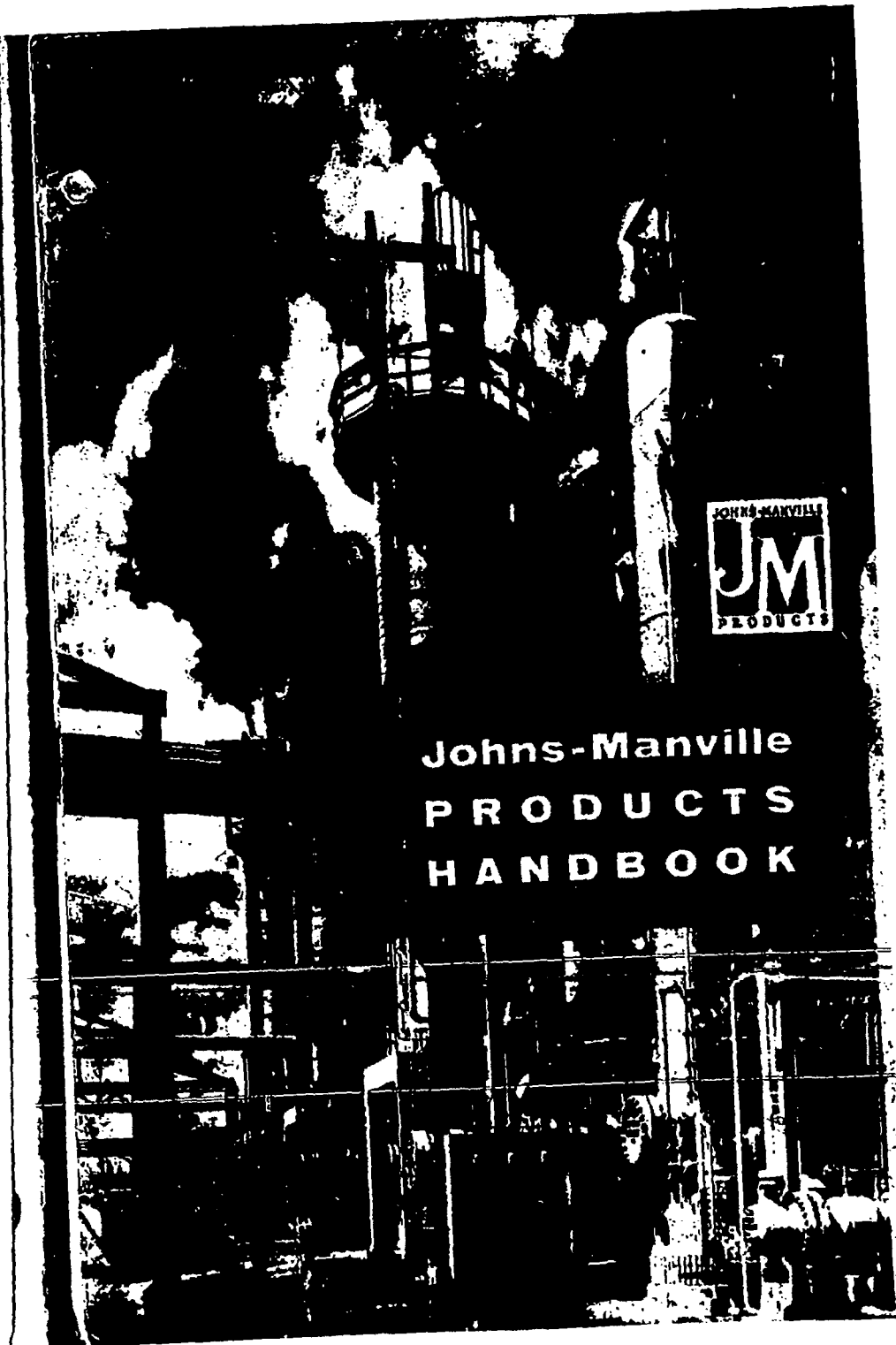


JM
Johns-Manville
Ken-Caryl Ranch
Denver, Colorado 80217

For information on other J-M
Thermal Insulations and
Fibers, write to:
Johns-Manville Insulation
Company, Division 111, Denver
Colorado 80217 or Call
(303) 678-1000

The physical properties of Johns-Manville Insulations represent
typical average values obtained in accordance with accepted test
methods and are subject to normal manufacturing variations.
They are supplied as a technical service unit and are subject to
change without notice. Check the Johns-Manville district office
to assure current information.

270214



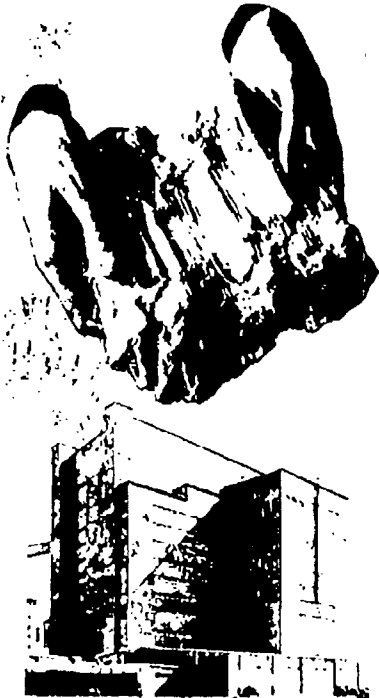
PLAINTIFF'S
EXHIBIT
JM-2318

THIS JOHNS-MANVILLE HANDBOOK WAS DEVELOPED

TO HELP YOU SELECT THE RIGHT MATERIAL TO . . .

CONTROL heat, cold, sound, motion and corrosion

PROTECT against fire, weather and wear . . .



For nearly a century Johns-Manville has been producing quality products to meet the ever-changing, ever-expanding needs of American Industry. Through the knowledge and skills acquired during this period, Johns-Manville has developed many lines of products, as described in this booklet, which can help you reduce costs and improve operations.

Upper left: Asbestos, nature's tough mineral, provides certain J-M products with strength, impermeability and resistance to many chemicals and acids.

Left: The new Johns-Manville Asbestos Mill at Asbestos, Quebec. This giant new mill ensures a dependable supply of uniform quality asbestos fiber for present and future needs. Its full production capacity will be greater than one-third the free world's supply of asbestos fiber.

MANUFACTURING AND MINING EXPERIENCE

Johns-Manville operates 30 modern strategically located plants where up-to-date production techniques and rigid product control assure maintained quality, year in and year out. The J-M mine at Asbestos, Quebec, is the largest mine in the world for the production of asbestos fiber . . . the Johns-Manville deposit at Lompoc, California, is the largest uniformly pure source of diatomite.

MODERN RESEARCH FACILITIES

In the Johns-Manville Research Center at Manville, New Jersey, scientists devote their constant efforts to the development and improvement of products made from asbestos, diatomite and a variety of other raw materials in order to keep pace with industrial requirements.

ENGINEERING SERVICE

A Johns-Manville sales representative will be pleased to provide you with additional data on products described in this booklet. In addition, he will be glad to work with you on any specific problems you have related to the use of such products in your operations. An inquiry to any of the J-M Sales Offices listed on the back cover of this Handbook will receive prompt attention.

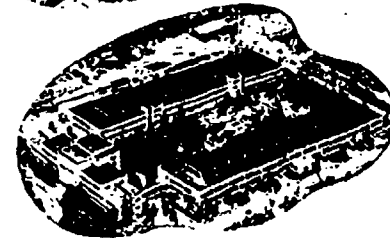


TABLE OF CONTENTS

Insulations and
Refractory Products 4-27

Transite[®]
Asbestos-Cement Pipe . . 28-30

Packings and Gaskets . . . 31-37

Electrical Products 38-41

Cellite[®] Diatomite Filter
Aids and Mineral Fillers . . . 42

Cellite Diatomite Catalyst Car-
riers, Metal Rasching Rings . . 43

J-M Synthello Silicates 44

Friction Materials 45

Pipe Protection Materials . . . 46

Floorings 47

Roofing and Siding 48-51

J-M Sales Offices . . . Back Cover

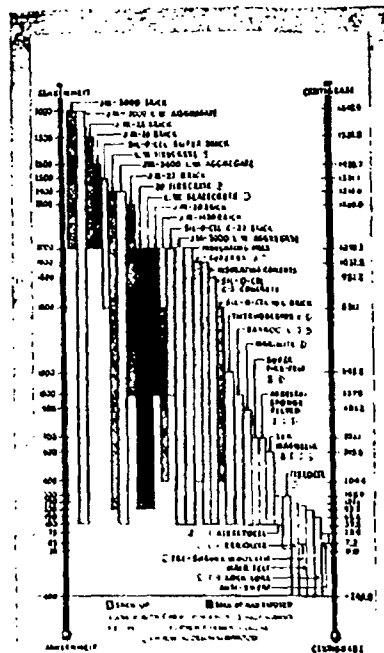
450142

450143

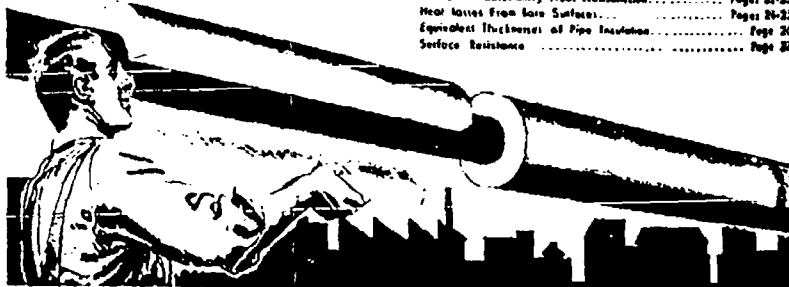


INSULATIONS

The World's Most Complete Insulation Service



An accurate chart of Johns-Manville Thermal Insulations, similar to the one above, is available in size 11 1/2" x 18". The chart is printed in four colors and is mounted on heavy card stock suitable for hanging on the wall. For your free copy of this ready reference chart, write your nearest Johns-Manville office for form 104-00.



450144

JOHNS - MANVILLE



INSULATIONS

Blocks for High Temperature Service



J-M 85% Magnesia has proven its value over many decades of satisfactory, economical service.



J-M 85% Magnesia is particularly adapted to conditions where high insulating value and light weight are needed.

J-M 85% MAGNESIA BLOCKS

The Standard Insulation for Service to 600F

HIGH INSULATING VALUE • LIGHT WEIGHT • EASILY CUT • PROVED LONG LIFE

Johns-Manville 85% Magnesia is composed of hydrated basic carbonate of magnesia bonded with asbestos fibers, and molded into block form. Its high insulating value and permanency have been proved over many decades of satisfactory, trouble-free service. Time and again, it has earned its right to be called "Industry's greatest fuel saver for temperatures to 600F."

The process by which the materials are fabricated into J-M 85% Magnesia block insulation results in a durable

product embodying good resistance to heat transmission, the highest weight consistent with good mechanical strength, and excellent workability. It is economical to apply on flat, curved or irregular surfaces, and is particularly adapted to conditions where high insulating value and light weight are needed or where surfaces are so irregular that an easily-cut insulation is required.

Where temperatures exceed 600F, J-M 85% Magnesia is used as the outer layer over Supercel. This construction, known as Supercel Combination, is described on page 6. J-M 85% Magnesia in pipe insulation form is described on page 12.

J-M Water-Resistant Magnesia for service to 450F offers the same unique combination of properties as J-M 85% Magnesia. In addition, because of its very high degree of water-resistance, it can be expected to function under moisture conditions that eliminate other insulations. Also available in pipe insulation form.

Standard Sizes

Length, inches	Thickness, inches	Width, inches
18 and 36	1 through 4	3 and 6, flat or curved
	1 1/2 through 4	9 and 12, flat only

Note: On curved blocks the 1/4" thickness is furnished subject to the specific radius applied.

PHYSICAL AND THERMAL PROPERTIES*

Density (pcf)	12.5 to 12.8 lb. per cu. ft.
Transverse Strength (modulus of rupture)	45 to 55 psi
Compressive Strength	45 to 75 psi to produce 5% compression
Linear Shrinkage	1 to 2% after 24-hr. setting period at 600F
Maximum Service Temperature	600F
Conductivity	Mean temperature 180F 200F 300F 400F
	1/2 in. per sq. ft. per F per in. .41 .43 .45 .47

*The figures given in this table are average values obtained in accordance with recognized test methods.

