It should be noted, however, that flexible metallic packings should never be used against rods or shafts made of brass or bronze.

J-M Flexible Metallic packings are made in many different styles including all-metallic and semi-metallic in both solid-braided and channel types. The channel types are generally used in combination with other types of flexible metallic packings to provide resilience and to act as a barrier against penetration. Another important use of flexible metallic packing is as end rings in combination with other types of packing such as Plastic.

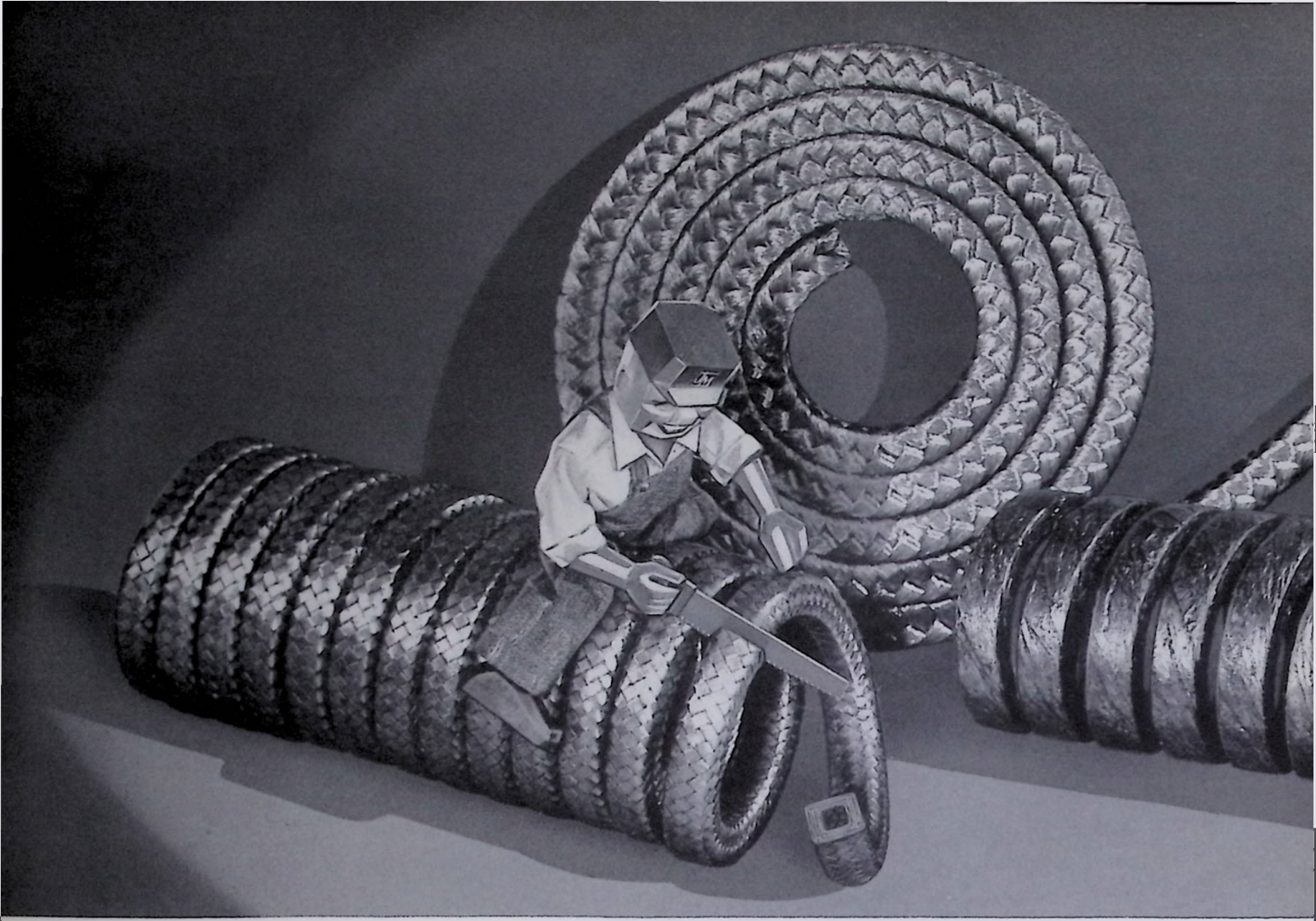
The method of construction and type of metals used in these packings are carefully selected for their ability to withstand the conditions for which they are designed.

Complete details on all J-M Flexible Metallic Packings are given on the following three pages.



*Many styles of J-M Flexible Metallic Packings are braided from thin metal ribbons or plaited from strands of wire*


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# J-M Flexible Metallic Rod Packing

***Durable and long wearing, J-M Flexible Metallic Packings are made in various forms to suit the service conditions for which they are recommended.***

**STYLE No. 360 — FOR GENERAL SERVICE** — This unusually effective and resilient Flexible Metallic Packing is composed of braided lead alloy ribbons over an asbestos core and is designed for use in centrifugal pumps handling hot or cold water, oil, etc., where temperatures do not exceed 500° F. and only on shafts running true and without vibration.

Style No. 360 is also used as header and follower rings, or as alternate rings, with Plastic Coil Packing in centrifugal pump service, especially where speeds exceed 1750 R.P.M.

This packing is thoroughly lubricated and graphited and the lead ribbons, being slightly knurled, retain the lubricant in the small indentations, thereby eliminating internal friction.

Style No. 360 Flexible Metallic may also be used in reciprocating rod service.

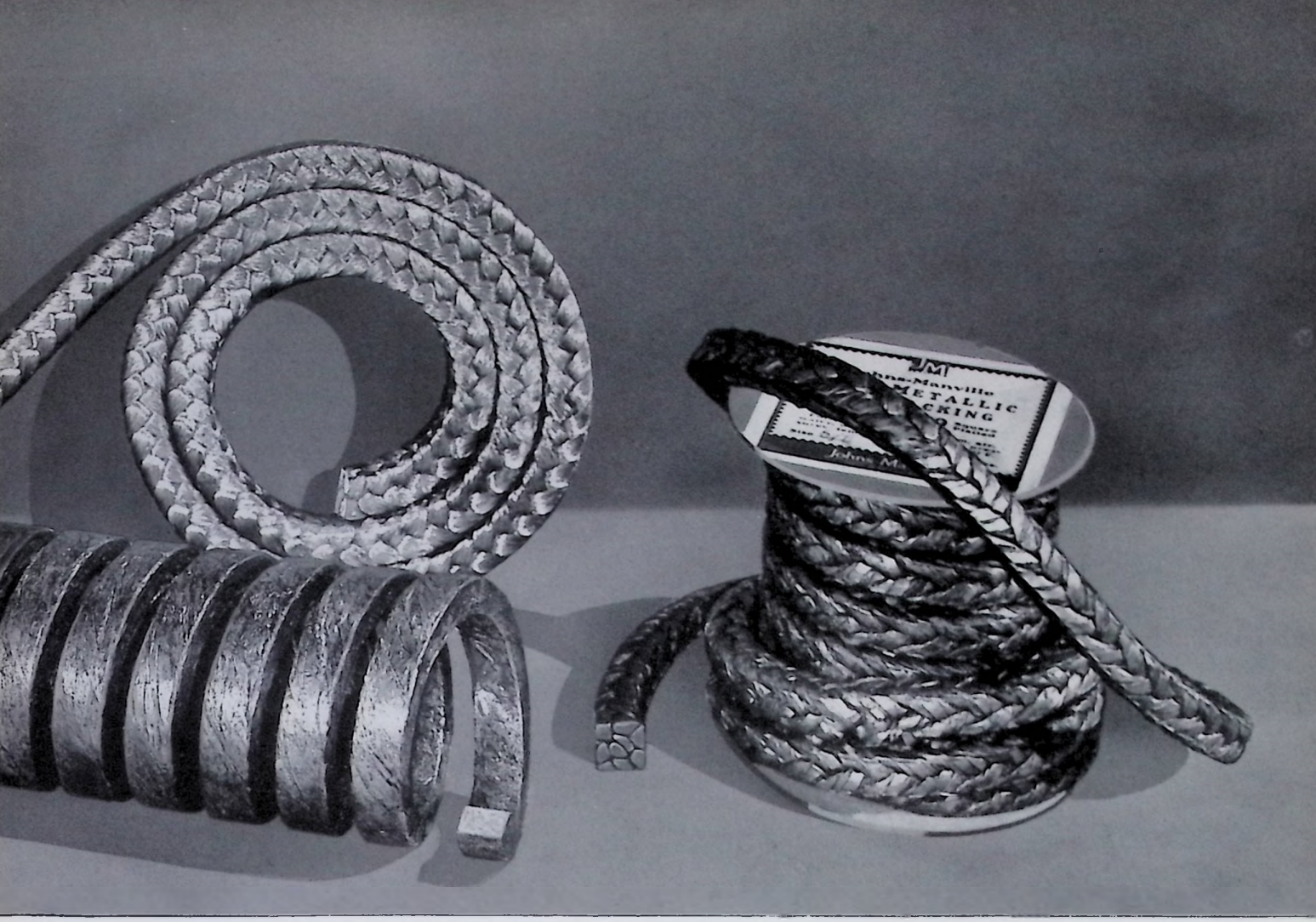
Furnished in sizes 3/16″ and up in spiral form, Style No. S-360 (shown at left above), and ring form, Style No. R-360.

**STYLE No. 361 — FOR GASOLINE SERVICE** — The same as Style No. 360 except that it is impregnated with a special lubricant for service against gasoline and other distillates. Style No. 361 is furnished in sizes 3/16″ and up in spiral form, Style No. S-361 and ring form, Style No. R-361.

**STYLE No. 362—(No. 360 IN ASBESTOS CHANNEL)—** Excellent sealing qualities and greater resilience are the outstanding characteristics of Style No. 362. It is recommended, in combination with other packings,



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 48 of 117
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for temperatures up to 500° F. against air, steam, ammonia and gas.

Style No. 362 is made by stitching Style No. 360 Flexible Metallic Packing into a "U"-shaped asbestos channel. Furnished in sizes 3/8" and up in spiral form, Style No. S-362, and ring form, Style No. R-362.

**STYLE No. 363—(No. 360 IN DUCK CHANNEL)—FOR HYDRAULIC SERVICE**—The same as Style No. 362 except that the channel construction is made of duck. It is particularly suitable for use on elevator rams, water works plungers, presses and in combination with other packings. It is furnished in sizes 3/8" and up in spiral form, Style No. S-363 and ring form, Style No. R-363.

**STYLE No. 350—PLAITED ASBESTOS AND LEAD**—Providing unusually low friction, Style No. 350 is designed for use on centrifugal pumps operating against high or low pressure steam, air, water and oil up to 500° F. It may also be used on reciprocating rods and plungers, either alone or in combination with other packings. When used on vacuum pumps, it is generally advisable to use header and follower rings of a softer packing such as J-M Mogul *(page 26)* or J-M Centripac *(page 30)*.

Style No. 350 is plaited square from ribbons of non-abrasive metal and asbestos yarn, thoroughly lubricated and graphited. It is furnished in sizes 1/4" and up in coil form, Style No. C-350 *(shown on spool above)* and ring form, Style No. R-350.

**STYLE No. 351—FOR GASOLINE SERVICE**—Constructed in exactly the same manner as Style No. 350 and designed for the same pressure and temperature conditions, this packing is specially lubricated for service against gasoline and other distillates. It is furnished in sizes 1/4" and up in coil form, Style No. C-351 and ring form, Style No. R-351.

**STYLE No. 379—FOR ACID SERVICE**—Designed especially for use as header and follower rings with plastic coil packings, such as Style No. 640 *(page 53)*, for acid pumps in pulp and paper mills and chemical



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 49 of 117
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asbestosclaims.law/library/13710/49

plants to pack against sulphuric and sulphurous acid in centrifugal pump service.

This flexible metallic packing is composed of lead alloy ribbons braided over a core of blue African asbestos. Furnished in sizes 3/16″ and up in spiral form, Style No. S-379 and ring form, Style No. R-379.

**STYLE No. 365—FOR TEMPERATURES OVER 500°F.**—This flexible metallic packing is made by braiding copper ribbons over an asbestos core and is designed for slow moving rods and expansion joints where high temperatures are encountered. Recommended for steam, oil, etc., it may be used alone, or as header and follower or alternate rings in combination with plastic packing.

Furnished in sizes 1/4″ and up in spiral form, Style No. S-365 and ring form, Style No. R-365.

**STYLE No. 391—FOR TEMPERATURES UP TO 1000°F.** Recommended for use against steam, air, oil and petroleum derivatives up to 1000° F. It is made of aluminum foil, graphited, lubricated, twisted and wrapped upon itself, then formed into square cross-section. Furnished in sizes 1/4″ and up in spiral form, Style No. S-391 *{shown in center of illustration on pages 48-49}* and ring form, Style No. R-391.

**STYLE No. 392—FOR TEMPERATURES UP TO 750°F.** The same as Style No. 391 except that it contains an asbestos core for greater resiliency. It is recommended for use against temperatures up to 750° F. Furnished in sizes 1/4″ and up in spiral form, Style No. S-392 and ring form, Style No. R-392.

**STYLE No. 280—SQUARE BRAIDED COPPER**—This is one of the earliest styles of flexible metallic packings and has long been used as header rings on high pressure service to take the brunt of the pressure; as end rings when packing heavy horizontal plungers to hold the weight of the plunger; or as bushing rings where excessive clearance exists between the wall of the stuffing box and the rod. In combination with other J-M Packings such as No. 240 W.P.H. Flax, it is recommended for packing high pressure hydraulic accumulators and accumulator pumps.

Style No. 280 is made entirely of pure soft annealed copper wire, plaited together to form a firm copper packing of square cross-section. Furnished in sizes 1/4″ and up in coil form, Style No. C-280 *{shown coiled on pages 48-49}* and ring form, Style No. R-280.

**STYLE No. 282—BRAIDED COPPER WITH ASBESTOS CHANNEL**—Recommended for the same general types of services as Style No. 280 except that it will not stand quite as heavy pressures. However, because of the channel it has greater resiliency.

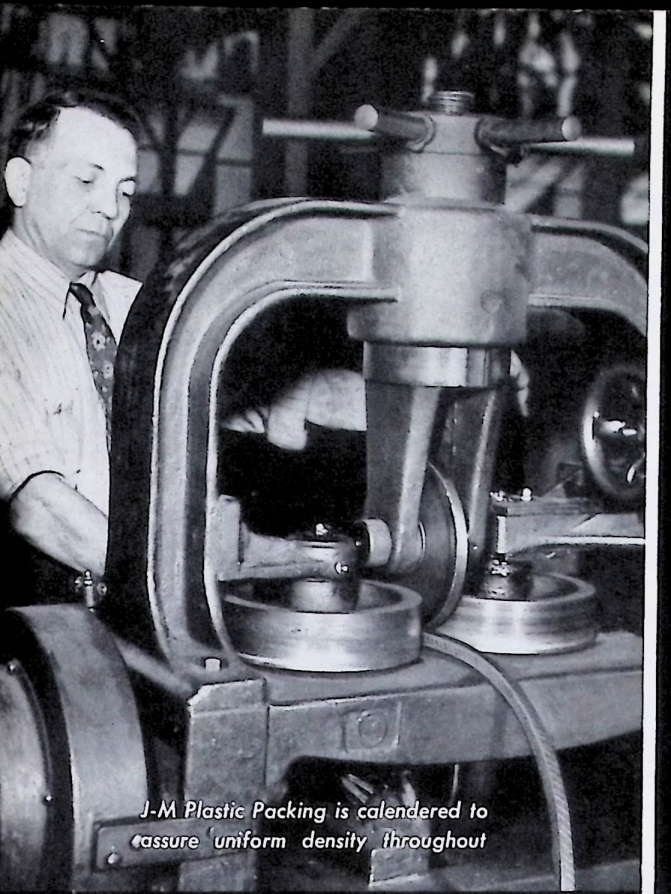
Style No. 282 consists of a U-shape asbestos channel, into which is securely stitched an insert of Style No. 280 square braided copper. Furnished in sizes 3/8″ and up in spiral form, Style No. S-282 and ring form, Style No. R-282.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | | Form of Package | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3/16″ | 1/4″ | 5/16″ | 3/8″ | 1/2″ | 5/8″ | 3/4″ | 7/8″ | 1″ | Coil | Spiral | Rings |
| **280** | — | 17 | 25 | 34 | 56 | 95 | 120 | 175 | 236 | On reels weighing 50 lbs. or more. | Not Furnished | Rings in all styles in boxes weighing approximately as follows:<br>To 1″ I.D.— 3 lbs.<br>1″ to 2″ I.D.— 5 lbs.<br>2″ to 3″ I.D.—10 lbs.<br>3″ to 4″ I.D.—15 lbs.<br>Over 4″ I.D.—20 lbs. |
| **282** | — | — | — | 22 | 32 | 49 | 78 | 92 | 120 | Not Furnished | One 12½ ft. length per box. | |
| **350** | — | 12.5 | 22 | 30 | 50 | 76 | 116 | 168 | 220 | On reels weighing 5, 10, 25 or 50 lbs. | Not Furnished | |
| **351** | — | 12.5 | 22 | 30 | 50 | 76 | 116 | 168 | 220 | | | |
| **360** | 8.5 | 18.75 | 29 | 44 | 75 | 110 | 150 | 192 | 240 | Not Furnished | One 12½ foot length per box. | |
| **361** | 8.5 | 18.75 | 29 | 44 | 75 | 110 | 150 | 192 | 240 | | | |
| **362** | — | — | — | 18.75 | 35 | 49 | 78 | 100 | 120 | | | |
| **363** | — | — | — | 22 | 37 | 51 | 85 | 103 | 124 | | | |
| **365** | — | 15 | 23 | 34 | 57 | 85 | 116 | 150 | 186 | | | |
| **379** | 8.5 | 18.75 | 29 | 44 | 75 | 110 | 150 | 192 | 235 | | | |
| **391** | — | 3.5 | 5.5 | 8 | 15 | 22 | 32 | 43 | 56 | | ¼″—4 lengths per box.<br>⅜″-2 lengths per box.<br>Over ⅜″-1 length per box. | |
| **392** | — | 3 | 5 | 6.75 | 12 | 19 | 27 | 37 | 48 | | | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 50 of 117
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J-M Plastic Packing is calendered to assure uniform density throughout

# Johns-Manville
# PLASTIC
## ROD, PLUNGER AND VALVE STEM PACKING

J-M Plastic Packings are tough, ductile materials that provide an effective seal with low friction. They have proved particularly successful in high speed centrifugal service.

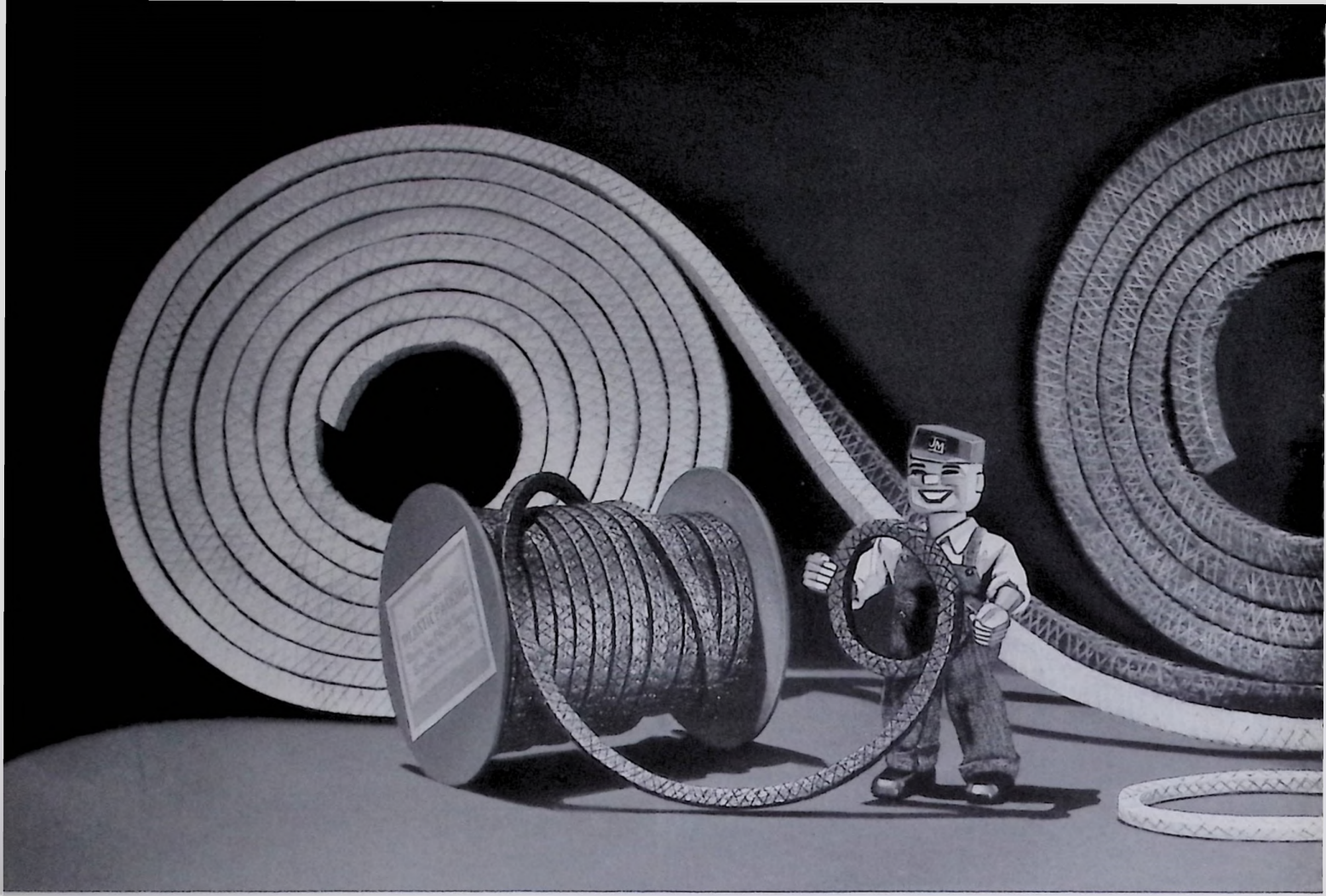
A major consideration in the manufacture of plastic packing is to obtain the most satisfactory combination of asbestos fibre, lubricant and other materials in the right density for the particular set of conditions against which it will operate. No one style is best for all conditions.

Johns-Manville, with its unlimited research facilities and broad packing experience is unusually well equipped to determine the right combination for every condition of service. Every style of J-M Plastic Packing has been backed by exhaustive laboratory and field tests.

Complete details on Johns-Manville Plastic Packings are given on the following three pages.

An intimate mixture of asbestos fibre, lubricant, and other materials is extruded through steel dies to form J-M Plastic Coil Packing


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# J-M Plastic Coil Packing

***Particularly developed for use on modern, high speed rotating shafts, J-M Plastic Packings provide an effective seal with low friction.***

THE modern trend toward higher and higher speeds in centrifugal pump design makes friction increasingly important as the determining factor in the life of the packing and the shaft. In designing J-M Plastic Packings, particular attention was given to providing the homogeneous structure and low friction so essential to long packing life in this high speed service.

Plastic packings were first introduced in shredded or bulk form, composed of a mixture of asbestos fibre, shredded lead, graphite and lubricant. Obviously such a mixture was difficult to handle and presented the inconvenience and many of the problems encountered years ago when plant men made their own packing.

It was difficult to install uniformly in the stuffing box and it lacked the proper uniformity and resiliency. Gland pressure had to be depended upon to compress the shredded material sufficiently to make it impervious to penetration or seepage through the packing itself. This often resulted in unequal density, providing only a temporary seal and requiring constant adjustment.

As an improvement over this original form, J-M Plastic Packings are made in coil form, of square cross-section, from which rings can be readily cut to fit stuffing box requirements. This form retains all the natural advantages of Plastic Packing, while at the same time assuring uniform density and ease of installation. All J-M Plastic Packings are adaptable to both reciprocating and rotating service and specially designed for high speed centrifugal operation.

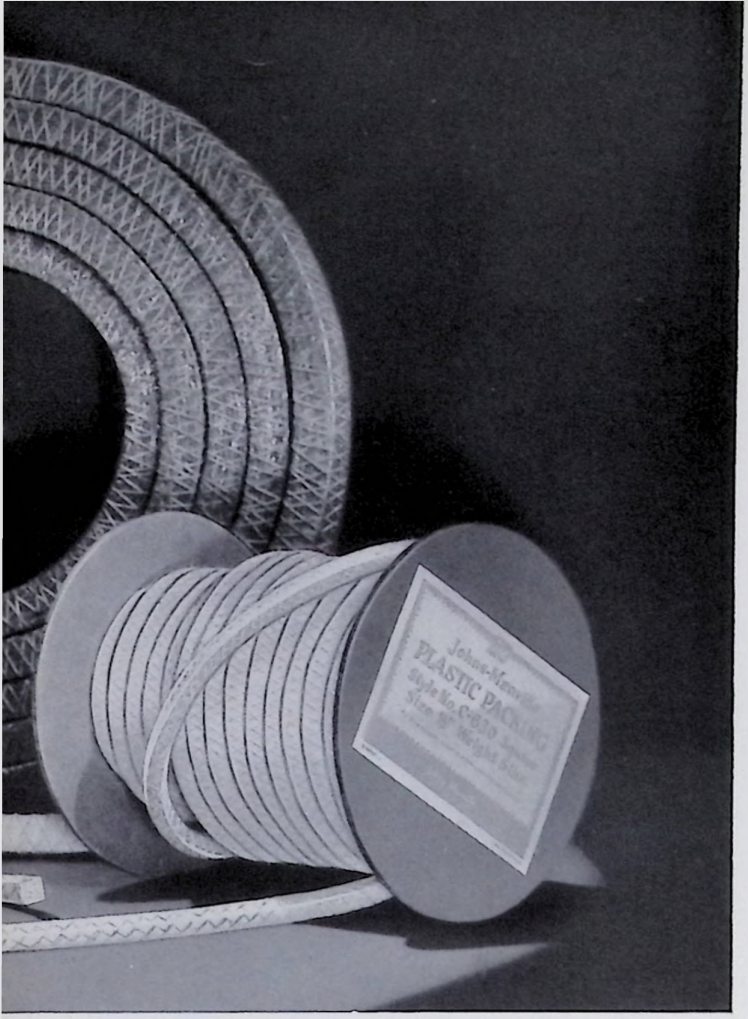
### Construction Details

The exact composition of J-M Plastic Coil Packings varies according to the service conditions against which each particular style is designed to operate.

Selected asbestos fibre of proper type and length is



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 52 of 117
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combined with such materials as graphite, mica, lubricants, non-friction metals in certain types, and binding compounds to produce a uniformly homogeneous mixture of low friction throughout. It is formed into coils of the proper density and size by extrusion through steel dies. All J-M Plastic Packings are furnished in sizes from 1/8″ to 1″, in graduations of 1/16″.

### Styles and Service Recommendations

**STYLE No. 610 — FOR GENERAL SERVICE** — Made of selected asbestos fibre mixed with pure graphite and a small amount of non-friction metal and bonded with a heat resisting compound to form a pliable coil for general maintenance packing against steam, air, water, ammonia, gases, etc., up to 600° F.

**STYLE No. 615 — FOR GENERAL SERVICE** — Similar to Style No. 610 except that no metal is used. It is adaptable to the same general service conditions.

**STYLE No. 620—FOR OIL AND GASOLINE SERVICE**—Made of asbestos fibre, pure graphite and a synthetic rubber oil resisting binder, specially designed for oil and gasoline service, both hot and cold.

**STYLE No. 630 — FOR FOOD PRODUCTS** — A white plastic coil composed of asbestos fibre, a special lubricant and a binder, for use where graphite cannot be used, such as in equipment handling food products, alcohol, caustics, weak organic acids, etc.

**STYLE No. 640 — FOR ACID SERVICE** — Designed especially for such acids as sulphuric or sulphurous, this material is composed of special blue African Crocidolite asbestos fibre, non-friction lead alloy, graphite and an acid-resisting binder. This construction, used with No. 379 Flexible Metallic *(page 50)* or Nos. 2017 or 2018 Acid Resisting *(page 32)* not only lasts longer than braided or plaited types, but its mild action is most economical in extending rod life.

**STYLE No. 645 — FOR ACID SERVICE** — Similar to Style No. 640, but contains no lead and should be used for packing against acids that react with lead. Use end rings of Nos. 2017 or 2018 Acid Resisting Packing *(page 32)*.

### Installation

J-M Plastic Packings are installed the same as any other type of coil packing. Being ductile and pliable, they mould themselves to the exact shape and size of the stuffing box and form a solid, tight-sealing bushing that operates with a minimum of friction.

NOTE: To prevent any possible extrusion of plastic packings, it is always advisable to use header and follower rings of a suitable type of braided or flexible metallic packing.

**SIZES, APPROX. WEIGHTS, PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1/8″ | 1/4″ | 3/8″ | 1/2″ | 5/8″ | 3/4″ | 7/8″ |
| 610 | 1.25 | 5 | 11.25 | 20 | 31.25 | 45 | 61.25 |
| 615 | .87 | 3.37 | 7.5 | 13.25 | 20.75 | 29.75 | 40.5 |
| 620 | .87 | 3.37 | 7.5 | 13.25 | 20.75 | 29.75 | 40.5 |
| 630 | .75 | 3 | 6.75 | 12 | 18.75 | 27 | 36.75 |
| 640 | 1.25 | 5 | 11.25 | 20 | 31.25 | 45 | 61.25 |
| 645 | .87 | 3.37 | 7.5 | 13.25 | 20.75 | 29.75 | 40.5 |

Form of Package

Style No. 620—in 12½ ft. lengths.
Sizes 1/8″ to 1/4″—4 lengths per box
Sizes 5/16″ and up—2 lengths per box

Styles No. 610, 615, 630, 640, 645 as follows:
Sizes up to and including 1/8″—1 lb. spools
Sizes 1/4″ to 1/8″ inclusive—5 lb. boxes
Sizes 1/4″ and up—10 lb. boxes



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 53 of 117
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# Asbestos—How it is Mined and Processed

*Many types of J-M Packings employ Canadian Chrysotile asbestos as the chief heat-resisting base structure. On this page are shown some of the steps in the mining and processing of this interesting, fireproof mineral fibre.*



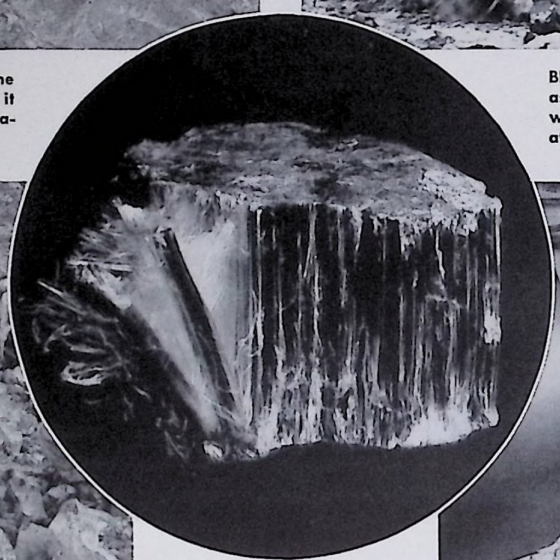
Asbestos occurs as veins in serpentine rock. Dark green in color in the mass, it becomes nearly pure white when separated into individual fibres.



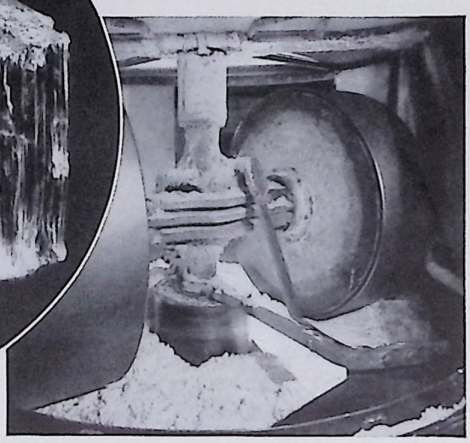
Blasting is the first step in separating asbestos fibre from the rock. This picture was made in the Johns-Manville Mine at Asbestos, Quebec.



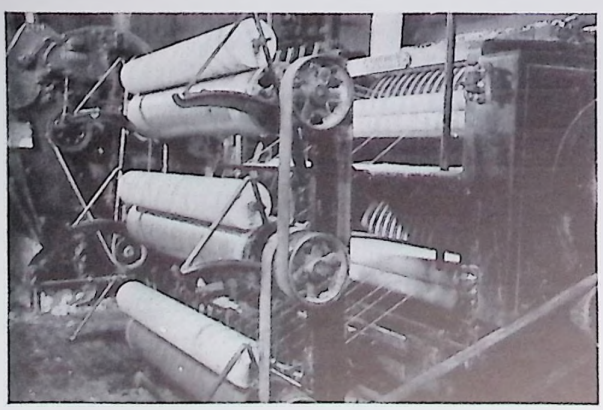
Fibre over 5/8" in length is "hand-cobbed" from the rock after the blast. Rock bearing shorter fibres goes to the mill for crushing and screening.



Only the longer grades of asbestos fibre are suitable for making yarn for asbestos fabric or braided packings. Shorter fibre is used in other products.



The pure rock-free asbestos is roller-crushed at the mill to "open" and separate the individual fibres in preparation for further processing.



Asbestos fibre is next carded into "roving".



Asbestos roving is spun into yarn.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 54 of 117
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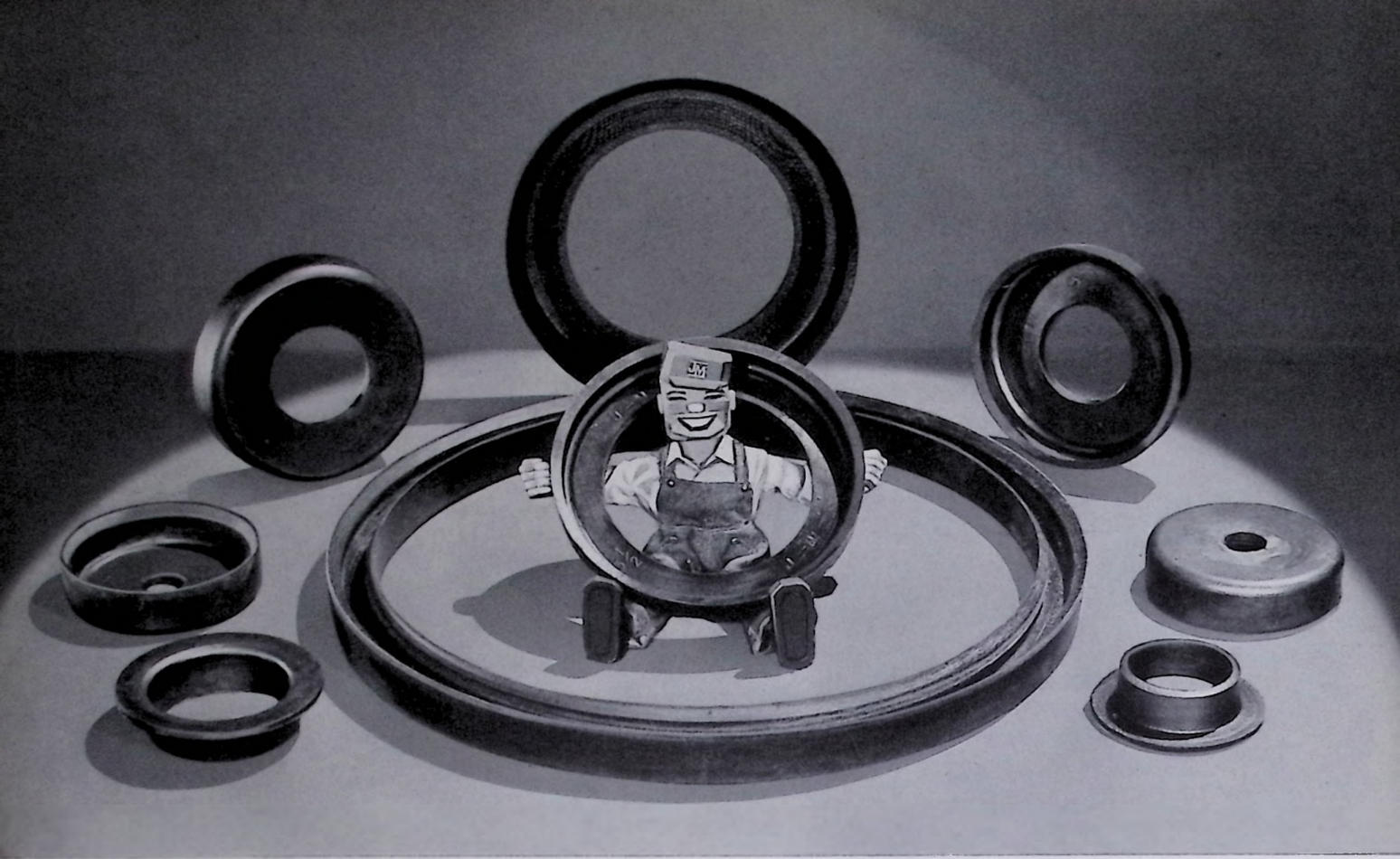
# Johns-Manville
# MOULDED PACKING PRODUCTS

Probably more than with any other type of packing, the manufacture of moulded products requires accurate knowledge of service conditions and the type of construction and composition best suited to those conditions. In most cases moulded products are called upon to withstand severe mechanical action and high pressures. Therefore, the slightest flaw or error in their construction may cause them to fail at the most inopportune time.

All J-M Moulded Packings are made to order from materials proved by long experience to be most satisfactory in the service for which they will be used. They are moulded to exact shape and size required, based on the information given on the data sheet accompanying each order. Complete details on J-M Moulded Packing Products will be found on the following pages.

J-M Moulded Packings are scientifically engineered and made to the exact shape and size required


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# J-M Moulded Packing Cups

***Designed for use on hydraulic and pneumatic equipment, J-M Packing Cups retain their shape in service and assure a positive seal even against extremely high pressures and temperatures.***

J-M MOULDED PACKING CUPS are designed to provide a tight seal with minimum friction on all types of slow-moving pistons and rams operating against air, water, steam, oil, etc., under high or low pressures.

They are specifically recommended for use on power reverse gears, steam brake cylinders, air hoists, pneumatic chucks, hydraulic presses, valves, steam and air rams for setting clutches and brakes, steam-operated cylinders on vulcanizers, air cylinders on foundry moulding equipment and all slow-moving pistons having a relatively short travel.

Actual performance records submitted by users demonstrate the remarkably long life of J-M Packing Cups. They have proved to be a splendid investment.

### Construction Details

J-M Packing Cups are a "custom-made" product, moulded to the exact shape and size required. As a pioneer in the field of moulded packing, Johns-Manville has the necessary experience to recommend and furnish the proper materials for any specific service condition. J-M Packing Cups are made of asbestos, duck or other fabrics, impregnated with heat and oil-resisting compounds selected to meet the particular conditions to be encountered. Unlike leather cups, their composition can be varied to meet service requirements.

### Styles and Service Recommendations

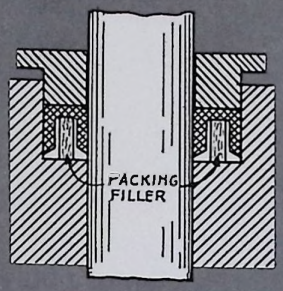
J-M Moulded Packings are made in five standard styles; A, B, P, U, and hat shape.

**TYPES "A", "B" AND "P"** are known as "regular" or "cup" packings and are generally used on the piston with the outside edge or lip contacting the cylinder wall.

**THE "U" TYPE** is usually installed in a stuffing box with one side forming the seal against the rod or plunger. They are moulded with either a round or flat bottom to fit the shape of the gland follower and are regularly furnished with a filler ring or rings of J-M Mogul, Flax or special moulded packing. These filler rings hold the lips of the cup off the bottom of the



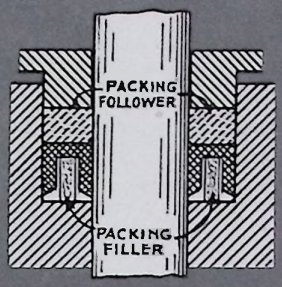
*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 56 of 117
Published by AsbestosClaims.Law
asbestosclaims.law/library/13710/56



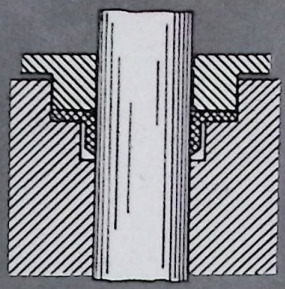

Type U cup, flat bottom, on hydraulic plunger



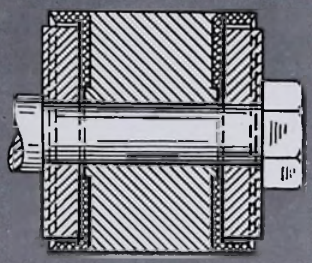

Type U cup, round bottom, on hydraulic plunger




Type U cup, flat bottom, with packing follower, on hydraulic plunger



Hat-shaped packing cup on hydraulic plunger



Arrangement of Type A cups on double acting piston

box and maintain contact between the lips, rod and stuffing box.

**THE "HAT" OR "FLANGE" TYPE** is most commonly used on small rods or where a packing of small cross-section is required. This type is also used as oil seals on small, slowly rotating shafts.

### How to Order

When ordering J-M Moulded Packing Cups, it is essential to give full and accurate information as outlined on the J-M Packing Cup Data Sheet shown at the right. In this way the correct type and size cups for the particular conditions may be furnished. Copies of this data sheet may be obtained at any Johns-Manville office.

District .....

Order No. .....

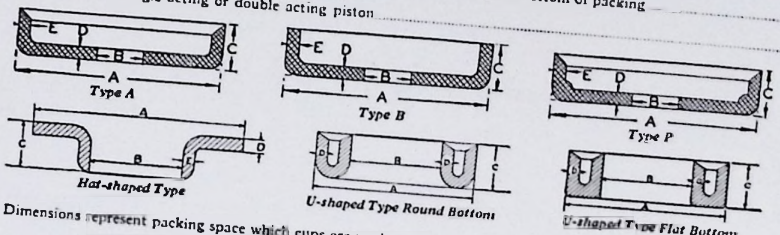
## JOHNS-MANVILLE MOULDED PACKING CUPS

Customer's Name .....

Address .....

Packing Cups are moulded to accurate dimensions—are composed of materials to suit the service conditions—therefore the following information must be furnished with each order:

1. Service .....
(State whether steam, hot water, cold water, air, oil, etc.)
2. Machine .....
(Brake press, accumulator pump, plunger elevator, etc., and name of manufacturer.)
3. How are cups lubricated? .....
4. Pressure on packing per sq. in. .....
5. Temperature of liquid or gas .....
6. Type of packing being replaced .....
7. Length of service of present packing .....
8. If any remarks, use other side and check here.....
9. Type of cup required .....
(State whether type A, B, P, U or Hat Shape)
10. If "U" cup state whether gland follower is FLAT or CONCAVED to fit bottom of packing .....
11. State whether single acting or double acting piston .....




12. Dimensions represent packing space which cups are made to fit.
"A" ..... "B" .....
"C" ..... For "U" Cups we recommend $\frac{1}{4}$" depth for plungers 1" to 4" diameter.
"D" ..... $\frac{7}{8}$" depth for plungers 4" to 7" diameter.
1" depth for all larger plungers.
(Consult list of J-M moulds—variation in this dimension may save mould charge), or leave thickness to factory.
If variation is permissible in any of above dimensions, indicate in spaces as "C"—$\frac{1}{4}$" to 1".
13. If "U" Cup show exact depth of stuffing box .....
14. If "U" Cup state whether Gravity Return or Power Return .....

### SPECIAL TYPES

15. Make dimensioned sketch on back of sheet. Show all packing conditions, add remarks necessary to make clear.
16. Give mould number of suitable cup if possible .....

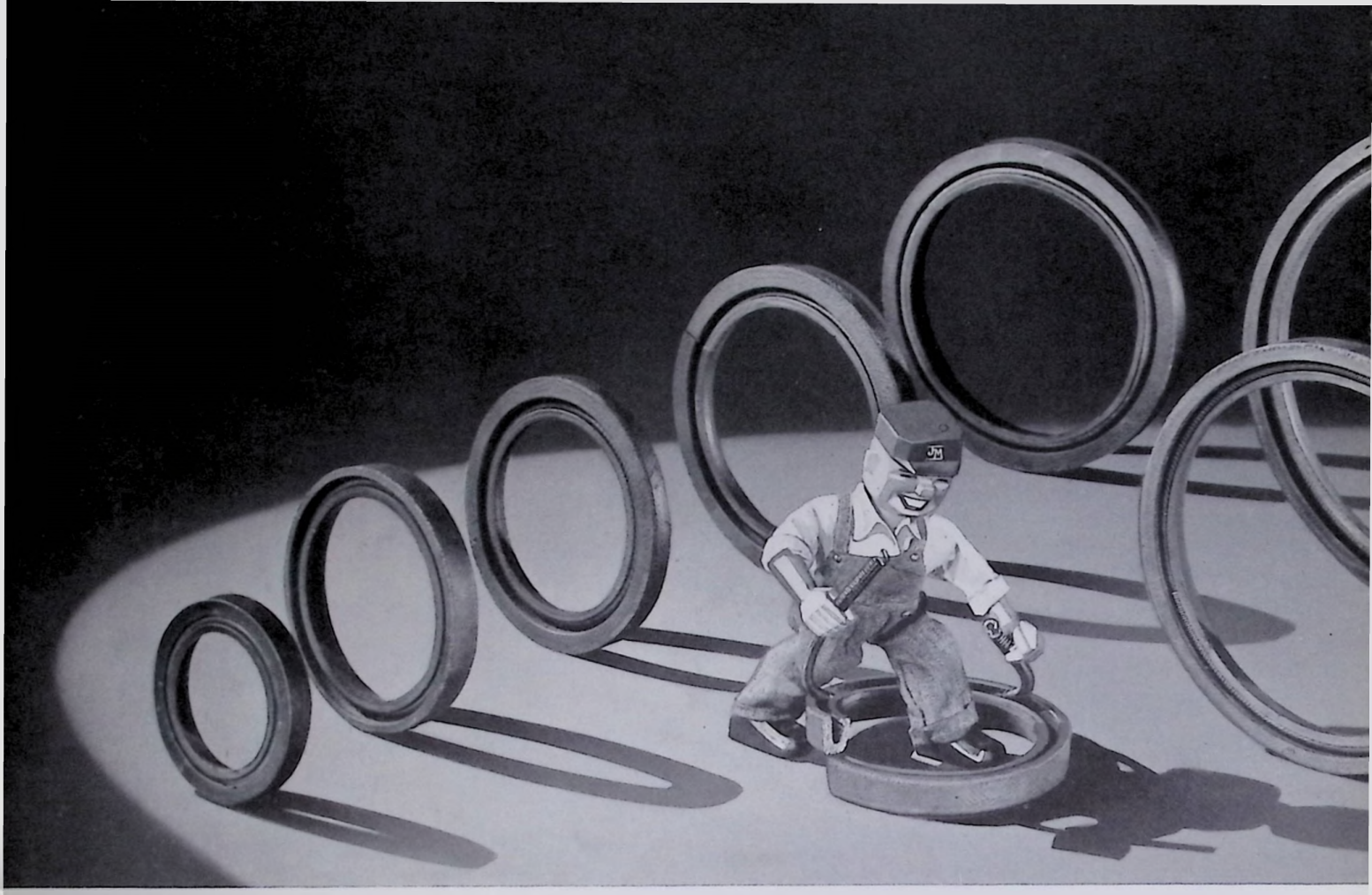
Date ..... Salesman .....

Customer's Signature .....

Form X1499 Printed in U. S. A.



Johns-Manville Packings (1941)
ACL Doc 13710 · Page 57 of 117
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# J-M Clipper Seal Rings

***Efficient, lubricant-retaining, dirt- and water-excluding seals specially designed to protect bearings on all types of mechanical equipment.***

THE protection of both anti-friction and plain sleeve bearings by means of correctly designed oil seals is vitally important for efficient operation. These seals must retain the lubricant in the bearings and prevent the entrance of dirt, water or other foreign matter. In designing J-M Clipper Seals, Johns-Manville engineers have considered these factors and developed a seal that gives maximum bearing protection under all conditions.

### Construction Details

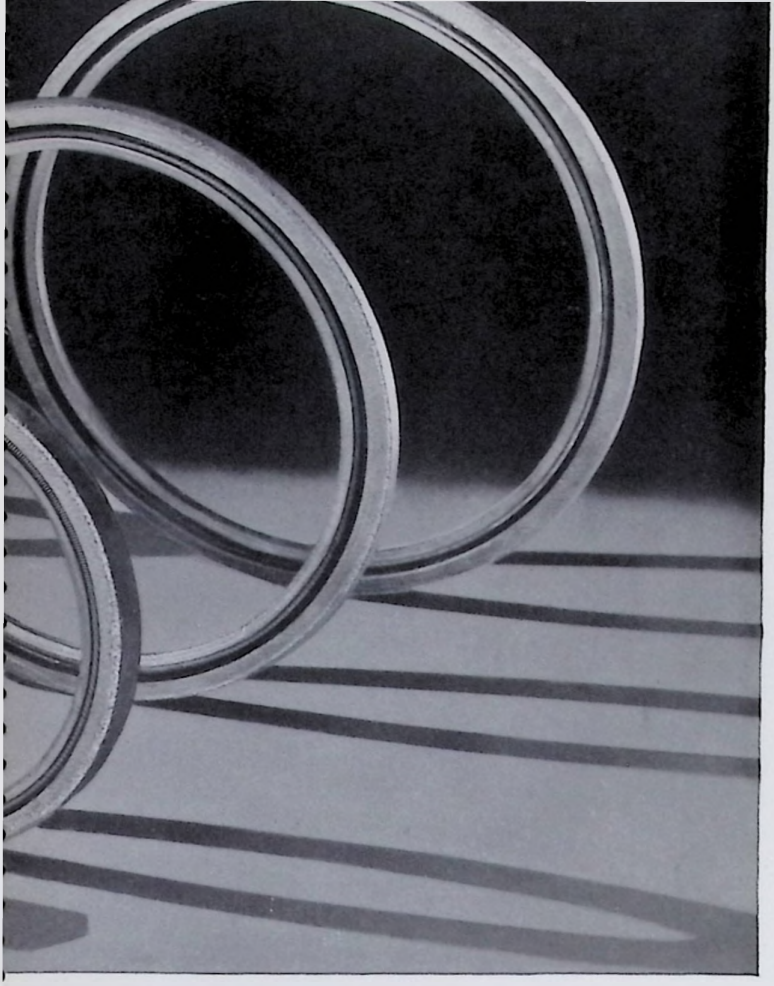
The J-M Clipper Seal is a well-engineered packing consisting of a one-piece moulded structure and a self-adjusting garter spring. It is constructed of tough, wear-resisting fabric and specially selected oil-resisting binding compounds.

The "heel" of the seal is a relatively dense structure possessing high mechanical strength to hold the lip in proper position and to withstand being pressed into the packing recess. The tight fit of this heel packs the outside diameter of the recess and prevents leakage.

The lip of the seal, while an integral part of the moulded body, is quite flexible and is held in contact with the shaft by a suitable garter spring set in a groove around the periphery of the lip. This spring applies a slight pressure to the lip that causes the packing to hug the shaft lightly, thereby developing just enough contact to provide the necessary sealing action without causing undue friction or wear. The design and flexibility of the lip enables it to shift the angle of contact on the shaft and provide a seal even on shafts that are slightly out of alignment.

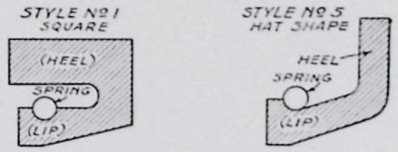


*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 58 of 117
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**CLIPPER SEAL RING DATA SHEET**

NAME OF CUSTOMER.....
LOCATION.....
Name of machine or unit.....
Location of Seal Ring.....
Number of seals required.....
Style of seal required — Style No. 1 ☐ Style No. 5 ☐




Speed of shaft.....
Shaft Metal — Steel ☐ Stainless ☐ Bronze ☐
Condition of Shaft.....
Diameter of Shaft.....
Diameter of Packing Recess.....
Depth of packing recess.....
Seal press fit in recess . . . . Yes ☐ No ☐
Follower or cover plate used . Yes ☐ No ☐
Seal Ring to be furnished . . Solid ☐ Split ☐
Seal Ring to be used against . Oil ☐ Water ☐
Other Fluid, Specify.....
Pressure of fluid.....
Temperature of fluid.....
Special conditions.....
.....
.....
.....

Unless otherwise specified, all split seal rings will be furnished with butt joint.

From this basic construction an almost infinite variation in shaft seal designs can be worked out. The area of the lip in contact with the shaft can also be varied from practically a line contact to any area desired.

### Styles of J-M Clipper Seals

J-M Clipper Seal Rings are furnished either endless or split — both of which can be made in square, rectangular or virtually any special cross-section.

The split seal, developed and perfected by Johns-Manville engineers, has proved highly practical in service—saving many hours of expensive labor and production time that would normally be lost in tearing down and reassembling equipment. Split seals are furnished with several types of joints to suit conditions on various types of mechanical equipment.

For those installations where the packing recess is easily accessible, endless seals are recommended.

Moulds for two standard styles of J-M Clipper Seal Rings are already made up in many sizes at the factory. A complete list of these sizes may be obtained from the J-M Clipper Seal Brochure. Other special sizes or shapes can also be made to individual specifications.

### Easily Installed

J-M Clipper Seals are ready for installation just as they are received from the factory. They are made to fit tightly against the inside of the packing box and should never be cut or trimmed.

They are applied by being pressed into the packing recess or, if this is inconvenient, they may be seated by tapping in place with a rawhide hammer.

When installing split seals, care should be taken not to pull the ends of the ring straight apart, but to separate them sideways to pass over the rod.

Cover plates should be used to keep the rings in position where excessive vibration may be encountered.

### How to Order

When ordering, complete information should be furnished as outlined on the J-M Clipper Seal Ring data sheet. A blueprint showing location of the seal is also helpful when it is available.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 59 of 117
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# J-M Conepac Rod Packing

***An automatic low friction packing designed to eliminate the necessity of frequent gland adjustments.***

CONEPAC, as the name implies, is made in conical shaped rings, formed to an angle of 45 degrees, and varying in thickness in proportion to the diameter of the rod on which it will be used.

Specially fabricated and moulded to size, Conepac offers a lip type design which permits the use of a greater number of rings for a given packing depth. Conepac is not dependent upon gland pressure to function. As installed, the lips are acted upon by the pressure of the fluid, thereby creating an effective, automatic seal and reducing friction to a minimum.

Conepac is recommended for turbine control and governor valves, steel valves in high pressure and high temperature steam service and for low speed reciprocating service against oil, steam and hot or cold water.

Conepac Rings are made from various compositions to meet a wide variety of service conditions. All styles are accurately made to fit in the stuffing box at a 45° angle and should never be cut or otherwise distorted. They are furnished in standard thicknesses of 3/16″ and up. Minimum flange width is 3/8″.

### Styles Available

**STYLE No. 45—FOR HIGH TEMPERATURES**—Made from pure asbestos yarn containing a fine copper wire



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 60 of 117
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insertion, braided to the proper width, then formed in a mould and graphited. Furnished with wide overlapping beveled joints to form a tight seal against leakage between joints. Especially recommended for turbine control valves, and other valve stems operating under superheated steam at temperatures up to 750° F.

**STYLE No. 46—FOR GENERAL SERVICE**—Designed for all general services such as oil and steam, etc., against temperatures up to 500° F. Made of copper wire-inserted asbestos yarn braided over a lead ribbon core, formed in a mould and thoroughly lubricated and graphited.

**STYLE No. 43—FOR GENERAL SERVICE**—Recommended for all general conditions such as oil, steam, etc. for temperatures up to 500° F. Made from synthetic rubber compound and asbestos, moulded to size and shape and vulcanized under pressure

**STYLE No. 44—FOR HYDRAULIC SERVICE**—Specially designed for hydraulic service and for use against oil, Style No. 44 is made from synthetic rubber and duck, moulded to size and shape and vulcanized under pressure. May be used for both high and low pressures.

### Installation Suggestions

Conepac Rings should always be installed with the inner lip of the ring facing the pressure. They are generally furnished in sets with or without preformed header and follower rings of proper shape to adapt the Conepac rings to the shape of the gland and bottom of stuffing box. For temperatures over 500° F., header and follower rings are made from Style No. 280 Braided Copper; for lower temperatures, they are made from one of the other styles of Flexible Metallic Packing, depending upon service conditions.

When ordering Conepac Rings, complete information should be given as outlined on data sheet above.

## CONEPAC DATA SHEET

Customer's Name _____

Address _____

Packing used on _____

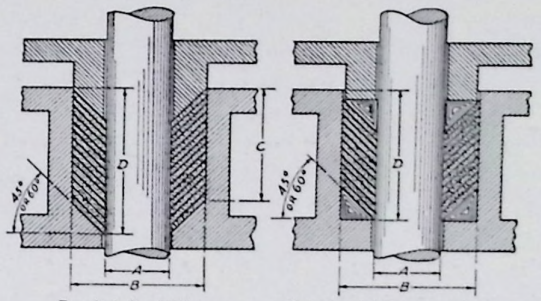
Service _____

Dimensions: A _____ B _____ C _____ D _____

Max. Pressure _____ lbs., Max. Temperature _____ Deg. F.

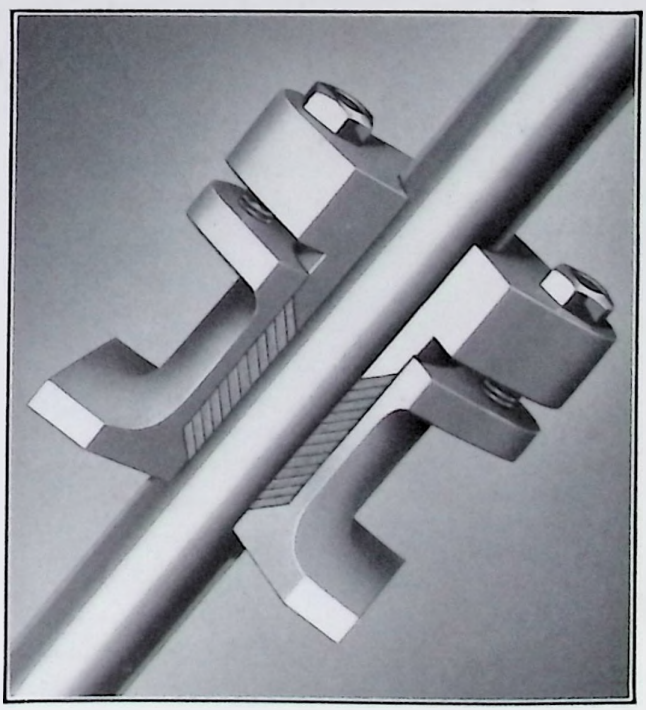
Style of Packing Recommended _____

Gland Follower _____ Bottom of Box _____




Beveled gland follower and box.

Flat gland follower and box with preformed header and follower rings.



Conepac Rings are not dependent upon gland pressure. As they nest together in the stuffing box they are acted upon only by the pressure of the fluid, thus reducing friction, yet providing an effective seal.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 61 of 117
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# J-M Pump Valves

***There is a J-M Pump Valve especially designed to provide perfect seating and long, highly efficient operation in every type of service.***

J-M PUMP VALVES are manufactured in a variety of styles to provide long and effective life under the particular conditions for which they are designed. All of them are made from various special rubber compounds, except Style No. 300 which is constructed from plies of high quality duck impregnated with resin gums.

### Styles Available

**STYLE No. 300 — FOR GENERAL SERVICE** — An exceptionally strong, hard valve designed for all general services including hot or cold water, oils, naphtha, benzene, paraffin and weak acids, on pressures up to 1000 lbs. and temperatures up to 300° F.

**STYLES No. 415 and No. 416—FOR COLD WATER**— These are both recommended for cold water service. Style No. 415 is a hard valve and may be used on pressures up to 400 lbs. Style No. 416 is a medium hard valve designed for pressures up to 200 lbs. It may be used against fresh, salt or alkali water and for other general industrial services.

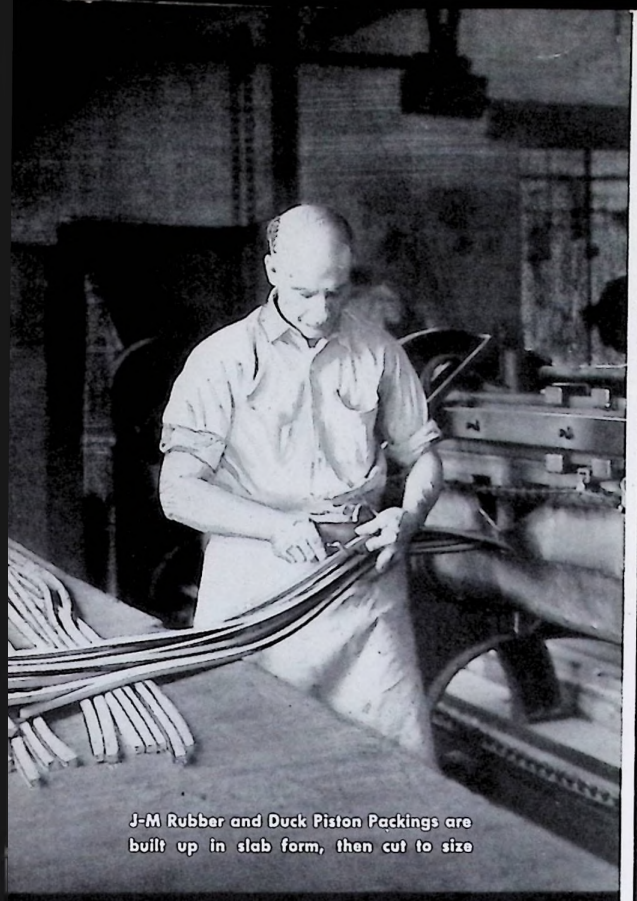
**STYLE No. 420 — FOR CONDENSER SERVICE** — A soft, but tough, pump valve made from a special rubber compound and recommended for lake, marine and other severe condenser services.

**STYLE No. 424 — FOR HOT WATER** — A hard valve of the highest quality, designed for hot water conditions. It may be used against pressures up to 300 lbs. and temperatures up to 300° F.

**STYLE No. 430—FOR OIL AND ACIDS**—This is a hard valve manufactured from a special rubber compound that is designed to give exceptional service against oil, acids, ammonia, syrups, etc., against pressures up to 300 lbs., and temperatures up to 300° F.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 62 of 117
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J-M Rubber and Duck Piston Packings are built up in slab form, then cut to size

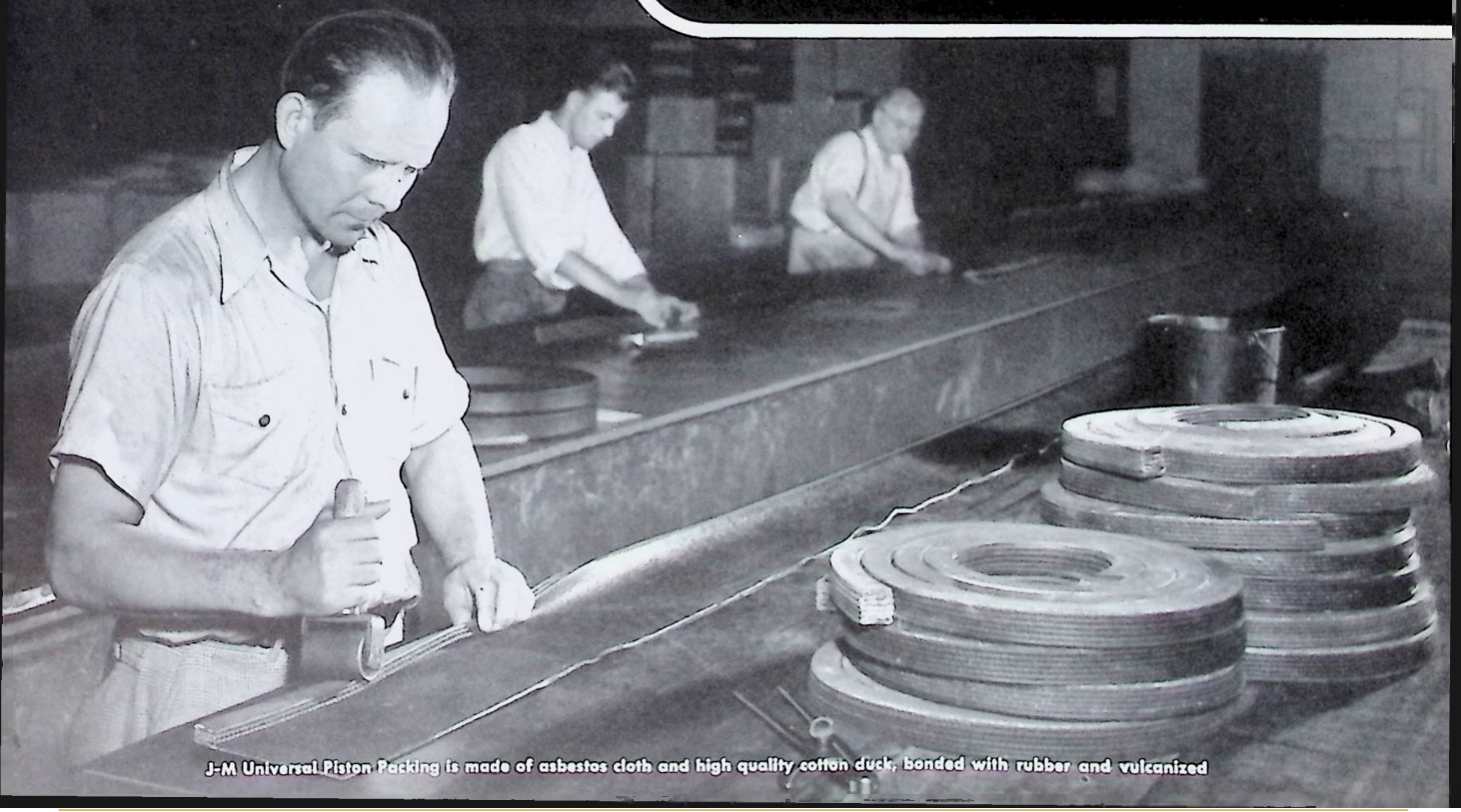
# Johns-Manville
# PISTON PACKING

Piston packing is subject to considerable wear and tear as it moves through the cylinder. Furthermore, in order to repack a piston, it is necessary to tear down the entire pump, involving great inconvenience and expense in both time and labor.

This inaccessibility for replacement, plus the severe service to which the packing is subjected, makes long life a most important factor in the selection of piston packing.

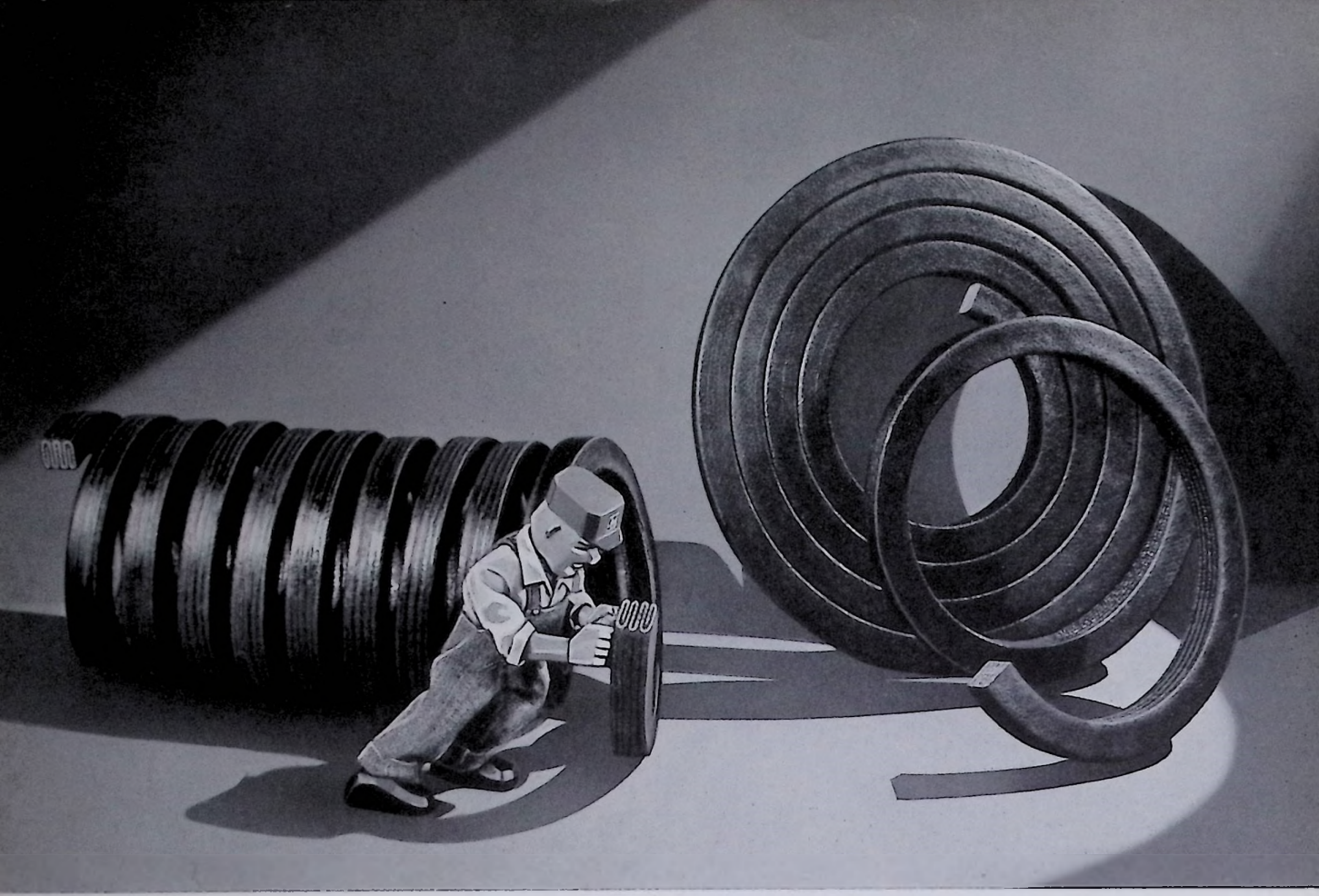
Johns-Manville Piston Packings are specially engineered to meet these exacting service conditions. Unusually tough and durable, they assure a completely satisfactory seal, minimum friction and long, highly efficient service with fewer shutdowns for replacement.

Complete details on all Johns-Manville Piston Packings will be found on the following pages.



J-M Universal Piston Packing is made of asbestos cloth and high quality cotton duck, bonded with rubber and vulcanized


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# J-M Universal Piston Packing

***A rugged, dependable piston packing.***

AS its name implies, J-M Universal, Style No. 33, has been recognized for many years as the highest quality packing for pistons of inside packed pumps in all general services, such as water, brine, air, oils and some chemicals, where packing space is 3/8″ or over.

### Construction Details

J-M Universal No. 33 is composed of a layer of asbestos cloth and high quality cotton duck, folded back and forth with the ends turned in, bonded with a special rubber compound, and vulcanized to size in steel moulds under carefully controlled temperature.

The rounded shoulders of the folded cloth, bonded under pressure and temperature, present a durable wearing surface which will not come apart in service. This construction and process of manufacture results in a dense, yet flexible, packing which will show increased efficiency and require fewer replacements than most other types of piston packings.

### Forms Available

J-M Universal Piston Packing is furnished in spiral form, Style No. S-33; coil form, Style No. C-33; and ring form, Style No. R-33.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | Form of Package | | |
|---|---|---|---|---|---|---|---|---|---|
| | 3/8″ | 1/2″ | 5/8″ | 3/4″ | 7/8″ | 1″ | Coil | Spiral | Rings |
| 33 | 10 | 18 | 24 | 36 | 45 | 60 | 12 ft. lengths in boxes weighing: 1/8″—5 to 6 lbs.; 1/2″ to 7/8″—9 to 11 lbs.; 1″—14 lbs. | One 12 ft. length per box | Packed in boxes weighing: 1″ to 2″ I.D.— 5 lbs. 2″ to 3″ I.D.—10 lbs. 3″ to 4″ I.D.—15 lbs. Over 4″ I.D.—20 lbs. |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 64 of 117
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# J-M Aqua Hydraulic Piston Packing

***Designed primarily for service against hot or cold water, J-M Aqua Hydraulic is a high-quality white piston packing of great tensile strength and durability.***

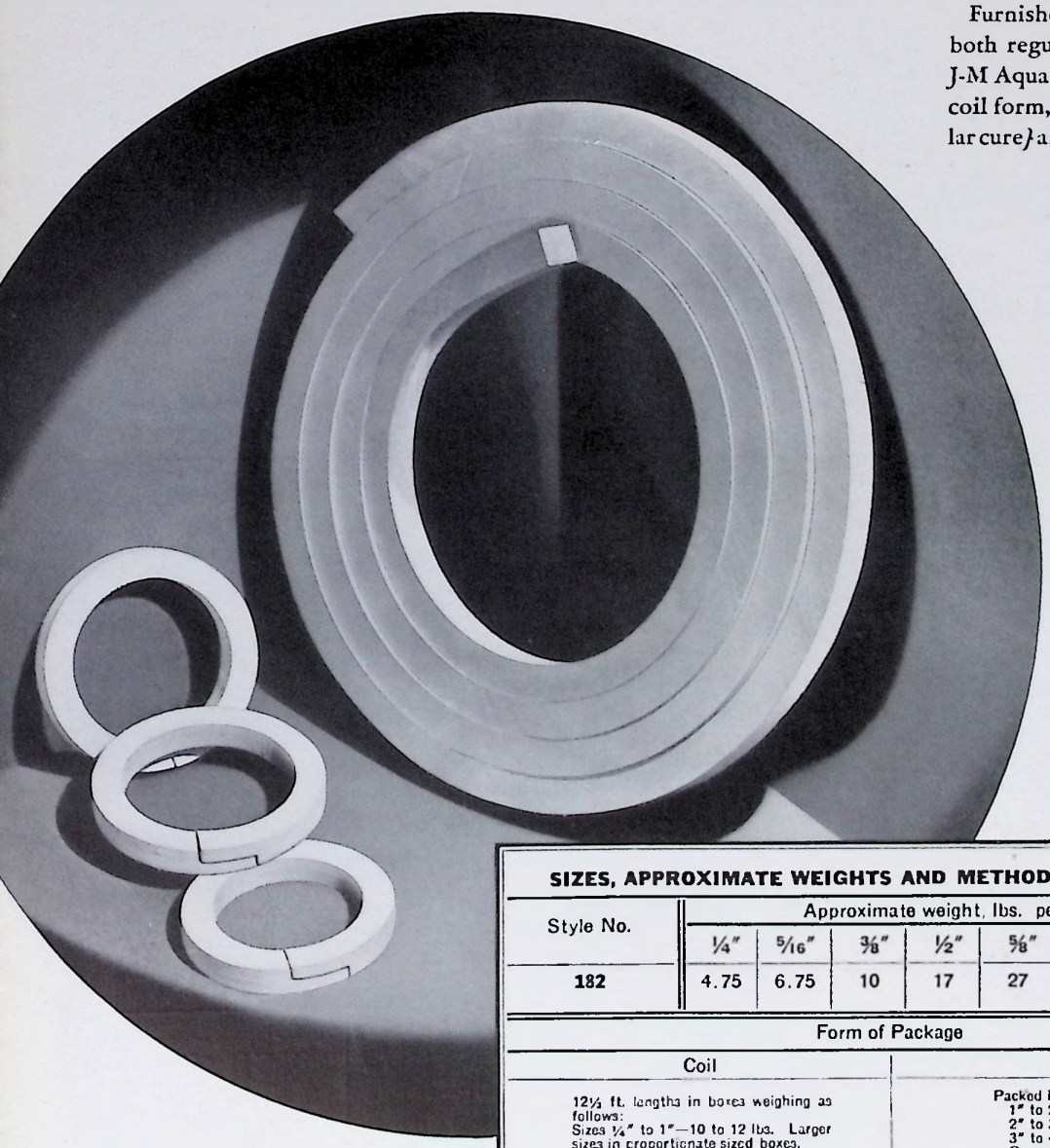
AQUA HYDRAULIC PISTON PACKING, Style No. 182, is used extensively against hot and cold water and oil, on inside packed pistons and as end rings in hydraulic sets. It is a standard type packing that has been widely accepted for this type of service. When it is to be used against extremely hot water, J-M Aqua Hydraulic should be ordered "Rock Hard."

### Construction Details

Aqua Hydraulic is made from highest quality fine white waterproof duck, cross laminated with a specially compounded white rubber friction of great tensile strength. This produces a material of uniformly high strength and resiliency with low absorption and minimum swell.

### Styles and Forms

Furnished in sizes 1/4" and up in both regular and rock hard cure. J-M Aqua Hydraulic is supplied in coil form, Styles No. C-182 (regular cure) and No. C-182-R.H. (rock hard). Also in ring form cut from slab stock, either solid or with step joint, Styles No. R-182 (regular cure) and No. R-182-R.H. (rock hard). Unless otherwise specified, Slab Cut rings will be furnished with step joint. Standard thickness for rings cut from slab stock is 1/2". Thicknesses other than standard may be obtained on order. When desired, rings formed from coil material (R-182-C) can also be furnished.



**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" |
| 182 | 4.75 | 6.75 | 10 | 17 | 27 | 38 | 64 | 72 |

| Form of Package | |
|---|---|
| Coil | Rings |
| 12½ ft. lengths in boxes weighing as follows: Sizes 1/4" to 1"—10 to 12 lbs. Larger sizes in proportionate sized boxes. | Packed in boxes weighing: 1" to 2" I.D.— 5 lbs. 2" to 3" I.D.—10 lbs. 3" to 4" I.D.—15 lbs. Over 4" I.D —20 lbs |



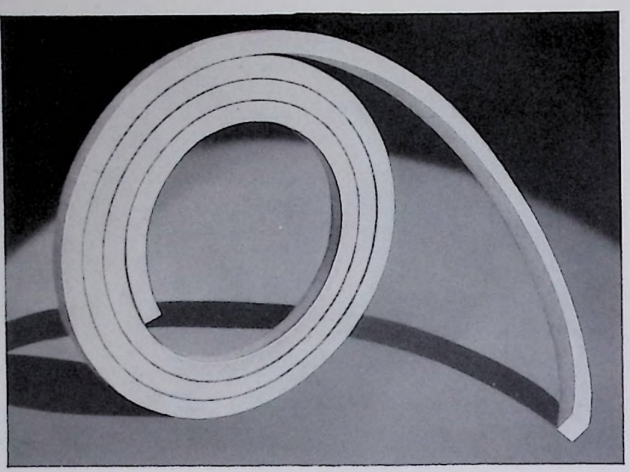
*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 65 of 117
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# J-M Light Weight Hydraulic Piston Packing

**FOR OIL AND GAS SERVICE**

BECAUSE it has much less tendency to swell than other types of piston packing, J-M Light Weight Hydraulic, Style No. 295, is particularly adapted to oil and gas service. It is recommended for use against crude oil, gasoline, benzine, naphtha, mineral seal oil and hot or cold water. It is also used as end rings in combination with other packings on outside packed rods and plungers operating against water or oil.

J-M Light Weight Hydraulic Piston Packing is made in laminated form from plies of high-quality, heavy-duty duck, frictioned together with a light rubber compound.



Furnished in sizes 1/4" and up, J-M Light Weight Hydraulic Piston Packing is furnished in coil form, Styles No. C-295 *(regular cure)* and No. C-295-R.H. *(rock hard)*. Also in ring form, Styles No. R-295 *(regular cure)* and No. R-295-R.H. *(rock hard)* cut from slab stock with step joint, or solid if specified. Rings formed from coil material, Style No. R-295-C, can also be furnished.

# J-M Square Hydraulic Piston Packing

**FOR HOT OR COLD WATER CONDITIONS**

SQUARE Hydraulic Piston Packing, Style No. 290, is a medium-quality piston packing specifically recommended for service against hot or cold water and cold oil, in use on inside packed pistons.

Made from plies of good quality duck, laminated with a special rubber friction compound, J-M Square Hydraulic is a dependable standard-type piston packing.

It is furnished in sizes 1/4" and up in coil form, Styles No. C-290 *(regular cure)* and No. C-290-R.H. *(rock hard)*. Also in ring form, Styles No. R-290 *(regular cure)* and No. R-290-R.H. *(rock hard)* cut from slab stock with step joint unless ordered solid. Rings made from coil material are also available, Style No. R-290-C.

# J-M Tucks Coil Packing

**FOR COLD WATER SERVICE**

TUCKS COIL PACKING, Style No. C-186, designed primarily as a cold-water piston packing, is recommended for service on inside-packed pistons operating at medium pressure.

Made from plies of heavy duck, frictioned together with a high-grade black rubber compound, J-M Tucks Coil Packing is furnished in coil form only, Style No. C-186. Sizes 1/4" and up.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | Form of Package | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" | Coil | Rings |
| **295** Light Weight Hydraulic | 4 | 6 | 9 | 16 | 23 | 33 | 45 | 59 | 12½ ft. lengths packed in boxes weighing as follows: Sizes 1/4" to 1"—10 to 12 lbs. Larger sizes in proportionate sized boxes. | Packed in boxes weighing: 1" to 2" I.D.— 5 lbs. 2" to 3" I.D.—10 lbs. 3" to 4" I.D.—15 lbs. Over 4" I.D.—20 lbs. |
| **290** Square Hydraulic | 5 | 8 | 12 | 19.5 | 31.5 | 46 | 59 | 77 | | |
| **C-186** Tucks Coil | 3.37 | 6.25 | 8.5 | 14 | 22 | 31 | 39 | 48 | | Style No. 186 not furnished in ring form. |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 66 of 117
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*Carefully blended ingredients are fed into the rear of the sheet packing machine*

# Johns-Manville
# SHEET PACKINGS

Uniformity is probably the most important consideration in any sheet packing··· uniformity of composition, resilience, density and resistance to deterioration. Without complete control of these factors it is impossible to calculate with any degree of accuracy the dependability or length of service of any gasket cut from that sheet.

Realizing this, Johns-Manville exercises extreme care during every stage of manufacture to guard the uniformity of the finished sheet. Rigid manufacturing specifications are set up and a highly trained staff of inspectors constantly checks the product for absolute conformance to those specifications. As a result, every Johns-Manville Sheet Packing provides a high degree of uniformity and dependability under the particular service conditions for which it is recommended.

Complete details on Johns-Manville Sheet Packings are given on the following pages.

*The finished sheet is removed from the sheeter on which it builds up under high pressure*


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# J-M Service

***Tough and durable, yet unusually pliable and resilient, J-M Service Sheet, Style No. 60, is always uniform in quality—provides a tight seal with freedom from blow outs in all general services.***

WHEN a flange leaks or a gasket blows out, it is often due to faulty installation. But in many cases the gasket itself is to blame. And the most likely cause of failure is lack of uniformity in the sheet packing used. That's why plant operators demand uniformity as the first requirement of the sheet packing they buy.

And that, too, is why J-M Service Sheet has been, for many years, the most widely used sheet packing on the market. Developed over a quarter-century ago, and the name derived from the J-M slogan "Service to Industry," Service Sheet has been constantly improved to assure uniformly dependable performance under the higher temperatures and pressures prevailing today. Plant engineers and maintenance men have learned to depend upon its complete uniformity in composition, density, strength, thickness and resiliency.

Today, thousands of industrial plants throughout the country have standardized on Service Sheet for high pressure and high temperature conditions against superheated steam, air, gas, water, hot oil, ammonia, acids, chemicals and many other fluids and gases encountered in industry.

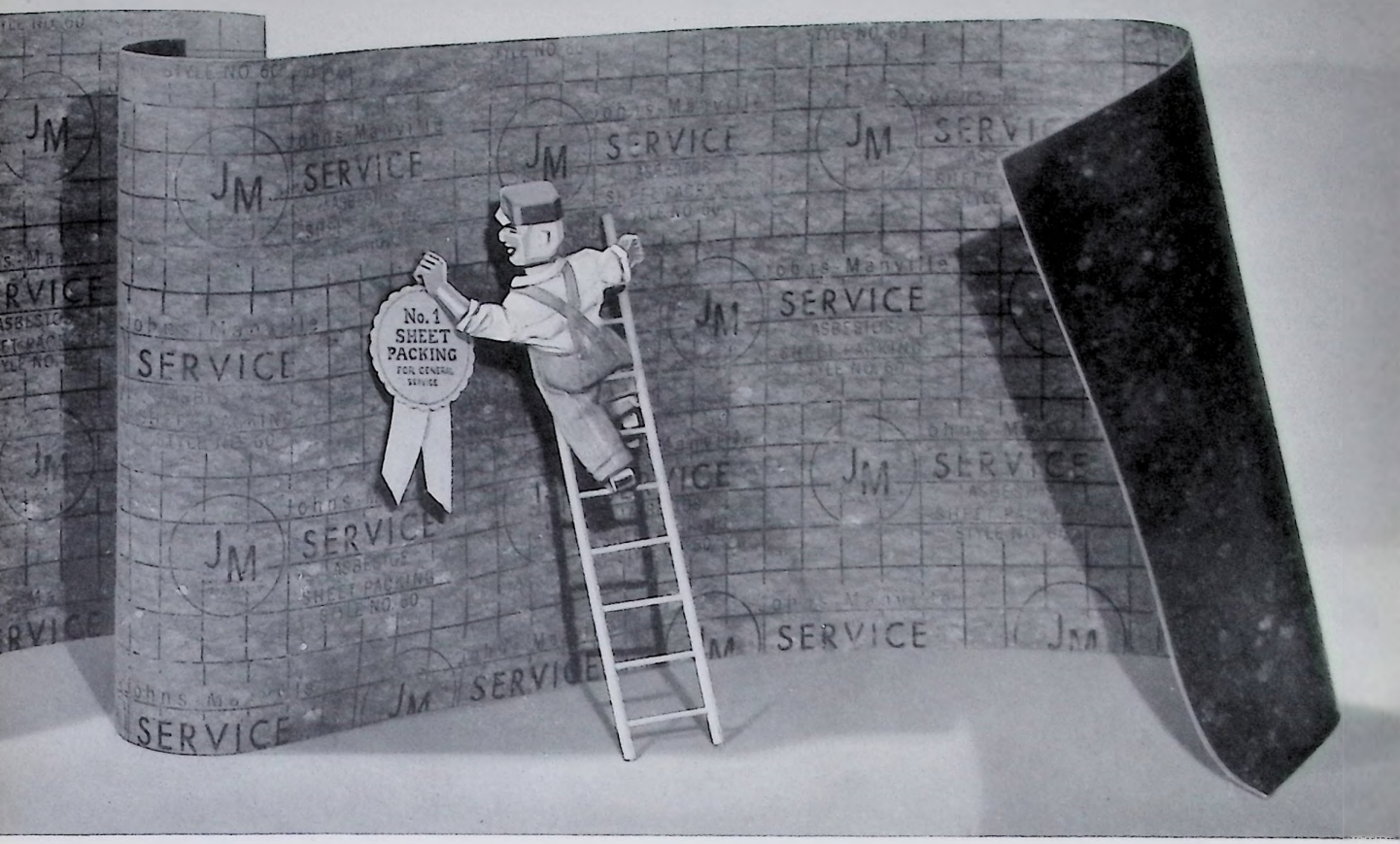
Typical examples of the adaptability of this all-purpose sheet are its use in modern steam generating plants to seal against the new high pressures and temperatures employed, and in the majority of the large oil refineries where Service Sheet is used for practically all conditions, including hot oil service. One of its outstanding characteristics is its stability in service, even under severe conditions.

### Construction Details

Composed of an intimate mixture of selected long-fibre asbestos and heat-resisting binding compounds,



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 68 of 117
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# Sheet Packing

Service Sheet is bonded under heat and pressure into a tough, durable sheet without plies or laminations.