450145

QUALITY PRODUCTS



INSULATIONS

Blocks for High Temperature Service

SUPEREX® BLOCKS AND SUPEREX COMBINATION

For service to 1900°F

Johns-Manville Superex Blocks are made of calcined diatomaceous silica blended with other insulating materials and bonded with asbestos fiber. These light weight, large size blocks will safely withstand temperatures up to 1900°F with negligible shrinkage. They are widely used for equipment operating at high temperatures, such as boiler furnaces, hot blast stoves, incinerators and waste incinerators, petroleum cracking furnaces, producer gas makers and metallurgical furnaces of various types. Superex is often used next to the hot surface because of its high heat resistance, with J-M 550 Magnesia as the outer layer.

Large size Superex Blocks mean faster installation and faster application.

STANDARD SIZES		
Width, in.	Length, in.	Thickness, in.
3 and 6 flat or curved	18 and 24	1 through 4
9 and 12 flat only		1½ through 4



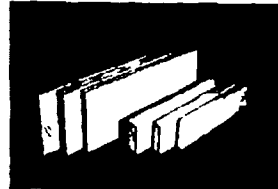
Large size Superex Blocks mean faster installation and faster application.

THERMOBESTOS BLOCKS

For service to 1200°F

Johns-Manville Thermobestos Block Insulation is made of hydrous calcium silicate combined with asbestos fiber by a special J-M process. Used for insulating boilers, tanks, heat exchangers and other equipment having flat or curved surfaces where temperature does not exceed 1200°F.

At temperatures above 600°F where the expansion of equipment is a significant factor, blocks should be applied in double-layer construction with staggered joints to prevent excessive heat losses and surface temperatures at the joints, caused by expansion, thereby eliminating damage to the exterior finish. Double-layer, staggered joint construction also minimizes thermal stresses in the insulation by reducing the temperature differential across each layer.



Thermobestos blocks may be used where temperatures on the insulation does not exceed 1200°F.

STANDARD SIZES

Width, in.	Length, in.	Thickness, in.
6 and 12	3 ft.	1, 1½, 2, 2½, 3, 4

*Order widths of 12 in. and curved blocks on special order.

PHYSICAL AND THERMAL PROPERTIES* OF SUPEREX AND THERMOBESTOS

Property	Superex	Thermobestos
Density (dry)	23 to 25 lb. per cu. ft.	10 to 12 lb. per cu. ft.
Transverse Strength	40 to 80 psi	50 to 70 psi
Modulus of Rupture	10 to 90 psi	130 to 140 psi
Compressive Strength	10 to 90 psi to produce ½ in. compression	130 to 140 psi to produce ½ in. compression
Linear Shrinkage	7.7% after 24 hr. curing period at 1900°F	1.2% after 24 hr. curing period at 1200°F
Maximum Service Temperature	1900°F	1200°F
Conductivity (Btu in. per sq. ft. per ft. per hr. at mean temperature)	0.02 to 0.03	0.02 to 0.03

RECOMMENDED THICKNESS OF 85% MAGNESIA, SUPEREX COMBINATION AND THERMOBESTOS

Temperature of Surface, °F	Inner Layer: Superex, in.	Outer Layer: 85% Magnesia, in.	Total Thickness, in.
100 to 190	1	1½	2½
200 to 290	1	2	3
300 to 390	1	2½	3½
400 to 490	1	3	4
500 to 590	1	3½	4½
600 to 690	1	4	5
700 to 790	1	4½	5½
800 to 890	1	5	6
900 to 990	1	5½	6½
1000 to 1090	1	6	7
1100 to 1190	1	6½	7½

*The figures given in this table are based on tests conducted in accordance with the methods described in the following table.



INSULATIONS

High Temperature Sheets

MARINITE® SHEETS

NON-CORRODING • BUILT • INSULATE • FIREPROOF • EASY TO WORK



Marinite sheets having built-in insulation provide better heat control, reduces heat losses, does not rot or corrode.

STANDARD SIZES

Material	Thickness, in.	Tolerance, in.	Sheet Size, in.
Marinite-23	1, 1½, 2"	± 1/16 in. length and width	36x72, 48x96, 60x120
Marinite-36	½, ¾, 1"	± 1/16 in. thickness	36x72, 48x96, 60x120
Marinite-65	½, ¾, 1"	± 1/16 in. thickness	36x72, 48x96, 60x120

*On special order only when volume warrants special rate.
† Can be finished on request where volume warrants special rate.

PHYSICAL AND THERMAL PROPERTIES

Property	Marinite-23	Marinite-36	Marinite-65
Density, Dry, lb per cu ft	21-25	24-38	40-70
Normal Moisture Content, % of dry weight	3 (approx.)	3 (approx.)	3 (approx.)
Transverse Strength, Dry, Ultimate, psi	550	900	1800
Modulus of Elasticity, psi (from transverse test)	0.15×10^6	0.40×10^6	0.70×10^6
Compressive Strength, in. per in. under load of 500 psi	0.020 max.	0.025 max.	0.030 max.
Impact Resistance, Ultimate, ft.-lb. (15" span, 15" width, 1" radius head wt.)	...	28	60
4 lb wt. on $\frac{1}{2}$ " thickness	42	78	150
6 lb wt. on 1" thickness			
Screw Holding Power, Ultimate, lb. (Sheet metal screws, Type A, Sizes 6-12)			
$\frac{1}{2}$ " penetration	33	60	160
$\frac{1}{4}$ " penetration	120	240	460
Scratch Hardness, Dry 10 kg load, 10 mm ball, 10 sec. 50 kg load, 10 mm ball, 10 sec.	6.5	...	...
	...	1.8 (comp. to yellow pine)	4.4
Moisture Expansion, in. per in. Shrinkage, normal to dry expansion, dry to 100% R.H. Expansion, dry to saturated	0.0008 0.0009 0.0010	0.0011 0.0011 0.0012	0.0011 0.0011 0.0013
Thermal Expansion, in. per in. per °F avg. over temperature range indicated. (Detailed information for special cases furnished on request)	2.8×10^{-6} up to 2000°, shrinkage thereafter	1.3×10^{-6} up to 1900°, shrinkage thereafter	2.6×10^{-6} up to 2500°, shrinkage thereafter
Maximum Service Temp., °F (for continuous service)	1900	1900	1900
Conductivity, Btu in. per sq ft per °F per hr at mean temperature	0.02 0.02 0.02 0.02 0.02 0.02	0.02 0.02 0.02 0.02 0.02 0.02	0.02 0.02 0.02 0.02 0.02 0.02

*A note, based on laboratory temperature and panel dimensions, giving the maximum total wall thickness of Marinite necessary to limit the effects of water vapor resulting from expansion and shrinkage is given in brackets 80-120. See also John-Manville for this information.
NOTE: The figures given above for the physical properties are average values obtained in accordance with standard test methods. However, due to factors beyond our control, responsibility for the results obtained from the use of this information is not assumed. Ultimate strength figures must be modified by applying appropriate factors of safety in design of building walls.

Refrigeration Sheets

ROCK CORK® SHEETS AND LAGGING

For service to minus 400F

FOR USE IN THE FOOD AND BEVERAGE INDUSTRIES • SANITARY • ODORLESS • MOISTURE-RESISTANT

Rock Cork is a basically mineral, moisture-resistant insulation developed especially for refrigeration use. Because of its many sanitary and thermal advantages, leading refrigeration engineers rely on Rock Cork for service in the food and beverage industries.

Rock Cork Sheets and Lagging are manufactured from mineral wool combined in production with an asphaltic binder, molded into sheet or lagging form and baked. The asphaltic binder provides an ideal base for an asphaltic adhesive or finish, assuring an air and moisture-resistant seal.

This strong, long-lasting insulation safeguards even the most sensitive food products because it is free from offensive odors. It is immune to termites, will not support mold growth and will not attract vermin or rodents. Standard sizes and properties of Rock Cork are given in the table at the bottom of this page.



Moisture-resistant Rock Cork Sheets provide superior insulation for all types of refrigeration service.

ZEROLITE SHEETS AND LAGGING

For service to minus 400F

FOR USE IN THE OIL AND CHEMICAL INDUSTRIES IMMUNE TO MANY ORGANIC SOLVENTS • FIRE-RESISTANT

Zerolite is a resin-bonded, mineral wool insulating material particularly applicable in the oil and chemical industries because of its strength, fire-resistance, low heat conductivity, excellent resistance to moisture, and immunity to attack or damage by organic solvents such as benzene, methyl ethyl ketone and petroleum fractions and

derivatives. Its exceptional moisture-resistance is a result of a special Johns-Manville process which disperses the resin binder over the mineral wool fibers. Standard sizes and properties of both Zerolite and Rock Cork Sheets and Lagging are given in the following table. Write your nearest Johns-Manville office for further information.

STANDARD SIZES AND PROPERTIES OF ROCK CORK AND ZEROLITE SHEETS AND LAGGING

Size	Sheets: 11 x 18 in (1 in. thickness), 18 x 36 in (1½, 2, 3, 4 in. thickness) Lagging: thickness, 1½, 2, 3, 4 in.; width, 2 to 6 in. Discs: thickness, 1½, 2, 3, 4 in.; maximum diameter, 36 in. Discs over 18 in. diameter finished in 2 pieces.					
Properties (See Charts for Rock Cork and Zerolite)	Compressive Strength, lb per Sq Ft		Compression, in. (Load, 300 lb per Sq Ft)		Water Absorption, Percent by Volume (Submerged 24 Hr)	
	400	300	0.010	0.010	3.0 max.	0.7 percent
Properties (See Charts for Rock Cork and Zerolite)	Transverse Strength (Modulus of Rupture)		Conductivity (Btu in. per Sq Ft per Ft per Hr at Mean Temperature)		Average Wt., lb per Cu Ft	
	30 mil	40 mil	0.33	0.31	15.0	0.37
Properties (See Charts for Rock Cork and Zerolite)	Transverse Strength (Modulus of Rupture)		Conductivity (Btu in. per Sq Ft per Ft per Hr at Mean Temperature)		Average Wt., lb per Cu Ft	
	30 mil	40 mil	0.33	0.31	15.0	0.37
Properties (See Charts for Rock Cork and Zerolite)	Transverse Strength (Modulus of Rupture)		Conductivity (Btu in. per Sq Ft per Ft per Hr at Mean Temperature)		Average Wt., lb per Cu Ft	
	30 mil	40 mil	0.33	0.31	15.0	0.37

450148

JOHNS - MANVILLE

For Air Conditioning Ducts

SPINTEX®, ROCK CORK® AND ZEROLITE®

**High Efficiency—Long Service Life
Low Installed Cost**

Johns-Manville Spintex, Rock Cork and Zerolite Insulations for air conditioning ducts are basically mineral wool products. Each has its particular characteristics that make it specially suitable for a specific type of air conditioning system. All three insulations have the low heat transfer properties that mean high insulating efficiency.

Some of the built-in values of Johns-Manville insulations for air conditioning ducts are: resistance to moisture, fire, rot, decay, and mold growth; plus low thermal conductivity and proved long life. For example, many installations of Rock Cork applied to air conditioning ducts more than 15 years ago are still paying dividends through efficient, maintenance-free service.

The low installed cost of Johns-Manville insulations for air conditioning ducts is a result of long experience in

developing scientifically correct insulations and proper methods of application. This means you can select the right insulation—the most economical to apply on your ducts—from the wide variety made by Johns-Manville. Each type of J-M insulation is engineered for peak performance and is easy and fast to apply. From the chart below select the J-M Duct Insulation best suited to your air conditioning requirements.



Properly applied Johns-Manville Insulation for Air Conditioning Ducts result in power and fuel savings over the years.

J-M SPINTEX INSULATIONS—Flexible and Semi-Rigid

Type	Average Wt., lb/Cu Ft	Facing	Thermal Conductivity (Btu/in./Sq Ft/Hr)			Disc, in.	Thickness, in.	Approx Wt., lb/Sq Ft	Standard Packaging, Sq Ft/Carroll
			50F	85F	120F				
A—Flexible	3.8	Asbestos paper, one side	0.26	0.28	0.31	20 x 120	1½	0.56	175
C—Semi-rigid	6.5	Asbestos paper, one side	0.34	0.36	0.38	20 x 48	1	0.65	30x48 148 175
						20 x 60	1½	0.93	180 175
K—Flexible	3.8	Kraft paper, one side	0.36	0.38	0.31	20 x 120	1	0.56	175
						20 x 48	1½	0.82	180 175
P—Semi-rigid	6.5	None	0.34	0.36	0.38	20 x 48	1	0.55	30x48 148 175
						20 x 60	1½	0.82	180 175
							2	1.10	80 87½

FIRE RESISTANCE: Mineral wool used in all Johns-Manville insulations. Types A, C, and P meet U.S. Marine Committee Spec. 22-MC-1 for fire-resistant insulation for shipboard use and are used successfully according to Section VI, U.S. Dept. of Commerce, Commercial Standard 512-B.

COEFFICIENTS: None of above types is capable of any extreme water or moisture resistance. Resistance actually 0.375, expressed on 14.5 percent basis, no allowance for thermal conductivity. Resistance to moisture, rot, decay, and mold growth is proved. Spintex, Rock Cork and Zerolite are immune to attack or damage by organic solvents such as benzene, methyl ethyl ketone and petroleum fractions and derivatives.

MOISTURE RESISTANCE: None of above types is capable of any extreme water or moisture resistance. Resistance actually 0.375, expressed on 14.5 percent basis, no allowance for thermal conductivity. Resistance to moisture, rot, decay, and mold growth is proved. Spintex, Rock Cork and Zerolite are immune to attack or damage by organic solvents such as benzene, methyl ethyl ketone and petroleum fractions and derivatives.

J-M ROCK CORK AND ZEROLITE INSULATIONS—Rigid

Average Wt, lb/Cu Ft	Facing	Thermal Conductivity (Btu/in./sq Ft/Hr)			Disc, in.	Thickness, in.	Approx Wt, lb/sq Ft	Standard Packaging	
		50F	85F	120F					
15.0	None can be plastered	Rock Cork	0.31	0.33	0.31	18 x 18	1	1.850	34 sq ft per carton
							1½	1.875	26 sq ft per carton
		Zerolite	0.37	0.39	0.30	18 x 24	2	2.600	27 sq ft per carton
							3	2.750	18 sq ft per carton
							4	3.000	12 sq ft per carton

Rock Cork and Zerolite are mineral wool blocks, also available in acoustical pipe insulation. Zerolite has a thermal set point binder, is fire resistant and unaffected by most organic solvents and petroleum products. Rock Cork has an asphaltic binder, is moisture-proof, highly moisture resistant, and fire resistant with no rot, decay, or mold growth.

450148

QUALITY PRODUCTS



INSULATIONS

For Heated Piping



J-M 85% Magnesia has proven its high insulating value and mechanical strength in decades of economical and satisfactory service.

J-M 85% MAGNESIA PIPE INSULATION (For 65% to 85% Hg)

The Universal Insulation for Heated Piping to 600F

LIGHT WEIGHT • HIGH INSULATING VALUE • ECONOMICAL • PROVEN LONG LIFE

Johns-Manville 85% Magnesia is added into sectioned and segmental pipe insulation from hydrated basic carbonate of magnesia bonded with asbestos fiber. The Johns-Manville process provides J-M 85% Magnesia insulation with a maximum number of voids, or minute dead air cells, which increases the natural resistance to heat transmission and reduces the weight of this durable insulation. Maximum mechanical strength consistent with high insulating value is an added advantage and the insulation is quickly and easily installed.

For temperatures above 600F, J-M 85% Magnesia is often used as an outer layer over Supertex Pipe Insulation. This combination (Supertex Combination) combines the high heat resistance of Supertex with the greater insulating value of 85% Magnesia. Thickness recommendations for 85% Magnesia and Supertex Combination are tabulated on page 11, physical and thermal properties on page 3.

J-M Water Resist 85% Magnesia, as described on page 3, is also furnished in pipe insulation form.

STANDARD SIZES

Length	Nominal Thickness, in.	Form	Standard Finish
3 ft.	1 through 6 in. pipe size only: 1½, 2, 2½, 3, 3½, 4, 4½, 5, 5½, 6 in. pipe size, also furnished double-layer, 2 and greater equally furnished double-layer but can be furnished single layer in limited quantities.	Furnished in sectioned or segmental form according to pipe size and thickness.	Sectional form furnished with convex jacket. Segmental form for larger pipe sizes furnished without convex.

NOTE: Always allow for expansion and contraction of pipe and insulation. Allow for 10% of 100% to be used for expansion.



INSULATIONS

For Heated Piping

(For 65% to 85% Hg)

SUPEREX® PIPE INSULATION

For Service to 1900F

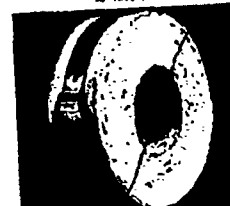
Made from selected diatomaceous silica blended with other insulating materials and bonded with asbestos fiber, producing a material of high heat resistance and insulating value. Often used as inner layer in combination with J-M 85% Magnesia (Supertex Combination) to combine the greater insulating value of 85% Magnesia with the high heat resistance of Supertex. Thickness recommendations for Supertex Combination are given on page 11. Physical and thermal properties of Supertex are given on page 6.



Supertex Combination Pipe Insulation—on inner layer of Supertex and outer layer of J-M 85% Magnesia.



Thermobestos is used for insulating steam and heated process lines with temperatures to 1200F.



Asbestos-Sponge Felted Pipe Insulation stands up under rough usage and mechanical abuse.

THERMOBESTOS® PIPE INSULATION

For Service to 1200F

Composed of hydrous calcium silicate combined with asbestos fiber by a special J-M process and used for insulating steam and heated process lines. Above 600F, where pipe expansion is a significant factor, pipe insulation should be applied in double-layer construction with staggered joints. This construction prevents excessive heat losses and surface temperatures of the joints opened by pipe expansion, thus eliminating scorched or burned jackets...eliminates potential fire hazard of exposed jackets to higher temperatures at the joints...minimizes thermal stresses in the insulation by reducing temperature differential across each layer. Thickness recommendations given on page 11. Physical and thermal properties on page 8.

ASBESTO-SPONGE® FELTED PIPE INSULATION

For Service to 700F

Made of asbestos felt so combined to give a spongy laminated material. Felt is wound one over the other to the desired thickness, the cylinder then being slit lengthwise to permit application. Has excellent thermal characteristics and retains these characteristics in service. Can be furnished with an integral weatherproof asbestos jacket or permeable jacket of wire-inserted asbestos cloth for use where subjected to water submersion.

BANROC® PIPE INSULATION—a felted, spun mineral wool fiber insulation which may be used to 1000F under normal conditions. Style No. 25 consists of Banroc secured to expanded metal lath; Style No. 65, to a sheet metal jacket.

STANDARD SIZES

J-M Insulation	Length	Thickness, in. (to fit standard pipe sizes)	Standard Finish
SUPEREX	2 ft. sections and segments.	Nominal 1 through 6" pipe size only: 1½, 2, 2½, and 3.	Convex jacket for pipe sizes 1½" and smaller.
THERMOBESTOS	2 ft. sections.	Nominal 1 through 6" pipe size only: 1½, 2, 2½, 3, 3½ and 4—single layer. Nominal 2 through 6" pipe size, 2½ through 6" pipe size and greater also furnished double-layer.	Convex jacket.
ASBESTO-SPONGE FELTED	2 ft. sections.	1 to 2½, single-layer; 2½ and over, double-layer.	Convex jacket (backpack) metal band furnished.
BANROC STYLE NO. 25	2 ft. sections.	1, 1½, 2, 2½, 3 and 4 for all standard pipe sizes 2" in diameter and larger.	Finning (convex) and convex jacket for interior work (not fireproof, weatherproof jacket for outdoor work (not fireproof).
BANROC STYLE NO. 65	2 ft. sections with 2" extra coating length for end laps.	1, 1½, 2, 2½ and 3 for all standard pipe sizes 2" in diameter and larger—4 to 6", 6", 8", 10" and 12" pipe sizes only.	24-gauge galvanized sheet metal outer casing with 6-gauge seam containing ½" galvanized pipe bolts.

*Also suitable for standard runs of copper tubing with nominal diameters of ½ in. and up.

450151



INSULATIONS

For Low Temperature Piping

FIBROCEL[®] PIPE INSULATION

For Hot and Cold Water, Low Pressure Steam and Combination Wet Heating and Cooling System Pipes
Service Temperatures 35F to 300F

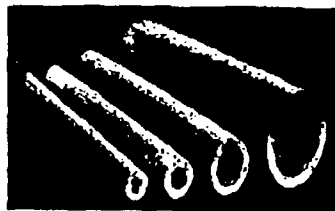
Fibrocel is a new low pressure insulation which, because of its mineral composition, is equally suited for use on chilled water or low pressure steam pipes. Non-drinking, decay resistant, fireproof, thermally efficient, dimensionally uniform, hard texture, economical to apply.

Available in three jacket styles:

Fibrocel C for steam or hot water. Furnished with standard or special weight canvas jacket and metal bands. For service temperatures from 60F to 300F.

Fibrocel O for steam or hot or cold water. Furnished with glazed white plastic coated paper jacket and metal bands. For service temperatures from 60F to 300F.

Fibrocel VB for chilled water or dead service. Furnished with vapor barrier jacket consisting of aluminum foil faced both sides with creped natural kraft, surfaced with special non-splastic waterproof lacquer. Finish may be painted if desired. For use on cold pipes subject to sweating. Particularly adapted for combination wet heating and cooling system pipes. For service temperatures from 35F to 300F.

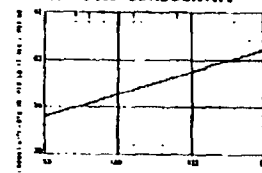


PHYSICAL AND THERMAL PROPERTIES*

Density	1 lb per cu ft
Transverse Strength (Modulus of Rupture)	50 psi
Shrinkage (Moist to dry)	0.8% per 24" length

*The figures given in this table are average values obtained in accordance with accepted test methods.

FIBROCEL CONDUCTIVITY



PRE-SHRUNK ASBESTOCEL PIPE INSULATION

For Service to 300F

J-M Pre-Shrunk Asbestocel is a cellular type of insulation, made up of alternate layers of plain and corrugated asbestos felt, for use on pipes conveying low pressure steam and hot water. Specially treated, moisture resistant asbestos paper is used which prevents "fretting," removing the cause of objectionable shrinkage cracks. Furnished in 3 ft. sections to fit standard pipe sizes and in standard thicknesses of 2 to 8 plies, each ply approximately 1/2" thick.

Three finishes available: Glazed White, Asbestos Paper, and Canvas. Also available for straight runs of copper tubing with nominal diameters of 1/2" and up.



Glazed white finish of Pre-Shrunk Asbestocel will not carry flames.

OTHER J-M PIPE INSULATIONS FOR SPECIAL REQUIREMENTS

J-M Insulation	Description	Use	Standard Sizes
*Pre-Shrunk Wool felt	Moisture resistant interlaid wool felt with dust-resistance liner.	Hot and cold water service lines for temperatures between 60 and 225F and with integral jacket, between 45 and 68F.	3 ft lengths, 1/2 to 2 in. thick single layer; 1, 1 1/2, 2 in. thick, double layer for pipe sizes 1/2" and up.
*Anti-Sweat	Pre-shrunk insulation and water proofing felt.	For temperatures above 45F. Keeps water out, prevents condensation and dripping.	3 ft sections, 1/2 and 3/4 in. thick, single-layer; 1, 1 1/2 and 2 in. thick double layer for standard pipe sizes.
*Zero	Layers of bar felt surrounded by several layers of wool felt.	Prevents cold water pipes from freezing under ordinary conditions.	3 ft lengths for all pipe sizes 1/2 in. and up. About 1 1/2 in. thick.

*Also suitable for straight runs of copper tubing with nominal diameters of 1/2" and up.