Service Sheet is furnished standard with graphite on one side to permit breaking the joint without destroying the gasket. The plain, ungraphited surface is ruled into one-inch squares to facilitate measuring and cutting. This square-inch marking reduces waste by enabling one to cut more accurately the amount of material required for a given gasket size. Where desired, Service Sheet can be supplied with graphite on both sides, or plain, as specified.

Service Sheet is furnished in sizes 54″ x 63″, 36″ x 126″, 36″ x 63″ and 54″ x 126″ in thicknesses of 1/64″ to 1/4″, and 108″ x 126″ in thicknesses of 1/32″ to 1/4″. It is also furnished as cut gaskets in all standard and special shapes.

### Economical to Use

It is a well-known fact that the thinner the gasket, the tighter the joint. Service Sheet, because of its great density and resiliency, can be used in the minimum thickness permitted by the condition of the flange.

Large quantity production of this material makes it possible for Johns-Manville to furnish Service Sheet at a price considerably less than that of any other sheet of comparable quality on the market.

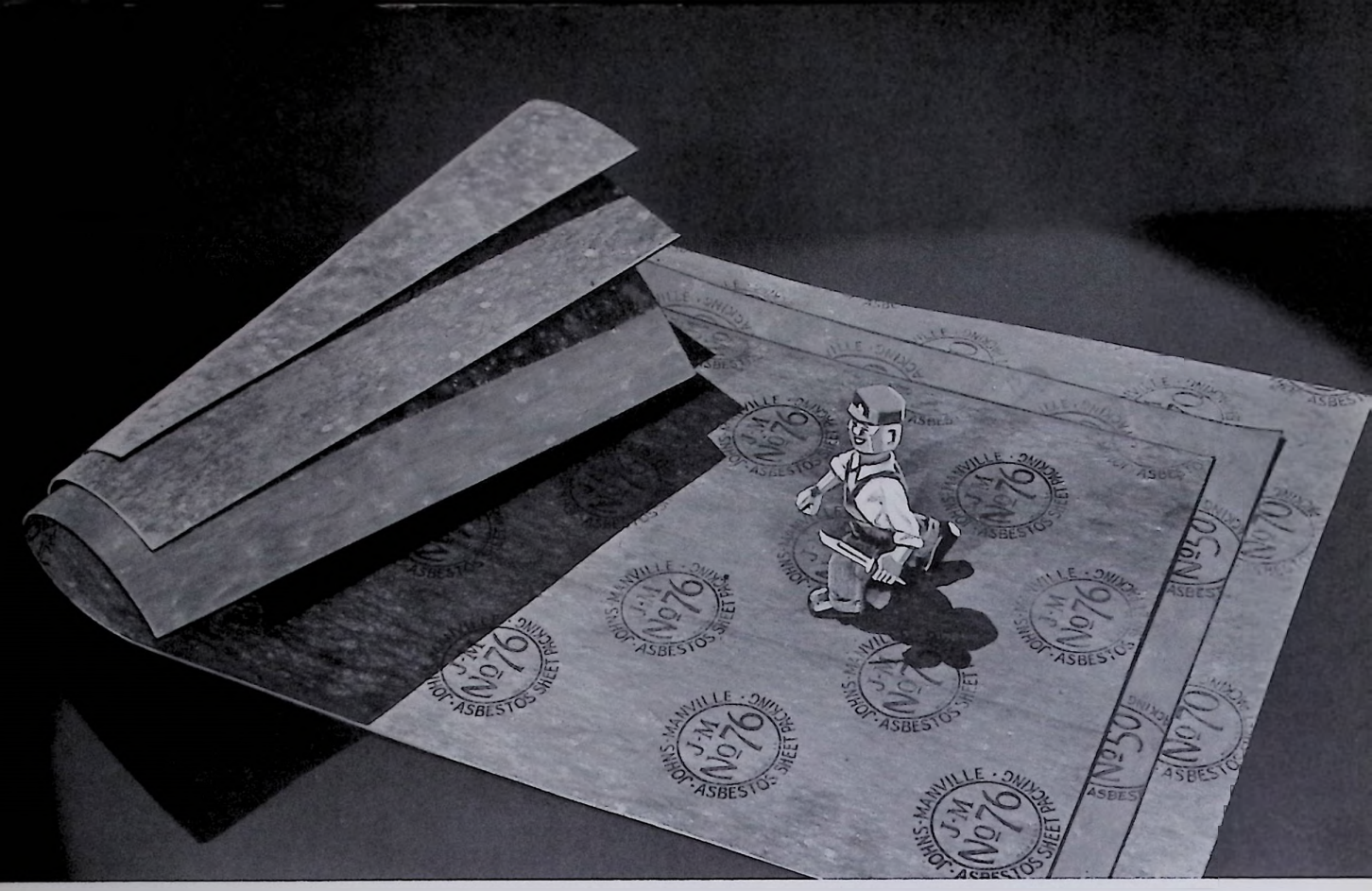
A still further economic advantage of Service Sheet is the fact that it will not dry out in stock. Thus, it may be ordered in the most economical quantity as it can be carried in storage indefinitely without deteriorating.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Sheet sizes, inches | Approx. weight, lbs. per square yard | | | | Form of Package |
|---|---|---|---|---|---|---|
| | | 1/64″ | 1/32″ | 1/16″ | 1/8″ | |
| 60 | 54″ x 63″, 54″ x 126″, 36″ x 63″, 36″ x 126″, 108″ x 126″ (last size not furnished in 1/64″ thickness) | 1.34 | 2.67 | 5.33 | 10.67 | Size 54″ x 63″ crated as follows: 1/64″—100 sheets, 1/32″—50 sheets, 1/16″—25 sheets, 1/8″—12 sheets. Other sizes crated according to quantity ordered. |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 69 of 117
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# J-M Asbestos Sheet Packing

**STYLE No. 50—ASBESTOS FIBRE SHEET**—This is a compressed asbestos fibre sheet packing, similar to Service Sheet, Style No. 60, but softer and not quite so dense. It is designed for service against gas, air or wherever a high-quality sheet softer than No. 60, or an asbestos fibre sheet without sulphur content, is required.

Style No. 50 Asbestos Sheet is furnished in sizes 36″ x 63″, 36″ x 126″, 54″ x 63″, 54″ x 126″ and 108″ x 126″ in thicknesses of 1/32″ to 1/4″; and sheets 36″ x 63″, 36″ x 126″, 54″ x 63″ and 54″ x 126″ in 1/64″ thickness. Style No. 50 is also furnished as cut gaskets in all standard and special shapes.

**STYLE No. 70 — ASBESTOS FIBRE SHEET** — Similar to Service Sheet, Style No. 60, but harder and denser. Style No. 70 is furnished in sheets 40″ x 42″ from 1/64″ to 1/8″ thick. It is also supplied as cut gaskets.

**STYLE No. 76 — A SYNTHETIC RUBBER BONDED ASBESTOS FIBRE SHEET**—A compressed asbestos sheet packing of high tensile strength for high or low pressure and temperature service against hot oils, petroleum solvents, refrigerants such as Freon, animal and vegetable oils, Carbon Tetrachloride, etc. Style No. 76 is used extensively for gaskets on airplane engines.

Made of long fibre asbestos, bonded with synthetic rubber, this packing fills a long-felt need in industry—providing resiliency, and resistance to liquids that are detrimental to natural rubber.

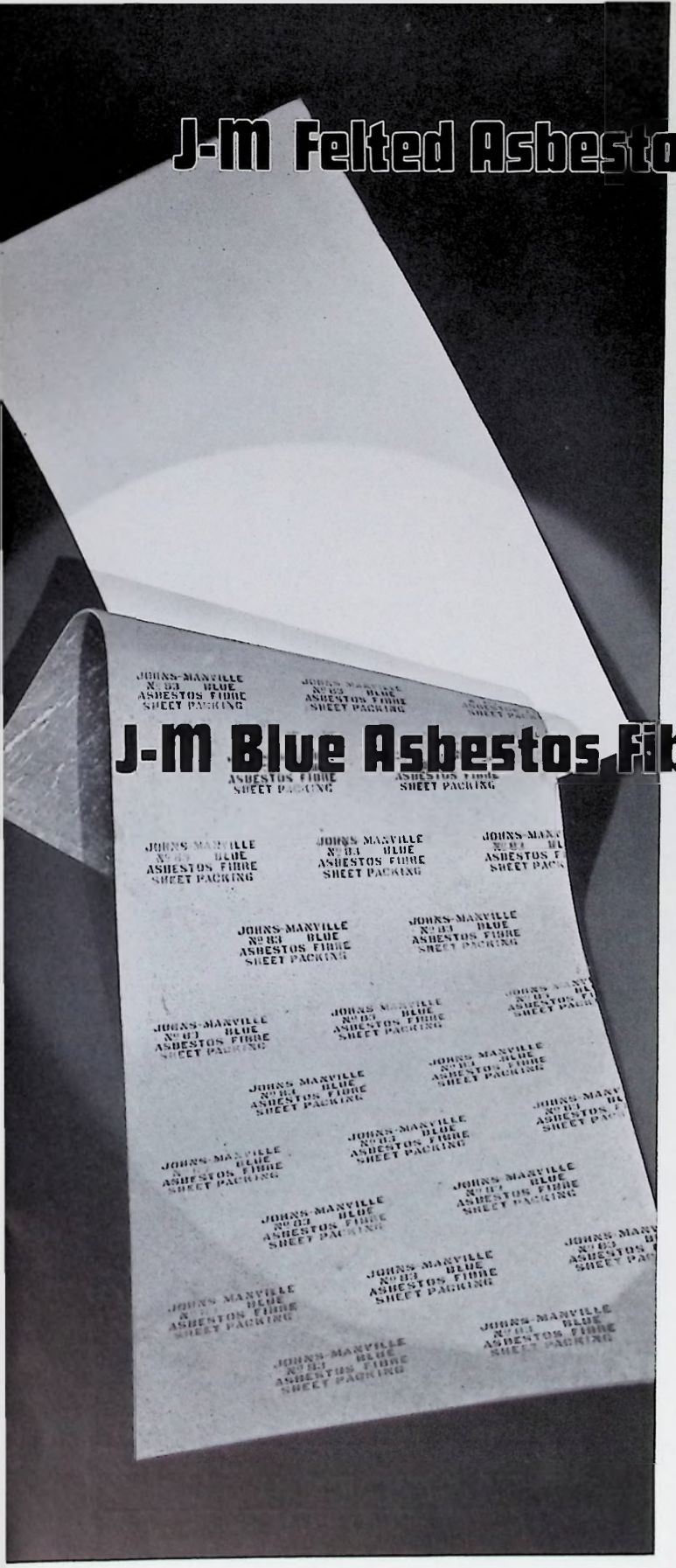
Style No. 76 is furnished in sheets 40″ x 42″ in thicknesses of 1/64″ to 1/8″. Also supplied as cut gaskets.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Sheet sizes, inches | Approx. wt., lbs. per sq. yd. | | | | Form of Package |
|---|---|---|---|---|---|---|
| | | 1/64″ | 1/32″ | 1/16″ | 1/8″ | |
| 50 | 54″ x 63″, 54″ x 126″, 36″ x 63″, 36″ x 126″, 108″ x 126″ (last size not furnished in 1/64″ thickness) | 1.34 | 2.67 | 5.33 | 10.67 | Size 54″ x 63″ crated as follows: 1/64″—100 sheets, 1/32″—50 sheets, 1/16″—25 sheets, 1/8″—12 sheets. Other sizes crated according to quantity ordered. |
| 70 | 40″ x 42″ | 1.34 | 2.67 | 5.33 | 10.67 | Crated according to quantity ordered. |
| 76 | 40″ x 42″ | 1.34 | 2.67 | 5.33 | 10.67 | Crated according to quantity ordered. |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 70 of 117
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# J-M Felted Asbestos Sheet Packing

### FOR HIGH TEMPERATURES

THIS is a high-quality felted asbestos sheet designed primarily for use where elevated temperatures make rubber-bonded sheets objectionable. It is recommended for service on flanges and other parallel surfaces in service against high temperature conditions.

J-M Felted Asbestos Sheet Packing, Style No. 219, is made of long-fibre asbestos, thoroughly felted together and bonded with a special heat-resistant, rubberless binder, firmly compressed under heat and pressure into a durable sheet that is considerably stronger than most ordinary felted asbestos sheets. It is furnished in thicknesses of 1/32″ and up, in 42″ x 48″ sheets, and as cut gaskets.

# J-M Blue Asbestos Fibre Sheet Packing

### FOR ACID SERVICE

MADE of Blue African Crocidolite Asbestos Fibre, bonded with an acid-resisting binder, Style No. 83 is a soft, felted sheet for use on pipe flanges against most of the acids encountered in chemical and industrial plants.

The density of this sheet makes it possible to obtain a tight, highly effective seal when used as gasketing for glass lined tanks, glass pipe flanges and pump connections where the pressure applied to flanges must necessarily be limited.

J-M Blue African Asbestos Sheet, Style No. 83, is furnished in thicknesses of 1/16″ and 1/8″ in 52″ x 58″ sheets, and as cut gaskets.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

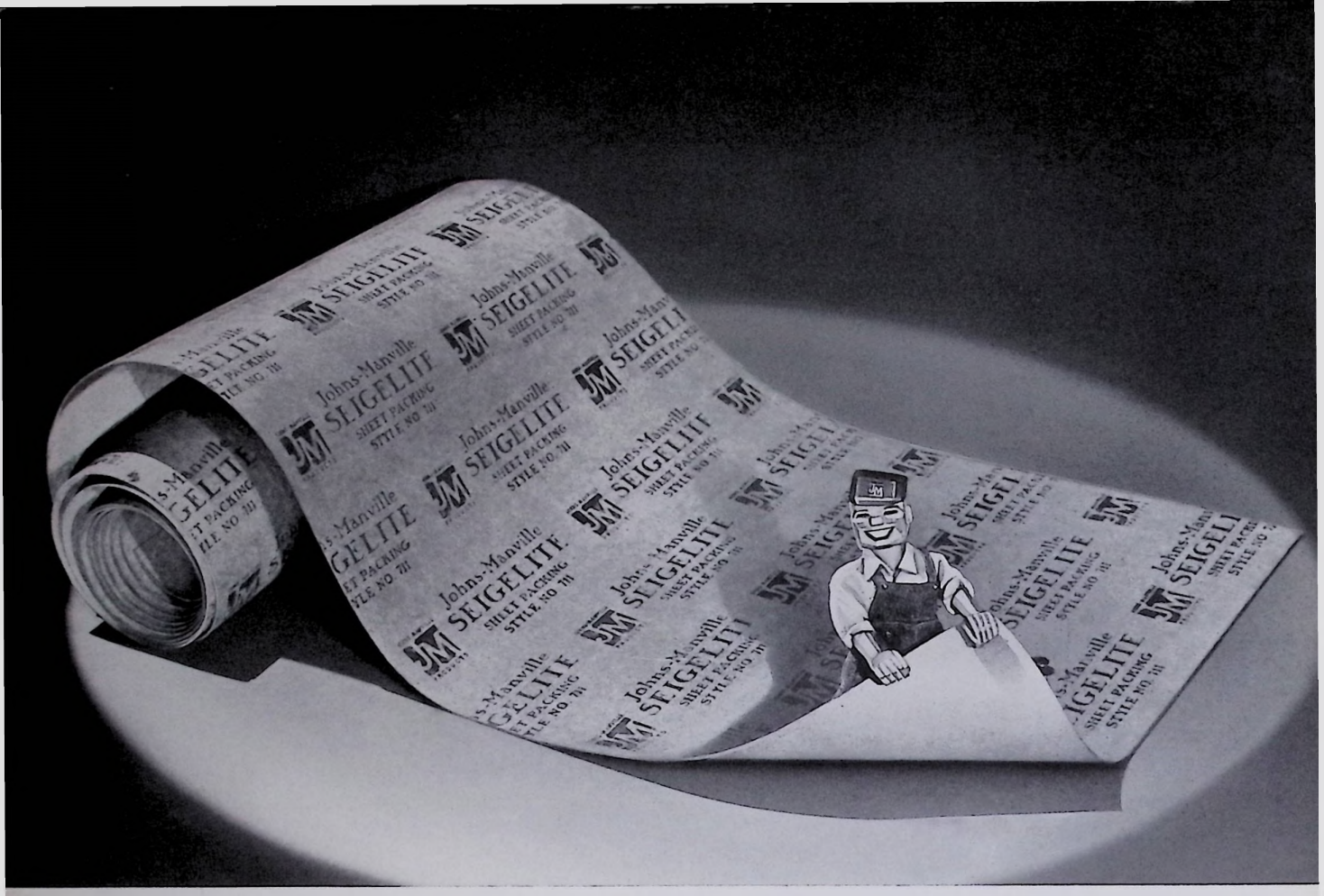
| Style No. | Sheet size inches | Approx. wt., lbs. per sq. yd. | | | | |
|---|---|---|---|---|---|---|
| | | 1/32″ | 1/16″ | 1/8″ | 3/16″ | 1/4″ |
| 83 | 52″ x 58″ | — | 2.8 | 5.6 | — | — |
| 219 | 42″ x 48″ | 1.62 | 3.5 | 7 | 10.5 | 14 |

Form of Package (both styles)

Sheets crated according to quantity ordered




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# J-M Seigelite Sheet Packing

***Approved by the Underwriters' Laboratories, Inc., for use against hazardous liquids.***

SEIGELITE, Style No. 711, is a strong, dense, high quality plant fibre sheet packing designed for use against gasoline, benzine, oil, greases and hot or cold water on all types of flanges and parallel surfaces.

It should be noted, however, that this packing is not recommended for use where temperatures exceed 250° F., or for alternate wet and dry conditions.

When immersed in liquids, Seigelite becomes extremely tough, resembling rawhide. Because of its tensile strength, it is much more satisfactory for hydraulic service than either rubber or cloth-inserted rubber sheets. Its density and resiliency allow it to be used in minimum thickness.

### Construction Details

Seigelite is made of a strong, plant fibre, thoroughly impregnated with a special preserving compound which resists the action of the fluids for which it is recommended. It contains no rubber or rubber substitutes that are soluble in gasoline or oil.

### Sizes and Thicknesses

In thicknesses of .01", 1/64", .02", 1/32" and 1/16", Seigelite is furnished in rolls 36" or 48" wide by 25 or 50 yards long. Thicknesses of 1/8" and up in sheets 36" x 48" only. Also supplied as cut gaskets.

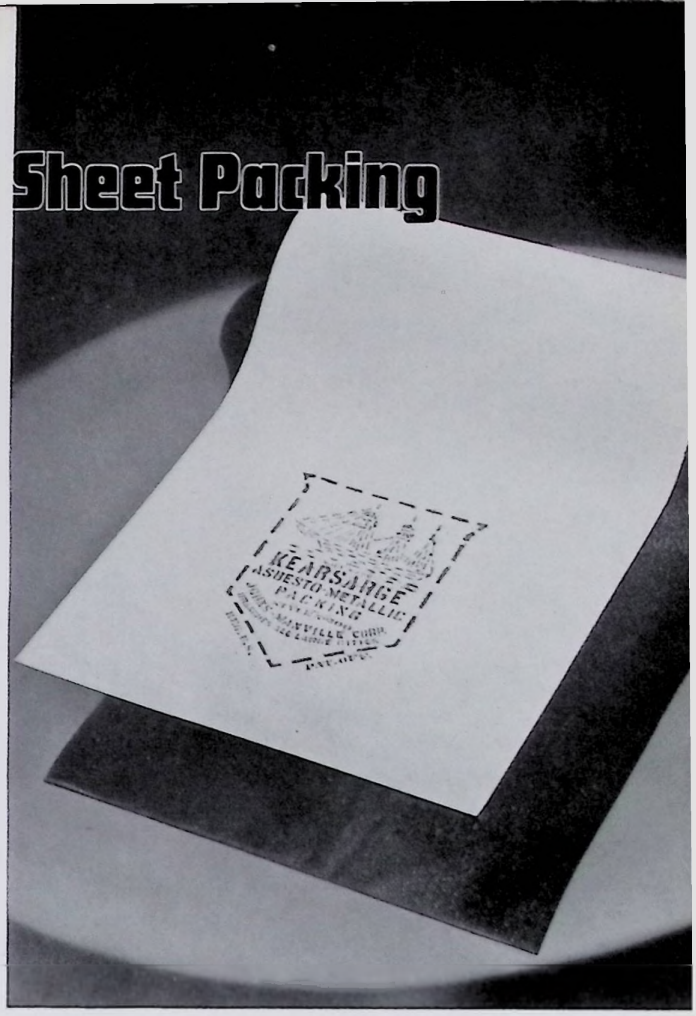
**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Sheet or Roll size, inches | Approximate weight, lbs. per square yard | | | | | | | | Form of Package |
|---|---|---|---|---|---|---|---|---|---|---|
| | | .01" | 1/64" | .02" | 1/32" | 1/16" | 1/8" | 3/16" | 1/4" | |
| 711 | Rolls—36" and 48" wide | .40 | .65 | .80 | 1.40 | 2.80 | — | — | — | One or more rolls per case—25 or 50 linear yards per roll. |
| | Sheets—36" x 48" | — | — | — | — | — | 5.71 | 8.51 | 11.42 | Crated according to quantity ordered. |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 72 of 117
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# J-M Kearsarge Sheet Packing

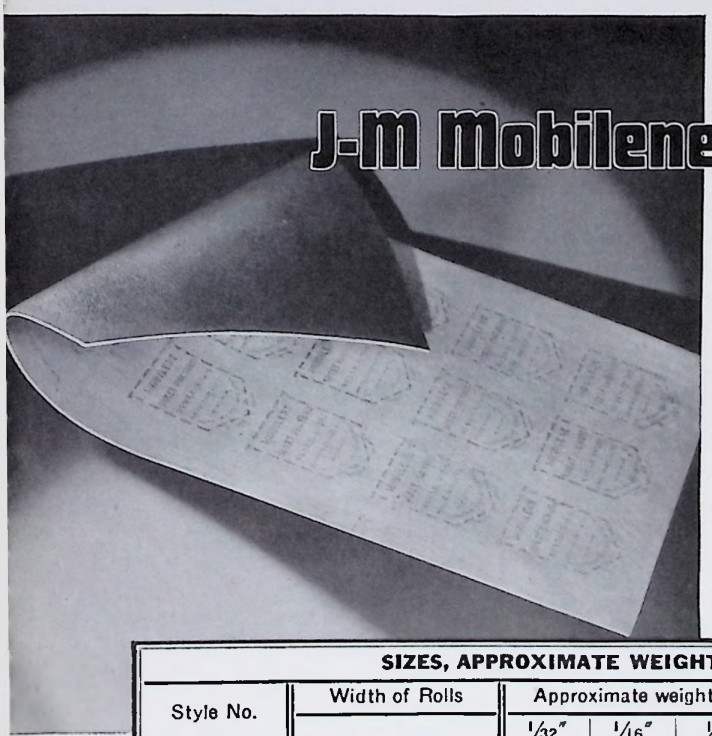



**STYLE No. 100—FOR ROUGH FLANGES**—This is a strong, flexible, woven sheet packing, particularly recommended for use on rough flanges against low, medium or high pressure steam, water and air. It is also recommended for use where a narrow flange gasket is necessary or where many ports and bolt holes must be used.

J-M Kearsarge Style No. 100 is made of tightly twisted asbestos yarn spun with brass wire for additional strength, woven into Asbesto-Metallic cloth and impregnated with a rubber heat-resisting compound.

Furnished 1/32″ to 1/4″ thick, in 48″ wide rolls. Also supplied as cut gaskets.

**STYLE No. 98 — FOR GASOLINE AND HOT OIL SERVICE**—Style No. 98 Sheet Packing is recommended for use on rough flanges against gasoline, oil and other petroleum derivatives. It is similar to Style No. 100 in general construction except that it is impregnated with synthetic rubber compound to provide maximum resistance to oil. Furnished in thicknesses of 1/32″ to 1/4″ in 48″ wide rolls, and as cut gaskets.



# J-M Mobilene Sheet Packing

ONE of the pioneers in asbestos sheet packing for use on various parts of gas and gasoline engines, Mobilene, Style No. 101, is still unsurpassed for packing cylinder heads, exhaust manifold flanges and water jacket connections, especially in marine service.

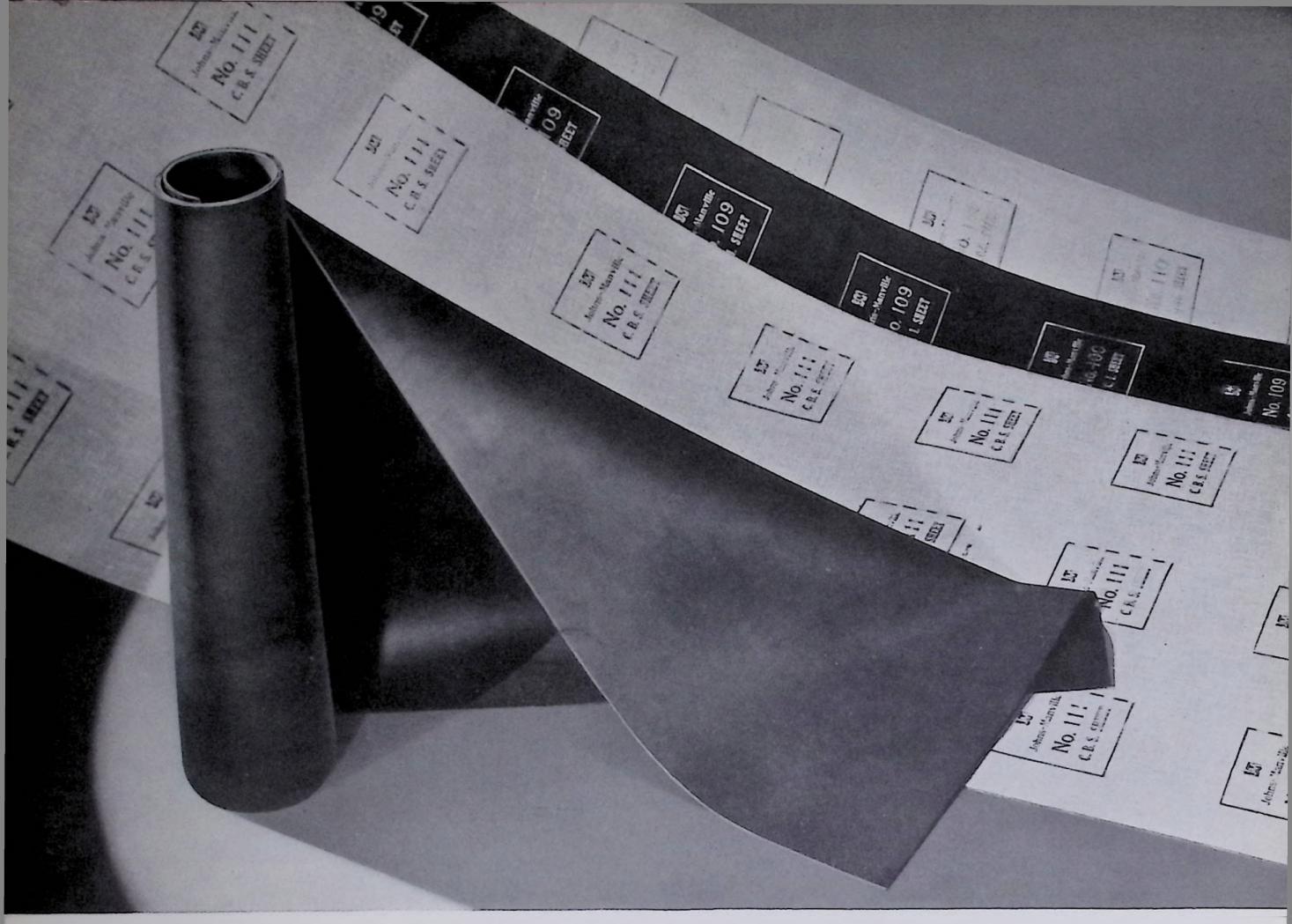
Made of a strong asbestos fabric, interwoven with fine brass wire, and impregnated with a special compound to withstand high temperature and pressure. Coated with a red compound on one side and graphite on the other, so that a joint may be taken apart without destroying the gasket. Furnished in thicknesses of 1/32″ to 1/4″, in 48″ wide rolls and as cut gaskets.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Width of Rolls | Approximate weight, lbs. per square yard | | | | | Form of Package |
|---|---|---|---|---|---|---|---|
| | | 1/32″ | 1/16″ | 1/8″ | 3/16″ | 1/4″ | |
| **100 and 98** Kearsarge Sheet | Rolls—48″ wide | 4.75 | 6.0 | 12.0 | 18 | 24 | 100 lb. and 250 lb. rolls. One or more rolls per case. |
| **101** Mobilene Sheet | | 4.5 | 5.5 | 10.5 | 16.5 | 22 | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 73 of 117
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# J-M Rubber and Synthetic Rubber

***A complete line of sheet packings to meet a wide variety of conditions that call for a rubber or synthetic rubber sheet.***

Over a period of many years Johns-Manville Rubber Sheet Packings have established a proved record of dependability and economy in the service for which they are recommended. With the recent introduction of synthetic rubber having greater resistance to oil, gasoline and other petroleum solvents, Johns-Manville, in line with its policy of continual improvement, has also developed sheet packings of this material for use where its unique properties are desirable.

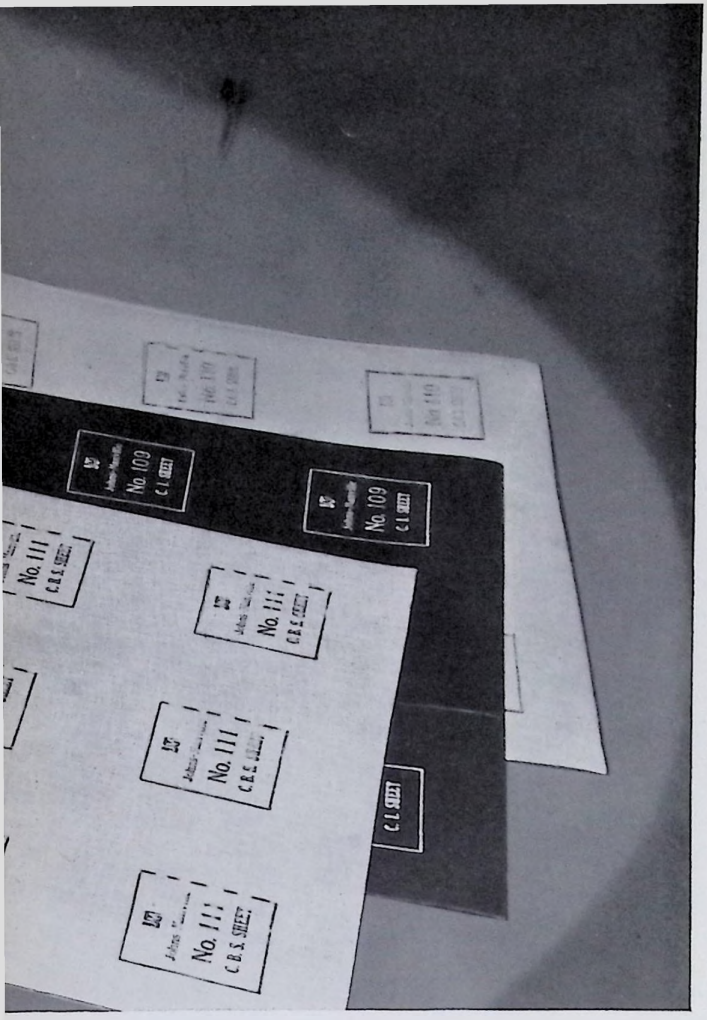
### Styles Available

**STYLE No. 104—FOR OIL AND GASOLINE**—This is a high quality synthetic rubber sheet packing specially developed for use against oil and petroleum solvents such as gasoline. It is not resistant to benzol, carbon tetrachloride and similar solvents. Because it is less permeable to gases than most rubber compounds, it is also well adapted to service against such gases as propane, butane, hydrogen, etc., which deteriorate rubber compounds. Style No. 104 has good resistance to abrasion and excellent tensile strength. It is made of a carefully compounded synthetic rubber of the highest quality and furnished in lengths of approximately 12 feet, in widths of 36″ and in thicknesses of 1/16″ and up.

**STYLE No. 105—DIAPHRAGM SHEET**—Similar to Style No. 104 except that it contains a medium-weight duck insertion to provide the additional strength necessary for diaphragm service. Highly recommended for use as a general purpose diaphragm sheet wherever an oil- and gasoline-resisting material is required. Furnished approximately 12 feet long, in widths of 36″ and thicknesses of 1/32″ and up.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 74 of 117
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# Sheet Packing

**STYLE No. 109 — FOR HYDRAULIC SERVICE —** This is a cloth inserted {C.I.} rubber sheet packing particularly designed for low-pressure cold water service. The rubber from which it is made is specially compounded to retain its resiliency and pliability when exposed to cold water conditions. Furnished in 36″ wide rolls in thicknesses of 1/16″ and up.

**STYLE No. 110 — FOR HYDRAULIC SERVICE —** Similar to Style No. 109 except that it is made with cloth on one side {C.O.S.} instead of cloth-inserted. It is also recommended for low-pressure cold water service. Furnished in 36″ wide rolls in thicknesses of 1/16″ and up.

**STYLE No. 111 — FOR HYDRAULIC SERVICE —** This is the same as Style No. 110 except that it has cloth on both sides {C.B.S.}. Furnished in 36″ wide rolls in thicknesses of 1/16″ and up.

**STYLE No. 112—BLACK OIL PROOF—**For many years Style No. 112 has been recognized as a dependable oil-resisting sheet packing. It is made of a black rubber compound designed to resist the action of oil. However, it will not last quite as long in most oil or gasoline services as the newer synthetic rubber sheets, Styles No. 104 and 105 described above. Furnished in 36″ wide rolls in thicknesses 1/16″ and up.

**STYLE No. 113—PURE GUM RUBBER—** This is an unusually soft, resilient sheet packing possessing high tensile strength. Made of pure gum rubber and recommended for use against ammonia, cold water and other cold fluids. Furnished in 36″ wide rolls in thicknesses of 1/16″ and up.

**STYLE No. 115—DIAPHRAGM SHEET—**This is a high quality duck-inserted rubber sheet specially designed for making diaphragms on damper regulators, reducing valves and similar equipment. Furnished in 36″ wide rolls in thicknesses of 1/16″ and up.

**NOTE:**—See next page for description of Liberty Red Rubber Sheet Packings, Styles No. 107 and 108.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Width of Rolls | Approximate weight, lbs. per sq. yd. | | | | Form of Package |
|---|---|---|---|---|---|---|
| | | 1/16″ | 1/8″ | 3/16″ | 1/4″ | |
| 104 | Rolls — 36″ wide | 4.37 | 8.75 | 13.12 | 17.5 | 100 lb. or 250 lb. Rolls, wrapped in burlap. |
| 105 | | 4.37 | 8.37 | 12.56 | 16.75 | |
| 109 | | 4.75 | 9.5 | 15 | 19 | |
| 110 | | 4.75 | 9.5 | 15 | 19 | |
| 111 | | 4.75 | 9.5 | 15 | 19 | |
| 112 | | 4.75 | 9.5 | 15 | 19 | |
| 113 | | 3 | 6 | 9 | 12 | |
| 115 | | 4.75 | 9.5 | 15 | 19 | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 75 of 117
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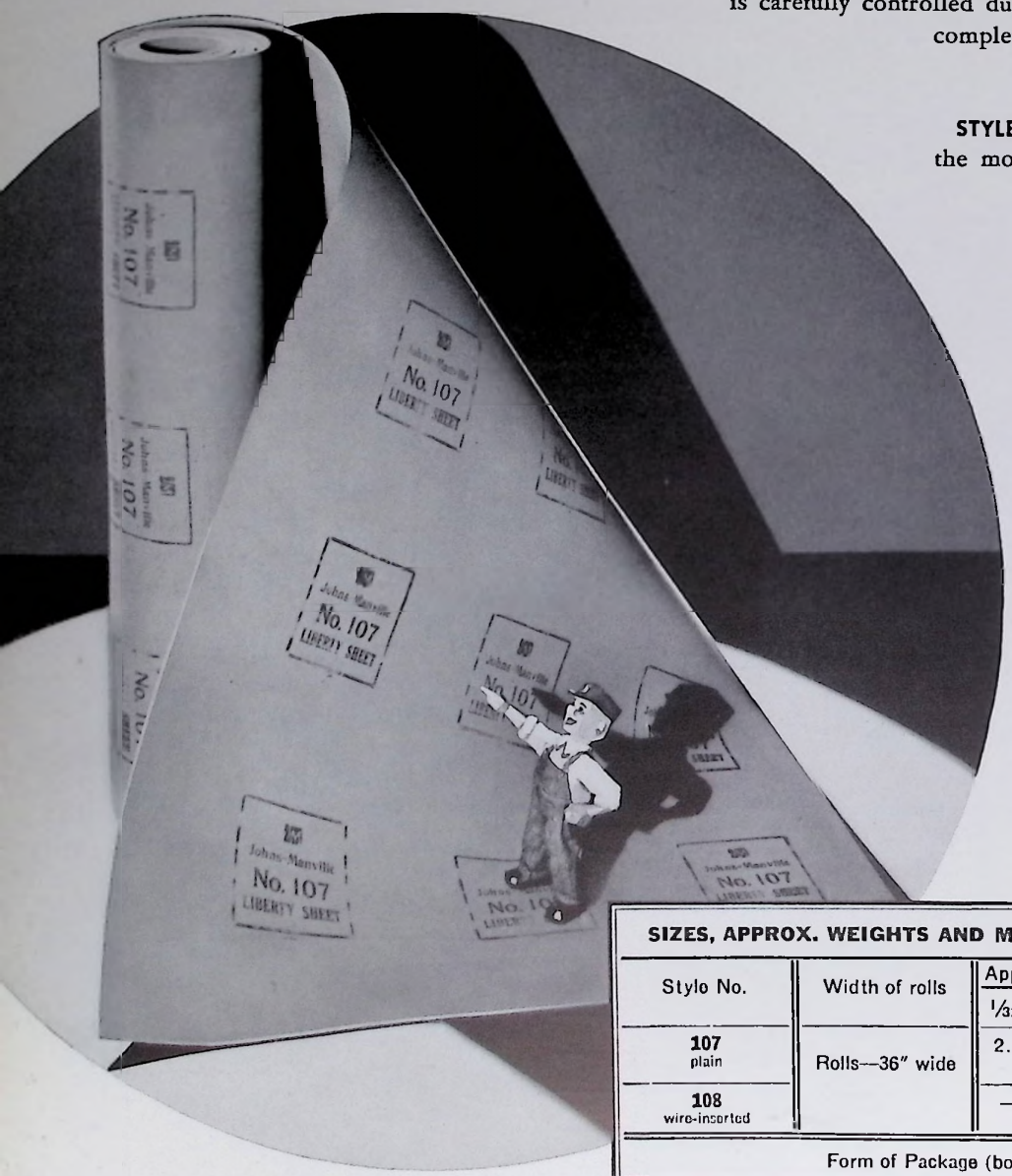
# J-M Liberty Red Rubber Sheet Packing

***The highest quality red rubber sheet made, Liberty has long been the preferred material wherever a sheet of this type is required.***

LIBERTY RED RUBBER SHEET PACKING is designed for use against hot and cold water, air and medium or low pressure saturated steam at pressures up to 150 lbs. It is a relatively light weight material that remains soft and pliable throughout its long life. Furthermore, it is firm enough to hold fast in a joint and strongly resists the tendency to creep or blow out in service.

### Construction Details

Made from a special heat-resisting rubber compound of the highest quality, this superior red rubber sheet is carefully controlled during manufacture to assure complete uniformity at all times.




### Styles Available

**STYLE No. 107—PLAIN**—This is the most popular style of Liberty Red Rubber Sheet Packing and is recommended for all general services where a high quality plain rubber sheet is needed. Style No. 107 is furnished in rolls 36″ wide and in thicknesses of 1/32″ and up. It is also furnished as cut gaskets in all standard and special sizes.

**STYLE No. 108—WIRE INSERTED**—Same as Style No. 107 except that it is reinforced with fine brass wire fabric to give additional strength. Furnished in rolls 36″ wide, in thicknesses of 1/16″ and up, and as cut gaskets in all standard and special sizes.

**SIZES, APPROX. WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Width of rolls | Approx. weight, lbs. per square yard | | | | |
|---|---|---|---|---|---|---|
| | | 1/32″ | 1/16″ | 1/8″ | 3/16″ | 1/4″ |
| **107** plain | Rolls—36″ wide | 2.5 | 4.75 | 9.5 | 14.25 | 19 |
| **108** wire-inserted | | — | 5.5 | 10.5 | 16.5 | 21 |

Form of Package (both styles)

100 and 200 lb. rolls or any specified weight, wrapped in burlap.




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J-M Cut Gaskets are furnished in many styles, cut in any standard or special shape desired

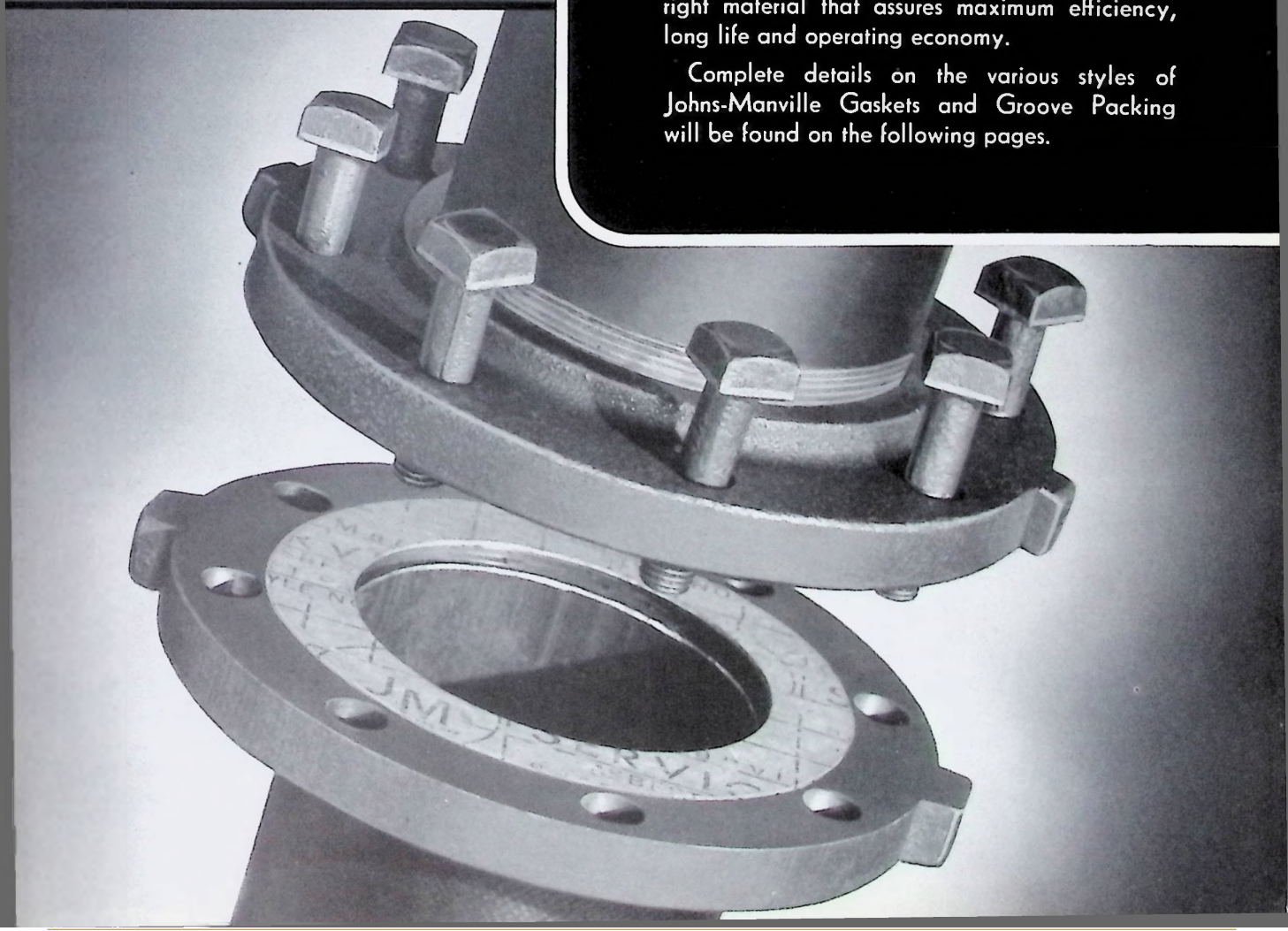
# Johns-Manville
# GASKETS AND GROOVE PACKING

There are four main characteristics essential for the dependable service of gaskets and groove packings: Resiliency, impenetrability, uniformity, and resistance to the medium against which they will be used.