INSULATIONS

For Refrigeration Piping

ROCK CORK[®] PIPE INSULATION

For service to minus 400F

MOISTURE-RESISTANT • PROVEN LONG LIFE

Made from mineral wool combined in production with an asphaltic binder, Rock Cork pipe insulation is further provided with an asphalt-saturated asbestos felt jacket which protects both longitudinal joints, reduces the need for seam-filling compounds and increases the speed of application. Many Rock Cork installations made more than 30 years ago are still paying dividends through efficient, trouble-free service.

Rock Cork is moisture-resistant, ... immune to termites, ... will not support mold growth, ... will not attract vermin or rodents. For these reasons, Rock Cork is widely used in the food and beverage industries.

Standard sizes of Rock Cork pipe insulation are shown in the table at the bottom of this page. All accessories required for proper application are furnished. Properties of Rock Cork will be found in the table on page 8.



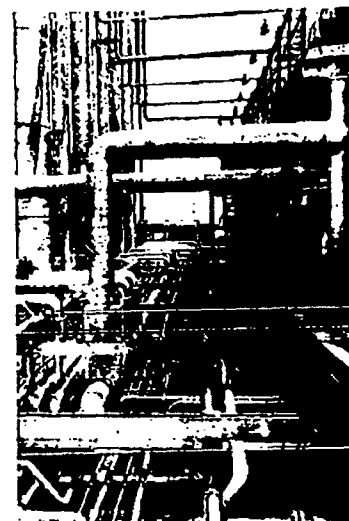
Properly applied, Rock Cork pipe insulation provides an unbroken, seamless sheath—a highly efficient barrier to the flow of heat.

ZEROLITE[®] PIPE INSULATION

For service to minus 400F

IMMUNE TO MANY ORGANIC SOLVENTS
FIRE-RESISTANT

A resin-bonded, mineral wool insulating material, Zerolite pipe insulation is particularly applicable in the oil and chemical industries because of its immunity to attack or damage by many organic solvents, low conductivity and excellent resistance to moisture. Furnished with all accessories required for proper application to the sizes shown in the following table. Properties of Zerolite are shown in the table on page 8.



The low conductivity and fire-resistance of Zerolite make it particularly applicable in the oil and chemical industries.

STANDARD SIZES OF ROCK CORK AND ZEROLITE PIPE INSULATION

Thickness	Length	Diameters
ICE WATER (1.4 to 1.9 in.)	3-ft sections	Available to fit standard pipe sizes from 1/2 through 12 in. In single-layer sections. Furnished in sectional form, hinged, for 3 in. pipe and smaller. Furnished in two separate half-sections for larger sizes. Also available for straight runs of brass or copper tubing with nominal diameters from 1/2 through 6 in.
HEAVY (2.9 to 3.2 in.)		
HEAVY HEAVY (3.8 to 4.2 in.)		

Cements and Fills

J-M INSULATING CEMENTS AND FILLS

EXCELLENT COVERAGE • DURABLE FINISH

Johns-Manville manufactures a quality insulating cement or insulating fill for practically any industrial requirement.

Insulating cements are used for insulating irregular surfaces such as valves, flanges, etc. Asbestos finishing cements are generally used as a surface finish over block or sheet insulation to seal the joints and provide a smooth finish.

Insulating fills are generally used to pack irregular or otherwise inaccessible spaces to provide insulation on both high and low temperature equipment. Detailed information on Johns-Manville Insulating Cements and Fills is tabulated below.



J-M INSULATING CEMENTS

Name	General Use	Character or Best	Specific, cu ft per bag	Approx E water needed to mix 100 lb cement	Packaging, lb per bag
NO. 302	Finishing	Asbestos	25	175	100
NO. 332	Finishing	Asbestos	25	100	50 or 100
NO. 301	Finishing	One coat Application	12	120	50
NO. 678	Protective	Semi-tertiary	10	75	50
NO. 310	Protective	Semi-tertiary	15	60	50
SUPERITE	Insulating	Dolomite	1900	45	34
NO. 100	Insulating	Expanded vermiculite	1800	78	30
NO. 458	Insulating	Mineral wool	1500	50	25
J-M 85% MAGNESIA	Insulating	Magnesium carbonate	600	70	35

J-M INSULATING FILLS

Name	Composition	Maximum Service Temperature, F	Weight to which usually packed, lb per cu ft	Packaging, lb per bag
FIROFIL	Mixture of diatomaceous silica and asbestos fibers	1800	15	50
FIL-INSUL	A mixture of mineral fibers	1000	15	65
LANCOK LOOSE GRANULATED	Mineral wool	1600	12	40
GRANULATED ROCK CORE	Mineral wool and Shwartzkopf binder	1301	13-14	40
FIROFIL	Asphalt-impregnated loose mineral wool	1550	10	40

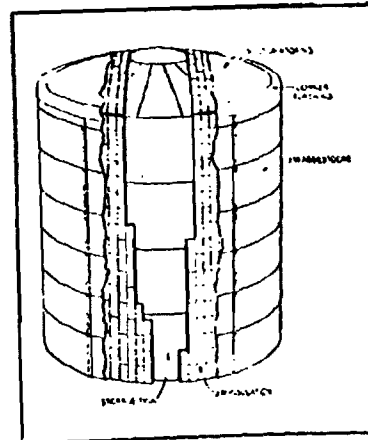
FIROFIL used at temperatures below 1000°.

Weather-Protection, Coatings

J-M WEATHER-PROTECTED[®] INSULATION

For Outdoor Tanks and Vessels
PERMANENT • MAINTENANCE-FREE

Developed as a simplified insulation specification by J-M Insulation Engineers, J-M Weather-Protected Insulation consists of Asbestos[®] (weather-resisting asbestos and cement) sheets applied over standard J-M insulations. J-M Weather-Protected Insulation assures greater fuel savings and more efficient operation of equipment, either heated or cooled. A J-M Engineer will be glad to survey your outdoor equipment and estimate the savings possible with J-M Weather-Protected Insulation.



Johns-Manville Weather-Protected Insulation was developed by J-M Insulation Engineers especially for outdoor tanks and vessels.



Skilled insulation applicators fasten Asbestos sheets over the insulation.

INSULKOTE[®] PROTECTIVE COATINGS

For service to 2500°

Guard Insulated Surfaces Against Weather or Water Vapor

Durable—J-M Insulkotes, compounded of selected and processed bitumens, asbestos fiber and mineral fillers, give maximum protection at lowest applied cost to insulated tanks, breechings, piping and other process equipment. They resist acid and alkaline atmospheres . . . will stand up under adverse weather conditions . . . minimize surface cracking and crazing under sudden temperature changes.

Seal Out Water—Insulkote helps prevent rusting and corrosion of expensive equipment. Depending on service involved, there is a type that will keep out water and permit passage of water vapor or one that will act as a water-vapor seal.

Easily Applied—Furnished ready-mixed in two consistencies for quick, easy trowel or spray application. A jet-black material, it will not fade after applied. If de-

signed, it may be readily painted by first applying a sealing coat of aluminum paint or equivalent, followed by a finish coat of lead and oil paint.

6 TYPES FOR CONVENIENT USE

Insulkote ST and SO—non-burning, weatherproof coatings for use over insulation on heated surfaces where "breathing" coatings are required. ST for trowel, SO for spray gun application.

Insulkote ST and SO—weatherproofing and vapor-barrier coatings for insulation on refrigerated surfaces. ST is an certified anti-corrosion coating. ST for trowel, SO for spray gun application.

Insulkote SOC and SOK—afford protection against weather and corrosive atmospheric conditions and will prevent condensation under moderate conditions. Both may be applied by spray gun or trowel.

PHYSICAL PROPERTIES

Property	Insulkote ST	Insulkote SO	Insulkote ST	Insulkote SO	Insulkote SOC	Insulkote SOK	Code
Composition	Asbestos	Asbestos	Asbestos	Asbestos	Asbestos	Asbestos	1—Asbestos type 2—Asbestos type 3—Asbestos type
Application	Trowel	Spray	Trowel	Spray	Trowel	Spray	4—Asbestos type 5—Asbestos type 6—Asbestos type
Weight per gal	12 lb	12 lb	12 lb	12 lb	12 lb	12 lb	7—Asbestos type 8—Asbestos type 9—Asbestos type
Coverage on applied, sq ft	16 sq ft per 100 lb in 1/2" coat	16 sq ft per 100 lb in 1/2" coat	16 sq ft per 100 lb in 1/2" coat	16 sq ft per 100 lb in 1/2" coat	16 sq ft per 100 lb in 1/2" coat	16 sq ft per 100 lb in 1/2" coat	10—Asbestos type 11—Asbestos type 12—Asbestos type
% shrinkage (troweled)	50	50	50	50	50	50	13—Asbestos type 14—Asbestos type 15—Asbestos type
Water vapor permeation in pounds per square foot 24 hours	2 to 3	1 to 2	2 to 3	1 to 2	2 to 3	1 to 2	16—Asbestos type 17—Asbestos type 18—Asbestos type
Temperature (at 1000°)	1000°	1000°	1000°	1000°	1000°	1000°	19—Asbestos type 20—Asbestos type 21—Asbestos type

Cements and Fills

J-M INSULATING CEMENTS AND FILLS
EXCELLENT COVERAGE • DURABLE FINISH

Johns-Manville manufactures a quality insulating cement or insulating fill for practically any industrial requirement.

Insulating cements are used for insulating irregular surfaces such as valves, flanges, etc. Asbestos finishing cements are generally used as a surface finish over block or sheet insulation to seal the joints and provide a smooth finish.

Insulating fills are generally used to pack irregular or otherwise inaccessible spaces to provide insulation on both high and low-temperature equipment. Detailed information on Johns-Manville Insulating Cements and Fills is tabulated below.



J-M INSULATING CEMENTS

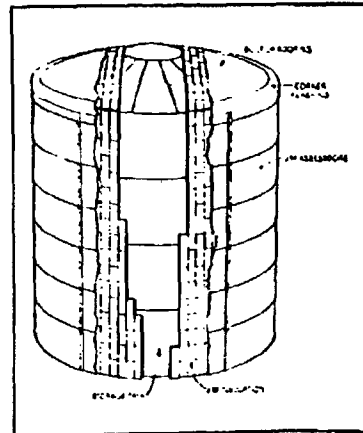
Name	General use	Character or base	Maximum Service Temperature, F	Covering capacity, applied and dried, 1 in. thick		Approx. lb. water needed to mix 100 lb. cement	Packaging, lb. per bag
				sq ft per 100 lb.	sq ft per bag		
NO. 302	Finishing	Asbestos	—	25	25	175	800
NO. 352	Finishing	Asbestos	—	19	9 1/2 or 15	100	50 or 100
NO. 301	Finishing	Asbestos	—	34	17	120	50
NO. 678	Protective Finishing	Semir-factory	1900	10	10	75	30
NO. 319	Protective Finishing	Semir-factory	1800	15	7 1/2	40	30
SUPERIOR	Insulating	Diatomaceous earth	1900	45	24	250	75
NO. 506	Insulating	Expanded vermiculite	1800	78	39	300	50
NO. 450	Insulating	Mineral wool	1500	50	25	250	50
J-M 65% MAGNESIA	Insulating	Magnesium carbonate	600	70	35	450	50

J-M INSULATING FILLS

Name	Composition	Maximum Service Temperature, F	Density to which usually packed, lb. per cu ft.	Packaging, lb. per bag
FERROFIL	Mixture of diatomaceous earth and asbestos fiber.	1800	18	80
FERROFIL	A mixture of mineral fibers.	1800	15	45
FERROFIL LOOSE GRANULATED	Mineral wool.	1800	12	40
OSANIKATE ROCK CORK	Mineral wool and bituminous binder.	1500	12-14	40
ZIROFIL	Asbestos impregnated coarse mineral wool.	1550	10	40

1. Maximum used at temperature below 150° F.

Weather-Protection, Coatings



Johns-Manville Weather-Protected Insulation was developed by J-M Insulation Engineers especially for outdoor tanks and vessels.

J-M WEATHER-PROTECTED[®] INSULATION

For Outdoor Tanks and Vessels
PERMANENT • MAINTENANCE-FREE

Developed as a simplified insulation specification by J-M Insulation Engineers, J-M Weather-Protected Insulation consists of Asbestos[®] (weather-resistant asbestos and cement) sheets applied over standard J-M Insulations. J-M Weather-Protected Insulation assures greater fuel savings and more efficient operation of equipment, either heated or cooled. A J-M Engineer will be glad to survey your outdoor equipment and estimate the savings possible with J-M Weather-Protected Insulation.