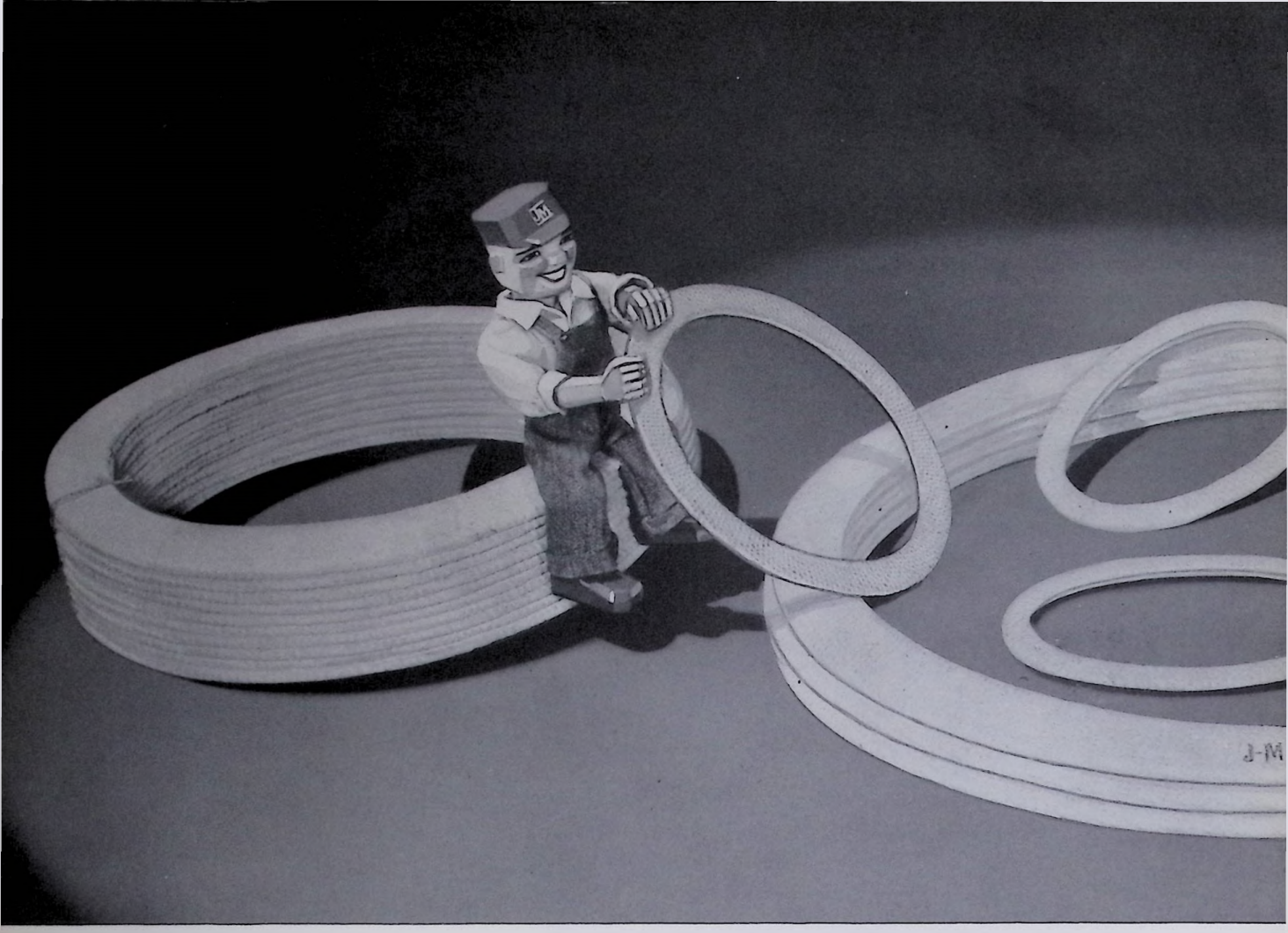
For the most satisfactory performance, it is advisable to consider those characteristics carefully before selecting a gasket for any specific service.

Johns-Manville Gaskets and Groove Packings are furnished in many styles, each of which is designed to meet the requirements of one particular set of conditions most satisfactorily. From this complete line it is possible to select the one right material that assures maximum efficiency, long life and operating economy.

Complete details on the various styles of Johns-Manville Gaskets and Groove Packing will be found on the following pages.




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# J-M Kearsarge Gaskets

***For sealing boiler manholes, handholes and tube plates. Years of satisfaction in the boiler room have made Kearsarge the yardstick by which engineers measure suitable performance in this service.***

J-M KEARSARGE GASKETS are virtually standard equipment for all manhole, handhole and tube plate services. Their dependability, economy, and uniform high quality year in and year out, have earned for them a widespread acceptance throughout industry.

**STYLE No. 116—KEARSARGE HANDHOLE AND MANHOLE GASKETS**—Made by folding and forming to the proper size and shape, plies of strong, durable, wire-inserted asbesto-metallic cloth, treated with a special rubber heat-resisting compound. The finished gaskets are formed with the edges of the folds on the inner side, while on the outer side, where the gasket is exposed to pressure, there is an unbroken, rounded shoulder.

Standard handhole gaskets have an average inside diameter between 3″ and 6″; and standard manhole gaskets an average inside diameter between 6″ and 18″. They are furnished in oval form to fit the plate for which they are intended, although shapes other than oval, as well as oval gaskets in sizes larger or smaller than standard, can also be supplied on order.

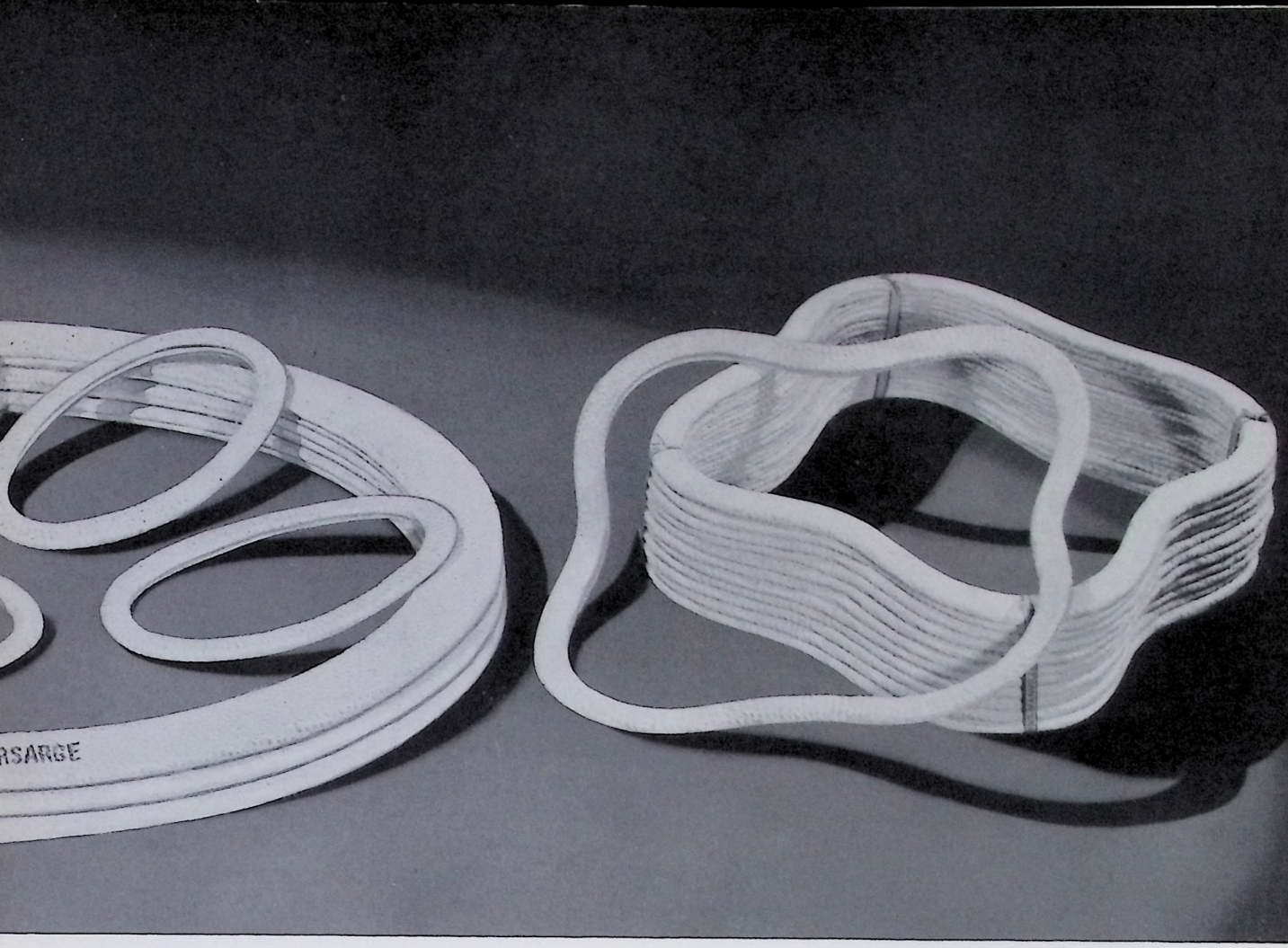
The minimum flange width is 3/8″. Thickness of the gaskets varies according to the number of plies of fabric, each ply being approximately 1/16″ thick. Best results are generally obtained through the use of gaskets three or four plies thick.

When ordering, it is necessary to specify the two inside diameters, on oval gaskets, or the i.d. of round gaskets, the width of the flange and the number of plies desired in the gasket.

For shapes other than oval or round, a template or drawing should be submitted and thickness specified.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 78 of 117
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**STYLE No. 118—KEARSARGE TUBE PLATE GASKETS**—Made seamless and without a joint, Kearsarge Tube Plate Gaskets are woven into tubular form from strong, wire-inserted asbestos yarn, treated with the same heat-resisting compound used in Kearsarge Manhole and Handhole Gaskets, then folded to size and shape.

Because there are no taped joints to interfere with perfect seating, they are particularly efficient when gaskets with a very narrow flange must be used.

In ordering, specify the size desired and the make of boiler upon which the gaskets are to be used.

**STYLE No. 136—SYNTHETIC RUBBER HANDHOLE AND MANHOLE GASKETS—FOR GASOLINE, OIL, ETC.**—These gaskets are especially made for service against oil, gasoline, kerosene and other types of rubber solvents. Made in the same manner as Style No. 116 Handhole and Manhole Gaskets, except that the cloth is treated with a synthetic rubber compound to resist the destructive action of gasoline, and similar fluids.

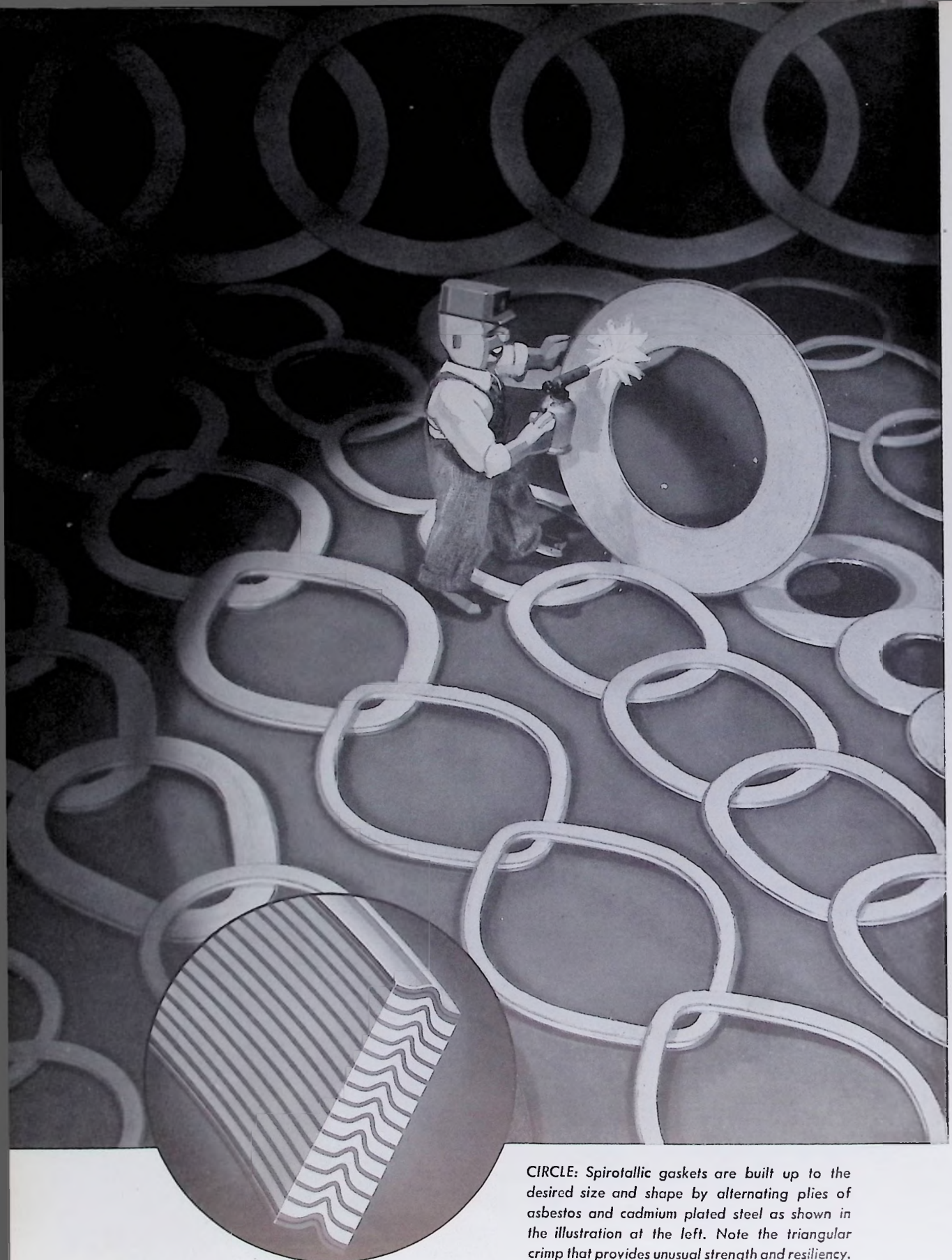
Style No. 136 gaskets are furnished in the same sizes, flange widths and thicknesses as Style No. 116.



Kearsarge Manhole Gaskets have earned an enviable reputation for long, efficient service. Made of strong, durable asbesto-metallic cloth, they provide maximum protection against costly gasket failures.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 79 of 117
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CIRCLE: Spirotallic gaskets are built up to the desired size and shape by alternating plies of asbestos and cadmium plated steel as shown in the illustration at the left. Note the triangular crimp that provides unusual strength and resiliency.



Johns-Manville Packings (1941)
ACL Doc 13710 · Page 80 of 117
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# J-M Spirotallic Gaskets

***A durable, resilient, corrosion-resistant gasket for high temperatures and high pressures on boiler handholes, manholes, tube plates, and pipe flanges.***

JUST as Kearsarge Gaskets are the usual choice for handholes, manholes and tube plates of boilers in general service, so are Spirotallic Gaskets the most satisfactory for *very high pressure* and *high temperature* conditions on the same equipment.

Because of their great strength, resiliency and high heat resistance, Spirotallic Gaskets reduce the problem of follow-up and often permit using the same gasket over and over again. Formed as a compact, reinforced unit, they will compress and expand automatically as the gasketing space varies in service, thus assuring a tight, effective seal at all times.

### Construction Details

J-M Spirotallic Gaskets are constructed of a continuous length of cold-rolled cadmium-plated steel, preformed with a triangular crimp in the center, and spirally wound over a mandrel with a strip of slightly wider asbestos paper in between.

In the manufacture of Spirotallic Gaskets the first plies of metal are wound together without asbestos and securely welded together. The asbestos paper is then wound between the plies of metal to the width of flange desired. The final plies of metal are wound without asbestos and electrically welded at several points.

These plies of cadmium-plated steel enclosing the inner and outer edges of the gasket provide a strong reinforcement against spreading under flange pressures. And, because the alternating plies of felted asbestos and steel are on edge between the bearing surfaces, with the asbestos plies slightly wider and extending beyond the steel, an effective cushioning and sealing action is obtained.

### Constant Spring Action

One of the outstanding features of construction is the triangular crimp in the central section of the metal strip. This central crimp provides the necessary spring action or resiliency when the gasket is compressed under flange pressure.

The asbestos fibres are completely secured between the interlocking plies of cadmium-plated steel, and serve as a guide in directing compression to the central, triangular crimp. This action is positive and continuous under all temperature and pressure conditions.

Standard Spirotallic Gaskets are designed to withstand severe service conditions, thus eliminating the necessity for different compositions or construction for various steam pressures. However, for acid, alkali or other special service conditions, Spirotallic Gaskets can also be made of other metal and fibre combinations to resist the particular conditions encountered.

### Shapes and Sizes

J-M Spirotallic Gaskets are furnished in all standard manhole, handhole and tube plate sizes in round, oval, square (with rounded corners), pear and diamond shapes with standard nominal thicknesses of 1/8", 3/16" and 1/4".

For boiler manhole plates the 3/16" thickness is recommended. For handholes and tube plates the 3/16" or 1/8" are usually most satisfactory.

For pipe flanges, the 1/8" thickness, made in ring form to fit inside the bolt holes, is recognized as standard. Minimum inside diameter, 2"; maximum outside diameter, 18". See list of standard sizes below.

**STANDARD SIZES OF SPIROTALLIC GASKETS**
(Standard Thickness 1/8")

| Nominal Pipe Size | Standard Pipe Flange Gaskets | | Extra Heavy Pipe Flange Gaskets | |
|---|---|---|---|---|
| | I. D. | O. D. | I. D. | O. D. |
| 1" | 2" | 2 5/8" | 2 1/8" | 2 3/4" |
| 1 1/4" | 2 1/4" | 2 7/8" | 2 1/2" | 3 1/8" |
| 1 1/2" | 2 5/8" | 3 1/4" | 3" | 3 5/8" |
| 2" | 3 1/4" | 4" | 3 1/2" | 4 1/4" |
| 2 1/2" | 4" | 4 3/4" | 4 1/8" | 5" |
| 3" | 4 3/8" | 5 1/4" | 4 7/8" | 5 3/4" |
| 3 1/2" | 5 1/4" | 6 1/4" | 5 3/8" | 6 3/8" |
| 4" | 5 5/8" | 6 3/4" | 5 7/8" | 7" |
| 4 1/2" | 5 3/4" | 6 7/8" | 6 1/2" | 7 5/8" |
| 5" | 6 3/8" | 7 5/8" | 7 1/8" | 8 3/8" |
| 6" | 7 3/8" | 8 5/8" | 8 3/8" | 9 3/4" |
| 7" | 8 5/8" | 9 7/8" | 9 1/2" | 10 7/8" |
| 8" | 9 5/8" | 10 7/8" | 10 5/8" | 12" |
| 9" | 10 7/8" | 12 3/8" | 11 3/8" | 13" |
| 10" | 11 3/4" | 13 1/4" | 12 1/2" | 14 1/8" |
| 12" | 14 1/4" | 16" | 14 3/4" | 16 1/2" |
| 14" | 15 7/8" | 17 5/8" | — | — |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 81 of 117
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# J-M CUT GASKETS

FACTORY-CUT GASKETS are an economical investment when reasonably large quantities of the same size gaskets are purchased. They eliminate the time, trouble and scrap material involved when plant men must cut their own gaskets from sheet stock. Johns-Manville's well-equipped gasket department makes it possible to produce perfectly cut gaskets for every requirement.

J-M Cut Gaskets are cut from every style of J-M Sheet Packing and in all the thicknesses in which the sheets from which they are cut are made.

**J-M SERVICE GASKETS, STYLE No. 60** — Cut from Service Sheet, Style No. 60 *(pages 68-69)*. The most widely used style of J-M Cut Gaskets for all general service conditions, such as superheated or saturated steam, air, hot or cold water, ammonia, oil and some acids, alkalies and other chemicals.

**J-M ASBESTOS GASKETS, STYLE No. 50** — Cut from J-M Asbestos Sheet Packing, Style No 50 *(page 70)*. Designed for service against gas and air, or wherever gaskets softer and less dense than No. 60 Service Gaskets are desired.

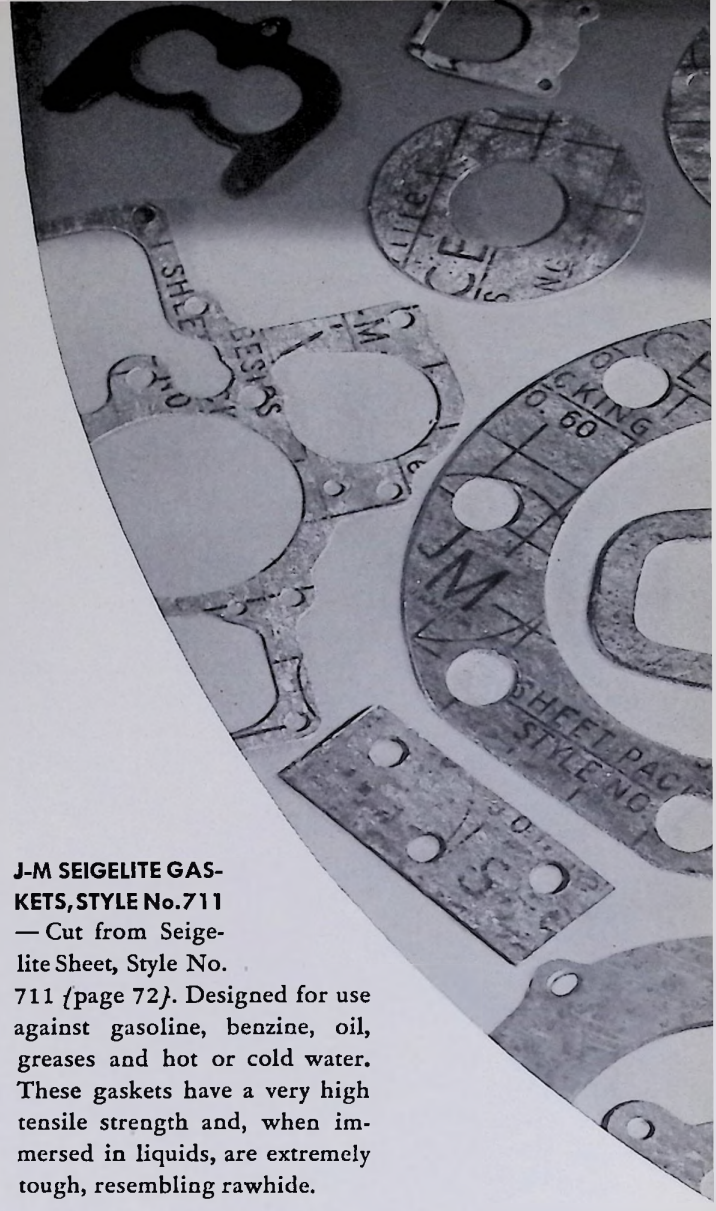
**J-M ASBESTOS GASKETS, STYLE No. 70** — Cut from J-M No. 70 Asbestos Sheet Packing *(page 70)*. Similar to No. 60 Service Gaskets, but harder and denser.

**J-M SYNTHETIC RUBBER BONDED ASBESTOS GASKETS, STYLE No. 76**—Cut from No. 76 Synthetic Rubber Bonded Asbestos Sheet Packing *(page 70)*. Specially designed for service against hot oils, petroleum solvents, refrigerants such as Freon, animal and vegetable oils, Carbon Tetrachloride, etc.

**J-M KEARSARGE CUT GASKETS, STYLE No. 100**— Cut from Kearsarge Sheet, Style No. 100 *(page 73)*. Recommended for use on rough flanges against low, medium or high pressure steam, air and water.

**J-M KEARSARGE CUT GASKETS STYLE No. 98** — Cut from J-M No. 98 Kearsarge Sheet Packing *(page 73)*. Impregnated with synthetic rubber compound for use against gasoline, oil and other petroleum derivatives.

**J-M MOBILENE GASKETS, STYLE No. 101** — Cut from Mobilene Sheet Packing, Style No. 101 *(page 73)*. Recommended for use on various parts of gas and gasoline engines, particularly in marine service.




**J-M SEIGELITE GASKETS, STYLE No. 711** — Cut from Seigelite Sheet, Style No. 711 *(page 72)*. Designed for use against gasoline, benzine, oil, greases and hot or cold water. These gaskets have a very high tensile strength and, when immersed in liquids, are extremely tough, resembling rawhide.

**J-M FELTED ASBESTOS GASKETS, STYLE No. 219** — Cut from Felted Asbestos Sheet Packing, Style No. 219 *(page 71)*. Recommended for service against high temperature conditions.

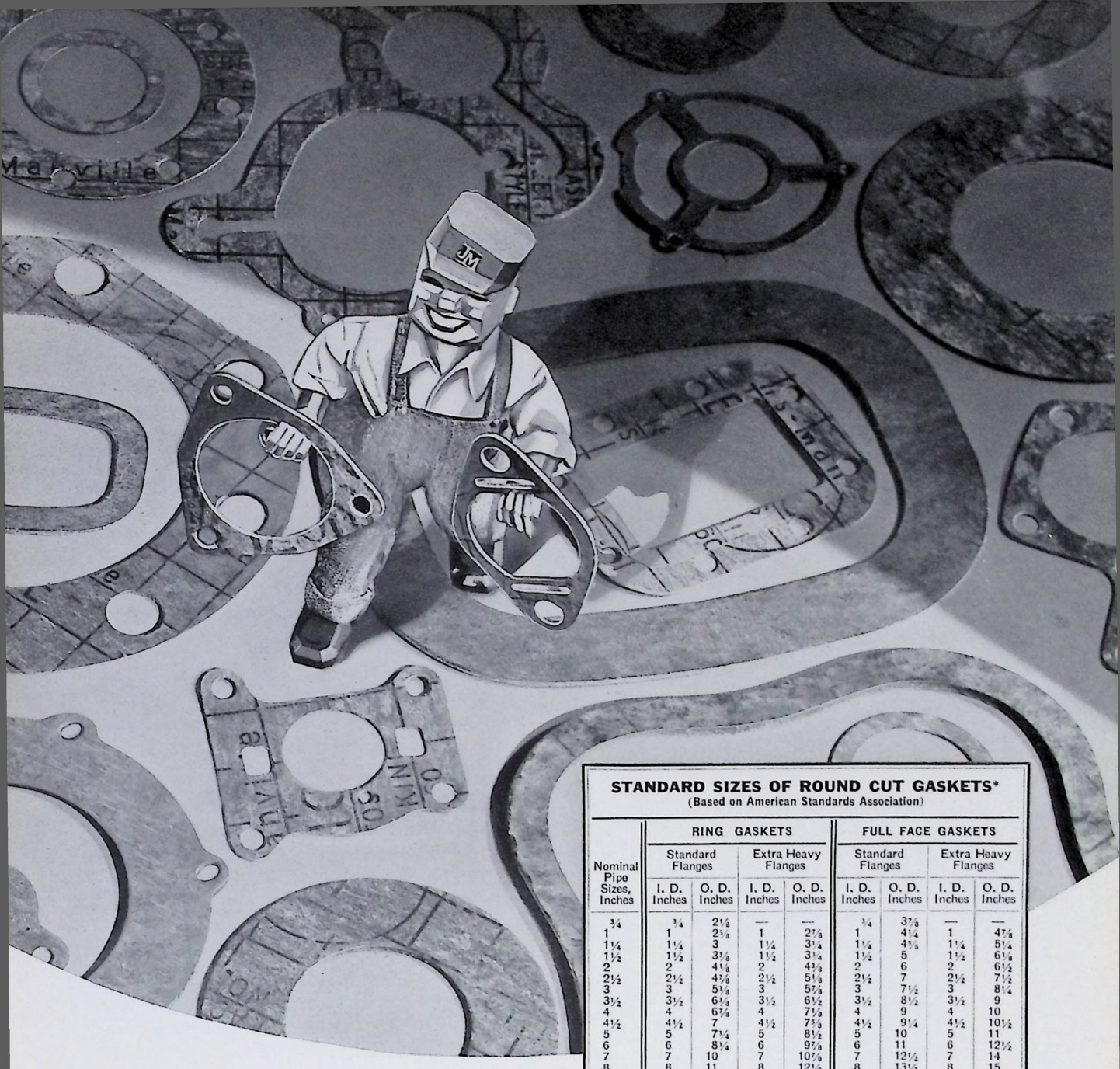
**J-M BLUE ASBESTOS GASKETS, STYLE No. 83** — Cut from Blue Asbestos Fibre Sheet Packing, Style No. 83 *(page 71)*. A soft felted material for acid service.

**J-M LIBERTY RED RUBBER GASKETS, STYLE No. 107**— Cut from Liberty Red Rubber Sheet Packing, Style No. 107 *(page 76)*. Recognized as the best rubber cut gaskets for all general service conditions against hot and cold water, air and medium or low pressure saturated steam. A high grade, resilient material that provides a tight seal and unusually long life.

**J-M LIBERTY RED RUBBER GASKETS, STYLE No. 108**— Cut from Liberty Red Rubber Sheet Packing, Style No. 108 *(page 76)*. Similar to No. 107 Cut Gaskets, above, but wire-inserted for additional strength.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 82 of 117
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## STANDARD SIZES OF ROUND CUT GASKETS*

(Based on American Standards Association)

| Nominal Pipe Sizes, Inches | RING GASKETS | | | | FULL FACE GASKETS | | | |
|---|---|---|---|---|---|---|---|---|
| | Standard Flanges | | Extra Heavy Flanges | | Standard Flanges | | Extra Heavy Flanges | |
| | I. D. Inches | O. D. Inches | I. D. Inches | O. D. Inches | I. D. Inches | O. D. Inches | I. D. Inches | O. D. Inches |
| ¾ | ¾ | 2⅛ | — | — | ¾ | 3⅞ | — | — |
| 1 | 1 | 2⅜ | 1 | 2⅞ | 1 | 4¼ | 1 | 4⅞ |
| 1¼ | 1¼ | 3 | 1¼ | 3¼ | 1¼ | 4⅝ | 1¼ | 5¼ |
| 1½ | 1½ | 3⅜ | 1½ | 3¼ | 1½ | 5 | 1½ | 6⅛ |
| 2 | 2 | 4⅛ | 2 | 4⅞ | 2 | 6 | 2 | 6½ |
| 2½ | 2½ | 4⅞ | 2½ | 5⅛ | 2½ | 7 | 2½ | 7½ |
| 3 | 3 | 5⅛ | 3 | 5⅞ | 3 | 7½ | 3 | 8¼ |
| 3½ | 3½ | 6⅛ | 3½ | 6½ | 3½ | 8½ | 3½ | 9 |
| 4 | 4 | 6⅞ | 4 | 7⅛ | 4 | 9 | 4 | 10 |
| 4½ | 4½ | 7 | 4½ | 7⅝ | 4½ | 9¼ | 4½ | 10½ |
| 5 | 5 | 7¼ | 5 | 8½ | 5 | 10 | 5 | 11 |
| 6 | 6 | 8¼ | 6 | 9⅞ | 6 | 11 | 6 | 12½ |
| 7 | 7 | 10 | 7 | 10⅞ | 7 | 12½ | 7 | 14 |
| 8 | 8 | 11 | 8 | 12⅛ | 8 | 13½ | 8 | 15 |
| 9 | 9 | 12½ | 9 | 12⅞ | 9 | 15 | 9 | 16¼ |
| 10 | 10 | 13½ | 10 | 14¼ | 10 | 16 | 10 | 17½ |
| 12 | 12 | 16⅛ | 12 | 16⅝ | 12 | 19 | 12 | 20½ |
| 14 O.D. | 14 | 17¼ | 13¼ | 19⅛ | 14 | 21 | 13¼ | 23 |
| 15 O.D. | 15 | 19 | 14¼ | 20⅛ | 15 | 22½ | 14¼ | 24½ |
| 16 O.D. | 16 | 20¼ | 15¼ | 21¼ | 16 | 23½ | 15¼ | 25½ |
| 18 O.D. | 18 | 21⅝ | 17 | 23½ | 18 | 25 | 17 | 28 |
| 20 O.D. | 20 | 23⅞ | 19 | 25¼ | 20 | 27½ | 19 | 30½ |
| 22 O.D. | 22 | 26 | 21 | 27⅝ | 22 | 29½ | 21 | 33 |
| 24 O.D. | 24 | 28¼ | 23 | 30½ | 24 | 32 | 23 | 36 |
| 26 O.D. | 26 | 30½ | — | — | 26 | 34¼ | — | — |
| 28 O.D. | 28 | 32¾ | — | — | 28 | 36½ | — | — |
| 30 O.D. | 30 | 34⅝ | — | — | 30 | 38¼ | — | — |
| 32 O.D. | 32 | 37 | — | — | 32 | 41¼ | — | — |
| 34 O.D. | 34 | 39 | — | — | 34 | 43¼ | — | — |
| 36 O.D. | 36 | 41¼ | — | — | 36 | 46 | — | — |
| 38 O.D. | 38 | 43⅝ | — | — | 38 | 48¼ | — | — |
| 40 O.D. | 40 | 45⅝ | — | — | 40 | 50¼ | — | — |
| 42 O.D. | 42 | 47⅞ | — | — | 42 | 53 | — | — |
| 44 O.D. | 44 | 50⅛ | — | — | 44 | 55¼ | — | — |
| 46 O.D. | 46 | 52⅛ | — | — | 46 | 57¼ | — | — |
| 48 O.D. | 43 | 54⅜ | — | — | 48 | 59½ | — | — |

*Other standard shapes, including oval, square, rectangular, etc., as well as special shapes, can also be furnished on order. When ordering special shapes a template or blue print should be furnished.

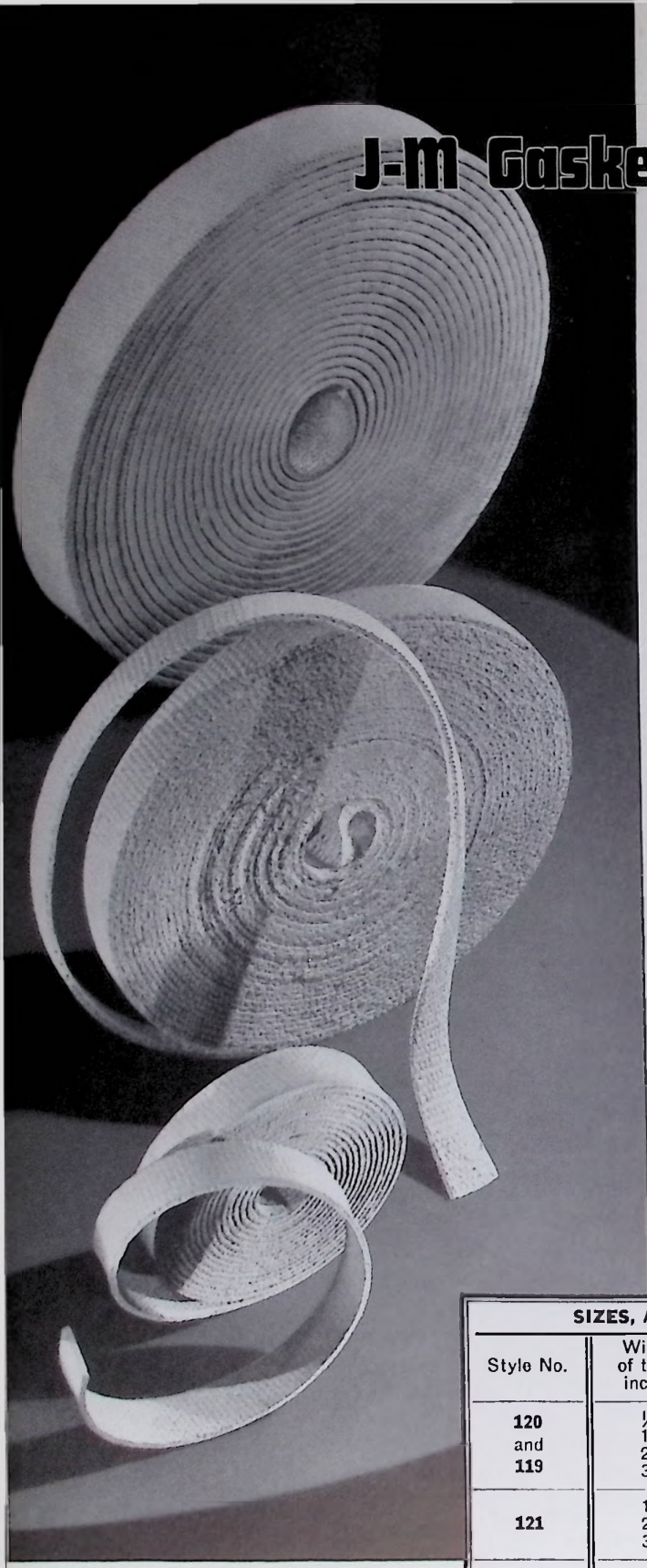
**OTHER J-M CUT GASKETS** are furnished cut from J-M Rubber or Synthetic Rubber Sheets *(pages 74-75)*.

STYLE No. 104—Synthetic Rubber for Oil and Gasoline
STYLE No. 105—C. I. Synthetic Rubber Diaphragm Sheet
STYLE No. 109—C. I. Rubber for Hydraulic Service
STYLE No. 110—C.O.S. Rubber for Hydraulic Service
STYLE No. 111—C.B.S. Rubber for Hydraulic Service
STYLE No. 112—Black Oil-Proof Rubber
STYLE No. 113—Pure Gum Rubber
STYLE No. 115—C.I. Rubber Diaphragm Sheet

J-M Cut Gaskets can also be supplied cut from asbestos paper, asbestos millboard, felt paper, manila tag paper, manila rope paper, strawboard, chipboard, fish paper, blotting paper, varnished cloth, etc.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 83 of 117
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# J-M Gasketing Tapes

***For all general gasketing services where the use of cut or preformed gaskets is impractical.***

**STYLE No. 120—KEARSARGE GASKETING TAPE**—This is a high quality, general utility gasketing tape that can be used successfully against steam, air, water, ammonia, and acidulated, alkaline and other chemical solutions, as well as general service conditions. It is a suitably soft and resilient material particularly recommended for use on rough or irregular-shaped surfaces.

In construction, Kearsarge Gasketing Tape is identical to Kearsarge Gaskets {page 78}, being made of high quality asbesto-metallic fabric treated with a resilient, heat-resisting rubber compound and folded into plies to the required size. It is furnished in widths 1/2″ and up and in thicknesses 1/16″ and up. Due to the folded type of construction, however, the tape cannot be supplied in widths less than twice the thickness.

**STYLE No. 119—FOR GASOLINE, OIL, ETC.**—Similar to Style No. 120 except that it is treated with a special synthetic rubber compound for service against gasoline, oil and other rubber solvents. Furnished in same sizes as Style No. 120.

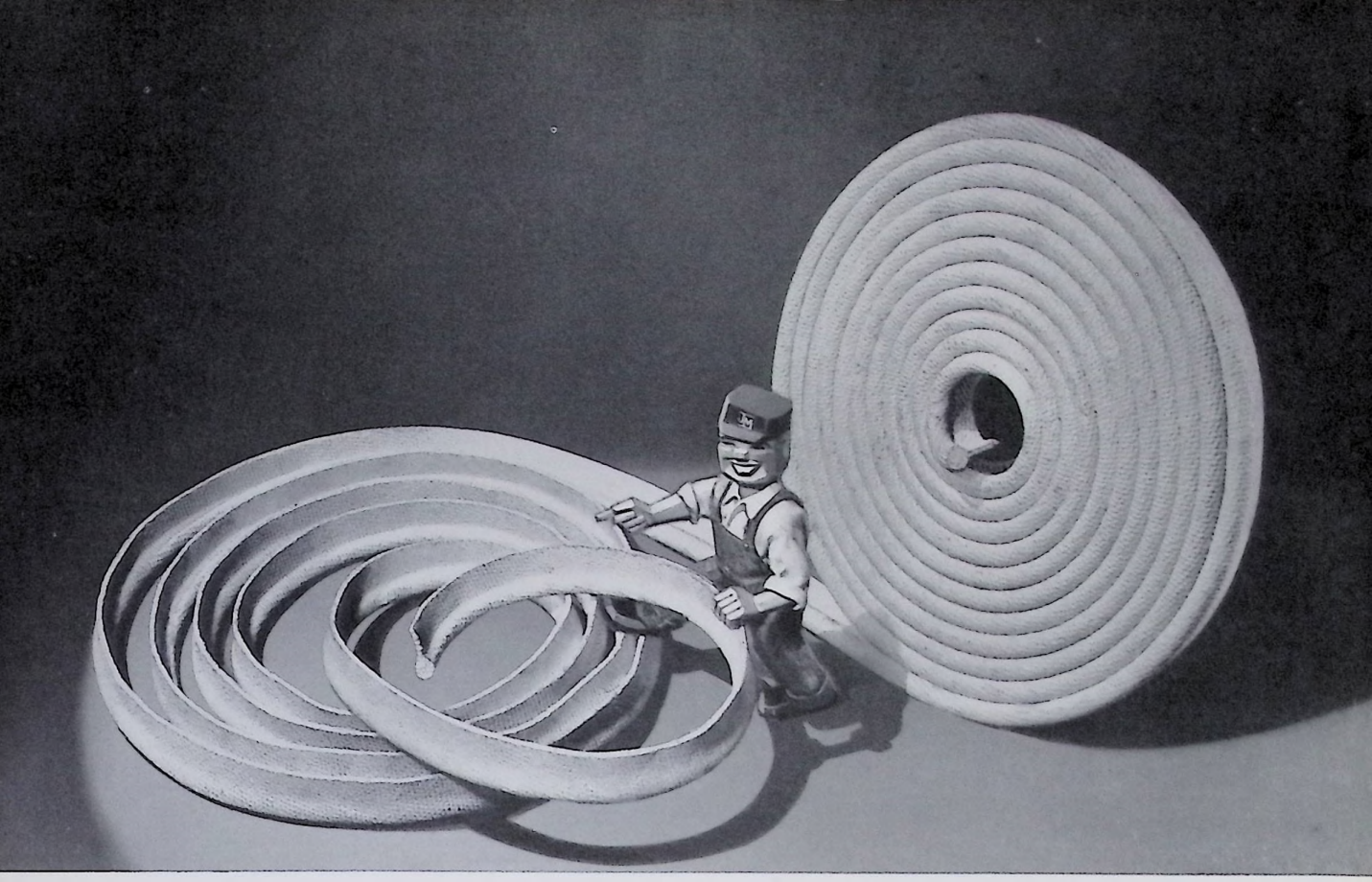
**STYLE No. 121 and 122 — WOVEN ASBESTOS GASING TAPE**—These are solid-woven, extremely rugged asbestos gasketing tapes especially designed for use where a tape without rubber or other impregnant is desired. Style No. 121 is made of wire-inserted long fibre asbestos yarn, woven to the thickness and width required. Style No. 122 is a slightly softer material than No. 121. It is made of plain long-fibre yarn, containing no wire, woven to the required width and thickness. Both Style Nos. 121 and 122 are furnished unimpregnated in lengths approximately 50 ft. long.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Width of tape, inches | Approx. weight, lbs. per 100 lin. ft. | | | | Form of Package |
|---|---|---|---|---|---|---|
| | | 1/8″ | 3/16″ | 1/4″ | 5/16″ | |
| 120 and 119 | 1/2″ | 5 | 7.5 | 10 | — | Coils, in lengths as follows: 1/4″ thickness —200 ft. Over 1/4″ thick—100 ft. |
| | 1″ | 10 | 15 | 20 | — | |
| | 2″ | 20 | 30 | 40 | — | |
| | 3″ | 30 | 45 | 60 | — | |
| 121 | 1″ | 9 | 10 | 16 | 20 | Coils, in 50 ft. lengths |
| | 2″ | 17 | 21 | 27 | 32 | |
| | 3″ | 26 | 28 | 43 | 48 | |
| 122 | 1″ | 8 | 8.75 | 14 | 17.5 | |
| | 2″ | 15 | 18.75 | 23.62 | 28 | |
| | 3″ | 22.75 | 24.5 | 37.5 | 42 | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 84 of 117
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# J-M Tadpole Gasketing Tape

***Designed for use as a door gasket where a groove is not provided, J-M Tadpole Gasketing Tape provides a tight seal with minimum pressure.***

TADPOLE GASKETING TAPE, Style No. 123, is designed for use as a door gasket where a tight seal must be obtained without heavy pressure.