Skilled insulation applicators fastening Asbestos sheets over the insulation.

INSULKOTE[®] PROTECTIVE COATINGS

For service to 250° F

Guard Insulated Surfaces Against Weather or Water Vapor

Durable—J-M Insulites, compounded of selected and processed bituminous, asbestos fiber and mineral fillers, give maximum protection at lowest applied cost to insulated tanks, heat exchangers, piping and other process equipment. They resist acid and alkali atmospheres . . . will stand up under adverse weather conditions . . . minimize surface cracking and crazing under sudden temperature changes.

Seal Out Water—Insulite helps prevent rusting and corrosion of expensive equipment. Depending on service involved, there is a type that will keep out water and permit passage of water vapor or one that will act as a water-vapor seal.

Easily Applied—Furnished ready-mixed in two consistencies for quick, easy trowel or spray application. A pebbled material, it will not leak after applied. If de-

sired, it may be readily polished by first applying a sealing coat of aluminum paint or equivalent, followed by a finish coat of lead and oil paint.

6 TYPES FOR CONVENIENT USE

Insulites ST and SG—non-leaking, water-proof coatings for use over insulation on heated surfaces where "breathing" coatings are required. ST for trowel, SG for spray gun application.

Insulites ST and SG—weatherproofing and vapor-barrier coatings for insulation on refrigerated surfaces. SG is an excellent anti-corrosion coating. ST for trowel, SG for spray gun application.

Insulites 50C and 50E—afford protection against weather and corrosive atmospheric conditions and will prevent condensation under most rate conditions. Both may be applied by spray gun or trowel.

PHYSICAL PROPERTIES

Property	Insulite ST	Insulite SG	Insulite ST	Insulite SG	Insulite 50C	Insulite 50E
Specific gravity	1.40	1.40	1.40	1.40	1.40	1.40
Application	trowel	spray	trowel	spray	trowel	spray
Depth per coat	1/8 in.	1/8 in.	1/8 in.	1/8 in.	1/8 in.	1/8 in.
Surface as applied, wet	10 gal per 100 sq ft 1/2" thick	10 gal per 100 sq ft 1/2" thick	10 gal per 100 sq ft 1/2" thick	10 gal per 100 sq ft 1/2" thick	10 gal per 100 sq ft 1/2" thick	10 gal per 100 sq ft 1/2" thick
1. Adhesive (minimum)	30	30	30	30	30	30
2. Water penetration in permeable recommended thickness	2 to 3	4 to 7	2 to 3	4 to 7	2 to 3	4 to 7
Resistance to creep	1000 lb 250°	1000 lb 250°	1000 lb 250°	1000 lb 250°	1000 lb 250°	1000 lb 250°

Notes: 1. Insulite 50C and 50E—waterproof type. 2. Spray gun application in wet areas may require brush and "over spray." Amount of over spray will vary with air velocity and type of surface. All surfaces have some degree of roughness and proper weathering should be provided where no trial is used in wet areas.

Insulating Fire Brick for Refractory Lining or Back-Up

INSULATING FIRE BRICK

For service to 3000F

STRONG • LIGHT WEIGHT • ACCURATELY SIZED

J-M Insulating Fire Brick are used as refractory lining or as back-up insulation behind other refractory protection. Their light weight and high insulating value make possible thinner furnace walls, improved efficiency and lower operating costs. Furnaces can be brought up to operating temperatures with minimal speed, resulting in increased production.

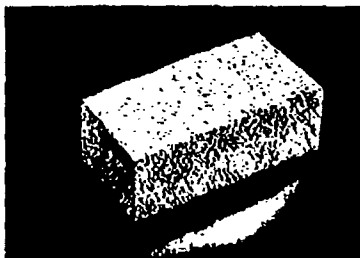
Each type of J-M Insulating Fire Brick has the correct balance of thermal and physical properties for its recommended service. All six types offer light weight, low conductivity and high structural strength.

JM-3000 Insulating Fire Brick, the newest of the six types, provides long-life insulation at a full 3000F, in back-up or direct exposure service. Molded from specially selected, high quality kaolin clays plus alumina, JM-3000 Insulating Fire Brick raises to a new high point the temperature for which such a product can safely be recommended.

MORTAR FOR LAYING J-M INSULATING FIRE BRICK

Mortar	Used for Laying Following Types	Approx Pounds Needed Per 1000 Brick Equivalent
J-M Insulating Fire Brick Mortar (Type S-1)	JM 25, JM 23, JM 22, JM 20 and JM 1620, sizes 10 1/2 x 10 1/2 x 10 1/2 and 10 1/2 x 10 1/2 x 10 1/2	700
J-M Super Back-Up Mortar (Type S-2)	JM 3000, exposed or back-up	400
JM 1620 Mortar (Type S-3)	JM 28, exposed or back-up	200 (400*)
JM 1620 Cement Mortar (Type S-4)	JM 25, JM 23, JM 22 and JM 1620, sizes 10 1/2 x 10 1/2 x 10 1/2 and 10 1/2 x 10 1/2 x 10 1/2	200 (400*)

*Type S-4 requires 1000 lbs. of cement per 1000 bricks.



J-M Insulating Fire Brick are available in six types for back-up or exposed use at temperatures up to 3000F.



Setting Fire Brick with J-M Mortar creates a light, strong, well-protected refractory wall.

STANDARD TYPES, SIZES AND PROPERTIES OF INSULATING FIRE BRICK**

Properties	Types of Insulating Fire Brick					
	JM-3000	JM-28	JM-25	JM-23	JM-20	JM-1620
Standard Sizes	Approximately used in all standard 9 in. shapes of the 2 1/2 in. series, as well as special shapes.					
Maximum service temperature	3000F	2800F	2600F	2300F	2000F	1600F
Approximate density, lb per cu ft	67.47	31	48	42	35	29
Transverse strength, psi	700	126	173	120	80	60
Cold crushing strength, psi	400	300	190	170	115	70
Linear shrinkage, percent	0.6 at 3000F	4.0 at 2800F	1.0 at 2600F	0.3 at 2300F	0.0 at 2000F	0.0 at 1600F
Reversible thermal expansion, percent	0.5-0.6 at 3000F	0.1-0.6 at 2800F	0.5-0.6 at 2600F	0.1-0.6 at 2300F	0.5-0.6 at 2000F	0.5-0.6 at 1600F
Conductivity (Btu in. per sq ft per hr at following mean temperatures)						
300F	2.10	260	1.92	1.31	0.97	0.77
1000F	1.76	230	2.22	1.91	1.22	1.01
1500F	2.33	320	2.52	2.31	1.47	1.17
2000F	2.62	352	2.82	2.70		

*Type S-4 requires 1000 lbs. of cement per 1000 bricks.

**The figures given in this table are average values obtained in accordance with standard test methods.

Insulating Brick for Back-Up Insulation, Insulating Concrete



SIL-O-CEL Insulating Brick being installed with Support Brick (see page 6) in the combustion chamber of a Hot Blast Stove.

STANDARD TYPES, SIZES AND PROPERTIES OF SIL-O-CEL Insulating Brick**

Properties	Types of Insulating Brick		
	SIL-O-CEL Super	SIL-O-CEL C-3	SIL-O-CEL 16L
Maximum service temp. (back up only)	2500F	2000F	1600F**
Standard sizes	All standard 9 in. shapes of the 2 1/2, and 3 in. series, as well as special shapes.		
Approx. density, lb per cu ft	80	38	23-35
Transverse strength, psi	90	115	60
Cold crushing strength, psi	300	700	350
Linear shrinkage, percent	1.0 at 2500F	0.8 at 2000F	0.7 at 1600F
Reversible thermal expansion, percent	1.3 at 2000F	0.7 at 2000F	less than 0.1 at 1600F
Conductivity (Btu in. per sq ft per hr at following mean temperatures)			
500F	1.70	1.47	0.92
1000F	1.95	1.88	1.07
1500F	2.19	2.08	1.22
2000F	2.45		

*The figures given in this table are average values obtained in accordance with standard test methods.

**Back-up only.

SIL-O-CEL C-3 AGGREGATE FOR MAKING INSULATING CONCRETE

For service to 1800F

Insulating concrete made with SIL-O-CEL C-3 Aggregate can be cast into any shape desired. This makes it possible to utilize insulation where it had been impossible previously due to structural reasons. Insulating concrete made with SIL-O-CEL C-3 Aggregate may be used in the construction of core, furnacing and chambering systems, foundations and bases of heated equipment, furnace doors and many special shapes such as boilers, dampers, etc. It is over three times as effective as the brick in preventing heat penetration. Suitable reinforcing, such as would

SIL-O-CEL® INSULATING BRICK

For service to 2500F

UNUSUALLY HIGH LOAD-BEARING CHARACTERISTICS

Made of diatomaceous silica, a material composed of millions of microscopic cells that offer maximum resistance to heat flow, SIL-O-CEL Insulating Brick are particularly useful where high loading characteristics are required.

SIL-O-CEL Insulating Brick are furnished in three types for use as back-up insulation behind refractory fire brick linings or behind insulating fire brick linings. The new SIL-O-CEL 16L brick, an improved replacement for the former SIL-O-CEL Natural Brick, may be used for exposed as well as back-up service.

Used as back-up insulation, SIL-O-CEL Insulating Brick make it possible to reduce the necessary thickness of the exposed refractory as much as one-third. This results in considerable saving in furnace wall construction for all types of high temperature equipment.

MORTAR REQUIRED

Mortar	Approx Pounds Needed Per 1000 Brick Equivalent		
	Super	C-3	16L
SIL-O-CEL® Mortar	—	80	80
Super Back-Up Mortar	80	—	—
JM-1620 Cement	—	—	200-400

*Back-up only. (Exposed or back-up.)

be used in ordinary concrete, and provision for expansion joints must be provided as with any other monolithic material. About 25 lb of C-3 Aggregate needed per cu ft when rammed into place and dried. Mixture sets up into strong, durable insulating concrete weighing about 80 lb per cu ft and with a crushing strength of about 1,000 psi (72 tons per sq ft). May be used where subjected to direct heat as high as 1800F.

SIL-O-CEL C-3 Aggregate comes in 50-lb bags.

450155

JOHNS - MANVILLE

QUALITY PRODUCTS



REFRACTORY PRODUCTS

Patching and Castable Materials

HYDRAULIC-SETTING REFRACTORIES

CASTABLE, TROWELING AND GUNNING REFRACTORIES FOR TEMPERATURES THROUGH 3000F

The complete line of Johns-Manville hydraulic-setting refractories makes it easy to select the refractory for your job that will cut maintenance costs . . . reduce furnace and equipment downtime . . . step up production.

FIRECRETE CASTABLE REFRACTORIES

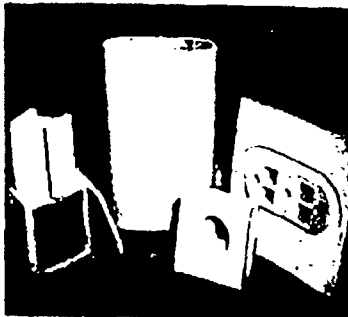
Special shapes and linings of all kinds cast with Johns-Manville Firecrete are ready for use within 24 hours. All five types of Firecrete have negligible shrinkage and exceptionally high resistance to spalling.

BLAZECRETE FOR TROWELING AND GUNNING

For heavy patching by troweling, Blazecrete eliminates laborious gunning or tamping. When gunned, it adheres readily with a minimum of rebound loss. All three types are economical for repatching old furnaces and building new ones.

DATA ON FIRECRETE AND BLAZECRETE

Type	Name	Character or Use	Maximum service temperature, F	Approx pounds per cu ft	Packaging
Castables	31 Firecrete	High alumina	3000	135	100 lb bags
	HT Firecrete	High alumina	2600	115	100 lb bags
	510 Firecrete	Al silicate	2400	110	50 or 100 lb bags
	1 W. Firecrete	Al silicate	2400	75	100 lb bags
	No 20 Firecrete	Al silicate	2000	58	50 lb bags
Gunning and patching cements	31 Blazecrete	High alumina	3000	gunning 155, patching 130	100 lb bags
	510 Blazecrete	Al silicate	2400	gunning 170-175, patching 110-115	100 lb bags
	1 W. Blazecrete	Al silicate	2000	gunning 71-81, patching 67-67	50 lb bags



Firecrete for casting special shapes.



Blazecrete for heavy patching.



Blazecrete for gunning application.



REFRACTORY PRODUCTS

Aggregates, Fills, Boiler Coating

J-M LIGHTWEIGHT AGGREGATES AND FILLS

FOR MAKING INSULATING REFRACTORY CONCRETE AND FOR INSULATING IRREGULAR SPACES AT TEMPERATURES THROUGH 3000F

Johns-Manville lightweight aggregates and fills are available in a wide selection for temperatures through 3000F. The Firecrete and Blazecrete refractories described on the preceding page are furnished prepared, ready for use. The three new refractories on this page—JM-3000, JM-2400 and JM-2000 L.W. Aggregates—may be mixed with calcium aluminate cement to form an insulating refractory concrete for various operating conditions. SJ-O-Cel C-3 may be mixed with calcium aluminate or portland cement for lower temperature conditions. By selection of the aggregate, an insulating refractory concrete can be made with the characteristics desired for constructing case, lapwelding and connecting covers, foundations and bases of heated equipment, furnace doors, and many special shapes such as dampers. In addition,



all materials shown here may be used as fills for insulating irregular spaces in high temperature equipment, making it possible to conserve heat where other forms of insulation cannot be economically installed.

DATA ON J-M LIGHTWEIGHT AGGREGATES AND FILLS

Name	Composition	Maximum service temperature, F	Approx density to which fills are normally packed, lb per cu ft	Packaging
JM-3000 L.W. Aggregate	High Alumina	3000	60	75-lb bags
JM-2400 L.W. Aggregate	Al Silicate	2400	50	65-lb bags
JM-2000 L.W. Aggregate	Al Silicate	2000	41	50-lb bags
SJ-O-Cel C-3	Calcined, non-graded diatomaceous silica	2000	31	50-lb bags
SJ-O-Cel Insulating Powder	Finely ground diatomaceous silica	1600	15-17	50-lb bags
SJ-O-Cel Coarse Grade	Similar to SJ-O-Cel Insulating Powder, but more coarsely graded	1600	28	50-lb bags

AERTITE® COATING FOR BOILER WALLS

For service to 250F

TOUGH • ELIMINATES AIR-INFILTRATION OR ESCAPE OF FURNACE GASES OR DUST

Aertite Coating is a tough, rubbery asphaltic-silicate coating in plastic form used on the outside of boiler walls to eliminate air infiltration. It provides an airtight "mask" over the entire boiler setting. Its adhesive and ductile qualities keep the coating airtight, and imperfect conditions due to air leakage through the setting is prevented. Aertite also checks the escape

of furnace gases or dust, and can be used in other locations for miscellaneous sealing against the effects of dampness, air and moisture. Aertite Coating is furnished in 25, 50, 150, 300 and 500 lb containers. For a 5 in. thick coating, from 50 to 80 lb per 100 sq ft of surface area will be required.

Method of Calculating Heat Transmission

FLAT AND CYLINDRICAL CONSTRUCTIONS

In the calculation of heat flow through constructions normally encountered in industrial practice, there are 4 general types of construction to be considered:

1. Flat Surface—single insulating material, single surface resistance.
2. Flat Surface—two or more insulating materials, single surface resistance.
3. Cylindrical Surface—single insulating material, single surface resistance.
4. Cylindrical Surface—two or more insulating materials, single surface resistance.

In each construction, the heat transmitted through the insulating material or materials is subject to the following simple laws:

1. The heat transmitted (Q) is directly proportional to the difference in temperature between the inside surface of the construction (either hot or cold) and the surrounding air on the outside ($t_i - t_o$).
2. The heat transmitted (Q) is inversely proportional to the sum of the resistances ($R_1 + R_2 + \dots + R_n$) of the various components of the construction (resistance of the insulation or insulations and resistance of the surface).
3. The resistances of the various insulating materials are directly proportional to their thickness (L) and inversely proportional to their thermal conductivity (k).
4. The surface resistance (R_s or $1/c$) is inversely proportional to the surface conductance (c). Surface resistance is plotted as a function of heat transmission on page 27.

FLAT CONSTRUCTION

Following these basic laws, the equations for heat transmission from a flat surface are as follows:

$$\text{For a single insulating material: } Q = \frac{t_i - t_o}{\frac{L}{k} + R_s}$$

$$\text{For two or more insulating materials: } Q = \frac{t_i - t_o}{\frac{L_1}{k_1} + \frac{L_2}{k_2} + \dots + \frac{L_n}{k_n} + R_s}$$

The second equation is used for more than two materials by adding to the resistance ($\frac{L}{k}$) of the individual materials.

As an example of the use of the equation for two insulating materials, the following problem is assumed:

Temperature of inside surface of construction (in this case, hot face) = 2000°
 Surrounding air temperature = 50°
 14 material (Insulite) = 9" of JM-20 Insulating Fire Brick
 2nd material = 1" of Superox Brick

It is first necessary to assume a value for surface resistance and to assume the mean temperatures of the JM-20 Insulating Fire Brick and the Superox in order to approximate the conductivities. Since these are but trial values, their accuracy is not essential in this first set up of the equation. Correct values are determined after the last solution. The assumptions are:

Mean temperature of JM-20 Insulating Fire Brick—1600°
 Mean temperature of Superox—500°
 Surface resistance (R_s) = 0.50

The conductivity values of the JM-20 Insulating Fire Brick and Superox are then determined from plotted conductivity charts and the values substituted in the equation which then becomes:

$$Q = \frac{2000 - 50}{\frac{9}{1.82} + \frac{1}{0.715} + 0.50} = \frac{1950}{0.34 + 1.40 + 0.50} = \frac{1950}{2.24} = 870 \text{ Btu per sq ft per hr}$$

It is now necessary to check the assumptions of the mean temperatures of the two materials as well as the surface resistance. From the "Surface resistances of flat surfaces" chart, (pg. 27) the correct value of surface resistance for 215 Btu per sq ft per hr under still air conditions is found to be 0.47 instead of the assumed value of 0.50.

To check the mean temperatures of the materials, it is only necessary to realize that the temperature drop through the construction from the hot face to the surrounding air is proportional to the resistance of the construction and that the temperature drop through any portion of the construction is proportional to the resistance of that portion of the construction. The total temperature drop from the hot face to the surrounding air is 1950° with a total resistance of 2.24. The resistance from the hot face to the mid-point of the JM-20 Insulating Fire Brick is one-half its total resistance or 1.17. The temperature drop from the hot face to the mid-point of the brick then is $\frac{1.17}{2.24} \times 1950 = 1018$. Thus the mean temperature of the JM-20 Insulating Fire Brick is 2000 - 1018 = 982°.

In a like manner the resistance from the hot face to the mid-point of the Superox is 0.34 + 1.05 or 1.39. The temperature drop to this point is therefore $\frac{1.39}{2.24} \times 1950 = 1187$. This results in a mean temperature of the Superox of 2000 - 1187 = 813°.

New conductivities are determined from the conductivity charts and substituted in the formula to give:

$$Q = \frac{1950}{\frac{9}{1.78} + \frac{1}{0.655} + 0.47} = \frac{1950}{0.32 + 1.53 + 0.47} = \frac{1950}{2.32} = 840 \text{ Btu per sq ft per hr}$$

The above checking procedure is repeated until there is no further change in values.

If a single insulating material is used, instead of two as shown in the example, the procedure is the same except that the assumption as to the value of heat transmitting material and the surface resistance.

DEFINITION OF SYMBOLS

- Q Heat transmission, Btu per sq ft per hr.
- t_i Temp. of inside surface of construction (either hot or cold), °F.
- t_o Temp. of surrounding air on outside of construction, °F.
- L Length of heat flow path, true thickness of flat (single) insulating material, in.
- $L_1, L_2, \dots, L_n$ Thickness of 2nd insulating material, in.
- $k_1, k_2, \dots, k_n$ Thermal conductivity of 1st insulating material, Btu in. per sq ft per °F per hr.
- k Thermal conductivity of 2nd insulating material, Btu in. per sq ft per °F per hr.
- c Surface conductance, Btu per sq ft per °F per hr.

Method of Calculating Heat Transmission

CYLINDRICAL CONSTRUCTION

With insulation applied to a cylinder, the heat transmitted per unit area of inner surface will be greater than for insulation on a flat surface since the outer area is greater than the inner area. To correct for this, it is necessary to use an "equivalent thickness" (X) which is the thickness of insulation on a flat surface that would be required to give the same rate of heat transmission per sq ft of outer surface of insulation as on a cylinder or pipe. Expressed in terms of the inner and outer radii and natural logarithms for a single insulating material, it is as follows:

$$X = r_o \log \frac{r_o}{r_i}$$

In which r_o = outer radius of insulation
 r_i = inner radius of insulation

For two layers of different insulating materials, the equivalent thickness of each material is as follows:

$$\text{Inner layer: } X_1 = r_o \log \left(\frac{r_o}{r_i} \right)$$

$$\text{Outer layer: } X_2 = r_o \log \left(\frac{r_o}{r_i} \right)$$

In which r_o and r_i are as above.
 r_o = outer radius of inner insulating material

By substituting these equivalent thicknesses for the insulation thickness in the previously given equation and following the same procedure as for flat materials, the heat transmission, Btu per sq ft of outer surface of insulation per hr, is calculated. (Pg. 26 gives the equivalent thicknesses for a single insulating material applied to various pipe sizes in nominal thicknesses of 1" through 4".)

Since heat transmission is generally given in terms of the pipe surface and since it will vary inversely as the ratio of the areas of the surfaces (which also vary directly with radii), it becomes necessary to multiply the heat transmission per sq ft of outside insulation surface by $\frac{r_o}{r_i}$ to obtain the result per sq ft of pipe surface. Multiplying this by the sq ft of pipe surface per linear foot of pipe gives the heat transmission in Btu per linear ft per hour.

As an example of figuring the heat loss from a cylindrical surface such as a pipe, the following problem is assumed:

Pipe size = 6"
 Pipe temperature = 750°
 Air temperature = 75°
 Inner material—Nominal 15" Superox
 Outer material—Nominal 2" 85% Magnesia

The procedure in this case is the same as for flat materials in that it is necessary to assume values for the surface resistance and the mean temperatures of the Superox and the 85% Magnesia in order to approximate the conductivities.

The following values are assumed:

Mean temperature of Superox—800°
 Mean temperature of 85% Magnesia—500°
 Surface resistance (R_s) = 0.70

(Surface resistance in this case is from the chart of "Surface resistance of round finished pipe insulation," Page 27.)

The next step is to determine the equivalent thicknesses of the two materials which are as follows:

6" x nominal 15" thick pipe insulation is 15" thick and outer layer pipe size is 6". 2" x nominal 2" thick pipe insulation is 2.5" thick.

$$\begin{aligned} n &= 0.313 \\ \frac{1.500}{0.313} &= 4.815 \\ \frac{2.500}{0.313} &= 7.987 \end{aligned}$$

Inner layer (Superox) =

$$X_1 = r_o \log \frac{r_o}{r_i} = 0.360 \log \frac{4.815}{0.313} = 0.009 \times \log 1.453$$

$$X_1 = 0.009 \times 0.160 = 0.0014$$

Outer layer (85% Magnesia) =

$$X_2 = r_o \log \frac{r_o}{r_i} = 0.360 \log \frac{7.987}{0.313} = 0.009 \times \log 1.440$$

$$X_2 = 0.009 \times 0.157 = 0.0014$$

Substituting these values with the conductivities for Superox and 85% Magnesia at the assumed mean temperatures previously given, the following equation is secured:

$$Q = \frac{750 - 75}{\frac{0.0014}{1.82} + \frac{0.0014}{0.655} + 0.70} = \frac{675}{0.75 + 0.0022 + 0.70} = \frac{675}{1.452} = 465 \text{ Btu per sq ft of outer insulation surface per hour}$$

It is now necessary to check the mean temperature assumptions as well as the surface resistance.