It is particularly adapted for service on doors of ovens, sterilizers, laboratory apparatus, safes, vaults, plenum chambers, air conditioning equipment, dust collectors, textile dryers and dry kilns, as well as for hinged tank covers, cooking kettles, kiers, etc.

Standard Tadpole Gasketing Tape is suitable for use against steam, air, water and gas. Special tape for unusual conditions such as extremely high temperatures, or for use against mineral oils and petroleum solvents, can also be supplied on special order.

### Construction Details

This tape is made by wrapping or forming asbestos cloth over a core of asbestos wick or rope, depending upon the size and degree of softness required. The cloth, extended on one side to form a flange, provides a means of securement to the door frame by riveting or adhesion. This leaves the "bulb" or round side of the tape free to form a cushion upon which the door or cover closes.

### Sizes Available

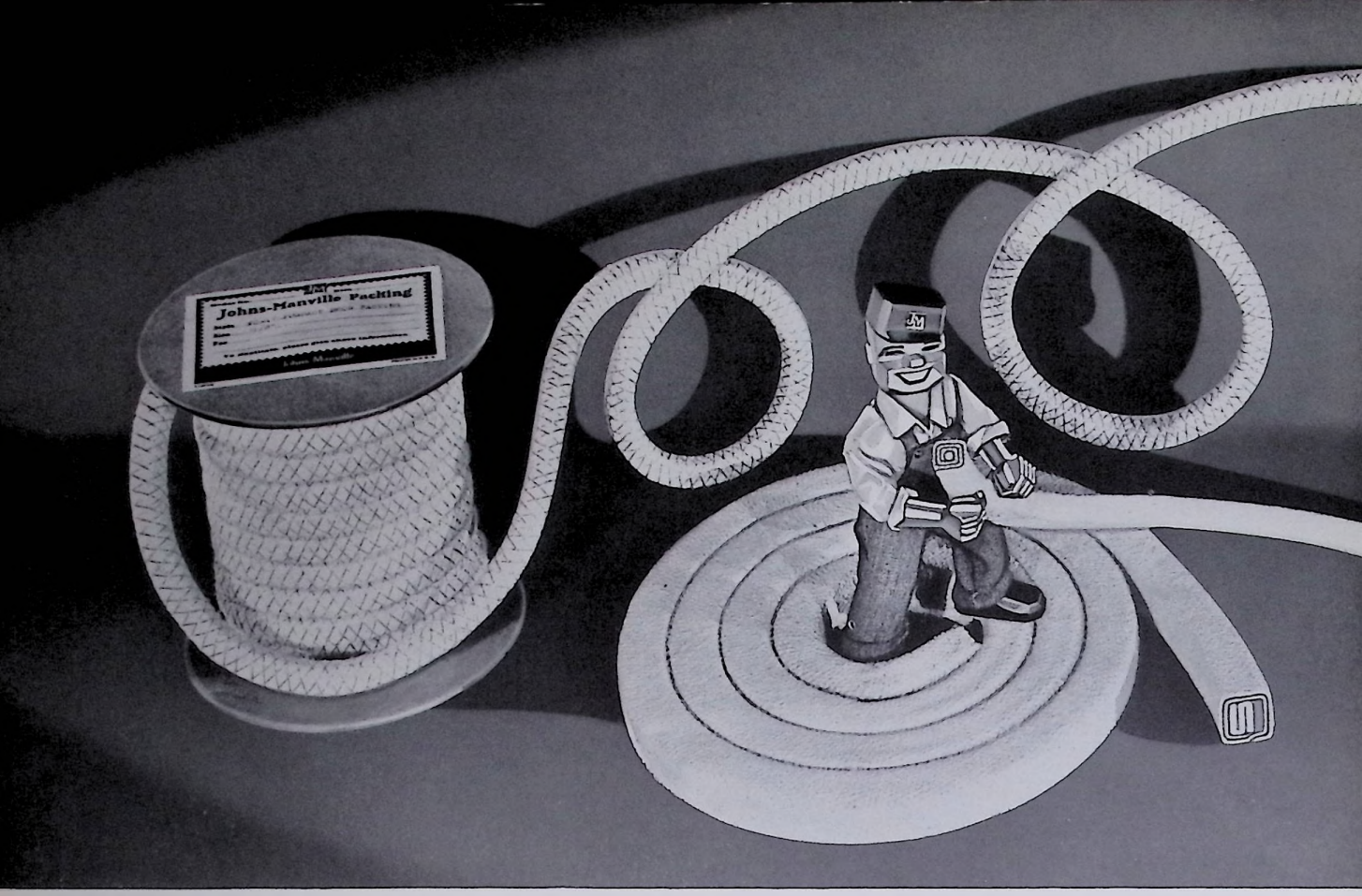
Tadpole Gasketing Tape is furnished in a wide range of standard sizes (see table below). Sizes other than standard can also be furnished on special order. However, in ordering special sizes, it should be noted that the bulb section should never be less than 3/8" and the total width, including bulb section and flange, should not be less than 3/4".

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Size No. | Dimensions, inches | Approx. wt., lbs. per 100 lin. ft. | Form of Package |
|---|---|---|---|---|
| 123 | 1 | 3/8" x 1 3/8" | 19 | Coils, in 50 ft. lengths |
| | 2 | 1/2" x 1 1/8" | 18.75 | |
| | 3 | 1/2" x 1 1/4" | 19.5 | |
| | 4 | 1/2" x 1 3/8" | 20.25 | |
| | 5 | 1/2" x 1 1/2" | 22 | |
| | 6 | 1/2" x 1 3/4" | 24.25 | |
| | 7 | 1/2" x 2" | 26.25 | |
| | 8 | 5/8" x 1 3/8" | 25 | |
| | 9 | 5/8" x 1 3/4" | 27.5 | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 85 of 117
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# J-M Groove or Door Packing

***A complete line of packings for use on all types of doors, converter bottoms and other equipment where packing is applied in a groove or slot.***

**STYLE No. C-17 — FOR FURNACE DOORS** — This is a durable, square cross-section material for use where the packing is subject to excessive wear, particularly in cases where the door must be opened and closed frequently. Made by braiding jackets of copper wire-inserted asbestos yarns over a twisted asbestos core, and finished with an open mesh braided copper wire jacket. Furnished in sizes 3/8″ and up.

**STYLE No. C-176 — FOR CONVERTER BOTTOMS** — Made in square cross-section, this material has great mechanical strength and high heat resistance. It does not lose its shape or break down when pounded into place in the groove. Made of rubber-frictioned asbestos cloth, without wire, wound around a core of asbestos rope and squared. Furnished in sizes 1/4″ and up.

**STYLE No. C-177 — FOR CONVERTER BOTTOMS** —This is similar to Style No. C-176 except that the cloth used for wrapping is made from asbestos wire-inserted yarns. Furnished square, in sizes 1/4″ and up.

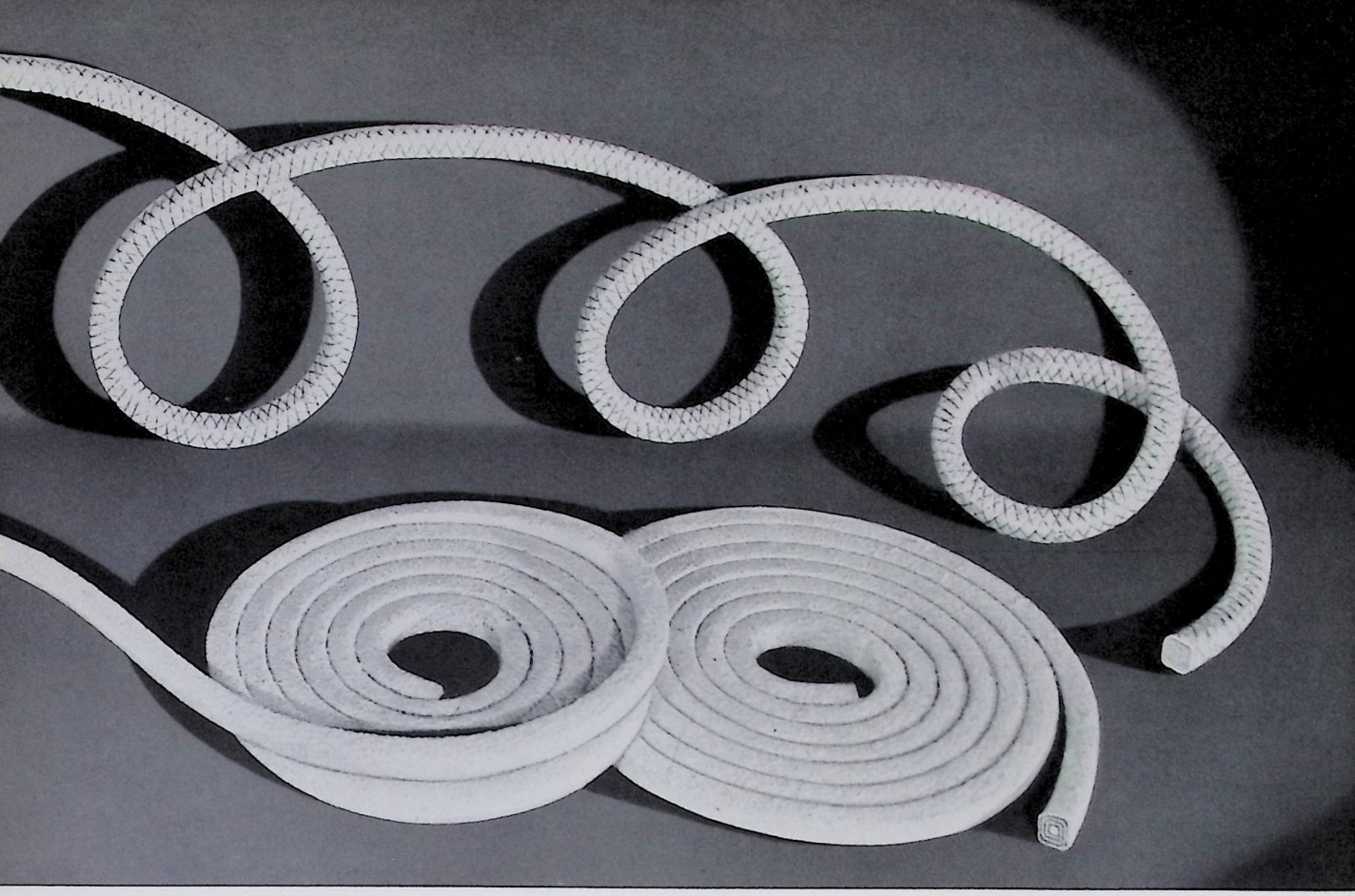
**STYLE No. C-216 — FOR WATER GAS GENERATOR DOORS**— An economical packing because its unusual toughness withstands repeated opening and sealing of the doors. Made in both round and square cross-section with a core of asbestos rope over which are braided jackets of asbestos yarn slightly impregnated with a rubber heat-resisting compound. Furnished graphited, in sizes 1/2″ and up. Orders should specify round or square cross-section.

**STYLE No. C-790 — FOR MISCELLANEOUS DOORS** — Made in both round and square cross-section, this packing is designed for use on hot blast stove clean-out doors, boiler explosion doors and the like. It is braided jacket-over-jacket from copper-wire-inserted commercially pure asbestos yarn. Sizes 3/8″ and up. When ordering, specify round or square.

**STYLE No. C-866 — FOR GENERAL SERVICE** — This is a high quality groove packing recommended for all general services where a resilient, square material is desired. It is made with a folded center block of asbestos cloth and a non-hardening rubber cushion, over which is wrapped a double wearing surface of asbestos cloth. Furnished in sizes 1/4″ and up.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 86 of 117
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asbestosclaims.law/library/13710/86



**STYLE No. C-872 — FOR HIGH TEMPERATURE CONDITIONS**—Designed for butterfly valves and similar apparatus, Style No. 872 is made of pure asbestos yarn, wire-inserted, braided jacket-over-jacket and formed square. Furnished in sizes 3/8" and up.

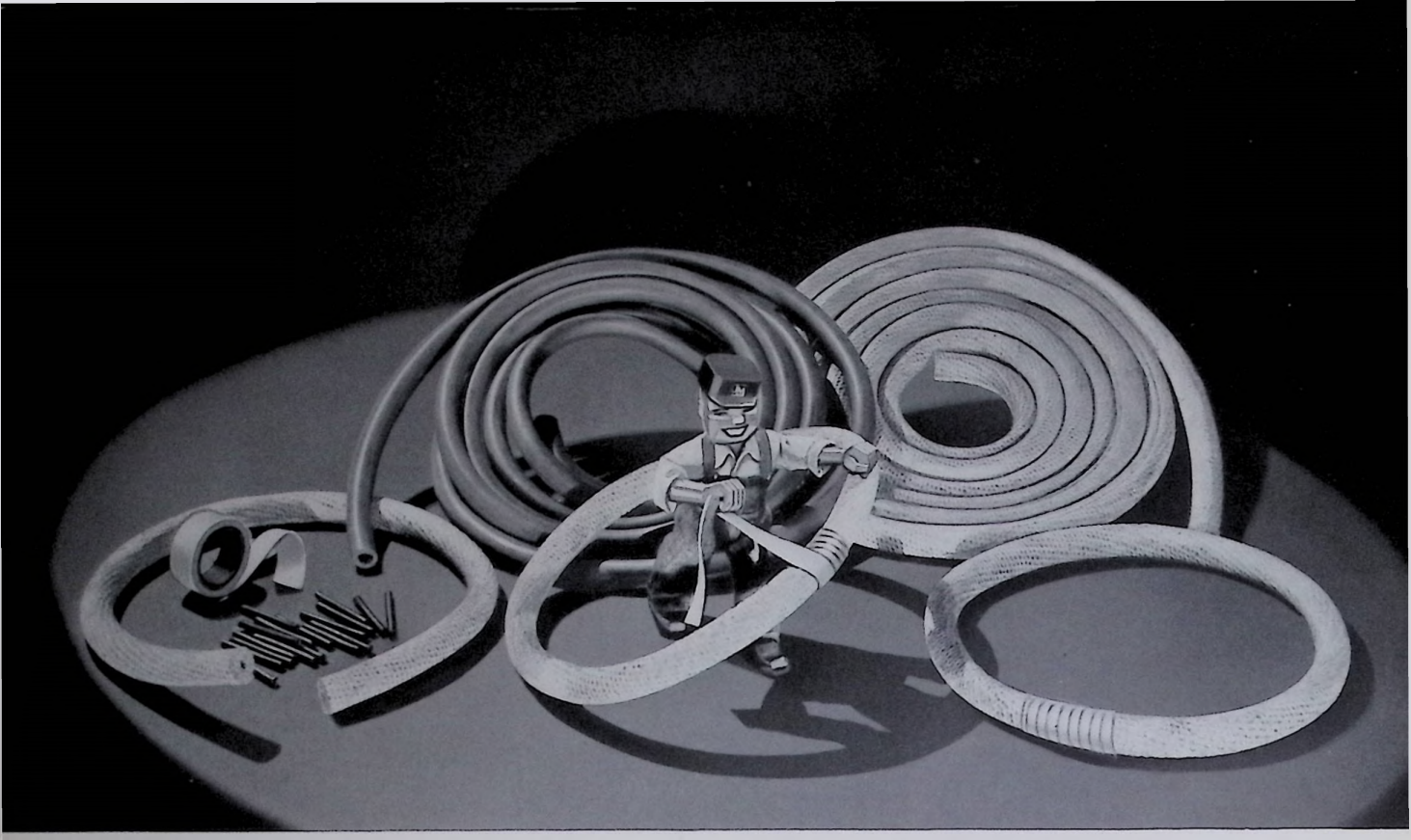
**STYLES No. 128 AND No. 129—FOR GAS PURIFIER BOXES** — These are extremely tough, rugged materials specially designed for packing gas purifier boxes and similar equipment. They are unaffected by gas and will withstand the weight of the cover as well as the force exerted in tightening the hold-down screws. Style No. 128 is made of plain asbestos cloth and Style No. 129 of wire-inserted asbestos cloth. In both styles, the cloth is folded back and forth into the required size and covered with a jacket of the same material. Heat-resisting compound is used on the center block but the covering jacket is untreated. They are furnished square or rectangular. Minimum width or thickness is 1/2". When ordering, specify width, thickness and on which side the cover will rest.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | Form of Package |
|---|---|---|---|---|---|---|---|---|---|
| | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" | |
| C-176 | 4 | 6 | 8 | 14 | 22 | 32 | 44 | 52 | 12½ ft. lengths in boxes weighing: 1/4" to 1/2"— 5 to 6 lbs. 5/16" to 3/4"— 8 to 10 lbs. 7/8" to 1" —10 to 14 lbs. |
| C-177 | 6 | 7 | 9 | 16 | 24 | 34 | 48 | 56 | |
| C-866 | 4 | 6 | 9 | 16 | 24 | 36 | 48 | 56 | |
| C-17 | — | — | 11 | 17 | 21 | 28 | 41 | 55 | 10, 25 and 50 lb. reels |
| C-216 | — | — | — | 19 | 30 | 40 | 48 | 78 | |
| C-790 | — | — | 14 | 19 | 30 | 40 | 60 | 80 | |
| C-872 | — | — | 14 | 19 | 30 | 40 | 60 | 80 | |
| | 1/2"x3/4" | 1/2"x1" | 3/4"x1" | 3/4"x1 1/4" | 3/4"x1 1/2" | 1"x1 1/2" | 1"x1 3/4" | 1"x2" | Coils, in 50 ft. lengths |
| C-128 | 18.75 | 22 | 37.50 | 46.87 | 66 | 75 | 87.33 | 100 | |
| C-129 | 21.25 | 25 | 50 | 62 | 78 | 85 | 99 | 113.25 | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 87 of 117
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# J-M Tubular Gasketing

***An efficient emergency gasketing that can be used wherever a gasket of round cross-section is desired.***

TUBULAR GASKETING is generally used as an emergency gasketing material for making any size gaskets quickly and easily. It is also used extensively for making odd or irregular-shaped gaskets and for packing joints where grooves are provided.

### Construction Details

As the name implies, Tubular Gasketing is made with a hollow center to provide maximum resiliency and to allow for expansion and contraction due to changing temperatures. Joints are made by the use of a short length of lead tubing that fits snugly into the hollow center of each end of the gasket. The joint is then firmly secured with friction tape.

### Styles Available

**STYLE No. 124—KEARSARGE TUBULAR GASKETING**—This is the most widely used style of tubular gasketing. It is made of strong, durable Asbesto-Metallic fabric, treated with a special heat-resisting rubber compound and rolled into round cross-section with a hollow center. Style No. 124 Gasketing can be used against steam, air, gas and a wide variety of other general service conditions.

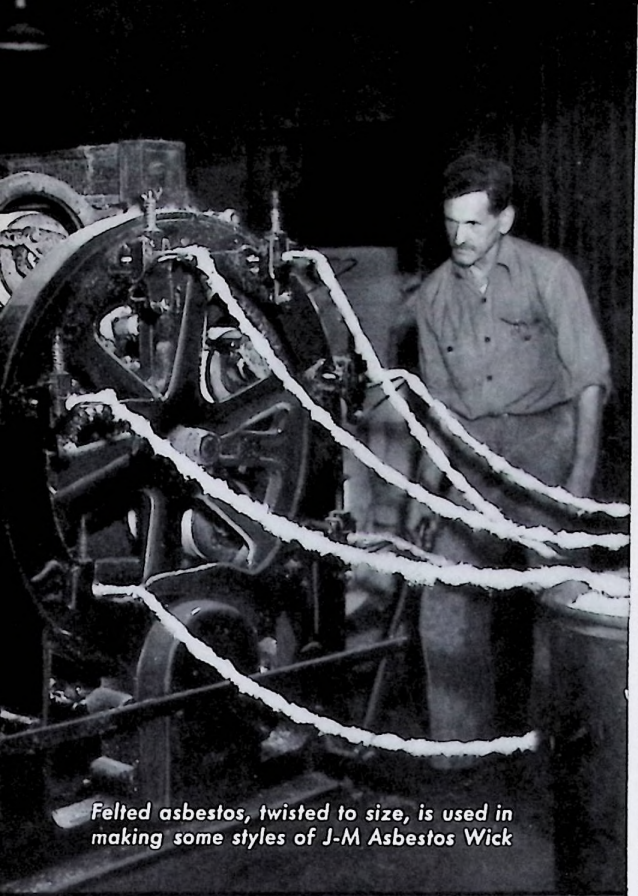
**STYLE No. 125 — LIBERTY RED RUBBER TUBULAR GASKETING**—This is designed for use against hot and cold water, air and medium and low-pressure steam up to 150 lbs. pressure. It is made in round cross section with a hollow center from a high quality red rubber compound.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | Form of Package |
|---|---|---|---|---|---|---|---|
| | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" | |
| 124 | 8 | 14 | 24 | 40 | 52 | 64 | 12½ ft. lengths, together with the necessary friction tape and lead, in 5 or 10 lb. boxes |
| 125 | 8.75 | 15 | 24 | 32 | 46 | 58 | Continuous lengths in 10 to 12 lb. boxes, net, including the necessary friction tape and lead |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 88 of 117
Published by AsbestosClaims.Law
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*Felted asbestos, twisted to size, is used in making some styles of J-M Asbestos Wick*

# Johns-Manville
# ASBESTOS WICK, ROPE AND CORD

Asbestos wick, rope and cord are essentially general utility or emergency packings. Their use is not confined to any specific service or set of conditions but depends more upon the resourcefulness and ingenuity of the user.

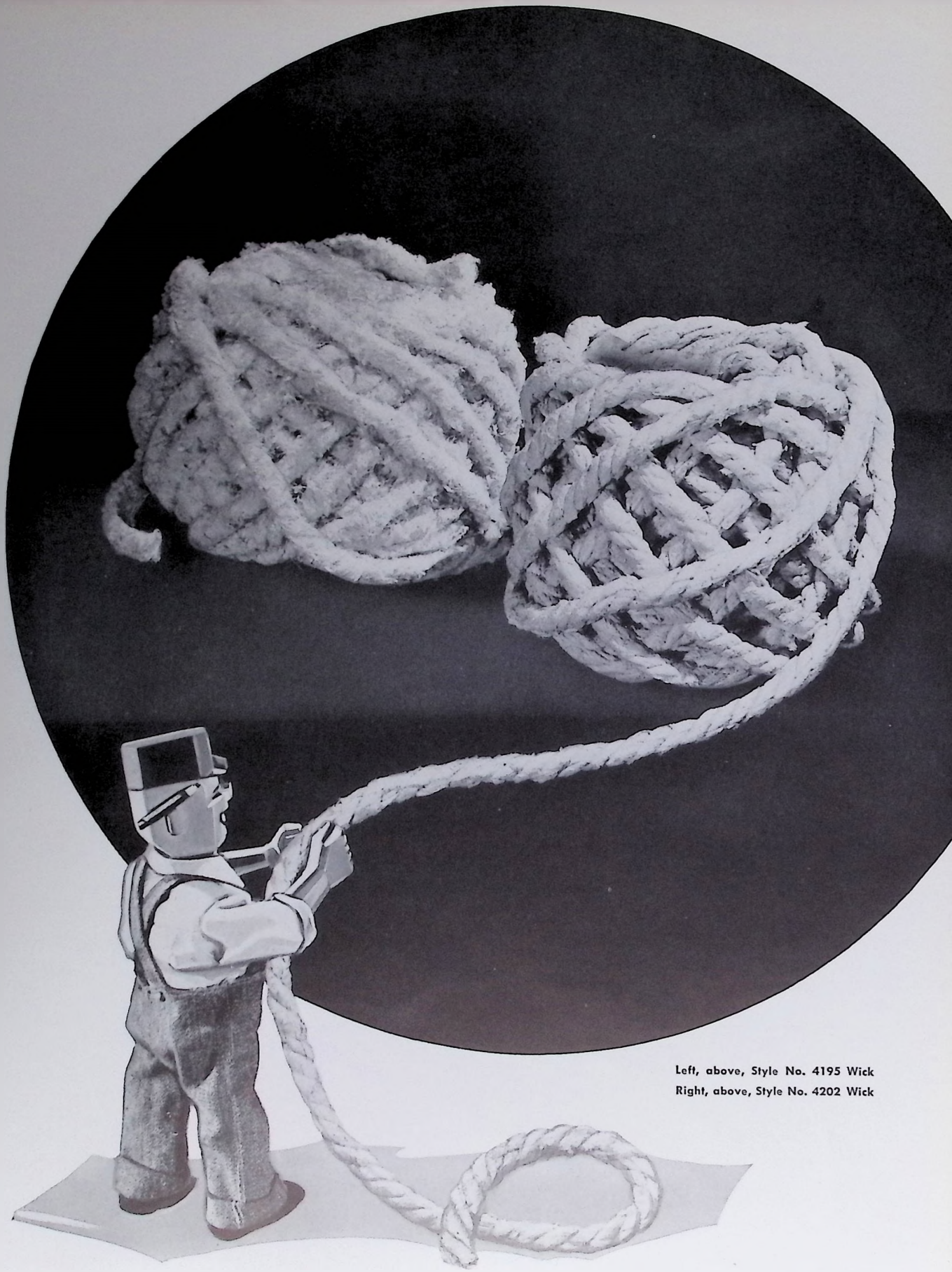
Asbestos wick is a soft, twisted material of approximately ¼" diameter. Where a material of larger diameter is required, asbestos rope, either braided or twisted, is usually recommended. The braided styles endure rough service most satisfactorily. The twisted styles, however, conform more readily to irregularities and allow greater compression. Asbestos cord, as its name implies, is made in sizes as small as 1/16" and is used where strength and a smooth hard surface is desired.

With its own source of supply from the world's largest asbestos mine, Johns-Manville has complete control of the quality of these materials and is able to furnish the many styles necessary to meet widely varying requirements.

Complete details on the various styles of J-M Asbestos Wick, Rope and Cord are given on the following pages.

*Large sizes of J-M Twisted Asbestos Rope are made on this interesting machine*


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Left, above, Style No. 4195 Wick
Right, above, Style No. 4202 Wick



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 90 of 117
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**asbestosclaims.law/library/13710/90**

# J-M Asbestos Wick Packing

***Adaptable to a wide variety of general service conditions, asbestos wick packings are virtually indispensable as a general utility and emergency packing, gasketing and caulking material.***

J-M ASBESTOS WICK PACKING is one of the oldest and simplest forms of asbestos packing. It is a soft, easily handled, highly heat-resistant material used for packing small valve stems on exhaust lines, hot water, vapor or low pressure heating systems; for caulking cracks in retorts, ovens, boiler walls and settings; for making small emergency repairs on steam lines, furnaces, etc.; as a separator or gasket between the cope and drag of foundry flasks; for wire wiping and countless other services too numerous to mention.

### Construction Details

J-M Asbestos Wick is made by twisting one or more strands of pure or commercially pure asbestos roving or felted asbestos, with or without a small cotton yarn in the center, depending upon the particular style. All styles are furnished without lubrication or graphite.

When desired, the individual strands comprising the wick may be untwisted and used separately. Or, when a larger size is required, two or more lengths may be twisted together to form any thickness desired.

### Styles Available

**WICK MADE FROM PURE FELTED ASBESTOS.** The following styles of asbestos wick, exclusive with Johns-Manville, are made from strands of *pure* felted asbestos twisted together. They have greater tensile strength than wick made from roving and are easier to handle without breaking.

**STYLE No. 4202**—This is the most popular style of J-M Felted Asbestos Wick, and is made of three strands of *pure* felted asbestos, twisted together. Each strand has a small cotton yarn through the center. Style No. 4202 is the strongest and most convenient style of asbestos wick available.

**STYLE No. 4199**—The same as Style No. 4202, except that it consists of a *single* strand of pure felted asbestos.

**STYLE No. 4197**—This is made of a single strand of *soft* twisted pure felted asbestos. It is used primarily for sealing acid carboy stoppers and for similar services.

**STYLE No. 4198**—The same as Style No. 4197 except that it is twisted more tightly and has a harder finish.

**WICK MADE FROM ASBESTOS ROVING**

**STYLE No. 4195**—Made of a single twisted strand of commercially pure asbestos roving.

**STYLE No. 195**—Made of several strands of commercially pure asbestos roving twisted together.

**STYLE No. 202**—This is the same as Style No. 195 except that strands of *pure* asbestos roving are used instead of commercially pure.

**STYLE No. 199**—Made of a single twisted strand of *pure* asbestos roving.

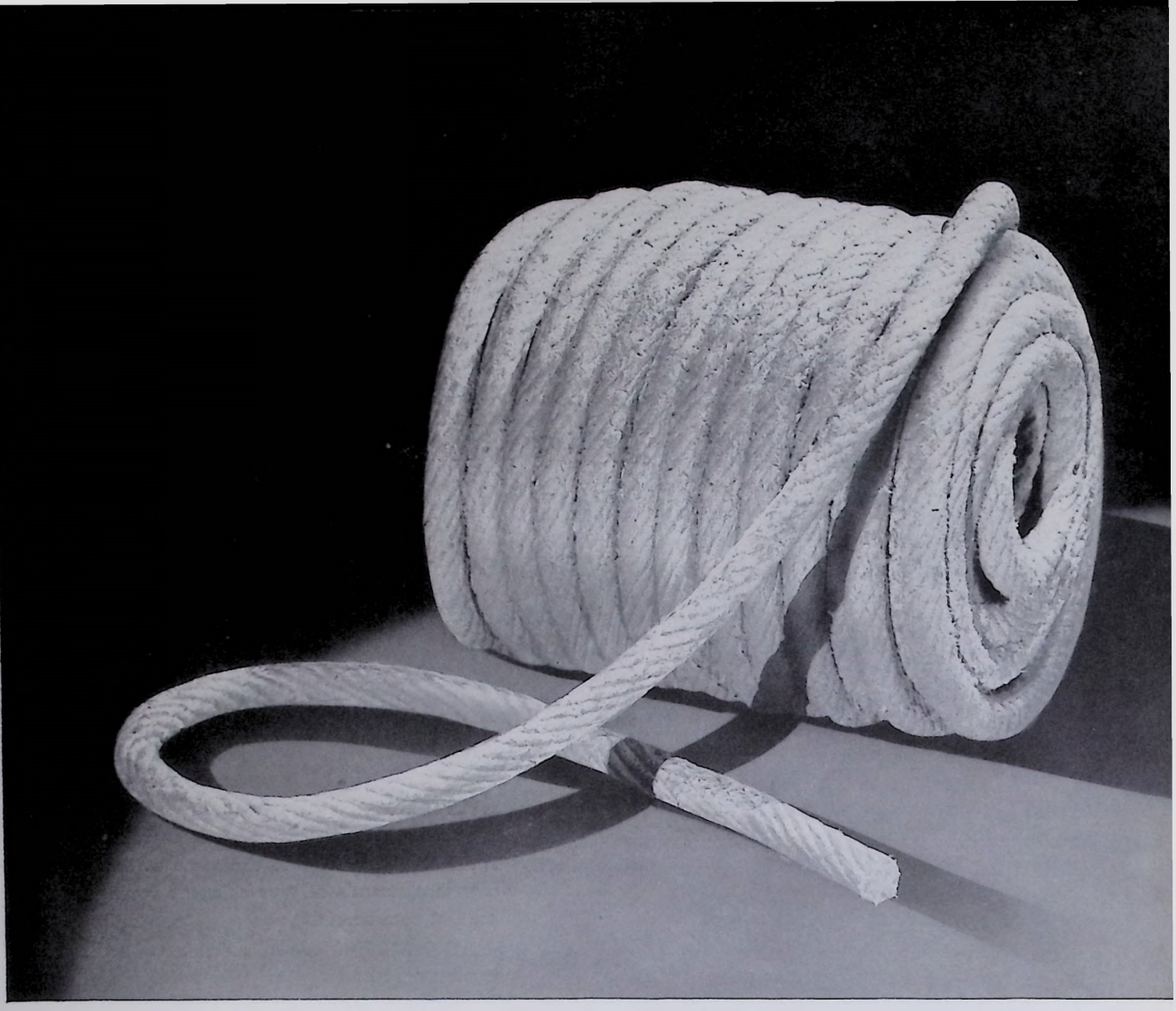
**STYLE No. 4193**—This is designed specially for service against acid. Made of pure blue African asbestos roving, it provides the maximum degree of resistance to acid conditions.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Description | Number of plies | Approx. thickness, in. | Approx. wt., lbs. per 100 lin. ft. | Form of Package |
|---|---|---|---|---|---|
| 4202 | Pure asbestos, cotton center | 3 ply (Standard)<br>1 ply (Special)<br>2 ply (Special) | ¼″<br>5/32″<br>7/32″ | 2.5<br>.74<br>1.5 | All styles furnished as follows:<br>25 or 50 lb. paper tubes or ¼, ½ and 1 lb. balls |
| 4199 | Pure asbestos, cotton center | single strand | ¼″ | 2 | |
| 4197 | Pure asbestos, soft finish | single strand | ¼″ | 2 | |
| 4198 | Pure asbestos, hard finish | single strand | ¼″ | 2 | |
| 4195 | Commercially pure asbestos | single strand | ¼″ | 1.66 | |
| 195 | Commercially pure asbestos | 4 ply (Standard)<br>1 ply (Special)<br>2 ply (Special)<br>3 ply (Special) | ¼″<br>⅛″<br>3/16″<br>7/32″ | 1.66<br>.37<br>.84<br>1.25 | |
| 202 | Pure asbestos | 4 ply | ¼″ | 1.58 | |
| 199 | Pure asbestos | single strand | ¼″ | 1.54 | |
| 4193 | Pure blue asbestos | multiple strand | ¼″ | .66 | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 91 of 117
Published by AsbestosClaims.Law
asbestosclaims.law/library/13710/91



# J-M Twisted Asbestos Rope Packing

***Larger than asbestos wick, but otherwise similar in properties, J-M Twisted Asbestos Rope is recommended for packing, caulking and gasketing where a material thicker than asbestos wick is desired.***

J-M TWISTED ASBESTOS ROPE is widely used throughout industry in a variety of miscellaneous services. It is pliable and adaptable—conforms readily to irregularities in groove surfaces and is easily worked and compressed.

Among the many and varied services for which Johns-Manville Twisted Asbestos Rope is used are the following: For caulking joints between furnace doors and brickwork; for expansion joints on boiler drums, furnace brickwork and blast furnace connections; and for packing explosion doors, gas generator doors, manhole covers, etc.

### Construction Details

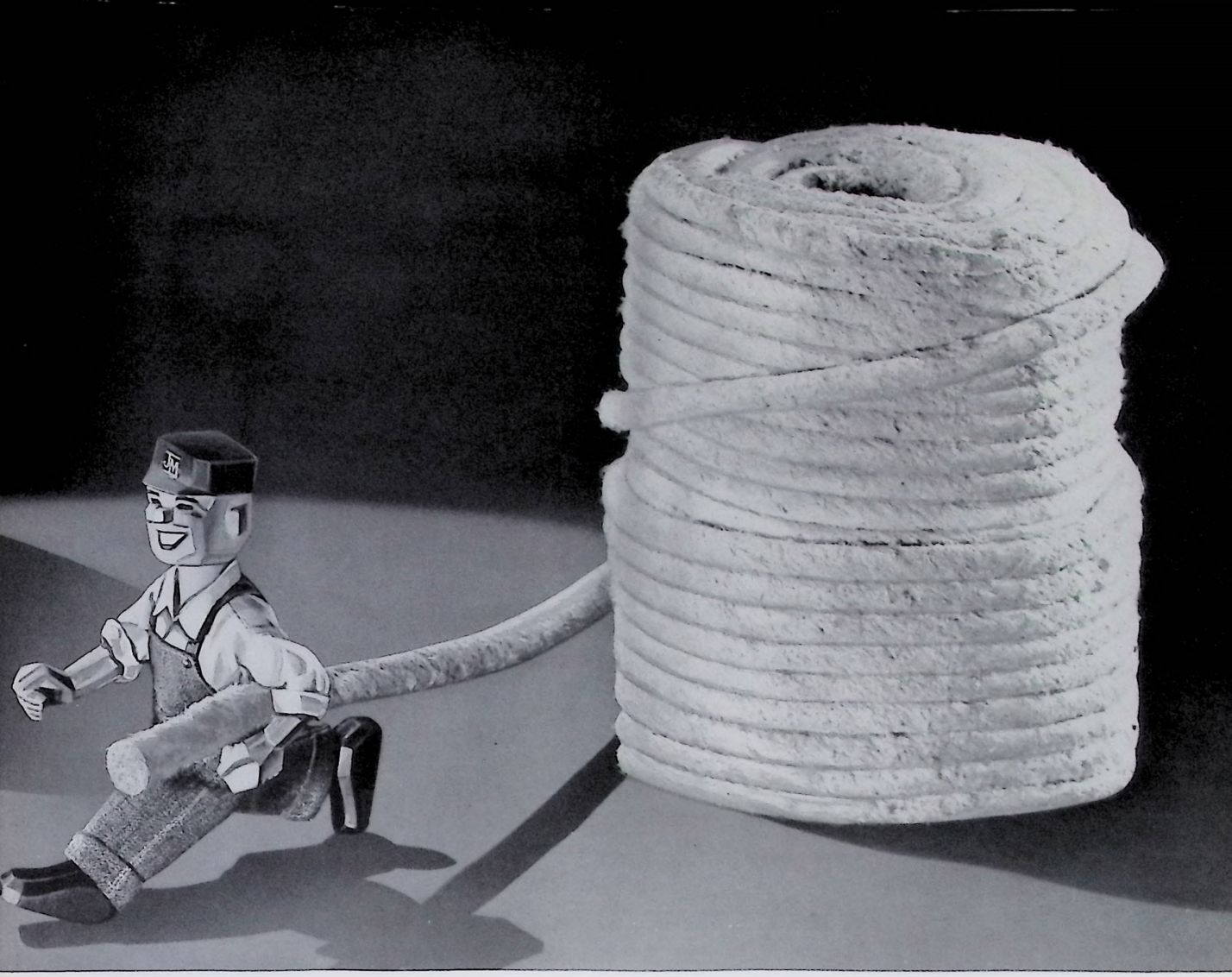
J-M Twisted Asbestos Rope is made from various styles of J-M Asbestos Wick. Two or more strands of wick are twisted tightly together to form a rope of any desired size. The center strands are bonded with a light coating of a suitable compound to provide additional strength and to prevent breaking or raveling during handling.

### Styles Available

**STYLE No. 4200**—This is the strongest, most adaptable and most widely used style of J-M Twisted Asbestos Rope. It is made by twisting tightly together



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 92 of 117
Published by AsbestosClaims.Law
asbestosclaims.law/library/13710/92



a number of strands of *pure* felted asbestos wick {Styles No. 4202 or No. 4199 depending upon the size — see page 91}. J-M Style No. 4200, shown at left above, is furnished in sizes 3/8″ and up.

**STYLE No. 4196**—A commercially pure twisted asbestos rope that is satisfactory for most ordinary conditions. It is manufactured by twisting together strands of roving type asbestos wick. No. 4196, shown at right above, is furnished in sizes 3/8″ and up.

**STYLE No. 200**—This is a high quality pure asbestos twisted rope for use against unusually high temperatures. It is made by twisting together strands of *pure* roving type asbestos wick. Sizes 3/8″ and up.

**STYLE No. 4194**—Specially recommended for service against acids, Style No. 4194 is made by tightly twisting together a number of strands of Style No. 4193 pure blue African Crocidolite asbestos wick {acid-resisting}. It is furnished in sizes 3/8″ and up.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | |
|---|---|---|---|---|---|---|
| | 3/8″ | 1/2″ | 5/8″ | 3/4″ | 7/8″ | 1″ |
| **4200** | 5 | 10 | 14 | 20 | 25 | 34 |
| **4196** | 5 | 10 | 14 | 20 | 25 | 34 |
| **200** | 6 | 11 | 17 | 25 | 30 | 40 |
| **4194** | 4 | 8 | 12 | 16 | 20 | 27 |

Form of Package

All styles furnished in coils weighing:
10, 25 and 50 lbs.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 93 of 117
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# J-M Braided Asbestos Rope

***Having a more compact structure than twisted rope, J-M Braided Asbestos Rope endures abrasion and rough usage over longer periods of time.***

LIKE the twisted styles of rope, J-M Braided Asbestos Rope serves many varied purposes in industrial use. However, because of its greater strength and firmness, it is usually more satisfactory in services where mechanical action is apt to be severe.

Among its successful uses are the following: groove packing for the covers of kiers and similar vessels, manhole covers and inspection doors; packing around coke oven door jambs and oven and flue cap doors; insulation on flexible or curved heated piping; filling for expansion joints in furnace brickwork; blow-off pipe protection in H.R.T. boilers; hot blast valve packing; and many similar locations requiring a dry, heat-resisting material which will endure rough usage.

### Construction Details

J-M Braided Asbestos Rope is made from pure or commercially pure asbestos yarn, braided jacket-over-jacket, or by braiding one or more jackets over a core of twisted asbestos rope, or by plaiting asbestos yarn into square cross-section. The braid-over-braid styles are firmer and have greater mechanical strength, while the plaited styles, being softer, deform more readily and are used where greater compression is desirable.

### Styles Made From Commercially Pure Asbestos

**STYLE No. 566** *(round)*—The most popular J-M Braided Asbestos Rope *(shown at left above)*. Made by braiding one or two jackets, depending upon size, of commercially pure asbestos yarn over a core of commercially pure twisted asbestos rope. In sizes 1/8″ to 3/4″, inclusive, it is furnished with one braided jacket; in sizes 7/8″ and larger, with two braided jackets.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 94 of 117
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**STYLE No. 787** *(square)**—Made with the same construction and of the same material as Style No. 566, but is calendered, after braiding, to square cross-section. Furnished in sizes 3/16″ and up.

**STYLE No. 702** *(round)*—One of the firmest and strongest types of asbestos rope, Style No. 702, shown at right of illustration, is made of commercially pure asbestos yarn, braided into jackets, one over the other, in sizes 1/8″ and up.

**STYLE No. 733** *(square)**—Similar to Style No. 702 in both material and construction, Style No. 733 is calendered to square cross-section. Sizes 3/16″ and up

**STYLE No. 580** *(square)*—Plaited square from commercially pure asbestos yarn and is recommended for use where a soft, easily deformed, yet strong asbestos rope is required. Furnished in sizes 3/16″ and up.

**STYLE No. 581** *(square)*—Similar to Style No. 580 except that the strands of asbestos yarn contain fine copper wire to give added strength and durability. It is furnished in sizes 3/16″ and up.

### Styles Made From Pure Asbestos

**STYLE No. 857** *(round)*—Made by braiding one or two jackets of pure asbestos yarn over a core of twisted pure asbestos rope. Furnished in sizes 1/8″ to 3/4″ with one braided jacket; and in sizes 7/8″ and larger with two braided jackets.

**STYLE No. 869** *(square)**—This is the same as Style No. 857 but is calendered to square cross-section. It is furnished in sizes 3/16″ and up.

**STYLE No. 788** *(round)*—This is recommended for use against extremely high temperatures. Made of jackets of pure asbestos yarn braided one over the other and furnished in sizes 1/8″ and up.

**STYLE No. 873** *(square)**—Similar to Style No. 788 except that it is calendered to square cross-section. Furnished in sizes 3/16″ and up.