The Surface resistance of round finished pipe insulation chart (page 27) shows that for a Btu loss of 70.2, the surface resistance should be 0.71 instead of the assumed value of 0.70.

The mean temperatures are checked exactly as before and are found to be:

$$\text{For Superox: } 750 - 0.75 \times \frac{1.775}{0.0022} = 750 - 125 = 625$$

$$\text{For 85\% Magnesia: } 750 - 0.75 \times \frac{3.35 + 2.005}{0.0022} = 750 - 457 = 293$$

With these new mean temperatures, the new conductivities are determined from the conductivity charts and substituted in the formula to give:

$$Q = \frac{675}{\frac{0.0014}{1.78} + \frac{0.0014}{0.655} + 0.71} = \frac{675}{0.75 + 0.0022 + 0.71} = \frac{675}{1.462} = 462 \text{ Btu per sq ft of outer insulation surface per hour}$$

The above checking procedure is repeated until there is no further change in values.

To convert the final value from per sq ft of outer insulation surface to per sq ft of pipe surface, it is multiplied by the ratio of insulation surface area to pipe surface area. Since these values are proportional to their respective radii, the final value is multiplied by $\frac{0.969}{0.313}$ or 3.104.

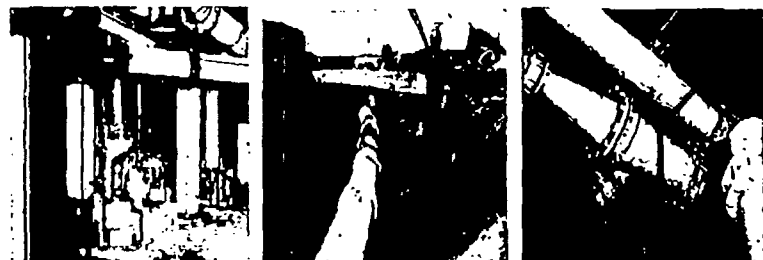
For 6" pipe, there are 1.794 sq ft of pipe surface per linear ft of pipe. Thus, the heat transmission (Q) is

$$\begin{aligned} Q &= 462 \times 1.794 \times 3.104 = 257 \\ Q &= 257 \text{ Btu per linear ft per hour} \end{aligned}$$



TRANSITE ASBESTOS-CEMENT PIPE

For Underground and Overhead Piping Systems



Transite's ability to reduce silencing and resist corrosion makes it ideal for conveying process liquids. An installation of Transite Pressure Pipe for an industrial water line. Its light weight makes it simple to unload, transport and handle. Transite-lined standard and special fittings were used throughout this entire overhead piping system.

TRANSITE PRESSURE PIPE

Strong • Durable • Corrosion-Resistant Throughout

Made of asbestos fibers, cement and silica, Transite Pipe is formed under heavy pressure on a smooth steel mandrel into a dense, homogeneous structure of great strength and durability. After forming, the pipe is subjected to a special steam-curing process. Here, under the action of high pressure steam, a chemical change occurs in which the silica unites chemically with the free lime ordinarily associated with cement products and converts it into highly stable calcium silicates, resulting in a cured pipe unusually resistant to corrosion attack. The ends of the pipe are accurately trimmed and machined to specifications determined by ultimate service, and each length is tested and inspected to assure uniform high quality.

HIGH FLOW CAPACITY—Transite Pressure Pipe's smooth interior surface offers minimum resistance to the flow of liquids. Its initial high flow capacity (Williams-Lassen C = 140 for water) stays high because Transite Pipe is immune to tuberculation, a costly form of internal pipe corrosion. This helps keep pumping costs low. . . . may mean selection of a smaller pipe size to handle the required volume. Transite Pipe also remains remarkably free from slime and bacteria growth within the pipe, probably because of the lack of nutrients in its composition and difference in electrostatic potential. Slime formations that do occur are loosely attached to pipe walls and readily removed by flushing.

RUSTPROOF, CORROSION-RESISTANT THROUGHOUT—Its asbestos-cement composition and special steam-curing process make Transite Pipe exceptionally resistant to corrosion attack throughout its entire structure. Under highly aggressive soils, to such severity as the oil fields where it carries corrosive salt water; and in coal mine operations where it carries acid drainage water, it has consistently outlasted other pipe materials. Transite Pipe will not form rust or other scales which can loosen and contaminate the material carried. For example, it has found wide acceptance in the pulp and paper and textile industries because its unspun qualities guard against

discoloration and the pick-up of insoluble components which might impair the quality of materials conveyed.

IMMUNE TO ELECTROLYSIS—Non-metallic, Transite Pipe is a non-conductor, therefore absolutely free from corrosion caused by electrolytic action between metal pipe and materials in the soil, or damage from stray electric currents from high voltage lines, street railways, etc.

Transite Pressure Pipe is recommended for temperatures up to 200°F, depending upon operating condition and the type of coupling used. In general, it can be economically used for handling process solutions having a pH range of 4.5 to 14.0. However, the handling of all chemical solutions, whether the chemical be in solution or suspension, should be carefully analyzed before making recommendations.

ECONOMICAL TO INSTALL—Because of its light weight, 13-ft. lengths and easily assembled joints, Transite Pressure Pipe is easier to truck to the job, easier to handle, easier to install. It is readily worked on the job. . . . can be tapped and drilled with standard equipment. . . . threads are sharp, clean and strong, resulting in tight, lasting connections.

DIMENSIONS AND APPROXIMATE WEIGHTS OF CLASS 150 TRANSITE PIPE

Pipe size, in.	Weight lb per ft. Pipe only
4"	6.9
6"	12.9
8"	18.6
10"	24.9
12"	30.6
14"	37.4
16"	47.4

*Actual weights of 4, 6, 8, 10, 12, 14 and 16 in. pipes are 2.99, 5.25 and 7.35 lb. respectively.

Standard length—13 ft.



TRANSITE ASBESTOS-CEMENT PIPE

For Underground and Overhead Piping Systems

For UNDERGROUND Water, Fire and Process Lines

The two types of coupling for underground installation with Transite® Pressure Pipe . . . the Ring-Tite® Coupling for pipe sizes up to 16" and the Simplex® Coupling for larger pipe sizes . . . assure maximum tightness and joint flexibility to withstand shock and vi-

bration, relieve line stresses and permit conformances to curves. The operating temperature limit for these couplings is controlled by the rubber sealing ring and is recommended to not exceed 150°F.



Close-up view of Ring-Tite Coupling. Note that one rubber ring has been cut to show how it is compressed between pipe and coupling.

The new **RING-TITE COUPLING** is made up of an asbestos-cement sleeve and two rubber sealing rings. The sleeve has two grooves machined into the inner wall. These grooves locate the rings accurately and hold them locked firmly in position. (Photograph at left shows cutaway view of assembled coupling.) Coupling design not only provides automatic aligning but also automatic adjustment for expansion. Pipe ends are automatically separated within the coupling giving the line flexibility. The few steps required to connect pipe and coupling are quick and sure. Even under difficult temperature or terrain conditions, the entire assembly operation can be carried on speedily and accurately.

The **SIMPLEX COUPLING** consists of a Transite sleeve, carefully machined to fit over the end of the pipe, and two rubber rings which, when assembled are tightly compressed between pipe and sleeve. Tight joints are quickly and easily made, even by inexperienced crews.

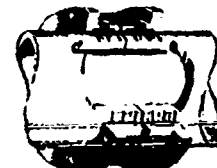
For further information on Transite Pressure Pipe and the Ring-Tite Coupling, write for brochure TR-142A. An Installation Guide (TR-62A) giving standard underground installation procedures for laying Transite Pressure Pipe is also available.

For OVERHEAD Industrial Water and Process Lines

Transite Pressure Pipe has widespread use in the process industries for overhead service in conveying water and many types of process liquids.

Recommended Couplings—The **Poured Flange Coupling** and the **Streed Roto-Split Flange Coupling** for joining Transite Pressure Pipe on overhead systems are right couplings designed to provide smooth flow and a permanently tight seal.

POURED FLANGE COUPLING



The **POURED FLANGE COUPLING** is made up of two cast iron bell-shaped flanges joined by attaching bolts and gasketed with a rubber ring gasket compressed between the pipe ends. All flanging is done on the ground by mounting the pipe and flanges in a jig and pouring a sulphur-base compound (Tegol, Leadite, Mineral Lead, etc.) into the space between the flange hub and pipe. No metal comes in contact with liquid being conveyed. Maximum recommended operating temperature is 150°F.

For complete details on Transite Pressure Pipe for Overhead Piping Systems, write for brochure TIT-113A.

STREED ROTO-SPLIT FLANGE COUPLING



The **STREED ROTO-SPLIT FLANGE COUPLING** consists of two cast steel flanges split into two mated semi-circular sections which are assembled on the pipe by means of lappers and tapered pins. The flanges are machine-tapered to

conform to a matching reverse taper on the ends of the pipe. A rubber gasket is compressed tightly between pipe ends. This coupling is quickly and easily assembled. Maximum recommended operating temperature is 200°F.

Expansion Joints—Transite Pipe has a thermal expansion of approx. .000005" per 1" pipe per °F Temperature Difference and a wetting expansion of approx. 5" in 150" from oven dry pipe to saturation. For long runs of pipe without direction changes, Johns-Manville recommends Streed Expansion Joints which compensate for expansion or contraction of the line.

Transite-Lined Fittings—Standard Transite-Lined Pipe Fittings such as elbows, tees, crosses, y's, laterals and reducers, as well as special fittings, are available. All overhead systems are designed to use Class 150 Transite Pipe.

Streets® Transite-Lined Gate Valves for the process industry for use within a pH range of 4.5 to 14 and temperatures to 150°F have been designed for ease of operation, full flow, elimination of pockets, tight shut-off of slurries. Made to standard dimensions and minimum clearance requirements, they assure minimum maintenance and low-cost corrosion-resistance.

*Incorporated in Streed Patenting Co.

450165

QUALITY PRODUCTS



TRANSITE ASBESTOS-CEMENT PIPE

For Vents, Ducts and Flues

TRANSITE INDUSTRIAL VENT PIPE

Resists Many Gases, Vapors and Fumes

Strong, durable, weatherproof and highly resistant to corrosion, this asbestos-cement pipe is giving economical service in practically every major industry where venting is a problem.

CORROSION-RESISTANT—Made of asbestos fibers, cement and silica, Transite Industrial Vent Pipe successfully withstands many of the corrosive gases, fumes, vapors and mists encountered in industrial venting operations. This advantage, coupled with its strength and thermal properties, assures important venting systems economical and provides efficient service and reduced maintenance. Being non-metallic in composition, Transite Industrial Vent Pipe is rustproof. Painting is not necessary.

LOW HEAT CONDUCTIVITY—The low heat conductivity of Transite Industrial Vent Pipe is an important advantage in maintaining the stack temperatures necessary for optimum flue conditions. Maintenance of flue temperatures also minimizes the formation of corrosive condensates within the stack or vent.

INSTALLATION ECONOMIES—The relatively light weight of Transite Industrial Vent Pipe, as well as the convenient lengths in which it is available, contribute to low handling and installation costs. Where conditions require, Transite Industrial Vent Pipe may be cut readily in the field.

VARIOUS FITTINGS AVAILABLE—Standard fittings, couplings and accessories are furnished to provide flexibility in the design of the venting system. Where conditions do not permit the use of stock fittings, special Transite fittings in any shape can be made to meet individual requirements.

For complete details write for Data Sheet Series DS-338.

STANDARD SIZES AND WEIGHTS

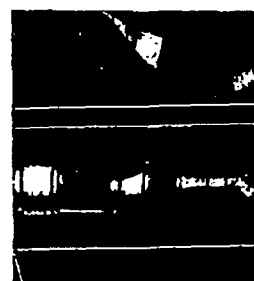
ID, Inches	Length, Feet	OD, Inches	Wall Thickness, Inches	Weight, Lbs. per foot
3	10	3.64	.32	3.0
4	10	4.44	.31	3.9
5	10	5.20	.33	5.3
6	10	6.20	.25	6.3
7	10	7.20	.40	9.1
8	13	8.80	.40	10.6
10	13	10.80	.40	12.5
12	13	12.90	.45	17.9
14	13	14.70	.45	20.7
16	13	17.00	.50	26.1
18	13	19.00	.50	29.3
20	13	21.10	.55	35.4
24	13	25.10	.60	48.9
30	13	31.34	.67	63.3
36	13	37.50	.75	84.5



In this metal plant, 30 in. Transite Industrial Vent Pipe is used to vent the corrosive fumes from eight printing tanks.