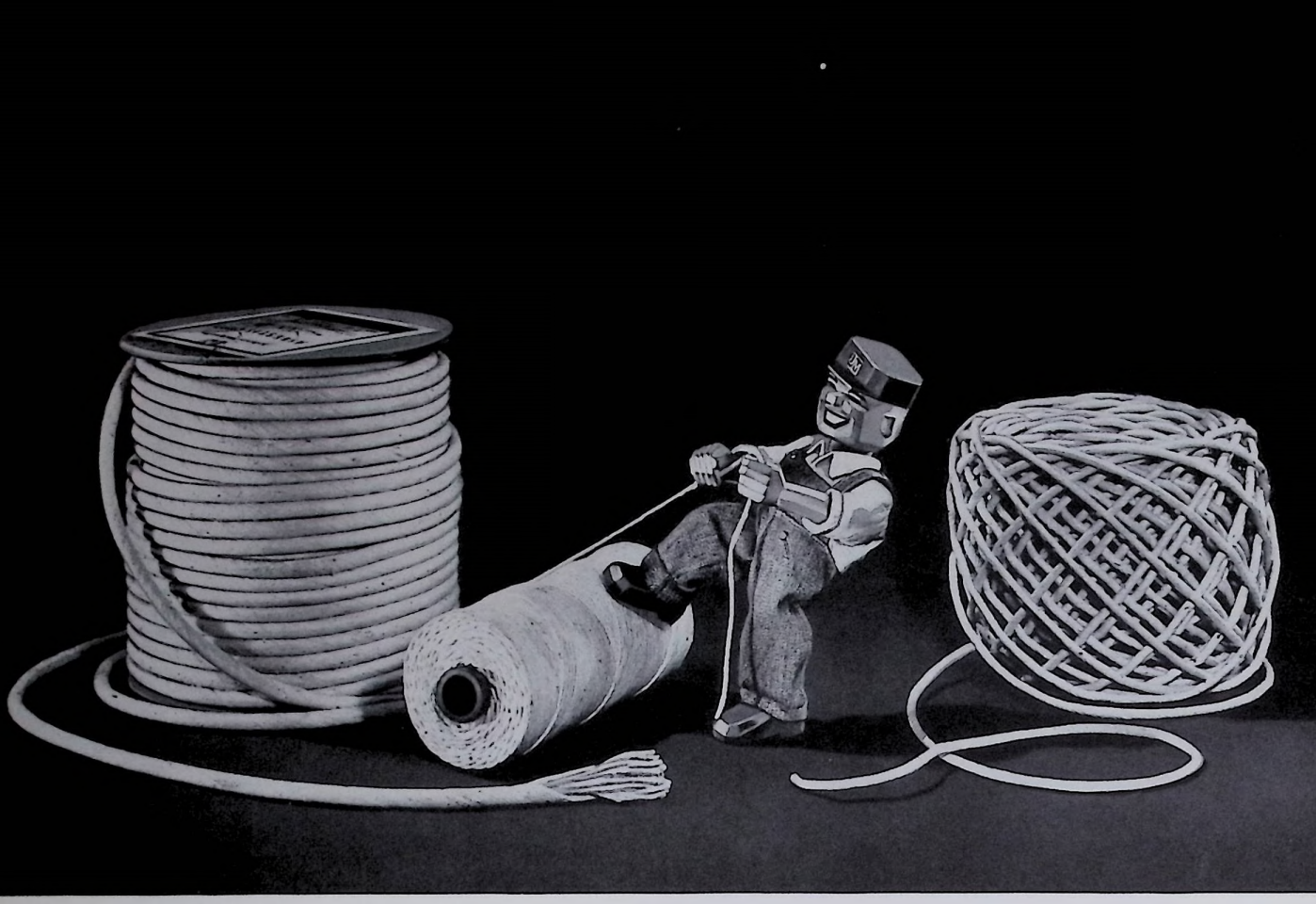
* Styles 787, 733, 873 and 869 can also be furnished rectangular in minimum thicknesses of 3/16″ and in widths not greater than twice the thickness.

**SIZES, APPROXIMATE WEIGHTS AND METHOD OF PACKAGING**

| Style No. | Approximate weight, lbs. per 100 lin. ft. | | | | | | | | | | Style of Package |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/8″ | 3/16″ | 1/4″ | 5/16″ | 3/8″ | 1/2″ | 5/8″ | 3/4″ | 7/8″ | 1″ | |
| 566 | .67 | 1.25 | 2 | 3 | 5 | 7 | 14 | 16 | 25 | 34 | |
| 787 | — | 2 | 3 | 5 | 7 | 14 | 16 | 25 | 34 | 40 | |
| 702 | .67 | 1.25 | 2 | 3 | 5 | 9 | 14 | 20 | 25 | 34 | All round styles furnished in 10, 25 or 50 lb. coils. |
| 733 | — | 2 | 3 | 5 | 9 | 14 | 20 | 25 | 34 | 50 | |
| 580 | — | 1.5 | 3 | 5 | 7.5 | 10.5 | 16.5 | 30 | 37 | 51 | All square styles furnished on 10, 25 or 50 lb. reels. |
| 581 | — | 1.75 | 4.5 | 6.5 | 9 | 12.5 | 19 | 33 | 42 | 56 | |
| 857 | .75 | 1.4 | 2 | 3 | 6 | 8 | 15 | 19 | 27 | 36 | |
| 869 | — | 2 | 3 | 6 | 8 | 15 | 19 | 27 | 36 | 50 | |
| 788 | .75 | 1.4 | 2.25 | 3.25 | 7.75 | 11 | 16.75 | 25 | 34 | 50 | |
| 873 | — | 2.25 | 3.25 | 7.75 | 11 | 16.75 | 25 | 34 | 50 | 66 | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 95 of 117
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# J-M Twisted Asbestos Cord

***Particularly recommended for suspending small objects in contact with flame and for string packing of small valve stems, J-M Twisted Asbestos Cord has a smooth, hard finish and is stronger and more durable than braided or twisted rope.***

BECAUSE of its hard finish and great tensile strength, J-M Twisted Asbestos Cord is especially serviceable in glass and chemical works, laboratories, plating works and wherever it is necessary to suspend metals, retorts, crucibles, etc., in contact with flame, heat, caustic solutions or weak acids. It is also used as a packing for small valve stems.

### Styles Available

**STYLE No. 285**—This material is made of strands of strong 1, 2 or 3-ply asbestos yarn twisted tightly together into a cord of the required diameter and treated with a suitable dressing to prevent raveling and provide a smooth, hard finish. It is furnished in sizes 1/16" and up.

**STYLE No. 274**—This is similar to Style No. 285 except that it is made of heavier asbestos yarns and is therefore lower in cost. It is also available in sizes 1/16" and up.

**SIZES, APPROXIMATE WEIGHT AND METHOD OF PACKAGING**

| Style No. | Approx. wt., lbs. per 100 lin. ft. | | | | Form of Package |
|---|---|---|---|---|---|
| | 1/16" | 1/8" | 3/16" | 1/4" | |
| 285 | .2 | .80 | 1.80 | 2.85 | 1 and 5 lb. paper tubes in boxes, or ¼, ½ and 1 lb. balls, or 5, 10, 25 and 50 lb. spools. |
| 274 | .2 | .714 | 1.54 | 2.5 | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 96 of 117
Published by AsbestosClaims.Law
asbestosclaims.law/library/13710/96



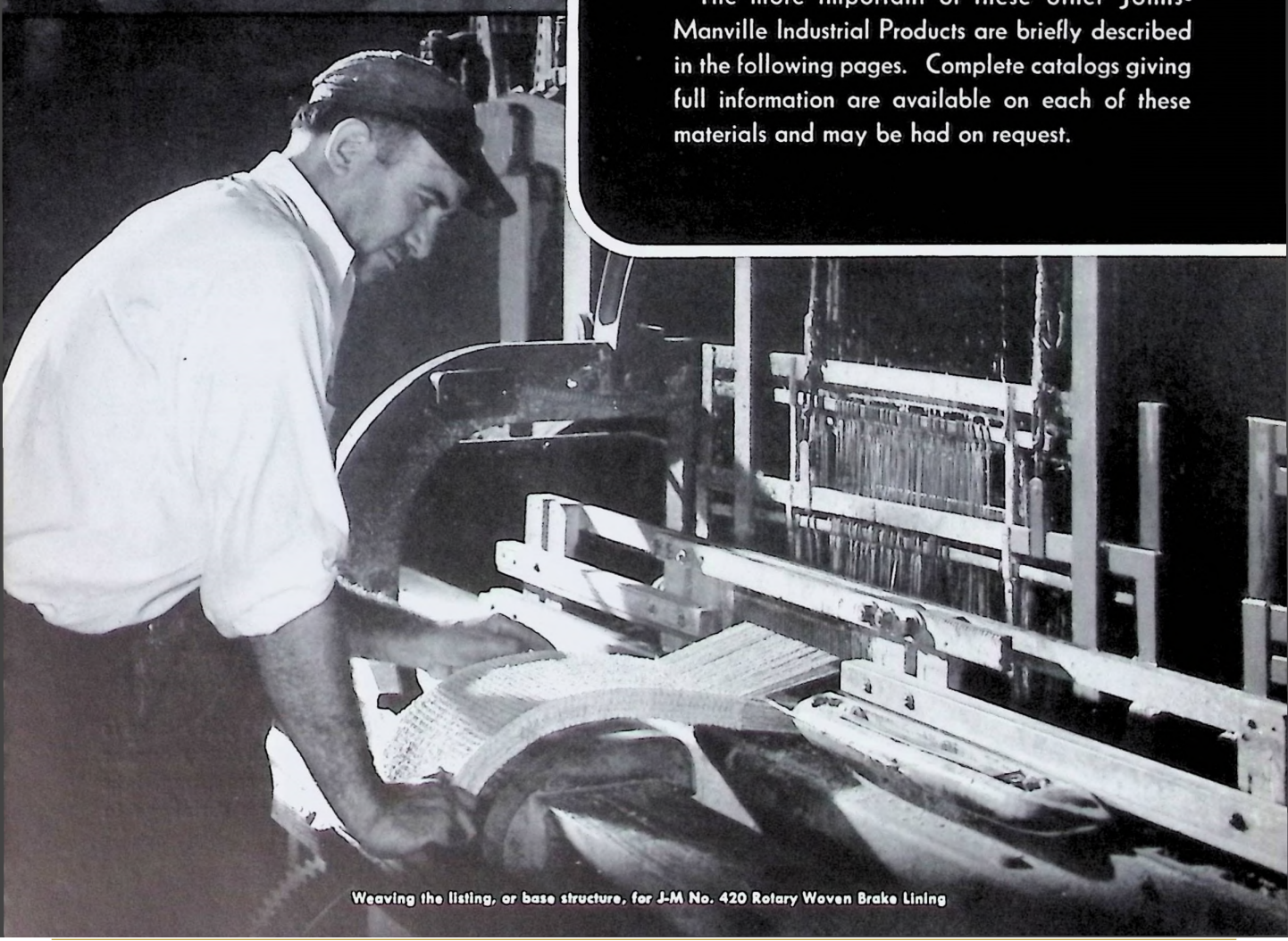
J-M Industrial Insulations are made in brick, block, cement and pipe-covering forms

# Johns-Manville
# INDUSTRIAL PRODUCTS

For more than 80 years Johns-Manville has pioneered in the development of products designed to minimize industrial waste, reduce maintenance expense and provide permanent, fireproof building materials for the protection of costly investments.

In addition to packings and gaskets, Johns-Manville manufactures many other materials which have played important parts in helping American industry to produce better products at lower cost. For example, J-M Insulating Materials, alone, are cutting the nation's industrial fuel bill by more than $250,000,000 each year.

The more important of these other Johns-Manville Industrial Products are briefly described in the following pages. Complete catalogs giving full information are available on each of these materials and may be had on request.

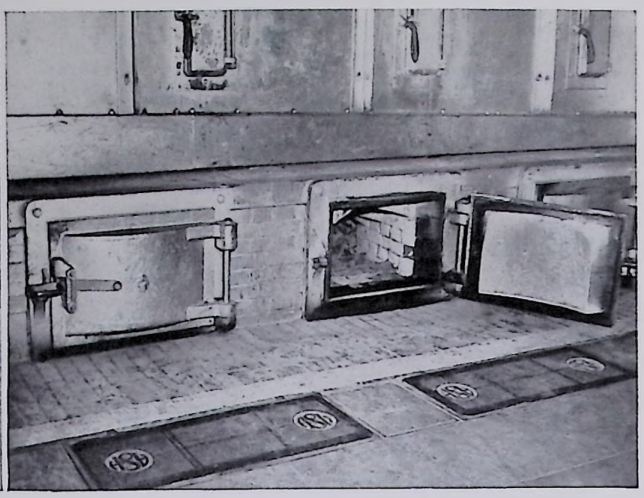


Weaving the listing, or base structure, for J-M No. 420 Rotary Woven Brake Lining


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J-M Firecrete is ideal for casting special shapes right on the job. When mixed with water it handles as easily as ordinary concrete.



Refractory linings for furnace and boiler doors of all types are quickly and easily cast with Firecrete Castable Refractories.

# J-M Refractory Products

## J-M Firecrete Castable Refractories

*for monolithic refractory construction and for casting special shapes.*

FIRECRETE is a castable refractory that has greatly simplified many types of construction which formerly were difficult and expensive to handle with standard fire brick or special refractory shapes. It is shipped dry and, when mixed with water on the job, can be handled as easily as ordinary concrete. It may be either tamped or poured in place.

Firecrete is recommended for furnace doors of all types, furnace bottoms, baffle tile, header protector tile, burner rings, pipe linings and miscellaneous special refractory shapes. It is highly resistant to spalling and has practically no drying or firing shrinkage. Firecrete is furnished in the following types, all of which are shipped in 100-lb. bags:

**STANDARD FIRECRETE for temperatures up to 2400° F.** This is the most generally applicable type of Firecrete. Due to its relatively fine gradation, it can be used for monolithic construction as thin as 1-1/2".

**H. T. FIRECRETE for temperatures up to 2800° F.** Similar in properties and uses to Standard Firecrete, but has considerably higher heat resistance which makes it suitable for use up to 2800° F.

**L. W. FIRECRETE for temperatures up to 2200° F.** Similar to Standard Firecrete but much lighter in weight. It has unusually low thermal conductivity, low heat storage capacity and remarkable resistance to spalling. L. W. Firecrete will withstand direct exposure to flame temperatures. It is especially recommended for casting small intermittent furnaces, furnace doors and bottoms, and special shapes.

With 50% lower heat storage capacity than fire brick, it is particularly suited for use in intermittently operated furnaces, because the furnace can be brought up to temperature more rapidly and 40% less heat is wasted as the furnace cools. Its low thermal conductivity, less than half that of fire brick, also recommends it for continuous furnaces.

**J-M CHROME CASTABLE for temperatures up to 3200° F.** Designed particularly for poured bottoms of forging furnaces where it effectively resists abrasion and the attack of iron scale, thus helping to produce cleaner forgings. It is ideal also as a slag-resistant base for billets.

## J-M Hellite

*A ready-mixed, plastic, air-setting cement for brick setting, wash-coating and shallow patching.*

FINELY ground and easily worked, J-M Hellite is an excellent general purpose refractory cement for temperatures up to 3000° F. It assures strong, tight joints, excellent adherence, minimum shrinkage in



Johns-Manville Packings (1941)
ACL Doc 13710 · Page 98 of 117
Published by AsbestosClaims.Law
asbestosclaims.law/library/13710/98

drying and firing, and will not bloat on rapid heating.

Hellite may be used for setting brick with either thin or heavy joints; for wash-coating, in which service it notably increases the resistance of fire brick to gases; and for shallow patching, either hot or cold, with paddle or gun. Hellite is supplied in proper consistency for immediate use with paddle or trowel and can be thinned with water for thin mortar joints or for gun or brush coatings.

## J-M No. 31 Refractory Cement

***A dry, heat-setting cement for bond or cushion joints.***

RATHER coarsely ground, this material is recommended for making joints 1/8″ to 3/16″ in thickness. Used in this way, it minimizes refractory maintenance by protecting the edges of the brick and by reducing damage caused by clinkering, slagging and spalling. Mixed with water, it develops exceptional workability and remains well in suspension. Temperature limit 3100°F.

## J-M No. 32 Refractory Cement

***A dry, heat-setting cement for brick-to-brick joints and for wash-coating.***

THIS is similar to No. 31 Cement except that it has a finer base. When mixed with water it develops excellent plasticity, handles easily and will not settle in the mixing box. It is an ideal material for thin, brick-to-brick joints and for wash-coating furnace interiors. Temperature limit 3100° F.

## Complete Data Available

Much additional information on the complete line of J-M Refractory Products, including the special refractories listed in the table below, is given in Refractory Catalog D.S. 700, a copy of which may be had on request. This catalog also contains a recommendation table, listing the proper refractory cement to use for many different types of service.



**Used for setting fire brick and for wash-coating furnace interiors, J-M Refractory Cements minimize furnace maintenance.**

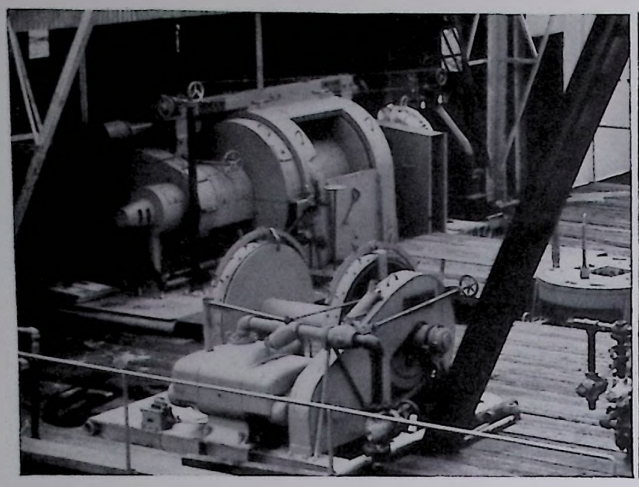
**DATA ON JOHNS-MANVILLE REFRACTORY PRODUCTS**

| Cement | Character of base | Highest working temperature, Deg. F. | Lowest working temperature, Deg. F. | Pounds needed to set 1000 brick | Pounds needed for 1 cu. ft. of monolithic construction | Form in which cement is shipped | Size of bags, cans or drums, pounds |
|---|---|---|---|---|---|---|---|
| Hellite | Al. Silicate | 3000 | Air-setting | 400† | | Ready-mixed | 100, 250, 500 850‡ |
| No. 32 | Al. Silicate | 3100 | 1250 | 400† | | Dry | 100 |
| No. 31 | Al. Silicate | 3100 | 1450 | 600* to 700* | | Dry | 100 |
| Std. Firecrete | Al. Silicate | 2400 | Air-setting | | 110 | Dry | 100 |
| H.T. Firecrete | High Alumina | 2800 | Air-setting | | 115 | Dry | 100 |
| L.W. Firecrete | Al. Silicate | 2200 | Air-setting | | 65 | Dry | 100 |
| J-M Chrome Castable | Chrome Ore | 3200 | Air-setting | | 180 | Dry | 100 |
| No. 20 | Silica | 2700 | Air-setting | 400† | | Ready-mixed | 100, 250, 500, 850‡ |
| No. 26 | Al. Silicate | 2900 | Air-setting | 600* to 700* | | Dry | 100 |
| No. 30 | Si. Carbide | 3000 | 1450 | 800* | | Dry | 100 |
| No. 33 | Kaolin | 3300 | 1250 | 750* | 130 | Dry | 100 |
| No. 34 | Chrome | 3400 | Air-setting | 600 | 200 | Dry | 100 |
| No. 35 | High Alumina | 3500 | 1200 | 750* | 130 | Dry | 100 |
| P.F.B.M.** | Al. Silicate | 3100 | 1500 | | 133 | Ready-mixed | 100, 250, 500 |

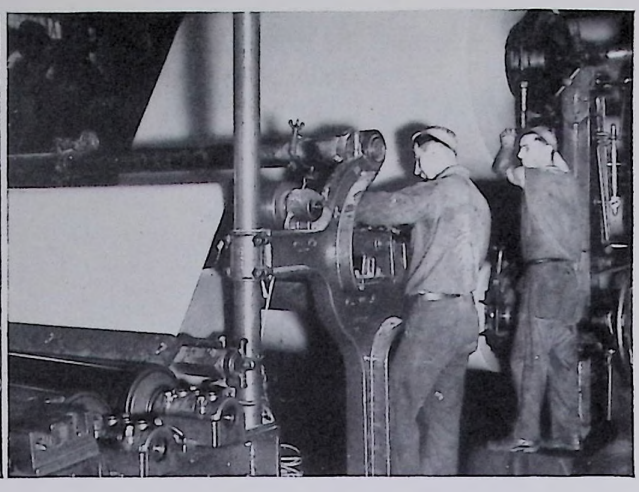
* The figure given is for a bond joint, ⅛ to 3/16 in. thick. Without asterisk, the quantities are for brick-to-brick joints.
** Plastic Fire Brick Material.
† Approximate quantities required for wash-coating 100 sq. ft.: 35 lb. Hellite with 7 lb. water; 50 lb. No. 32 with 30 lb. water; 40 lb. No. 20 with 7 lb. water.
‡ Also furnished in 5, 10, 25 and 50-lb. containers.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 99 of 117
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This IDECO Winch and IDECO Rotary Hoist, made by International Derrick and Equipment Co., are equipped with J-M No. 420 Lining.



Paper machine brake costs were reduced 79% in the Bogota P and B Corp. plant when they changed to Johns-Manville Friction Blocks.

# J-M Industrial Friction Materials

J-M Industrial Friction Materials are available in a wide variety of flexible and rigid styles designed to meet every industrial service requirement. All these materials possess unusual resistance to heat, uniformity of friction, long life and durability. The flexible styles are recommended for average and high speed service and are adaptable to all sizes of drums. They readily conform to irregular surfaces and require only a minimum wearing-in period. The rigid styles are noted for mechanical strength, quiet operation and maximum resistance to heat. They are designed for low or average speed and severe shock service, and their wearing-in period is relatively short.

**J-M FOLDED AND COMPRESSED GROUND LINING, STYLE No. 600** — A flexible, mechanically strong general utility lining with a low rate of wear and wide range of application. It is adaptable for various speeds, withstands shock load conditions and will resist temperatures up to 500° F. Made of asbestos cloth woven from brass wire-inserted yarns, coated both sides with heat resisting compound, folded, pressed, cured by heat and ground to provide a short wearing-in period.

**J-M WOVEN AND COMPRESSED GROUND LINING, STYLE No. 900** — The latest development in flexible brake linings. Woven solid from long fibre asbestos yarns, compressed, cured by heat and ground to reduce the wearing-in period. Style No. 900 provides the same general frictional characteristics and wide range of application as Style No. 600 and is particularly recommended for temperatures above 500° F.

**J-M GIANT WOVEN, STYLE No. 400**— Designed for severe services. Woven solid from multi-metal wire-inserted asbestos yarns, it provides a relatively high coefficient of friction, unusually good heat resistance.

**J-M STANDARD WOVEN LINING, STYLE No. 300**— Recommended for light, high-speed service where a relatively high and constant coefficient of friction is required through a wide range of temperatures. Woven solid from brass wire-inserted asbestos yarns.

**J-M OIL-RESISTING LININGS, STYLES No. 304 and 404** — Similar to Styles No. 300 and 400, respectively, but impregnated with an inorganic oil-resisting compound. *{Made on special order only.}*

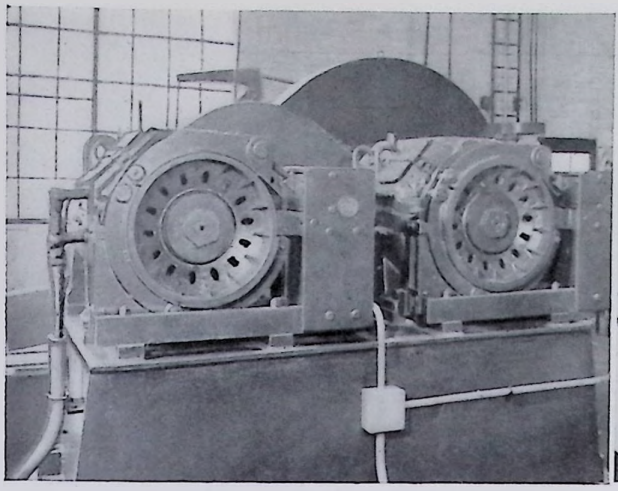
**J-M GIANT WOVEN ROTARY LINING, STYLE No. 420** —An exceedingly rugged lining developed for use on brakes of rotary draw works used in drilling oil wells. Particularly recommended for deep drilling operations. Made from wire-inserted asbestos yarns, woven tightly together by an improved weaving method, and impregnated with a resinous compound.

**J-M GIANT WOVEN ROTARY LINING, STYLE No. 430** —Designed for brakes on rotary draw works used in drilling wells of average depth. Made of the same base structure as Style No. 400, this lining is rugged but not quite as dense as Style No. 420. Contains a resinous impregnation.

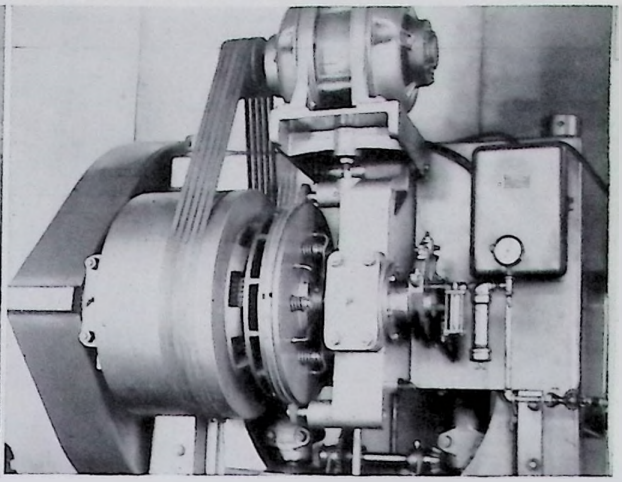
**J-M HEAVY DUTY WOVEN GROUND LINING, STYLE No. 510** — A dense, solid woven lining with excep-



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 100 of 117
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Variable-voltage blast furnace skip-hoist engine driven by two motors with brakes equipped with J-M Folded and Compressed Linings.



Both the clutch and brake of this Minster Multiple Disc Synchronized clutch and brake assembly are lined with J-M Moulded Facings.

tionally good non-scoring properties and high mechanical strength. Woven from multi-metal wire-inserted asbestos yarns.

**J-M FRICTION BLOCKS, STYLE No. 140** — A high quality, general purpose rigid brake block providing a remarkably low rate of wear, particularly in the higher ranges of temperatures, and a medium coefficient of friction. Moulded from selected asbestos, brass particles and an oil-resisting binder.

**J-M FRICTION BLOCKS, STYLE No. 135** — A long-wearing rigid brake block with an unusually low and constant coefficient of friction. Particularly recommended where smooth, continuous tensions are required. Contains no metal.

**J-M MOULDED FRICTION LINING, STYLE No. 240** — A rigid moulded lining of medium friction designed as a companion product to Style No. 140 brake block. Contains brass particles.

**J-M MOULDED FRICTION LINING, STYLE No. 230** — A rigid moulded lining with a medium coefficient of friction. Made like a brake block. Contains no metal.

**J-M MOULDED FRICTION LINING, STYLE No. 235** — A rigid moulded lining with a low coefficient of friction. Contains no metal.

**J-M CLUTCH FACINGS** for cone and disc clutches, are made from any of the above materials. Insert blocks can be furnished from block materials and some fabric structures.

**J-M RIVET HOLE PLUGS, STYLE No. 1200** reduce scoring by preventing dirt and other erosive materials from accumulating in countersinks. Furnished in stick form, Style No. 1200-S and as preformed plugs of the correct size and thickness, Style No. 1200-F.

### Complete Data and Recommendations

Brochure FM-7A gives more complete information on all of the J-M Industrial Friction Materials described above, including data on coefficient of friction, sizes and thicknesses available and the service conditions for which each material is recommended. This brochure also contains a detailed recommendation table which indicates the most efficient and economical friction materials to use for a wide variety of industrial equipment and for various operating conditions. A copy of this brochure may be had on request.



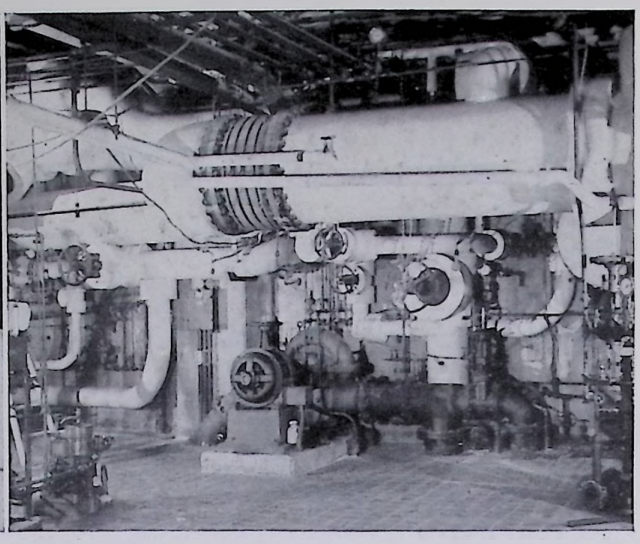
This huge Marion shovel, Type 5560, fitted with a 32 cu. yd. dipper is equipped with Johns-Manville Giant Woven Lining.



Johns-Manville Packings (1941)
ACL Doc 13710 · Page 101 of 117
Published by AsbestosClaims.Law
asbestosclaims.law/library/13710/101



Johns-Manville Superex is widely recognized as the most efficient block insulation available for use against temperatures up to 1900° F.



J-M 85% Magnesia blocks and pipe covering have long been the standard insulation for power plant equipment and steam lines.

# Johns-Manville Industrial Insulations

***Johns-Manville provides insulating materials for use throughout the entire range of industrial process temperatures and in forms suited to every mechanical requirement. The more important of these materials are described below:***

**J-M 85% MAGNESIA BLOCKS AND PIPE INSULATION:** For many years the standard insulation in the moderate temperature field, 85% Magnesia still ranks as the most generally satisfactory and economical material for service up to 600° F.

J-M 85% Magnesia blocks are furnished in standard sizes 3″ x 18″ and 6″ x 36″, flat or curved, from 1″ to 4″ thick and 12″ x 36″ from 1-1/2″ to 4″ thick. Other sizes and thicknesses and lagging on special order. Pipe insulation is furnished for all pipe sizes.

**ASBESTO-SPONGE FELTED SHEETS, BLOCKS AND PIPE INSULATION:** Formed of laminated sheets of asbestos felts and spongy, cellular material, its unusual insulating efficiency, high salvage value and ability to withstand vibration, shocks and rough usage make Asbesto-Sponge Felted the ideal material for temperatures up to 700° F. where maximum insulating efficiency and durability are desired. It retains its high insulating value unimpaired over long years of service, and can be removed and replaced without loss of efficiency.

Asbesto-Sponge Felted is furnished in sheets 24″ x 36″ and blocks 6″ x 36″, from 1/2″ to 4″ thick. Pipe insulation is furnished for all pipe sizes.

**SUPEREX BLOCKS AND PIPE INSULATION:** Superex, made of specially selected and calcined diatomaceous silica, bonded with asbestos fiber, safely withstands temperatures up to 1900° F. Because of its low thermal conductivity, a lesser thickness of Superex is required for the same insulating value than any material of equal heat resistance.

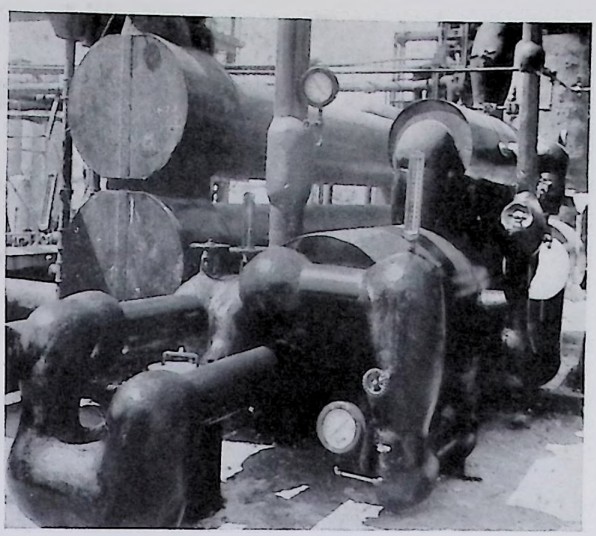
Superex Blocks are widely used for the insulation of boiler furnaces, hot blast stoves, open-hearth regenerators, glass tank regenerators, rotary cement kilns, metallurgical furnaces and other industrial equipment operated at high temperatures.

Blocks are furnished in standard sizes 3″ x 18″ and 6″ x 36″, flat and curved, from 1″ to 4″ thick and 12″ x 36″ from 1-1/2″ to 4″ thick. Other sizes and thicknesses on special order. Superex Pipe Insulation is furnished for all pipe sizes.

**SUPEREX COMBINATION BLOCK OR PIPE INSULATION:** Superex Combination Insulation (one or more layers of J-M 85% Magnesia or Asbesto-Sponge Felted outside an inner layer of Superex) results in greater insulating efficiency and heat resistance for a given insulation thickness. The Superex is always used next



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 102 of 117
Published by AsbestosClaims.Law
asbestosclaims.law/library/13710/102



J-M Rock Cork Pipe Covering and Sheets have established an enviable record for long life and high insulating efficiency in low temperature service.

to the hot surface as a protection for the 85% Magnesia or Asbesto-Sponge Felted, which, though high in insulation value, would not, if used alone, withstand the temperatures involved.

Superex Combination Insulation assures maximum insulating effectiveness on superheated steam lines, boiler settings, open-hearth regenerators, oil-still furnaces, heat-treating furnaces of many types and a wide variety of other high temperature industrial equipment.

**JOHNS-MANVILLE INSULATING BRICK AND INSULATING FIRE BRICK:** Seven types of J-M Insulating Brick and Insulating Fire Brick are available with temperature limits from 1600° to 2600° F. These materials are widely used, either in back of refractory linings or directly exposed as insulating fire brick in boilers, still furnaces, heat-treating furnaces, kilns and other types of high temperature equipment. They reduce operating costs, improve performance and permit thinner furnace wall construction. Used as insulating fire brick in intermittent furnaces, they also effect large savings in heat capacity losses during shutdowns, due to their unusually low heat absorption.

**SIL-O-CEL C-3 INSULATING CONCRETE:** Made of Sil-O-Cel C-3 (a calcined granular insulating material) and portland or lumnite cement, Sil-O-Cel C-3 Concrete may be cast in any desired form for lining furnace doors, insulating furnace bases and for many other purposes where a light-weight insulating-refractory concrete is required. Temperature limit 1800° F.

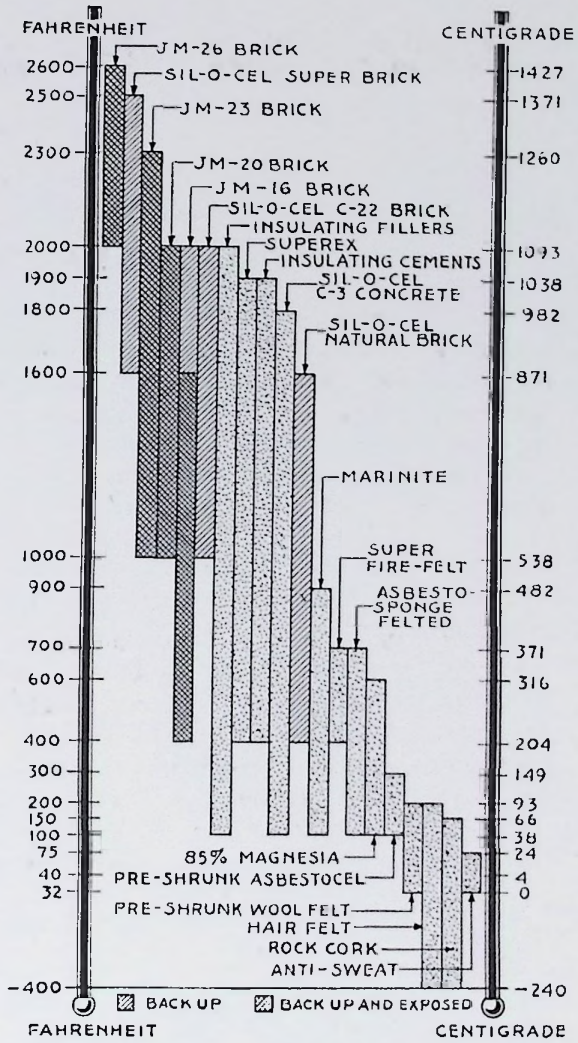
**J-M ROCK CORK SHEETS AND PIPE INSULATION:** J-M Rock Cork is an efficient insulating material for cold storage construction and refrigerating equipment and piping, manufactured from mineral wool combined with a waterproof binding ingredient. Because of its composition it is rot-proof, vermin-proof, odorless and will not absorb odors. Unusually moisture-resistant, it maintains its high insulating value unimpaired over long periods of time.

Standard size sheets are 18" x 36" and 1-1/2", 2", 2-1/2", 3" and 4" thick; also 18" x 18" x 1". Lagging and disks also furnished.

Rock Cork Pipe Insulation is furnished for all pipe sizes, in Ice Water, Brine and Heavy Brine thicknesses.

### Complete Catalog Available

In addition to the materials listed above, Johns-Manville also furnishes many other types of insulation. A complete catalog of all J-M Insulating Materials will be sent on request. Ask for Catalog IN-55A.






Johns-Manville Packings (1941)
ACL Doc 13710 · Page 103 of 117
Published by AsbestosClaims.Law
asbestosclaims.law/library/13710/103

# Other Johns-Manville Industrial Products

**TRANSITE WATER AND SEWER PIPE.** Hundreds of American municipalities and industrial plants are now using Transite Water Pipe to assure clean water, high pressures and minimum maintenance through the years. Made of asbestos fibre and cement, built up under high pressure on a polished steel mandrel, Transite Pipe is remarkably strong and highly resistant to corrosion. Since it is also immune to tuberculation, the internal corrosion that builds up on the interior of ordinary pipe, Transite assures permanently high delivery capacity and low pumping costs. Among its many industrial applications are its use as drainage lines in coal mines, as oil gathering and salt water disposal lines in the oil industry, and as water, pulp and stock lines in paper mills. Furnished in sizes 2″ to 36″, and for pressures up to 200 lbs. Full details in Catalog TR-11A. For information on Transite Sewer Pipe, ask for Brochure TR-21A.

**TRANSITE VENT PIPE.** Made in the same manner as Transite Water Pipe, this material is widely used as vents and stacks in industrial plants of every type. It is unusually resistant to weather and corrosive fumes and has proved a decidedly economical material because of its virtual freedom from maintenance. Complete information in engineering brochure D.S. 336.

**TRANSITE ELECTRICAL CONDUIT.** Made in the same way as Transite Pipe, this modern type of electrical conduit provides the advantages of lower installation cost and reduced operating and maintenance expense. Unusually strong and corrosion-resistant, it can be used underground without a concrete envelope. Unaffected by weather, it is also the ideal material for exposed locations. Transite Korduct is a thinner walled material for installation in concrete. For full information, ask for Brochure D.S. 410.

**TRANCELL.** A light-weight, strong, fire-resistant sheet for electrical cell structures and doors, barriers and partitions for housing and separating electrical equipment such as oil switches, current and potential transformers, disconnecting switches, bus bars, etc. Ask for brochure D.S. 426.

**DUXSEAL.** A plastic, putty-like material for sealing the openings of electrical ducts in manhole and cellar walls, and for a wide variety of other electrical and general industrial uses. Petroseal is a similar material especially treated to make it impervious to oil. Full information on both products is given in Data Sheet EL-160.



Transite Pipe has established an enviable record for efficient, low-cost service in hundreds of industrial and municipal water and sewer lines.

**TRANSITE CORE PLATES AND PALLETS.** Now widely used in foundries and in the ceramic industries where their light weight and resistance to warpage, breakage and corrosion are important advantages. Ask for Data Sheets.

**ASBESTOS FIBRE, TEXTILES AND CLOTHING.** The world's largest producer of asbestos and asbestos products, Johns-Manville has a complete line of asbestos fibres, cloth and other textiles, and clothing. For full information, ask for Brochure D.S. 760.

**CELITE FILTER AIDS.** Diatomaceous Silica powders which, 25 years ago, revolutionized industrial clarification processes. These materials assure perfect clarity and lower production costs in the manufacture of sugar, chemicals, oils, varnishes, fruit juices, beer, and a wide variety of other products. Ask for engineering brochure D.S. 450.

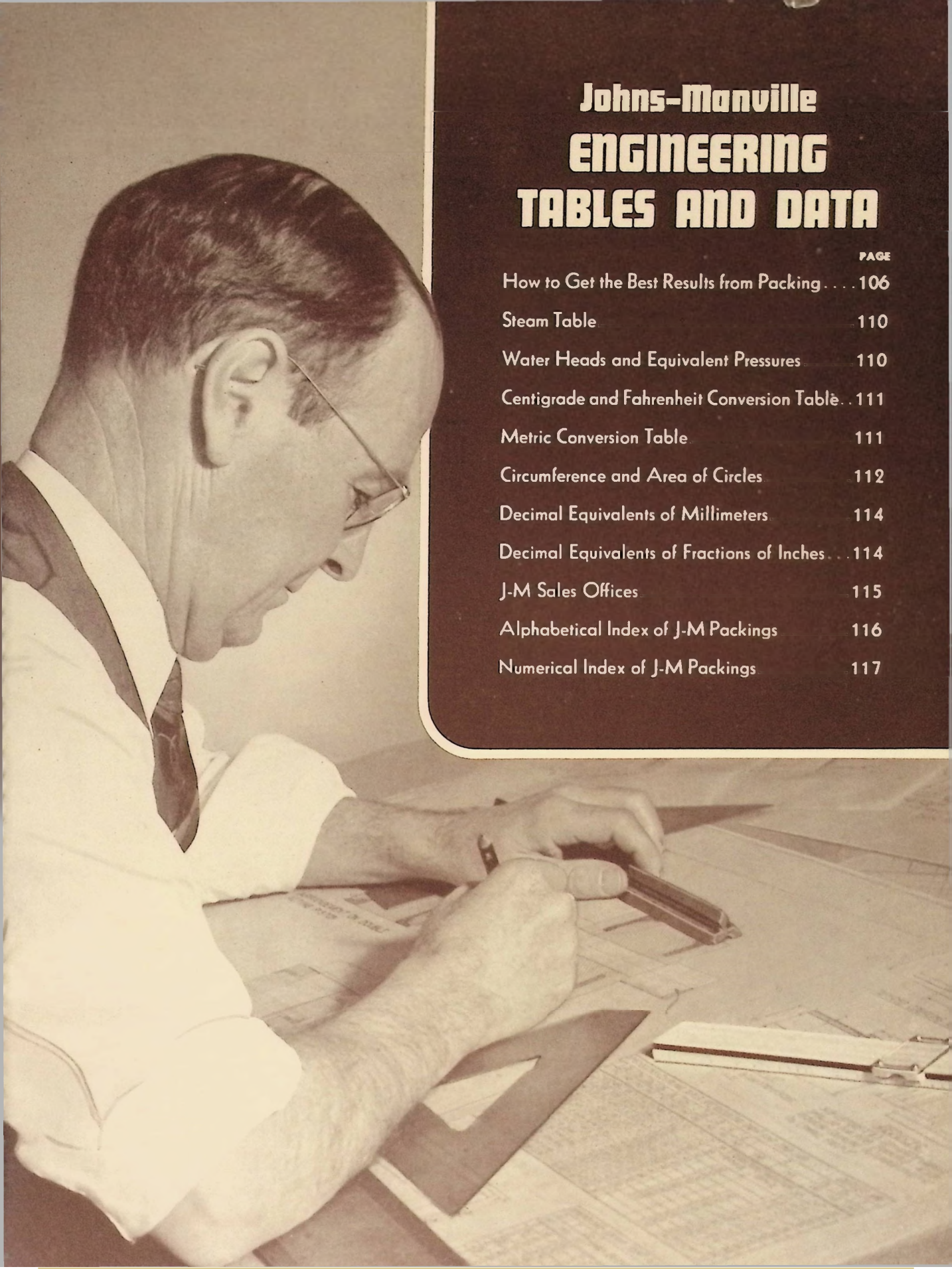
**J-M INDUSTRIAL BUILDING MATERIALS.** A few of the many J-M Building Materials are listed below with the form number of the specific catalog which gives full information on each:

| | |
|---|---|
| Built-up and Insulated Roofs . . . . . | BU-30A |
| Corrugated Transite Roofing and Siding | TR-12A |
| Asphalt Tile Flooring . . . . . | FL-20A |
| Transite Movable Asbestos Partitions . | TR-22A |
| Sound Control Materials . . . . . | AC-26A |

For further information on any J-M Materials, address the nearest Johns-Manville office listed on page 118.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 104 of 117
Published by AsbestosClaims.Law
asbestosclaims.law/library/13710/104



# Johns-Manville
# ENGINEERING TABLES AND DATA


| | PAGE |
|---|---|
| How to Get the Best Results from Packing | 106 |
| Steam Table | 110 |
| Water Heads and Equivalent Pressures | 110 |
| Centigrade and Fahrenheit Conversion Table | 111 |
| Metric Conversion Table | 111 |
| Circumference and Area of Circles | 112 |
| Decimal Equivalents of Millimeters | 114 |
| Decimal Equivalents of Fractions of Inches | 114 |
| J-M Sales Offices | 115 |
| Alphabetical Index of J-M Packings | 116 |
| Numerical Index of J-M Packings | 117 |




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# How To Get The Best Results From Packing

***There are four main factors that influence the life and performance of packings in service. By giving careful attention to all these factors, the most satisfactory service will be assured.***

**1. Quality of Packing Used**

The cost of materials in a repacking job is, in most cases, the smallest item of expense. Labor, lost production and general shut-down expense are the real items to consider. Therefore, in practically all cases, the best packing you can buy is the cheapest in the long run. Cost per year, rather than cost per pound, is the best way of judging packing quality.

**2. The Right Style for the Condition**

Recommendations governing the selection of packings for a particular service or set of conditions are given on pages 6 to 12 of this catalog. These recommendations are based on Johns-Manville's wide experience in the manufacture and installation of packings. Where there exists a special condition, not covered, a J-M Packing engineer will be glad to study plant requirements and submit detailed recommendations.

**3. Mechanical Condition of Equipment**

Scored, fluted, eroded, rusty, shouldered or bent rods, or rods running low or out of true, will shorten the life of any packing. Therefore, it is cheapest in the end to use only high quality rods and to see that they are properly maintained and cared for.

**4. Proper Installation and Maintenance of Packing**

Packings play an important role in the efficient operation of industrial equipment and should be maintained with the same care as is exercised with any other vital machine part. No packing, regardless of quality or characteristics, will operate with the highest degree of efficiency unless it is properly installed and cared for. The simple suggestions outlined on this and the following pages have been found helpful in prolonging the life of packing in service and eliminating many common packing problems.

---

## HOW TO GET THE MOST OUT OF ROD PACKINGS

1. First make sure the correct *style* packing is used.
   *a)* It is advisable to store packings in their original containers for easy identification.
2. Measure stuffing box accurately and make sure the right size packing and the right diameter rings are used.
   *a)* On cold conditions, such as cold water and brine, rings should be cut to exact size as there is little expansion.
   *b)* On steam service, a slight clearance on the ends of the rings may be advisable. For hot conditions, such as hot water and ammonia, a greater clearance is generally allowed. Realize also that there will be greater expansion on rings of large diameter.
3. Remove all old packing and see that the stuffing box is clean before new packing is installed.
4. Seat each ring evenly in the stuffing box before the next ring is applied.
5. Apply plenty of lubrication, such as lubricating oil or grease and graphite, when installing packing, to help the packing work in.
6. Stagger or break the joints.
7. When the necessary number of rings have been installed, take up evenly on the gland with a wrench, to assure proper seating of the packing, then slacken off and take up only finger-tight. Be sure the gland is not cocked, but that it is even and exerting equal pressure all around.
8. It is often advisable to allow the box to leak slightly in the beginning to allow for expansion and proper seating. Packing that is too tight in the box will cause undue friction and wear out quickly.
   *a)* When packing against hot water, it may be necessary, due to expansion, to slack off on the gland from time to time until a balance is reached.
   *b)* On ammonia compressors, during the "heat" period, it is often necessary to slacken the gland after it has been tightened on the "freeze."



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 106 of 117
Published by AsbestosClaims.Law
asbestosclaims.law/library/13710/106

9. Metallic and semi-metallic packings are very sensitive to gland adjustments and should be used only on rods which are in good condition and perfect alignment. Lip-type packings are also sensitive to gland pressure, due to wedging of the lips when excessive gland pressure is applied.

10. When equipment is to be laid up for several weeks or more, it is sometimes advisable to remove the packing and grease the rod in order to guard against the possibility of corrosion.

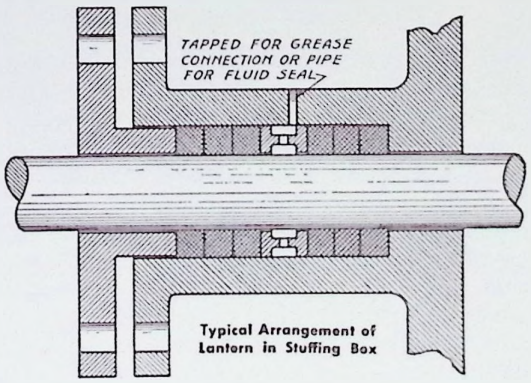
## LUBRICATION AND SEALING OF STUFFING BOXES

Lubrication is just as important to packing as to a shaft running in a bearing. Johns-Manville applies scientific control over the type and quantity of lubrication incorporated in their packings. However, it is impossible to put sufficient lubrication into any packing to last throughout its normal operating life. Lack of lubrication has a tendency to increase friction and to make all packing lose its resiliency and become hard. The use of a lubricating seal ring, or lantern, has proved very effective in materially increasing the life of packings. Lantern Rings are especially effective when used on rotating shafts.

Lanterns are also employed for cooling purposes or to seal against leakage of the liquids being pumped, such as expensive fluids or acids, and to prevent the infiltration of air through the stuffing box on the suction side of a centrifugal pump.

Oil, grease or water is supplied to the lantern ring, as indicated in the arrangement shown below.

Pump manufacturers generally furnish lantern rings as standard equipment on their pumps where service conditions indicate them to be necessary.




## HINTS ON GASKETS

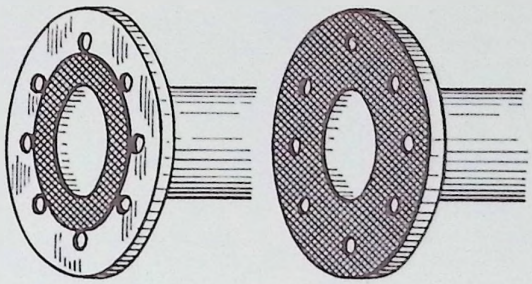
To assure the most satisfactory gasket service, the following installation suggestions should be observed:

1. Use a quality gasket, as the cost of the gasket is only a small part of the total cost. Also, be sure the style selected is recommended for the conditions against which it will be used.

2. See that the flanges are perfectly clean and true.

3. Use as thin a gasket as possible for the particular flange condition. Where flanges or surfaces are perfectly flat and smooth, a thin gasket is, as a rule, better than a thicker gasket. Where surfaces are rough or do not line up perfectly, a thicker gasket usually does a better job.

4. A ring cut gasket is generally preferable to a full flange gasket.



Ring Cut Gasket  Full Flange Gasket

5. See that the gasket is properly centered and does not project inside the flanges.

6. When it is desirable to graphite one or both surfaces of the gasket for easy removal, use a solution of graphite and water, with or without a small amount of glycerine. NEVER USE MINERAL OIL FOR APPLYING GRAPHITE, as it causes deterioration of gaskets containing rubber. This applies to all types of boiler manhole and hand hole gaskets, except metallic, as well as gaskets cut from rubber sheet packing. If the joint is to be permanent, it is better not to treat the gasket at all.

7. See that all bolts or studs are in good condition.

8. See that the flanges are pulled up evenly and tightly. Alternate from side to side in taking up bolts or studs to insure even pressure all around.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 107 of 117
Published by AsbestosClaims.Law
asbestosclaims.law/library/13710/107

## RING PACKING JOINTS

The type of joint used in any rod, plunger or piston packing is a very important factor. In cutting rings on the job from spiral or coil packing, care should be taken to see that joints are carefully and accurately prepared, with proper allowance made for anticipated expansion of the packing in service.

To prevent fraying of the ends when cutting rings from spiral or coil packings such as flax and braided, plaited or twisted asbestos, wrap a piece of tape around the packing where the joint is to be made and then cut through the center of the tape. This not only makes it easier to cut but also provides good square ends that stay square, without fraying, while being installed in the stuffing box.

The following is a description of the standard types of packing ring cuts and joints.

## RING-CUT TYPES

**Diagonal Cut:** The diagonal cut is supplied, when specified, on rings of the rubber and duck type. It is used extensively for rods or plungers which are worn or out of line, and for rods having considerable vibration or sway. The diagonal cut ring is frequently used in combination with plain rings.

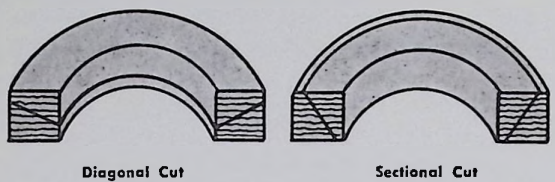
**Sectional Cut:** The sectional cut is supplied, when specified, on rings of the rubber and duck type. It is used principally in combination with plain rings for worn or scored plungers or rods.

Sectional cut rubber and duck rings are extensively used on ammonia compressors.

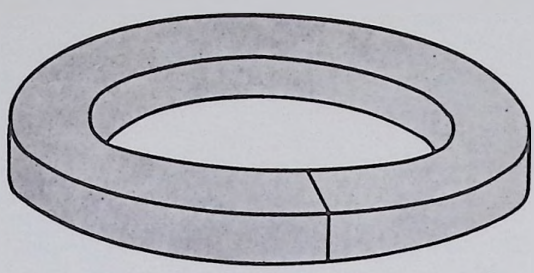
## JOINT TYPES

**Butt or Square Joint:** The butt or square joint is the simplest type of cut. It is made by a straight knife cut through the body of the ring on one side at right angles to the flange width. With certain types of packings using this type of joint, care must be taken to allow for expansion in order to prevent jamming due to the swelling of the packing in service.

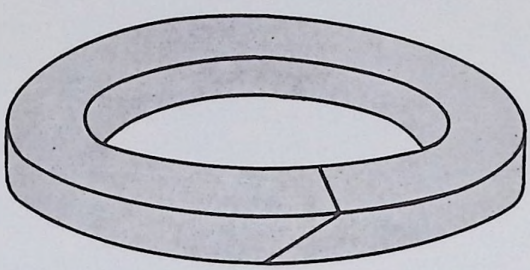
**Bevel or Skive Joint:** This type of joint is most commonly used on all types of rod and plunger packing. A slight advantage of the bevel or skive joint over the butt or square joint is that the bevel joint permits a certain amount of sliding action in the joint, thus absorbing a portion of the ring expansion due to the swelling encountered in some services.



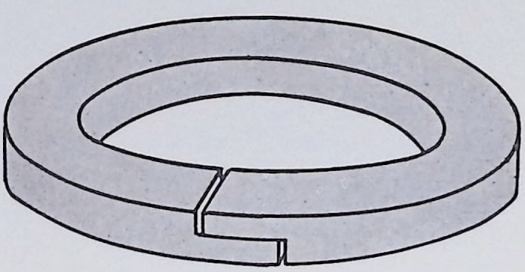
Diagonal Cut — Sectional Cut



Butt or Square Joint



Bevel or Skive Joint

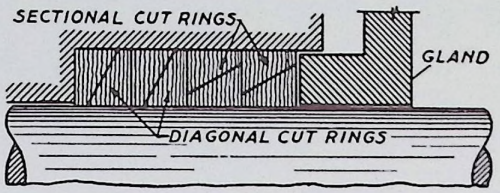


Step Joint or Step Cut

**Step Joint or Step Cut:** This joint is usually used on hydraulic packings for inside packed pistons where a jointed ring is required. The advantage of the step joint or step cut is that it provides for a considerable amount of expansion without losing the continuity of the ring periphery and consequent loss of efficiency through slippage of liquid past the rings. This advantageous effect is accomplished by a clearance left at each end of the tongues forming the top and bottom of the joint, permitting the joint to open and close and still retain contact with the cylinder wall throughout its entire outside circumference.



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 108 of 117
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### INSTALLATION OF DIAGONAL OR SECTIONAL CUT RINGS

To secure best results, installations of either diagonal or sectional cut rings should be made as follows:

1. The outside section of ring, or that part of the divided ring which is concave, should be placed first in the stuffing box with the concave side of the ring facing the gland.
2. The inner section of the ring should then be installed and care taken to see that the outer and inner sections are concentric and properly nested.
3. The entire ring should then be firmly seated before installing the next ring.
4. Care should be taken to stagger all joints.

### J-M Packing Symbols

For simplification, Johns-Manville uses but one style number for each different kind of packing, instead of a different number for coil, spiral and ring. The following symbols are used to identify the different forms in which J-M Packings are furnished:

Prefix C = Coil form
S = Spiral form
R = Ring form

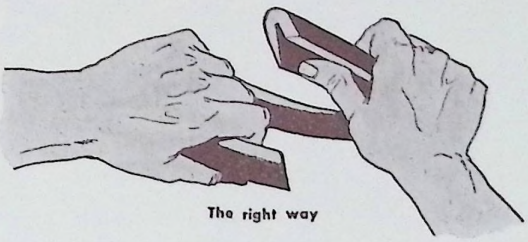
Suffix—SC = Sectional cut rings
—DC = Diagonal cut rings
—RH = Rock hard
—S = Solid rings (R-182, R-295 and R-290 are furnished with step joints unless—S specified)
—C = Rings formed from coil (R-171, R-172, R-182, R-290 and R-295 furnished cut from slab unless—C specified)
—DD = Double dipped in lubrication, or more lubrication than standard

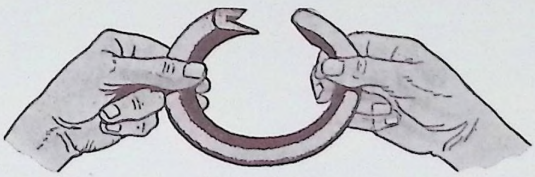
### INSTALLATION OF SEA RINGS

A set of J-M Rings is usually composed of one header ring, several Sea Rings and one follower ring. (See tags attached to rings). The number of Sea Rings used depends upon the depth of the stuffing-box.

**Procedure:**

1. Remove old packing and clean the stuffing-box.
2. First install header, so tagged, as arranged in set when received. See that it is pushed back so that all of it is seated against the bottom of the stuffing-box. Then install Sea Rings with lips toward the pressure and with the joints staggered. Be sure that the lip of each Sea Ring is properly seated against the preceding ring. After all Sea Rings are in, install follower ring, so tagged, last, as arranged in set when received.
3. Do not pull ends of rings straight apart to pass over rod. Separate them sideways as shown below.


The right way


The wrong way

4. Work the two ends of rings into the box first and then the remainder of the ring.
5. Never cut off ends or any part of rings. They are made to fit tight against inside of stuffing-box.
6. Only sufficient gland pressure must be used to prevent movement of the packing in the box. When installation is first made, take up gland nuts only finger-tight to allow Sea Rings to adjust themselves properly, during which time there will probably be a slight leakage. The gland nuts should be inspected to see that they are kept just tight enough to stop all leakage, as excessive gland pressure tends to distort the Sea Rings and impair their efficiency.



Johns-Manville Packings (1941)
ACL Doc 13710 · Page 109 of 117
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asbestosclaims.law/library/13710/109

## STEAM TABLE

| Gauge Pressure lbs. | Temp. Deg. F. | Gauge Pressure lbs. | Temp. Deg. F. | Gauge Pressure lbs. | Temp. Deg. F. | Gauge Pressure lbs. | Temp. Deg. F. | Gauge Pressure lbs. | Temp. Deg. F. | Gauge Pressure lbs. | Temp. Deg. F. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 212 | 35 | 281 | 70 | 316 | 130 | 355 | 200 | 387 | 465 | 462 |
| 1 | 216 | 36 | 282 | 71 | 317 | 132 | 356 | 205 | 389 | 475 | 464 |
| 2 | 219 | 37 | 283 | 72 | 317 | 134 | 357 | 210 | 391 | 485 | 467 |
| 3 | 222 | 38 | 284 | 73 | 318 | 136 | 359 | 215 | 393 | 505 | 471 |
| 4 | 225 | 39 | 285 | 74 | 319 | 138 | 360 | 220 | 395 | 525 | 475 |
| 5 | 228 | 40 | 287 | 75 | 320 | 140 | 361 | 225 | 397 | 545 | 478 |
| 6 | 230 | 41 | 288 | 76 | 321 | 142 | 362 | 230 | 399 | 565 | 482 |
| 7 | 233 | 42 | 289 | 77 | 321 | 144 | 363 | 235 | 401 | 585 | 486 |
| 8 | 235 | 43 | 290 | 78 | 322 | 146 | 364 | 240 | 402 | 605 | 489 |
| 9 | 237 | 44 | 291 | 79 | 323 | 148 | 365 | 245 | 404 | 625 | 493 |
| 10 | 240 | 45 | 292 | 80 | 324 | 150 | 366 | 250 | 406 | 645 | 496 |
| 11 | 242 | 46 | 293 | 82 | 325 | 152 | 367 | 255 | 407 | 685 | 503 |
| 12 | 244 | 47 | 294 | 84 | 327 | 154 | 368 | 260 | 409 | 725 | 509 |
| 13 | 246 | 48 | 295 | 86 | 328 | 156 | 368 | 265 | 411 | 765 | 515 |
| 14 | 248 | 49 | 297 | 88 | 330 | 158 | 369 | 270 | 412 | 805 | 521 |
| 15 | 250 | 50 | 298 | 90 | 331 | 160 | 370 | 275 | 414 | 845 | 526 |
| 16 | 252 | 51 | 299 | 92 | 332 | 162 | 371 | 280 | 415 | 885 | 532 |
| 17 | 254 | 52 | 300 | 94 | 334 | 164 | 372 | 285 | 417 | 925 | 537 |
| 18 | 255 | 53 | 301 | 96 | 335 | 166 | 373 | 295 | 420 | 965 | 542 |
| 19 | 257 | 54 | 302 | 98 | 336 | 168 | 374 | 305 | 423 | 985 | 544 |
| 20 | 259 | 55 | 302 | 100 | 338 | 170 | 375 | 315 | 426 | 1035 | 550 |
| 21 | 261 | 56 | 303 | 102 | 339 | 172 | 376 | 325 | 429 | 1085 | 556 |
| 22 | 262 | 57 | 304 | 104 | 340 | 174 | 377 | 335 | 431 | 1135 | 561 |
| 23 | 264 | 58 | 305 | 106 | 341 | 176 | 378 | 345 | 434 | 1185 | 567 |
| 24 | 265 | 59 | 306 | 108 | 343 | 178 | 378 | 355 | 437 | 1235 | 572 |
| 25 | 267 | 60 | 307 | 110 | 344 | 180 | 379 | 365 | 439 | 1285 | 577 |
| 26 | 268 | 61 | 308 | 112 | 345 | 182 | 380 | 375 | 442 | 1335 | 582 |
| 27 | 270 | 62 | 309 | 114 | 346 | 184 | 381 | 385 | 444 | 1385 | 587 |
| 28 | 271 | 63 | 310 | 116 | 348 | 186 | 382 | 395 | 447 | 1435 | 591 |
| 29 | 273 | 64 | 311 | 118 | 349 | 188 | 383 | 405 | 449 | 1485 | 596 |
| 30 | 274 | 65 | 312 | 120 | 350 | 190 | 384 | 415 | 451 | 1585 | 604 |
| 31 | 275 | 66 | 312 | 122 | 351 | 192 | 384 | 425 | 454 | 1685 | 613 |
| 32 | 277 | 67 | 313 | 124 | 352 | 194 | 385 | 435 | 456 | 1785 | 621 |
| 33 | 278 | 68 | 314 | 126 | 353 | 196 | 386 | 445 | 458 | 1885 | 628 |
| 34 | 279 | 69 | 315 | 128 | 354 | 198 | 387 | 455 | 460 | 1985 | 635 |

## TABLE OF WATER HEADS AND EQUIVALENT PRESSURES

(To estimate any pressure multiply the head (in feet) by .4333. The result is lbs. per square inch.)

| Head in Feet | Pressure lbs. per sq. in. | Head in Feet | Pressure lbs. per sq. in. | Head in Feet | Pressure lbs. per sq. in. | Head in Feet | Pressure lbs. per sq. in. |
|---|---|---|---|---|---|---|---|
| 5 | 2.17 | 60 | 26.00 | 250 | 108.33 | 550 | 238.33 |
| 10 | 4.33 | 70 | 30.33 | 275 | 119.17 | 600 | 260.00 |
| 15 | 6.50 | 80 | 34.67 | 300 | 130.00 | 650 | 281.67 |
| 20 | 8.67 | 90 | 39.00 | 325 | 140.83 | 700 | 303.33 |
| 25 | 10.83 | 100 | 43.33 | 350 | 151.67 | 750 | 325.00 |
| 30 | 13.00 | 125 | 54.17 | 375 | 162.49 | 800 | 346.67 |
| 35 | 15.17 | 150 | 65.00 | 400 | 173.33 | 850 | 368.33 |
| 40 | 17.33 | 175 | 75.83 | 425 | 184.16 | 900 | 390.00 |
| 45 | 19.50 | 200 | 86.67 | 450 | 195.00 | 950 | 411.67 |
| 50 | 21.67 | 225 | 97.50 | 475 | 205.83 | 1000 | 433.33 |
| | | | | 500 | 216.67 | | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 110 of 117
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## CENTIGRADE AND FAHRENHEIT CONVERSION TABLE

| Cent. | Fahr. | Cent. | Fahr. | Cent. | Fahr. | Cent. | Fahr. | Cent. | Fahr. | Cent. | Fahr. | Cent. | Fahr. | Cent. | Fahr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| —40 | —40.0 | +10 | +50.0 | +150 | +302 | +350 | +662 | +550 | +1022 | +750 | +1382 | +950 | +1742 | +1300 | +2372 |
| —38 | —36.4 | 11 | 51.8 | 155 | 311 | 355 | 671 | 555 | 1031 | 755 | 1391 | 955 | 1751 | 1310 | 2390 |
| —36 | —32.8 | 12 | 53.6 | 160 | 320 | 360 | 680 | 560 | 1040 | 760 | 1400 | 960 | 1760 | 1320 | 2408 |
| —34 | —29.2 | 13 | 55.4 | 165 | 329 | 365 | 689 | 565 | 1049 | 765 | 1409 | 965 | 1769 | 1330 | 2426 |
| —32 | —25.6 | 14 | 57.2 | 170 | 338 | 370 | 698 | 570 | 1058 | 770 | 1418 | 970 | 1778 | 1340 | 2444 |
| —30 | —22.0 | 15 | 59.0 | 175 | 347 | 375 | 707 | 575 | 1067 | 775 | 1427 | 975 | 1787 | 1350 | 2462 |
| —28 | —18.4 | 16 | 60.8 | 180 | 356 | 380 | 716 | 580 | 1076 | 780 | 1436 | 980 | 1796 | 1360 | 2480 |
| —26 | —14.8 | 17 | 62.6 | 185 | 365 | 385 | 725 | 585 | 1085 | 785 | 1445 | 985 | 1805 | 1370 | 2498 |
| —24 | —11.2 | 18 | 64.4 | 190 | 374 | 390 | 734 | 590 | 1094 | 790 | 1454 | 990 | 1814 | 1380 | 2516 |
| —22 | — 7.6 | 19 | 66.2 | 195 | 383 | 395 | 743 | 595 | 1103 | 795 | 1463 | 995 | 1823 | 1390 | 2534 |
| —20 | — 4.0 | 20 | 68.0 | 200 | 392 | 400 | 752 | 600 | 1112 | 800 | 1472 | 1000 | 1832 | 1400 | 2552 |
| —19 | — 2.2 | 21 | 69.8 | 205 | 401 | 405 | 761 | 605 | 1121 | 805 | 1481 | 1010 | 1850 | 1410 | 2570 |
| —18 | — 0.4 | 22 | 71.6 | 210 | 410 | 410 | 770 | 610 | 1130 | 810 | 1490 | 1020 | 1868 | 1420 | 2588 |
| —17 | + 1.4 | 23 | 73.4 | 215 | 419 | 415 | 779 | 615 | 1139 | 815 | 1499 | 1030 | 1886 | 1430 | 2606 |
| —16 | 3.2 | 24 | 75.2 | 220 | 428 | 420 | 788 | 620 | 1148 | 820 | 1508 | 1040 | 1904 | 1440 | 2624 |
| —15 | 5.0 | 25 | 77.0 | 225 | 437 | 425 | 797 | 625 | 1157 | 825 | 1517 | 1050 | 1922 | 1450 | 2642 |
| —14 | 6.8 | 30 | 86.0 | 230 | 446 | 430 | 806 | 630 | 1166 | 830 | 1526 | 1060 | 1940 | 1460 | 2660 |
| —13 | 8.6 | 35 | 95.0 | 235 | 455 | 435 | 815 | 635 | 1175 | 835 | 1535 | 1070 | 1958 | 1470 | 2678 |
| —12 | 10.4 | 40 | 104.0 | 240 | 464 | 440 | 824 | 640 | 1184 | 840 | 1544 | 1080 | 1976 | 1480 | 2696 |
| —11 | 12.2 | 45 | 113.0 | 245 | 473 | 445 | 833 | 645 | 1193 | 845 | 1553 | 1090 | 1994 | 1490 | 2714 |
| —10 | 14.0 | 50 | 122.0 | 250 | 482 | 450 | 842 | 650 | 1202 | 850 | 1562 | 1100 | 2012 | 1500 | 2732 |
| — 9 | 15.8 | 55 | 131.0 | 255 | 491 | 455 | 851 | 655 | 1211 | 855 | 1571 | 1110 | 2030 | 1510 | 2750 |
| — 8 | 17.6 | 60 | 140.0 | 260 | 500 | 460 | 860 | 660 | 1220 | 860 | 1580 | 1120 | 2048 | 1520 | 2768 |
| — 7 | 19.4 | 65 | 149.0 | 265 | 509 | 465 | 869 | 665 | 1229 | 865 | 1589 | 1130 | 2066 | 1530 | 2786 |
| — 6 | 21.2 | 70 | 158.0 | 270 | 518 | 470 | 878 | 670 | 1238 | 870 | 1598 | 1140 | 2084 | 1540 | 2804 |
| — 5 | 23.0 | 75 | 167.0 | 275 | 527 | 475 | 887 | 675 | 1247 | 875 | 1607 | 1150 | 2102 | 1550 | 2822 |
| — 4 | 24.8 | 80 | 176.0 | 280 | 536 | 480 | 896 | 680 | 1256 | 880 | 1616 | 1160 | 2120 | 1560 | 2840 |
| — 3 | 26.6 | 85 | 185.0 | 285 | 545 | 485 | 905 | 685 | 1265 | 885 | 1625 | 1170 | 2138 | 1570 | 2858 |
| — 2 | 28.4 | 90 | 194.0 | 290 | 554 | 490 | 914 | 690 | 1274 | 890 | 1634 | 1180 | 2156 | 1580 | 2876 |
| — 1 | 30.2 | 95 | 203.0 | 295 | 563 | 495 | 923 | 695 | 1283 | 895 | 1643 | 1190 | 2174 | 1590 | 2894 |
| 0 | 32.0 | 100 | 212.0 | 300 | 572 | 500 | 932 | 700 | 1292 | 900 | 1652 | 1200 | 2192 | 1600 | 2912 |
| + 1 | 33.8 | 105 | 221.0 | 305 | 581 | 505 | 941 | 705 | 1301 | 905 | 1661 | 1210 | 2210 | 1650 | 3002 |
| 2 | 35.6 | 110 | 230.0 | 310 | 590 | 510 | 950 | 710 | 1310 | 910 | 1670 | 1220 | 2228 | 1700 | 3092 |
| 3 | 37.4 | 115 | 239.0 | 315 | 599 | 515 | 959 | 715 | 1319 | 915 | 1679 | 1230 | 2246 | 1750 | 3182 |
| 4 | 39.2 | 120 | 248.0 | 320 | 608 | 520 | 968 | 720 | 1328 | 920 | 1688 | 1240 | 2264 | 1800 | 3272 |
| 5 | 41.0 | 125 | 257.0 | 325 | 617 | 525 | 977 | 725 | 1337 | 925 | 1697 | 1250 | 2282 | 1850 | 3362 |
| 6 | 42.8 | 130 | 266.0 | 330 | 626 | 530 | 986 | 730 | 1346 | 930 | 1706 | 1260 | 2300 | 1900 | 3452 |
| 7 | 44.6 | 135 | 275.0 | 335 | 635 | 535 | 995 | 735 | 1355 | 935 | 1715 | 1270 | 2318 | 1950 | 3542 |
| 8 | 46.4 | 140 | 284.0 | 340 | 644 | 540 | 1004 | 740 | 1364 | 940 | 1724 | 1280 | 2336 | 2000 | 3632 |
| 9 | 48.2 | 145 | 293.0 | 345 | 653 | 545 | 1013 | 745 | 1373 | 945 | 1733 | 1290 | 2354 | 2050 | 3722 |

## METRIC CONVERSION TABLE

Millimeters × .03937 = inches.
Millimeters ÷ 25.4 = inches.
Centimeters × .3937 = inches.
Centimeters ÷ 2.54 = inches.
Meters × 39.37 = inches.
Meters × 3.281 = feet.
Meters × 1.094 = yards.
Kilometers × .6214 = miles.
Kilometers ÷ 1.6093 = miles.
Kilometers × 3281 = feet.
Square Centimeters × .155 = sq. inches.
Square Centimeters ÷ 6.452 = sq. inches.
Square Meters × 10.764 = sq. feet.
Square Kilometers × 247.1 = acres.
Hectare × 2.471 = acres.
Cubic Centimeters ÷ 16.383 = cubic inches.
Cubic Centimeters ÷ 29.57 = fluid ounce (U.S.P.).
Cubic Meters × 35.315 = cubic feet.
Cubic Meters × 1.308 = cubic yards.
Cubic Meters × 264.2 = liquid gallons (231. cubic inches).
Liters × 61.02 = cu. in.
Liters × 33.8 = fluid ounces (U.S.P.).
Liters × .2642 = liquid gallons (231. cu. in.).
Liters ÷ 3.78 = liquid gallons (231 cu. in.).
Liters ÷ 28.316 = cubic feet.
Hectoliters × 3.531 = cubic feet.
Hectoliters × 2.838 = bushels (2150.42 cu. in.).
Hectoliters × .131 = cubic yards.
Hectoliters ÷ 26.42 = liquid gallons (231. cu. in.).
Grams × 15.43 = grains
Grams ÷ 981. = dynes.
Grams (water) ÷ 29.57 = fluid ounces.
Grams ÷ 28.35 = ounces avoirdupois.
Grams per cu. cent. ÷ 27.68 = lbs. per cubic inch.
Joule × .7376 = foot pounds.
Kilograms × 2.205 = pounds.
Kilograms × 35.3 = oz. avoirdupois.
Kilograms ÷ 907.2 = tons (2,000 lbs.).
Kilograms per sq. cent. × 14.22 = lbs. per sq. in.
Kilogram-meters × 7.233 = foot lbs.
Kilogr. per Meter × .672 = lbs. per foot.
Kilogr. per Cu. Meter × .062 = lbs. per cubic foot.
Kilowatts × 1.341 = Horse Power.
Watts ÷ 746. = Horse Power.
Watts × .7376 = foot pounds per second.
Cheval vapeur ÷ .9863 = Horse Power.
(Centigrade × 1.8) + 32 = degrees Fahr.



Johns-Manville Packings (1941)
ACL Doc 13710 · Page 111 of 117
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# CIRCUMFERENCES AND AREAS OF CIRCLES

| Diam. | Circum. | Area | Diam. | Circum. | Area | Diam. | Circum. | Area | Diam. | Circum. | Area | Diam. | Circum. | Area | Diam. | Circum. | Area |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/64 | .04909 | .00019 | 1/2 | 10.996 | 9.6211 | 10 | 31.416 | 78.540 | 19 | 59.690 | 283.53 | 28 | 87.965 | 615.75 | 37 | 116.239 | 1075.2 |
| 1/32 | .09818 | .00077 | 9/16 | 11.192 | 9.9678 | 1/8 | 31.809 | 80.516 | 1/8 | 60.083 | 287.27 | 1/8 | 88.357 | 621.26 | 1/4 | 116.632 | 1082.5 |
| 3/64 | .14726 | .00173 | 5/8 | 11.388 | 10.321 | 1/4 | 32.201 | 82.516 | 1/4 | 60.476 | 291.04 | 1/4 | 88.750 | 626.80 | 1/4 | 117.024 | 1089.8 |
| 1/16 | .19635 | .00307 | 11/16 | 11.585 | 10.680 | 3/8 | 32.594 | 84.541 | 3/8 | 60.868 | 294.83 | 3/8 | 89.143 | 632.36 | 3/8 | 117.417 | 1097.1 |
| 5/64 | .29452 | .00690 | 3/4 | 11.781 | 11.045 | 1/2 | 32.987 | 86.590 | 1/2 | 61.261 | 298.65 | 1/2 | 89.535 | 637.94 | 1/2 | 117.810 | 1104.5 |
| 1/8 | .39270 | .01227 | 13/16 | 11.977 | 11.416 | 5/8 | 33.379 | 88.664 | 5/8 | 61.654 | 302.49 | 5/8 | 89.928 | 643.55 | 5/8 | 118.202 | 1111.8 |
| 9/64 | .49087 | .01917 | 7/8 | 12.174 | 11.793 | 3/4 | 33.772 | 90.763 | 3/4 | 62.046 | 306.35 | 3/4 | 90.321 | 649.18 | 3/4 | 118.596 | 1119.2 |
| 5/32 | .58905 | .02761 | 15/16 | 12.370 | 12.177 | 7/8 | 34.165 | 92.886 | 7/8 | 62.439 | 310.24 | 7/8 | 90.713 | 654.84 | 7/8 | 118.988 | 1126.7 |
| 11/64 | .68722 | .03758 | | | | | | | | | | | | | | | |
| | | | 4 | 12.566 | 12.566 | 11 | 34.558 | 95.033 | 20 | 62.832 | 314.16 | 29 | 91.106 | 660.52 | 38 | 119.381 | 1134.1 |
| 1/4 | .78540 | .04909 | 1/16 | 12.763 | 12.962 | 1/8 | 34.950 | 97.205 | 1/8 | 63.225 | 318.10 | 1/8 | 91.499 | 666.23 | 1/8 | 119.773 | 1141.6 |
| 9/64 | .88357 | .06213 | 1/8 | 12.959 | 13.364 | 1/4 | 35.343 | 99.402 | 1/4 | 63.617 | 322.06 | 1/4 | 91.892 | 671.96 | 1/4 | 120.166 | 1149.1 |
| 5/16 | .98175 | .07670 | 3/16 | 13.155 | 13.772 | 3/8 | 35.736 | 101.62 | 3/8 | 64.010 | 326.05 | 3/8 | 92.284 | 677.71 | 3/8 | 120.559 | 1156.6 |
| 11/64 | 1.0799 | .09281 | 1/4 | 13.352 | 14.186 | 1/2 | 36.128 | 103.87 | 1/2 | 64.403 | 330.06 | 1/2 | 92.677 | 683.49 | 1/2 | 120.951 | 1164.2 |
| 3/8 | 1.1781 | .11045 | 5/16 | 13.548 | 14.607 | 5/8 | 36.521 | 106.14 | 5/8 | 64.795 | 334.10 | 5/8 | 93.070 | 689.30 | 5/8 | 121.344 | 1171.7 |
| 13/64 | 1.2763 | .12962 | 3/8 | 13.744 | 15.033 | 3/4 | 36.914 | 108.43 | 3/4 | 65.188 | 338.16 | 3/4 | 93.462 | 695.13 | 3/4 | 121.737 | 1179.3 |
| 7/16 | 1.3744 | .15033 | 7/16 | 13.941 | 15.466 | 7/8 | 37.306 | 110.75 | 7/8 | 65.581 | 342.25 | 7/8 | 93.855 | 700.98 | 7/8 | 122.129 | 1186.9 |
| 15/64 | 1.4726 | .17257 | 1/2 | 14.137 | 15.904 | | | | | | | | | | | | |
| | | | 9/16 | 14.334 | 16.349 | 12 | 37.699 | 113.10 | 21 | 65.973 | 346.36 | 30 | 94.248 | 706.86 | 39 | 122.522 | 1194.6 |
| 1/2 | 1.5708 | .19635 | 5/8 | 14.530 | 16.800 | 1/8 | 38.092 | 115.47 | 1/8 | 66.366 | 350.50 | 1/8 | 94.640 | 712.76 | 1/8 | 122.915 | 1202.3 |
| 17/64 | 1.6690 | .22166 | 11/16 | 14.726 | 17.257 | 1/4 | 38.485 | 117.86 | 1/4 | 66.759 | 354.66 | 1/4 | 95.033 | 718.69 | 1/4 | 123.308 | 1210.6 |
| 9/16 | 1.7671 | .24850 | 3/4 | 14.923 | 17.728 | 3/8 | 38.877 | 120.28 | 3/8 | 67.152 | 358.84 | 3/8 | 95.426 | 724.64 | 3/8 | 123.700 | 1217.7 |
| 19/64 | 1.8653 | .27688 | 13/16 | 15.119 | 18.190 | 1/2 | 39.270 | 122.72 | 1/2 | 67.544 | 363.05 | 1/2 | 95.819 | 730.62 | 1/2 | 124.093 | 1225.4 |
| 5/8 | 1.9635 | .30680 | 7/8 | 15.315 | 18.665 | 5/8 | 39.663 | 125.19 | 5/8 | 67.937 | 367.28 | 5/8 | 96.211 | 736.62 | 5/8 | 124.486 | 1233.2 |
| 21/64 | 2.0617 | .33824 | 15/16 | 15.512 | 19.147 | 3/4 | 40.055 | 127.68 | 3/4 | 68.330 | 371.54 | 1/4 | 96.604 | 742.64 | 3/4 | 124.878 | 1241.0 |
| 11/16 | 2.1598 | .37122 | | | | 7/8 | 40.448 | 130.19 | 7/8 | 68.722 | 375.83 | 7/8 | 96.997 | 748.69 | 7/8 | 125.271 | 1248.8 |
| 23/64 | 2.2580 | .40574 | 5 | 15.708 | 19.635 | | | | | | | | | | | | |
| | | | 1/16 | 15.904 | 20.129 | 13 | 40.841 | 132.73 | 22 | 69.115 | 380.13 | 31 | 97.389 | 754.77 | 40 | 125.664 | 1256.6 |
| 3/4 | 2.3562 | .44179 | 1/8 | 16.101 | 20.629 | 1/8 | 41.233 | 135.30 | 1/8 | 69.508 | 384.46 | 1/8 | 97.782 | 760.87 | 1/8 | 126.056 | 1264.5 |
| 25/64 | 2.4544 | .47937 | 3/16 | 16.297 | 21.135 | 1/4 | 41.626 | 137.89 | 1/4 | 69.900 | 388.82 | 1/4 | 98.175 | 766.99 | 1/4 | 126.449 | 1272.4 |
| 13/16 | 2.5525 | .51849 | 1/4 | 16.493 | 21.648 | 3/8 | 42.019 | 140.50 | 3/8 | 70.293 | 393.20 | 3/8 | 98.567 | 773.14 | 3/8 | 126.842 | 1280.3 |
| 27/64 | 2.6507 | .55914 | 5/16 | 16.690 | 22.166 | 1/2 | 42.412 | 143.14 | 1/2 | 70.686 | 397.61 | 1/2 | 98.960 | 779.31 | 1/2 | 127.235 | 1288.2 |
| 7/8 | 2.7489 | .60132 | 3/8 | 16.886 | 22.691 | 5/8 | 42.804 | 145.80 | 5/8 | 71.079 | 402.04 | 5/8 | 99.353 | 785.51 | 5/8 | 127.627 | 1296.2 |
| 29/64 | 2.8471 | .64504 | 7/16 | 17.082 | 23.221 | 3/4 | 43.197 | 148.49 | 3/4 | 71.471 | 406.49 | 3/4 | 99.746 | 791.73 | 3/4 | 128.020 | 1304.2 |
| 15/16 | 2.9452 | .69029 | 1/2 | 17.279 | 23.758 | 7/8 | 43.590 | 151.20 | 7/8 | 71.864 | 410.97 | 7/8 | 100.138 | 797.98 | 7/8 | 128.413 | 1312.2 |
| 31/64 | 3.0434 | .73708 | 9/16 | 17.475 | 24.301 | | | | | | | | | | | | |
| | | | 5/8 | 17.671 | 24.850 | 14 | 43.982 | 153.94 | 23 | 72.257 | 415.48 | 32 | 100.531 | 804.25 | 41 | 128.805 | 1320.3 |
| 1 | 3.1416 | .7854 | 11/16 | 17.868 | 25.406 | 1/8 | 44.375 | 156.70 | 1/8 | 72.649 | 420.00 | 1/8 | 100.924 | 810.54 | 1/8 | 129.198 | 1328.3 |
| 1/16 | 3.3379 | .8866 | 3/4 | 18.064 | 25.967 | 1/4 | 44.768 | 159.48 | 1/4 | 73.042 | 424.56 | 1/4 | 101.316 | 816.86 | 1/4 | 129.591 | 1336.4 |
| 1/8 | 3.5343 | .9940 | 13/16 | 18.261 | 26.535 | 3/8 | 45.160 | 162.30 | 3/8 | 73.435 | 429.13 | 3/8 | 101.709 | 823.21 | 3/8 | 129.983 | 1344.5 |
| 3/16 | 3.7306 | 1.1075 | 7/8 | 18.457 | 27.109 | 1/2 | 45.553 | 165.13 | 1/2 | 73.827 | 433.74 | 1/2 | 102.102 | 829.58 | 1/2 | 130.376 | 1352.7 |
| 1/4 | 3.9270 | 1.2272 | 15/16 | 18.653 | 27.688 | 5/8 | 45.946 | 167.99 | 5/8 | 74.220 | 438.36 | 5/8 | 102.494 | 835.97 | 5/8 | 130.769 | 1360.8 |
| 5/16 | 4.1233 | 1.3530 | | | | 3/4 | 46.338 | 170.87 | 3/4 | 74.613 | 443.01 | 3/4 | 102.887 | 842.39 | 3/4 | 131.161 | 1369.0 |
| 3/8 | 4.3197 | 1.4849 | 6 | 18.850 | 28.274 | 7/8 | 46.731 | 173.78 | 7/8 | 75.006 | 447.69 | 7/8 | 103.280 | 848.83 | 7/8 | 131.554 | 1377.2 |
| 7/16 | 4.5160 | 1.6230 | 1/8 | 19.242 | 29.465 | 15 | 47.124 | 176.71 | 24 | 75.398 | 452.39 | 33 | 103.673 | 855.30 | 42 | 131.947 | 1385.4 |
| 1/2 | 4.7124 | 1.7671 | 1/4 | 19.635 | 30.680 | 1/8 | 47.517 | 179.67 | 1/8 | 75.791 | 457.11 | 1/8 | 104.065 | 861.79 | 1/8 | 132.340 | 1393.7 |
| 9/16 | 4.9087 | 1.9175 | 3/8 | 20.028 | 31.919 | 1/4 | 47.909 | 182.65 | 1/4 | 76.184 | 461.86 | 1/4 | 104.458 | 868.31 | 1/4 | 132.732 | 1402.0 |
| 5/8 | 5.1051 | 2.0739 | 1/2 | 20.420 | 33.183 | 3/8 | 48.302 | 185.66 | 3/8 | 76.576 | 466.64 | 3/8 | 104.851 | 874.85 | 3/8 | 133.125 | 1410.3 |
| 11/16 | 5.3014 | 2.2365 | 5/8 | 20.813 | 34.472 | 1/2 | 48.695 | 188.69 | 1/2 | 76.969 | 471.44 | 1/2 | 105.243 | 881.41 | 1/2 | 133.518 | 1418.6 |
| 3/4 | 5.4978 | 2.4053 | 3/4 | 21.206 | 35.785 | 5/8 | 49.087 | 191.75 | 5/8 | 77.362 | 476.26 | 5/8 | 105.636 | 888.00 | 5/8 | 133.910 | 1427.0 |
| 13/16 | 5.6941 | 2.5802 | 7/8 | 21.598 | 37.122 | 3/4 | 49.480 | 194.83 | 3/4 | 77.754 | 481.11 | 3/4 | 106.029 | 894.62 | 3/4 | 134.303 | 1435.4 |
| 7/8 | 5.8905 | 2.7612 | | | | 7/8 | 49.873 | 197.93 | 7/8 | 78.147 | 485.98 | 7/8 | 106.421 | 901.26 | 7/8 | 134.696 | 1443.8 |
| 15/16 | 6.0868 | 2.9483 | 7 | 21.991 | 38.485 | | | | | | | | | | | | |
| | | | 1/8 | 22.384 | 39.871 | 16 | 50.265 | 201.06 | 25 | 78.540 | 490.87 | 34 | 106.814 | 907.92 | 43 | 135.088 | 1452.2 |
| 2 | 6.2832 | 3.1416 | 1/4 | 22.776 | 41.282 | 1/8 | 50.658 | 204.22 | 1/8 | 78.933 | 495.79 | 1/8 | 107.207 | 914.61 | 1/8 | 135.481 | 1460.7 |
| 1/16 | 6.4795 | 3.3410 | 3/8 | 23.169 | 42.718 | 1/4 | 51.051 | 207.39 | 1/4 | 79.325 | 500.74 | 1/4 | 107.600 | 921.32 | 1/4 | 135.874 | 1469.1 |
| 1/8 | 6.6759 | 3.5466 | 1/2 | 23.562 | 44.179 | 3/8 | 51.444 | 210.60 | 3/8 | 79.718 | 505.71 | 3/8 | 107.992 | 928.06 | 3/8 | 136.267 | 1477.6 |
| 3/16 | 6.8722 | 3.7583 | 5/8 | 23.955 | 45.664 | 1/2 | 51.836 | 213.82 | 1/2 | 80.111 | 510.71 | 1/2 | 108.385 | 934.82 | 1/2 | 136.659 | 1486.2 |
| 1/4 | 7.0686 | 3.9761 | 3/4 | 24.347 | 47.173 | 5/8 | 52.229 | 217.08 | 5/8 | 80.503 | 515.72 | 5/8 | 108.778 | 941.61 | 5/8 | 137.052 | 1494.7 |
| 5/16 | 7.2649 | 4.2000 | 7/8 | 24.740 | 48.707 | 3/4 | 52.622 | 220.35 | 3/4 | 80.896 | 520.77 | 1/4 | 109.170 | 948.42 | 1/4 | 137.445 | 1503.3 |
| 3/8 | 7.4613 | 4.4301 | | | | 7/8 | 53.014 | 223.65 | 7/8 | 81.289 | 525.84 | 7/8 | 109.563 | 955.25 | 7/8 | 137.837 | 1511.9 |
| 7/16 | 7.6576 | 4.6664 | 8 | 25.133 | 50.265 | | | | | | | | | | | | |
| 1/2 | 7.8540 | 4.9087 | 1/8 | 25.525 | 51.849 | 17 | 53.407 | 226.98 | 26 | 81.681 | 530.93 | 35 | 109.956 | 962.11 | 44 | 138.230 | 1520.5 |
| 9/16 | 8.0503 | 5.1572 | 1/4 | 25.918 | 53.456 | 1/8 | 53.800 | 230.33 | 1/8 | 82.074 | 536.05 | 1/8 | 110.348 | 969.00 | 1/8 | 138.623 | 1529.2 |
| 5/8 | 8.2467 | 5.4119 | 3/8 | 26.311 | 55.088 | 1/4 | 54.192 | 233.71 | 1/4 | 82.467 | 541.19 | 1/4 | 110.741 | 975.91 | 1/4 | 139.015 | 1537.9 |
| 11/16 | 8.4430 | 5.6727 | 1/2 | 26.704 | 56.745 | 3/8 | 54.585 | 237.10 | 3/8 | 82.860 | 546.35 | 3/8 | 111.134 | 982.84 | 3/8 | 139.408 | 1546.6 |
| 3/4 | 8.6394 | 5.9396 | 5/8 | 27.096 | 58.426 | 1/2 | 54.978 | 240.53 | 1/2 | 83.252 | 551.55 | 1/2 | 111.527 | 989.80 | 1/2 | 139.801 | 1555.3 |
| 13/16 | 8.8357 | 6.2126 | 3/4 | 27.489 | 60.132 | 5/8 | 55.371 | 243.98 | 5/8 | 83.645 | 556.76 | 5/8 | 111.919 | 996.78 | 5/8 | 140.194 | 1564.0 |
| 7/8 | 9.0321 | 6.4918 | 7/8 | 27.882 | 61.862 | 3/4 | 55.763 | 247.45 | 3/4 | 84.038 | 562.00 | 3/4 | 112.312 | 1003.8 | 3/4 | 140.586 | 1572.8 |
| 15/16 | 9.2284 | 6.7771 | | | | 7/8 | 56.156 | 250.95 | 7/8 | 84.430 | 567.27 | 7/8 | 112.705 | 1010.8 | 7/8 | 140.979 | 1581.6 |
| 3 | 9.4248 | 7.0686 | 9 | 28.274 | 63.617 | 18 | 56.549 | 254.47 | 27 | 84.823 | 572.56 | 36 | 113.097 | 1017.9 | 45 | 141.372 | 1590.4 |
| 1/16 | 9.6211 | 7.3662 | 1/8 | 28.667 | 65.397 | 1/8 | 56.941 | 258.02 | 1/8 | 85.216 | 577.87 | 1/8 | 113.490 | 1025.0 | 1/8 | 141.764 | 1599.3 |
| 1/8 | 9.8175 | 7.6699 | 1/4 | 29.060 | 67.201 | 1/4 | 57.334 | 261.59 | 1/4 | 85.608 | 583.21 | 1/4 | 113.883 | 1032.1 | 1/4 | 142.157 | 1608.2 |
| 3/16 | 10.014 | 7.9798 | 3/8 | 29.452 | 69.029 | 3/8 | 57.727 | 265.18 | 3/8 | 86.001 | 588.57 | 3/8 | 114.275 | 1039.2 | 3/8 | 142.550 | 1617.0 |
| 1/4 | 10.210 | 8.2958 | 1/2 | 29.845 | 70.882 | 1/2 | 58.119 | 268.80 | 1/2 | 86.394 | 593.96 | 1/2 | 114.668 | 1046.3 | 1/2 | 142.942 | 1626.0 |
| 5/16 | 10.407 | 8.6179 | 5/8 | 30.238 | 72.760 | 5/8 | 58.512 | 272.45 | 5/8 | 86.786 | 599.37 | 5/8 | 115.061 | 1053.5 | 5/8 | 143.335 | 1634.0 |
| 3/8 | 10.603 | 8.9462 | 3/4 | 30.631 | 74.662 | 1/4 | 58.905 | 276.12 | 3/4 | 87.179 | 604.81 | 1/4 | 115.454 | 1060.7 | 1/4 | 143.728 | 1643.9 |
| 7/16 | 10.799 | 9.2806 | 7/8 | 31.023 | 76.589 | 7/8 | 59.298 | 279.81 | 7/8 | 87.572 | 610.27 | 7/8 | 115.846 | 1068.0 | 7/8 | 144.121 | 1652.9 |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 112 of 117
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# CIRCUMFERENCES AND AREAS OF CIRCLES — (Continued)

| Diam. | Circum. | Area | Diam. | Circum. | Area | Diam. | Circum. | Area | Diam. | Circum. | Area | Diam. | Circum. | Area | Diam. | Circum. | Area |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | 144.513 | 1661.9 | 55 | 172.788 | 2375.8 | 64 | 201.062 | 3217.0 | 73 | 229.336 | 4185.4 | 82 | 257.611 | 5281.0 | 91 | 285.885 | 6503.9 |
| 1/8 | 144.906 | 1670.9 | 1/8 | 173.180 | 2386.6 | 1/8 | 201.455 | 3229.6 | 1/8 | 229.729 | 4199.7 | 1/8 | 258.003 | 5297.1 | 1/8 | 286.278 | 6521.8 |
| 1/4 | 145.299 | 1680.0 | 1/4 | 173.573 | 2397.5 | 1/4 | 201.847 | 3242.2 | 1/4 | 230.122 | 4214.1 | 1/4 | 258.396 | 5313.3 | 1/4 | 286.670 | 6539.7 |
| 3/8 | 145.691 | 1689.1 | 3/8 | 173.966 | 2408.3 | 3/8 | 202.240 | 3254.8 | 3/8 | 230.514 | 4228.5 | 3/8 | 258.789 | 5329.4 | 3/8 | 287.063 | 6557.6 |
| 1/2 | 146.084 | 1698.2 | 1/2 | 174.358 | 2419.2 | 1/2 | 202.633 | 3267.5 | 1/2 | 230.907 | 4242.9 | 1/2 | 259.181 | 5345.6 | 1/2 | 287.456 | 6575.5 |
| 5/8 | 146.477 | 1707.4 | 5/8 | 174.751 | 2430.1 | 5/8 | 203.025 | 3280.1 | 5/8 | 231.300 | 4257.4 | 5/8 | 259.574 | 5361.8 | 5/8 | 287.848 | 6593.5 |
| 3/4 | 146.869 | 1716.5 | 3/4 | 175.144 | 2441.1 | 3/4 | 203.418 | 3292.8 | 3/4 | 231.692 | 4271.8 | 3/4 | 259.967 | 5378.1 | 3/4 | 288.241 | 6611.5 |
| 7/8 | 147.262 | 1725.7 | 7/8 | 175.536 | 2452.0 | 7/8 | 203.811 | 3305.6 | 7/8 | 232.085 | 4286.3 | 7/8 | 260.359 | 5394.3 | 7/8 | 288.634 | 6629.6 |
| 47 | 147.655 | 1734.9 | 56 | 175.929 | 2463.0 | 65 | 204.204 | 3318.3 | 74 | 232.478 | 4300.8 | 83 | 260.752 | 5410.6 | 92 | 289.027 | 6647.6 |
| 1/8 | 148.048 | 1744.2 | 1/8 | 176.322 | 2474.0 | 1/8 | 204.596 | 3331.1 | 1/8 | 232.871 | 4315.4 | 1/8 | 261.145 | 5426.9 | 1/8 | 289.419 | 6665.7 |
| 1/4 | 148.440 | 1753.5 | 1/4 | 176.715 | 2485.0 | 1/4 | 204.989 | 3343.9 | 1/4 | 233.263 | 4329.9 | 1/4 | 261.538 | 5443.3 | 1/4 | 289.812 | 6683.8 |
| 3/8 | 148.833 | 1762.7 | 3/8 | 177.107 | 2496.1 | 3/8 | 205.382 | 3356.7 | 3/8 | 233.656 | 4344.5 | 3/8 | 261.930 | 5459.6 | 3/8 | 290.205 | 6701.9 |
| 1/2 | 149.226 | 1772.1 | 1/2 | 177.500 | 2507.2 | 1/2 | 205.774 | 3369.6 | 1/2 | 234.049 | 4359.2 | 1/2 | 262.323 | 5476.0 | 1/2 | 290.597 | 6720.1 |
| 5/8 | 149.618 | 1781.4 | 5/8 | 177.893 | 2518.3 | 5/8 | 206.167 | 3382.4 | 5/8 | 234.441 | 4373.8 | 5/8 | 262.716 | 5492.4 | 5/8 | 290.990 | 6738.2 |
| 3/4 | 150.011 | 1790.8 | 3/4 | 178.285 | 2529.4 | 3/4 | 206.560 | 3395.3 | 3/4 | 234.834 | 4388.5 | 3/4 | 263.108 | 5508.8 | 3/4 | 291.383 | 6756.4 |
| 7/8 | 150.404 | 1800.1 | 7/8 | 178.678 | 2540.6 | 7/8 | 206.952 | 3408.2 | 7/8 | 235.227 | 4403.1 | 7/8 | 263.501 | 5525.3 | 7/8 | 291.775 | 6774.7 |
| 48 | 150.796 | 1809.6 | 57 | 179.071 | 2551.8 | 66 | 207.345 | 3421.2 | 75 | 235.619 | 4417.9 | 84 | 263.894 | 5541.8 | 93 | 292.168 | 6792.9 |
| 1/8 | 151.189 | 1819.0 | 1/8 | 179.463 | 2563.0 | 1/8 | 207.738 | 3434.2 | 1/8 | 236.012 | 4432.6 | 1/8 | 264.286 | 5558.3 | 1/8 | 292.561 | 6811.2 |
| 1/4 | 151.582 | 1828.5 | 1/4 | 179.856 | 2574.2 | 1/4 | 208.131 | 3447.2 | 1/4 | 236.405 | 4447.4 | 1/4 | 264.679 | 5574.8 | 1/4 | 292.954 | 6829.5 |
| 3/8 | 151.975 | 1837.9 | 3/8 | 180.249 | 2585.4 | 3/8 | 208.523 | 3460.2 | 3/8 | 236.798 | 4462.2 | 3/8 | 265.072 | 5591.4 | 3/8 | 293.346 | 6847.8 |
| 1/2 | 152.367 | 1847.5 | 1/2 | 180.642 | 2596.7 | 1/2 | 208.916 | 3473.2 | 1/2 | 237.190 | 4477.0 | 1/2 | 265.465 | 5607.9 | 1/2 | 293.739 | 6866.1 |
| 5/8 | 152.760 | 1857.0 | 5/8 | 181.034 | 2608.0 | 5/8 | 209.309 | 3486.3 | 5/8 | 237.583 | 4491.8 | 5/8 | 265.857 | 5624.5 | 5/8 | 294.132 | 6884.5 |
| 3/4 | 153.153 | 1866.5 | 3/4 | 181.427 | 2619.4 | 3/4 | 209.701 | 3499.4 | 3/4 | 237.976 | 4506.7 | 3/4 | 266.250 | 5641.2 | 3/4 | 294.524 | 6902.9 |
| 7/8 | 153.545 | 1876.1 | 7/8 | 181.820 | 2630.7 | 7/8 | 210.094 | 3512.5 | 7/8 | 238.368 | 4521.5 | 7/8 | 266.643 | 5657.8 | 7/8 | 294.917 | 6921.3 |
| 49 | 153.938 | 1885.7 | 58 | 182.212 | 2642.1 | 67 | 210.487 | 3525.7 | 76 | 238.761 | 4536.5 | 85 | 267.035 | 5674.5 | 94 | 295.310 | 6939.8 |
| 1/8 | 154.331 | 1895.4 | 1/8 | 182.605 | 2653.5 | 1/8 | 210.879 | 3538.8 | 1/8 | 239.154 | 4551.4 | 1/8 | 267.428 | 5691.2 | 1/8 | 295.702 | 6958.2 |
| 1/4 | 154.723 | 1905.0 | 1/4 | 182.998 | 2664.9 | 1/4 | 211.272 | 3552.0 | 1/4 | 239.546 | 4566.4 | 1/4 | 267.821 | 5707.9 | 1/4 | 296.095 | 6976.7 |
| 3/8 | 155.116 | 1914.7 | 3/8 | 183.390 | 2676.4 | 3/8 | 211.665 | 3565.2 | 3/8 | 239.939 | 4581.3 | 3/8 | 268.213 | 5724.7 | 3/8 | 296.488 | 6995.3 |
| 1/2 | 155.509 | 1924.4 | 1/2 | 183.783 | 2687.8 | 1/2 | 212.058 | 3578.5 | 1/2 | 240.332 | 4596.3 | 1/2 | 268.606 | 5741.5 | 1/2 | 296.881 | 7013.8 |
| 5/8 | 155.902 | 1934.2 | 5/8 | 184.176 | 2699.3 | 5/8 | 212.450 | 3591.7 | 5/8 | 240.725 | 4611.4 | 5/8 | 268.999 | 5758.3 | 5/8 | 297.273 | 7032.4 |
| 3/4 | 156.294 | 1943.9 | 3/4 | 184.569 | 2710.9 | 3/4 | 212.843 | 3605.0 | 3/4 | 241.117 | 4626.4 | 3/4 | 269.392 | 5775.1 | 3/4 | 297.666 | 7051.0 |
| 7/8 | 156.687 | 1953.7 | 7/8 | 184.961 | 2722.4 | 7/8 | 213.236 | 3618.3 | 7/8 | 241.510 | 4641.5 | 7/8 | 269.784 | 5791.9 | 7/8 | 298.059 | 7069.6 |
| 50 | 157.080 | 1963.5 | 59 | 185.354 | 2734.0 | 68 | 213.628 | 3631.7 | 77 | 241.903 | 4656.6 | 86 | 270.177 | 5808.8 | 95 | 298.451 | 7088.2 |
| 1/8 | 157.472 | 1973.3 | 1/8 | 185.747 | 2745.6 | 1/8 | 214.021 | 3645.0 | 1/8 | 242.295 | 4671.8 | 1/8 | 270.570 | 5825.7 | 1/8 | 298.844 | 7106.9 |
| 1/4 | 157.865 | 1983.2 | 1/4 | 186.139 | 2757.2 | 1/4 | 214.414 | 3658.4 | 1/4 | 242.688 | 4686.9 | 1/4 | 270.962 | 5842.6 | 1/4 | 299.237 | 7125.6 |
| 3/8 | 158.258 | 1993.1 | 3/8 | 186.532 | 2768.8 | 3/8 | 214.806 | 3671.8 | 3/8 | 243.081 | 4702.1 | 3/8 | 271.355 | 5859.6 | 3/8 | 299.629 | 7144.3 |
| 1/2 | 158.650 | 2003.0 | 1/2 | 186.925 | 2780.5 | 1/2 | 215.199 | 3685.3 | 1/2 | 243.473 | 4717.3 | 1/2 | 271.748 | 5876.5 | 1/2 | 300.022 | 7163.0 |
| 5/8 | 159.043 | 2012.9 | 5/8 | 187.317 | 2792.2 | 5/8 | 215.592 | 3698.7 | 5/8 | 243.866 | 4732.5 | 5/8 | 272.140 | 5893.5 | 5/8 | 300.415 | 7181.8 |
| 3/4 | 159.436 | 2022.8 | 3/4 | 187.710 | 2803.9 | 3/4 | 215.984 | 3712.2 | 3/4 | 244.259 | 4747.8 | 3/4 | 272.533 | 5910.6 | 3/4 | 300.807 | 7200.6 |
| 7/8 | 159.829 | 2032.8 | 7/8 | 188.103 | 2815.7 | 7/8 | 216.377 | 3725.7 | 7/8 | 244.652 | 4763.1 | 7/8 | 272.926 | 5927.6 | 7/8 | 301.200 | 7219.4 |
| 51 | 160.221 | 2042.8 | 60 | 188.496 | 2827.4 | 69 | 216.770 | 3739.3 | 78 | 245.044 | 4778.4 | 87 | 273.319 | 5944.7 | 96 | 301.593 | 7238.2 |
| 1/8 | 160.614 | 2052.8 | 1/8 | 188.888 | 2839.2 | 1/8 | 217.163 | 3752.8 | 1/8 | 245.437 | 4793.7 | 1/8 | 273.711 | 5961.8 | 1/8 | 301.986 | 7257.1 |
| 1/4 | 161.007 | 2062.9 | 1/4 | 189.281 | 2851.0 | 1/4 | 217.555 | 3766.4 | 1/4 | 245.830 | 4809.0 | 1/4 | 274.104 | 5978.9 | 1/4 | 302.378 | 7276.0 |
| 3/8 | 161.399 | 2073.0 | 3/8 | 189.674 | 2862.9 | 3/8 | 217.948 | 3780.0 | 3/8 | 246.222 | 4824.4 | 3/8 | 274.497 | 5996.0 | 3/8 | 302.771 | 7294.9 |
| 1/2 | 161.792 | 2083.1 | 1/2 | 190.066 | 2874.8 | 1/2 | 218.341 | 3793.7 | 1/2 | 246.615 | 4839.8 | 1/2 | 274.889 | 6013.2 | 1/2 | 303.164 | 7313.8 |
| 5/8 | 162.185 | 2093.2 | 5/8 | 190.459 | 2886.6 | 5/8 | 218.733 | 3807.3 | 5/8 | 247.008 | 4855.2 | 5/8 | 275.282 | 6030.4 | 5/8 | 303.556 | 7332.8 |
| 3/4 | 162.577 | 2103.3 | 3/4 | 190.852 | 2898.6 | 3/4 | 219.126 | 3821.0 | 3/4 | 247.400 | 4870.7 | 3/4 | 275.675 | 6047.6 | 3/4 | 303.949 | 7351.8 |
| 7/8 | 162.970 | 2113.5 | 7/8 | 191.244 | 2910.5 | 7/8 | 219.519 | 3834.7 | 7/8 | 247.793 | 4886.2 | 7/8 | 276.067 | 6064.9 | 7/8 | 304.342 | 7370.8 |
| 52 | 163.363 | 2123.7 | 61 | 191.637 | 2922.5 | 70 | 219.911 | 3848.5 | 79 | 248.186 | 4901.7 | 88 | 276.460 | 6082.1 | 97 | 304.734 | 7389.8 |
| 1/8 | 163.756 | 2133.9 | 1/8 | 192.030 | 2934.5 | 1/8 | 220.304 | 3862.2 | 1/8 | 248.579 | 4917.2 | 1/8 | 276.853 | 6099.4 | 1/8 | 305.127 | 7408.9 |
| 1/4 | 164.148 | 2144.2 | 1/4 | 192.423 | 2946.5 | 1/4 | 220.697 | 3876.0 | 1/4 | 248.971 | 4932.7 | 1/4 | 277.246 | 6116.7 | 1/4 | 305.520 | 7428.0 |
| 3/8 | 164.541 | 2154.5 | 3/8 | 192.815 | 2958.5 | 3/8 | 221.090 | 3889.8 | 3/8 | 249.364 | 4948.3 | 3/8 | 277.638 | 6134.1 | 3/8 | 305.913 | 7447.1 |
| 1/2 | 164.934 | 2164.8 | 1/2 | 193.208 | 2970.6 | 1/2 | 221.482 | 3903.6 | 1/2 | 249.757 | 4963.9 | 1/2 | 278.031 | 6151.4 | 1/2 | 306.305 | 7466.2 |
| 5/8 | 165.326 | 2175.1 | 5/8 | 193.601 | 2982.7 | 5/8 | 221.875 | 3917.5 | 5/8 | 250.149 | 4979.5 | 5/8 | 278.424 | 6168.8 | 5/8 | 306.698 | 7485.3 |
| 3/4 | 165.719 | 2185.4 | 3/4 | 193.993 | 2994.8 | 3/4 | 222.268 | 3931.4 | 3/4 | 250.542 | 4995.2 | 3/4 | 278.816 | 6186.2 | 3/4 | 307.091 | 7504.5 |
| 7/8 | 166.112 | 2195.8 | 7/8 | 194.386 | 3006.9 | 7/8 | 222.660 | 3945.3 | 7/8 | 250.935 | 5010.9 | 7/8 | 279.209 | 6203.7 | 7/8 | 307.483 | 7523.7 |
| 53 | 166.504 | 2206.2 | 62 | 194.779 | 3019.1 | 71 | 223.053 | 3959.2 | 80 | 251.327 | 5026.5 | 89 | 279.602 | 6221.1 | 98 | 307.876 | 7543.0 |
| 1/8 | 166.897 | 2216.6 | 1/8 | 195.171 | 3031.3 | 1/8 | 223.446 | 3973.1 | 1/8 | 251.720 | 5042.3 | 1/8 | 279.994 | 6238.6 | 1/8 | 308.269 | 7562.2 |
| 1/4 | 167.290 | 2227.0 | 1/4 | 195.564 | 3043.5 | 1/4 | 223.838 | 3987.1 | 1/4 | 252.113 | 5058.0 | 1/4 | 280.387 | 6256.1 | 1/4 | 308.661 | 7581.5 |
| 3/8 | 167.683 | 2237.5 | 3/8 | 195.957 | 3055.7 | 3/8 | 224.231 | 4001.1 | 3/8 | 252.506 | 5073.8 | 3/8 | 280.780 | 6273.7 | 3/8 | 309.054 | 7600.8 |
| 1/2 | 168.075 | 2248.0 | 1/2 | 196.350 | 3068.0 | 1/2 | 224.624 | 4015.2 | 1/2 | 252.898 | 5089.6 | 1/2 | 281.173 | 6291.2 | 1/2 | 309.447 | 7620.1 |
| 5/8 | 168.468 | 2258.5 | 5/8 | 196.742 | 3080.3 | 5/8 | 225.017 | 4029.2 | 5/8 | 253.291 | 5105.4 | 5/8 | 281.565 | 6308.8 | 5/8 | 309.840 | 7639.5 |
| 3/4 | 168.861 | 2269.1 | 3/4 | 197.135 | 3092.6 | 3/4 | 225.409 | 4043.3 | 3/4 | 253.684 | 5121.2 | 3/4 | 281.958 | 6326.4 | 3/4 | 310.232 | 7658.9 |
| 7/8 | 169.253 | 2279.6 | 7/8 | 197.528 | 3104.9 | 7/8 | 225.802 | 4057.4 | 7/8 | 254.076 | 5137.1 | 7/8 | 282.351 | 6344.1 | 7/8 | 310.625 | 7678.3 |
| 54 | 169.646 | 2290.2 | 63 | 197.920 | 3117.2 | 72 | 226.195 | 4071.5 | 81 | 254.469 | 5153.0 | 90 | 282.743 | 6361.7 | 99 | 311.018 | 7697.7 |
| 1/8 | 170.039 | 2300.8 | 1/8 | 198.313 | 3129.6 | 1/8 | 226.587 | 4085.7 | 1/8 | 254.862 | 5168.9 | 1/8 | 283.136 | 6379.4 | 1/8 | 311.410 | 7717.1 |
| 1/4 | 170.431 | 2311.5 | 1/4 | 198.706 | 3142.0 | 1/4 | 226.980 | 4099.9 | 1/4 | 255.254 | 5184.9 | 1/4 | 283.529 | 6397.1 | 1/4 | 311.803 | 7736.6 |
| 3/8 | 170.824 | 2322.1 | 3/8 | 199.098 | 3154.5 | 3/8 | 227.373 | 4114.0 | 3/8 | 255.647 | 5200.8 | 3/8 | 283.921 | 6414.9 | 3/8 | 312.196 | 7756.1 |
| 1/2 | 171.217 | 2332.8 | 1/2 | 199.491 | 3166.9 | 1/2 | 227.765 | 4128.2 | 1/2 | 256.040 | 5216.8 | 1/2 | 284.314 | 6432.6 | 1/2 | 312.588 | 7775.6 |
| 5/8 | 171.609 | 2343.5 | 5/8 | 199.884 | 3179.4 | 5/8 | 228.158 | 4142.5 | 5/8 | 256.433 | 5232.8 | 5/8 | 284.707 | 6450.4 | 5/8 | 312.981 | 7795.2 |
| 3/4 | 172.002 | 2354.3 | 3/4 | 200.277 | 3191.9 | 3/4 | 228.551 | 4156.8 | 3/4 | 256.825 | 5248.9 | 3/4 | 285.100 | 6468.2 | 3/4 | 313.374 | 7814.8 |
| 7/8 | 172.395 | 2365.0 | 7/8 | 200.669 | 3204.4 | 7/8 | 228.944 | 4171.1 | 7/8 | 257.218 | 5264.9 | 7/8 | 285.492 | 6486.0 | 7/8 | 313.767 | 7834.4 |
| | | | | | | | | | | | | | | | 100 | 314.159 | 7854.0 |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 113 of 117
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# DECIMAL EQUIVALENTS OF MILLIMETERS AND FRACTIONS OF MILLIMETERS

10 mm. = 1 Centimeter = 0.3937 inches
10 cm. = 1 Decimeter = 3.937 inches
10 dm. = 1 Meter = 39.37 inches
25.4 mm. = 1 inch

| mm. | Inches | mm. | Inches | mm. | Inches | mm. | Inches | mm. | Inches |
|---|---|---|---|---|---|---|---|---|---|
| 1/50 | .00079 | 30/50 | .02362 | 11 | .43307 | 41 | 1.61417 | 71 | 2.79527 |
| 2/50 | .00157 | 31/50 | .02441 | 12 | .47244 | 42 | 1.65354 | | |
| 3/50 | .00236 | 32/50 | .02520 | 13 | .51181 | 43 | 1.69291 | 72 | 2.83464 |
| 4/50 | .00315 | 33/50 | .02598 | 14 | .55118 | 44 | 1.73228 | 73 | 2.87401 |
| | | 34/50 | .02677 | | | | | 74 | 2.91338 |
| 5/50 | .00394 | | | 15 | .59055 | 45 | 1.77165 | 75 | 2.95275 |
| 6/50 | .00472 | 35/50 | .02756 | 16 | .62992 | 46 | 1.81102 | 76 | 2.99212 |
| 7/50 | .00551 | 36/50 | .02835 | 17 | .66929 | 47 | 1.85039 | | |
| 8/50 | .00630 | 37/50 | .02913 | 18 | .70866 | 48 | 1.88976 | 77 | 3.03149 |
| 9/50 | .00709 | 38/50 | .02992 | 19 | .74803 | 49 | 1.92913 | 78 | 3.07086 |
| | | 39/50 | .03071 | | | | | 79 | 3.11023 |
| 10/50 | .00787 | | | 20 | .78740 | 50 | 1.96850 | 80 | 3.14960 |
| 11/50 | .00866 | 40/50 | .03150 | 21 | .82677 | 51 | 2.00787 | 81 | 3.18897 |
| 12/50 | .00945 | 41/50 | .03228 | 22 | .86614 | 52 | 2.04724 | | |
| 13/50 | .01024 | 42/50 | .03307 | 23 | .90551 | 53 | 2.08661 | 82 | 3.22834 |
| 14/50 | .01102 | 43/50 | .03386 | 24 | .94488 | 54 | 2.12598 | 83 | 3.26771 |
| | | 44/50 | .03465 | | | | | 84 | 3.30708 |
| 15/50 | .01181 | | | 25 | .98425 | 55 | 2.16535 | 85 | 3.34645 |
| 16/50 | .01260 | 45/50 | .03543 | 26 | 1.02362 | 56 | 2.20472 | 86 | 3.38582 |
| 17/50 | .01339 | 46/50 | .03622 | 27 | 1.06299 | 57 | 2.24409 | | |
| 18/50 | .01417 | 47/50 | .03701 | 28 | 1.10236 | 58 | 2.28346 | 87 | 3.42519 |
| 19/50 | .01496 | 48/50 | .03780 | 29 | 1.14173 | 59 | 2.32283 | 88 | 3.46456 |
| | | 49/50 | .03858 | | | | | 89 | 3.50393 |
| 20/50 | .01575 | | | 30 | 1.18110 | 60 | 2.36220 | 90 | 3.54330 |
| 21/50 | .01654 | 1 | .03937 | 31 | 1.22047 | 61 | 2.40157 | 91 | 3.58267 |
| 22/50 | .01732 | 2 | .07874 | 32 | 1.25984 | 62 | 2.44094 | | |
| 23/50 | .01811 | 3 | .11811 | 33 | 1.29921 | 63 | 2.48031 | 92 | 3.62204 |
| 24/50 | .01890 | 4 | .15748 | 34 | 1.33858 | | | 93 | 3.66141 |
| | | | | | | 64 | 2.51968 | 94 | 3.70078 |
| 25/50 | .01969 | 5 | .19685 | 35 | 1.37795 | 65 | 2.55905 | 95 | 3.74015 |
| 26/50 | .02047 | 6 | .23622 | 36 | 1.41732 | 66 | 2.59842 | 96 | 3.77952 |
| 27/50 | .02126 | 7 | .27559 | 37 | 1.45669 | | | | |
| 28/50 | .02205 | 8 | .31496 | 38 | 1.49606 | 67 | 2.63779 | 97 | 3.81889 |
| 29/50 | .02283 | 9 | .35433 | 39 | 1.53543 | 68 | 2.67716 | 98 | 3.85826 |
| | | | | | | 69 | 2.71653 | 99 | 3.89763 |
| | | 10 | .39370 | 40 | 1.57480 | 70 | 2.75590 | 100 | 3.93700 |

# DECIMAL EQUIVALENTS OF FRACTIONS OF INCHES

| Fraction | Decimal Equivalent | Fraction | Decimal Equivalent | Fraction | Decimal Equivalent | Fraction | Decimal Equivalent | Fraction | Decimal Equivalent |
|---|---|---|---|---|---|---|---|---|---|
| 1/64 | .015625 | 7/32 | .21875 | 27/64 | .421875 | 5/8 | .625 | 53/64 | .828125 |
| 1/32 | .03125 | 15/64 | .234375 | 7/16 | .4375 | 41/64 | .640625 | 27/32 | .84375 |
| 3/64 | .046875 | 1/4 | .250 | 29/64 | .453125 | 21/32 | .65625 | 55/64 | .859375 |
| 1/16 | .0625 | 17/64 | .265625 | 15/32 | .46875 | 43/64 | .671875 | 7/8 | .875 |
| 5/64 | .078125 | 9/32 | .28125 | 31/64 | .484375 | 11/16 | .6875 | 57/64 | .890625 |
| 3/32 | .09375 | 19/64 | .296875 | 1/2 | .500 | 45/64 | .703125 | 29/32 | .90625 |
| 7/64 | .109375 | 5/16 | .3125 | 33/64 | .515625 | 23/32 | .71875 | 59/64 | .921875 |
| 1/8 | .125 | 21/64 | .328125 | 17/32 | .53125 | 47/64 | .734375 | 15/16 | .9375 |
| 9/64 | .140625 | 11/32 | .34375 | 35/64 | .546875 | 3/4 | .750 | 61/64 | .953125 |
| 5/32 | .15625 | 23/64 | .359375 | 9/16 | .5625 | 49/64 | .765625 | 31/32 | .96875 |
| 11/64 | .171875 | 3/8 | .375 | 37/64 | .578125 | 25/32 | .78125 | 63/64 | .984375 |
| 3/16 | .1875 | 25/64 | .390625 | 19/32 | .59375 | 51/64 | .796875 | 1 | 1 |
| 13/64 | .203125 | 13/32 | .40625 | 39/64 | .609375 | 13/16 | .8125 | | |



*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 114 of 117
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# ALPHABETICAL INDEX OF J-M PACKINGS


| PACKING | PAGE |
|---|---|
| Acid-Resisting Rod | 32 |
| Air, and Air Pump Sets | 36 |
| Aqua Hydraulic Piston | 65 |
| Asbestos Cord | 96 |
| Asbestos Hollow Core Rod | 22 |
| Asbestos Rope | 92 to 95 |
| Asbestos Sheet and Cut Gaskets | 70 & 82 |
| Asbestos Wick | 91 |
| Besta-Monia Rod | 40 |
| Black Oil-Proof Sheet and Cut Gaskets | 75 & 82 |
| Blue Asbestos Fibre and Cut Gaskets | 71 & 82 |
| Boiler Gaskets, Kearsarge | 78 |
| Boiler Gaskets, Spirotallic | 81 |
| Caustic-Resisting Rod | 33 |
| Centripac Rod | 30 |
| Clipper Seal Rings | 58 |
| Conepac Rod | 60 |
| Copper, Square-Braided, Rod | 50 |
| Cord, Twisted Asbestos | 96 |
| Cross Diagonal Rod | 38 |
| Cups, Moulded Packing | 56 |
| Cut Gaskets | 82 |
| Diaphragm Rubber Sheet and Cut Gaskets | 74 & 82 |
| Door or Groove Packing | 86 |
| Duro Rod | 40 |
| Felted Asbestos Sheet and Cut Gaskets | 71 & 82 |
| Flax | 44 |
| Flexible Metallic | 47 |
| Gasketing Tapes | 84 & 85 |
| Gasketing, Tubular | 88 |
| Gaskets, Cut | 82 |
| Gaskets, Kearsarge | 78 |
| Gaskets, Spirotallic | 81 |
| Gasoline Resisting Rod | 34 |
| Groove or Door Packing | 86 |
| H-P Diagonal Rod | 39 |
| Hollow Core Rod | 22 & 42 |
| Hydraulic Piston, Aqua | 65 |
| Hydraulic Piston, Light Weight | 66 |
| Hydraulic Piston, Square | 66 |
| Interlocked Braided Rod | 25 |
| Interlocked Braided No. 270 Rod | 35 |
| Jewett Rod | 28 |
| Jute | 46 |
| Kearsarge Manhole, Handhole & Tube Plate Gaskets | 78 |
| Kearsarge Rod | 18 |
| Kearsarge Sheet and Cut Gaskets | 73 & 82 |
| Liberty Red Rubber Sheet and Cut Gaskets | 76 & 82 |
| Liberty Red Rubber Tubular Gasketing | 88 |
| Light Weight Hydraulic Piston | 66 |
| L-P Diagonal Rod | 39 |
| Metallic, Flexible | 47 |
| Mobilene Sheet and Cut Gaskets | 73 & 82 |
| Mogul Rod | 26 |
| Moulded Packing Cups | 56 |
| Oil Field Spiral | 41 |
| Oil Field Packings, Special | 41 |
| Packing Cups, Moulded | 56 |
| Plastic | 51 |
| Polish Rod Rings | 41 |
| Pump Valves | 62 |
| Rajah Rod | 29 |
| Rope, Twisted and Braided Asbestos | 92 to 95 |
| Rubber and Duck Hollow Core Rod | 42 |
| Rubber and Synthetic Rubber Sheet and Cut Gaskets | 74 & 82 |
| Sea Rings | 13 |
| Seigelite Sheet and Cut Gaskets | 72 & 82 |
| Service Sheet and Cut Gaskets | 68 & 82 |
| Slush Pump Rings and Sets | 41 |
| Spirotallic Gaskets | 81 |
| Square-Braided Copper | 50 |
| Square Hydraulic Piston | 66 |
| Superheat Steam Rod | 20 |
| Tadpole Gasketing Tape | 85 |
| Thermo Rod | 36 |
| Tubular Gasketing | 88 |
| Tucks Piston | 66 |
| Universal Piston | 64 |
| Universal Rod | 21 |
| Valve Stem (Mogul and Rajah) | 26 & 29 |
| Valves, Pump | 62 |
| Victor Rod | 42 |
| White Lubricated Rod | 31 |
| Wick, Asbestos | 91 |




*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 116 of 117
Published by AsbestosClaims.Law
asbestosclaims.law/library/13710/116

# NUMERICAL INDEX OF J-M PACKINGS


| STYLE NO. | PACKING | PAGE |
|---|---|---|
| 2 | Rajah Rod (Round) | 29 |
| 5 | Rod | 36 |
| 6 | Rajah Rod (Square) | 29 |
| 7 | Centripac Rod | 30 |
| 9, 10 | Jewett Rod | 28 |
| 11 | Centripac Rod | 30 |
| 14 | Jewett Rod | 28 |
| 15 | Kearsarge Rod | 18 |
| 15–55 | Air Pump Sets | 36 |
| 17 | Groove or Door | 86 |
| 18, 19 | Centripac | 30 |
| 32 | Universal Rod | 21 |
| 33 | Universal Piston | 64 |
| 43 to 46 | Conepac Rod | 60 |
| 50 | Asbestos Sheet and Cut Gaskets | 70 & 82 |
| 55 | Air | 36 |
| 60 | Service Sheet and Cut Gaskets | 68 & 82 |
| 70, 76 | Asbestos Sheet and Cut Gaskets | 70 & 82 |
| 83 | Blue Asbestos Fibre Sheet and Cut Gaskets | 71 & 82 |
| 98, 100 | Kearsarge Sheet and Cut Gaskets | 73 & 82 |
| 101 | Mobilene Sheet and Cut Gaskets | 73 & 82 |
| 104 to 115 | Rubber and Synthetic Rubber Sheet and Cut Gaskets | 74, 76, 82 |
| 116, 118 | Kearsarge Gaskets | 78 |
| 119 to 122 | Gasketing Tapes | 84 |
| 123 | Tadpole Gasketing Tape | 85 |
| 124, 125 | Tubular Gasketing | 88 |
| 128, 129 | Groove or Door | 87 |
| 136 | Kearsarge Gaskets | 79 |
| 156 | Oil Field Spiral | 41 |
| 166 | Kearsarge Rod | 18 |
| 167 | Superheat Steam Rod | 20 |
| 171 | Duro Rod | 40 |
| 172 | Besta-Monia Rod | 40 |
| 173 | Victor Rod | 42 |
| 176, 177 | Groove or Door | 86 |
| 181 | Flax (W.P.H.) | 44 |
| 182 | Aqua Hydraulic Piston | 65 |
| 183 | H-P Diagonal Rod | 39 |
| 184 | L-P Diagonal Rod | 39 |
| 186 | Tucks Piston | 66 |
| 188, 189 | Flax | 44 |
| 193 | Mogul Rod | 26 |
| 195, 199 | Asbestos Wick | 91 |
| 200 | Asbestos Rope | 93 |
| 202 | Asbestos Wick | 91 |
| 216 | Groove or Door | 86 |
| 219 | Felted Asbestos Sheet and Gaskets | 71 & 82 |
| 222, 223 | Mogul Rod | 26 |
| 240 | Flax (W.P.H.) | 44 |
| 253 to 259 | Interlocked Braided Rod | 25 |
| 270 | Interlocked Braided Rod | 35 |
| 271 | Cross Diagonal Rod | 38 |
| 274 | Asbestos Cord | 96 |
| 280, 282 | Flexible Metallic | 50 |
| 285 | Asbestos Cord | 96 |
| 290 | Square Hydraulic Piston | 66 |
| 293 | Gasoline Rod | 34 |
| 295 | Light Weight Hydraulic Piston | 66 |
| 300 | Pump Valves | 62 |
| 322, 323 | Gasoline Rod | 34 |
| 350 to 363 | Flexible Metallic | 48 & 49 |
| 365 | Flexible Metallic | 50 |
| 373, 374 | Polish Rod Rings | 41 |
| 379 | Flexible Metallic | 49 |
| 385 | Hollow Core Rod | 22 |
| 390 | Rubber and Duck Hollow Core Rod | 42 |
| 391, 392 | Flexible Metallic | 50 |
| 415 to 430 | Pump Valves | 62 |
| 474, 476 | Slush Pump Rings and Sets | 41 |
| 566 | Asbestos Rope | 94 |
| 580, 581 | Asbestos Rope | 95 |
| 610 to 645 | Plastic | 53 |
| 702 | Asbestos Rope | 95 |
| 711 | Seigelite Sheet and Cut Gaskets | 72 & 82 |
| 731 | Rod | 36 |
| 733, 787, 788 | Asbestos Rope | 95 |
| 789 | Thermo Rod | 36 |
| 790 | Groove or Door | 86 |
| 857 | Asbestos Rope | 95 |
| 866, 872 | Groove or Door | 86 & 87 |
| 873 | Asbestos Rope | 95 |
| 2000 | Flax | 44 |
| 2010 to 2018 | Acid-Resisting Rod | 32 |
| 2020 to 2022 | Caustic-Resisting | 33 |
| 2035, 2036 | White Lubricated | 31 |
| 3000 | Flax (W.P.H.) | 44 |
| 4181 | Jute (W.P.H.) | 46 |
| 4191 | Jute | 46 |
| 4193 | Asbestos Wick | 91 |
| 4194 | Asbestos Rope | 93 |
| 4195 | Asbestos Wick | 91 |
| 4196 | Asbestos Rope | 93 |
| 4197 to 4199 | Asbestos Wick | 91 |
| 4200 | Asbestos Rope | 92 |
| 4202 | Asbestos Wick | 91 |




*Johns-Manville Packings (1941)*
ACL Doc 13710 · Page 117 of 117
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asbestosclaims.law/library/13710/117