A variety of acid and alkali process fumes in many types of industrial plants are vented by Transite Industrial Vent Pipe.



The photo above shows some of the many Transite fittings and couplings which make Transite Industrial Vent Pipe adaptable to virtually any type of venting system.



PACKINGS AND GASKETS

General Gasket Discussion

DISCUSSION OF FLANGE SURFACE FINISH ON GASKET SEALABILITY AND JOINT PERFORMANCE

Joints in equipment designed to hold fluids under pressure can be sealed in three general ways: Welded joints are leakproof but are not practical if the assembly has to be broken frequently. Metal-to-metal joints may take one of several forms but none are adaptable to all conditions. Gasketed joints are the most economical for the majority of cases.

Since there is no one gasketing material that will seal every possible fluid under all conditions of temperature and pressure, we find a wide variety of gasket materials in use, varying from soft rubberlike compositions to solid metal. The objective of all design should be an assembly in which the clearance between flanged joints is zero and the joint gas-tight.

Flange Surface Finishes

Conventional bolted flanges using conventional gaskets require surface finishes that are commercially practical. For simplicity only, four finishes are considered.

1. A "very smooth" face such as may be considered the result of the best possible machine shop practice without resorting to grinding or polishing. This finish should not exceed a roughness reading of 80 microinch RA15 measured either radially or circumferentially.
2. A "commercial smooth" finish which may be produced with several combinations of tool shape, depth of cut and cross feed. Good practice will result in a groove depth of approx. .0005" with 80 to 100 sharp serrations per inch of width. The roughness measurement of such a face will range from 150 to 200 microinch RA15.
3. A "commercial concentric serrated" facing consisting of a series of concentric grooves approximately 1/64" deep and 1/32" apart. The tips of the ridges should be uniform in height and sharpness. If the tip exceeds a width of .010" the effectiveness of this facing is reduced.

4. A "commercial photographic" finish consisting of a continuous spiral cut, approximately .010" deep at a rate of 32 serrations per inch of width. The tips of the ridges should be of uniform height and sharpness. If the tip exceeds a width of .010", the effectiveness of this facing is reduced. The corners of the grooves should be "U" shaped rather than a sharp "V" shape.

Considering these four finishes, the chart at the bottom of this page lists the finish recommended for the most important gasket types. No attempt has been made to cover the problem of surface finish requirements for extremely high pressure closures. Experience in this field has indicated that the manner in which the gasket is to function is the determining factor. Closures of the pressure-seal type generally perform best when the surfaces are as smooth as it is possible to make them.

For more complete details on the effect of flange surface finishes on gasket sealability and joint performance, write for a copy of "The Gasket," PK-48A No. 7.

Selection of Type of Gasket

The following empirical formula has been developed and used successfully as a guide in determining whether a sheet packing gasket or a metallic gasket should be used in a given installation: "If the product found by multiplying the operating pressure (psi.) by the operating temperature (°F) does not exceed 250,000, sheet packing gaskets may be used. The rule should not be applied when pressures exceed 1500 psi. or temperatures are over 850°F."

Johns-Manville offers a complete line of sheet packing, asbestos-metallic and metallic gaskets. Many of these sheet packings are described on Page 32. A catalog of the complete line of J-M Coetzee® metallic gaskets, as well as J-M Coetzee technical bulletins describing the corrosion-resistance of the more popular gasket materials, is available on request.

FINISH RECOMMENDED FOR SEVERAL IMPORTANT GASKET TYPES

Gasket Cross-Section	J-M Gasket Style No. and Description	Flange Surface Finish	Gasket Cross-Section	J-M Gasket Style No. and Description	Flange Surface Finish
	Flat, 1) Non-metallic, all materials 2) Flat solid metal (940)	1) Commercial smooth 2) Photo finish		Asbestos-metallic (940)	Smooth
	Concentric serrated metal (940)	Very smooth		Metallized metal (940)	Smooth
	Serrated metal with serrations 1/64" deep and 1/32" apart (940)	Smooth		Metallized metal (940)	Smooth
	Flat (940) or serrated (940)	Very smooth		Metallized metal (940)	Smooth
	Flat (940) or serrated (940)	Very smooth		Metallized metal (940)	Smooth

*If the gasket width is less than 1/2" and the gasket cannot be located directly opposite the flange face, only the smooth finish should be used.



A TYPE FOR EVERY SERVICE

Round cut gaskets are furnished ring or full-face for standard or extra heavy flanges for all standard pipe sizes. Special shapes can also be furnished on order. A template or blueprint should accompany orders for special shapes.

* For the full details regarding the survey, see the



The Simple Stuffing Box and the Use of Packings to Control Leakage

The packing used should have a low coefficient of friction and the surface of the shaft should be smooth and polished. A continuous supply of lubrication is necessary to maintain a low friction and finally a means of removing the heat generated in the stuffing box is necessary. Controlled leakage of an expendable cooling medium, such as water, oil, grease, etc., is probably the simplest solution of the heat removal problem.

Stuffing box design is primarily empirical and is the result of the designer's own conception or experience. All too frequently no consideration is given to the work done in excess that must be absorbed by the stuffing box.

A quick and empirical approach to the relative energy to be absorbed by any stuffing box is obtained by calculating the Pressure Velocity Factor. The P.V. Factor is easily determined by multiplying the fluid discharge pressure in pounds per square inch (psi.) by the surface velocity of the shaft in feet per minute. Neglecting friction, the P.V. Factor is a measure of the energy absorbed by the stuffing box. The following examples illustrate the use of the P.V. Factor.

Centrifugal Pump "B" - 1" shaft or skew
3600 rpm - 250 psi operating pressure

$$4 \times \frac{3.1416 \times 3600 \times 250}{12} = 942,500$$

Coefficients of Friction

Due to continually varying conditions in any stuffing box, it is most difficult to determine the resulting coefficient of friction. Under ideal conditions of a well-lubricated packing and a smooth polished shaft, the coefficient of friction is of the magnitude of .015. A dry, worn and thoroughly carbonized piece of packing operating on a rough shaft may show a coefficient of friction of .40 or higher. Since the power consumption and rate of heat generation are directly proportional to the coefficient of friction, it is understandable why it is necessary to keep the friction at as low a level as possible.

The above data from Packing Clinic Notes is available on request.

Helpful Hints for Handling Pushkins

1. Keep bearings in alignment. Packing is for sealing and cannot take the place of bearings.
2. Use packings of correct size. Oversize packings are difficult to install and may cause excessive friction. Undersize packings may be ruined by too much takeup.
3. Where leakage cannot be permitted, provide a means of introducing a sealing or lubricating fluid such as water, oil or grease into the stuffing box. The dead weight seal developed by Worthington Pump & Machinery Corporation has proved effective.
4. When reworking packing, use all new, clean packing. Worn packings are dry, highly compressed, have high friction and may develop scoring.
5. Remember packing is relatively cheap. Labor and materials necessary to replace worn shafts, sleeves or rods are expensive and critical commodities.

Carefully examine packing removed from a stuffing box, as it often gives clues to the condition of the equipment and may be the means of solving packing problems. All packing installations have a definite economic length of service or performance. If the service of the packing is extended beyond this economic life, damage may occur to the equipment due to excessive friction or scoring. Also, economic loss may result from excessive leakage.



Rod, Plunger and Valve Stem Packings



JOHNS-MANVILLE PACKINGS

Johns-Manville packages have been developed to meet all types of industrial parking requirements. The following Parking Selection Chart for seal, plunger and valve stem packings should prove helpful in selecting the right packing for your particular service. Descriptions of many types of J-M Sheet Packings and O-Ring Gaskets are given on page 22. For special or unusual conditions, Johns-Manville engineers are available to help study your particular requirements and submit specific recommendations.

Find the packing for your particular application from the chart shown below. Details and sizes for the packing you select are listed alphabetically on the opposite page.

JOHNS-MANVILLE PACKING SELECTION CHART

ROD, PLUNGER AND VALVE STEM PACKINGS

Type of Rod			
Service	Reciprocating	Centrifugal	Valve Stems
Steam over 1000'	Superheat, = 167 Flashback Metallic, = 291, 303 Rajah, 36, 2		Jensen, #12, 14 High Temperature, #201
Steam up to 5000'	See Rings Kearney, Style #166		Style #222, 223 Jensen, Style #20
Hot Water	See Rings Cross Diamond, Style #221	Centripet, Style #7 Interlocked, Style #235	Mogul, Style #193 Style #222, 223 Jensen, Style #10
Cold Water Brine	See Rings Nuclear, Style #190 Flex, Style #189	Centripet, Style #7 Interlocked, Style #235 Flashback Metallic, Style #350	Mogul, Style #193 Style #222, 223 Jensen, Style #10
Ammonia	Servo-matic, Style #172 Cross Diamond, Style #221	Centripet, Style #7 Interlocked, Style #235	Mogul, Style #193 Style #222, 223
Oil up to 3500'	See Rings Mogul, Style #227, 223 Interlocked, Style #255, 270	Centripet, Style #7 Flashback Metallic, Style #350	Mogul, Style #193 Style #222, 223 Interlocked, Style #255
Air	See Rings Kearney, Style #166		Jensen, Style #10
Acid	Chemcor, Style #2006, 2209, 2011, 2012 Style #2013, 2014 Acid-resisting, Style #2017	Plastic Style #449, 445 Chemcor Style #2011, 2012 Style #2013, 2014 Acid-resisting, Style #2016	Chemcor, Style #2011, 2012 Style #2013, 2014 Acid-resisting, Style #2017
Natural Gas under 500 psi	See Rings Kearney, Style #15 Mogul, Style #222		Mogul, Style #193 Style #222, 223
Gasoline	Gasoline Rod, Style #223 Interlocked, Style #239	Centripet, Style #18 Plastic, Style #425	Gasoline Rod Style #202, 203
Caustic	Interlocked, Style #254 Caustic Resisting, Style #2020	Interlocked, Style #254 Caustic resisting, Style #2021	Caustic-resisting, Style #2020
Washed Pulp and Sack	Friedlander, Style #253	Interlocked, Style #253	



Rod, Plunger and Valve Stem Packings

STANDARD TYPES, SIZES AND PROPERTIES OF JOHNS-MANVILLE PACKINGS

[illegible]

¹Style emphasized with pen and blue ink.



PACKINGS AND GASKETS

Clipper Oil Seals

THE ONE-PIECE PRECISION MOLDED OIL SEAL DESIGNED FOR BETTER BEARING PROTECTION

The Johns-Manville Clipper Seal, adaptable to practically any sealing requirement, has a tough, dense heel and a soft, flexible lip concentrically molded into one piece. A specially designed garter spring holds the lip in light, but firm, contact with the shaft.

This unique construction provides a long-wearing, easily installed oil seal that possesses superior lubricant-retaining, dirt-excluding properties.

Molded to specification for shaft diameters from 1/4 in. to 60 in., Clipper Seals are available in three lip designs as described below. Various lip compounds are used in molding to provide the proper lip diameter for temperatures up to 450°F and for shaft speeds up to 3500 rpm or 1/2 in. Stacked mold sizes available furnished on request.

THESE 3 LIP DESIGNS PROVIDE A CHOICE OF BEARING SURFACES



TYPE 1PD
(endless)

Recommended as an all-purpose seal for slow, medium and high speed service as well as medium and heavy duty conditions. Temperature limit, -65 to +450°F, depending upon compound used.



TYPE RPD
(lip)

Recommended for operating conditions similar to those for Type 1PD but where installation requires a split seal. Temperature limit, -65 to +450°F, depending upon compound used.



TYPE SS
(endless and
springless)

Recommended for very small cavities where a spring type seal cannot be installed. The interference fit of the lip on the shaft forms the seal. Temperature limit, 275°F.

USE J-M SPLIT CLIPPER SEALS FOR HARD-TO-FIT SPACES

Many machines are designed with only a minimum clearance for the installation of the oil seal. In these applications, the seal cannot be applied over the end of the shaft, as in most installations, but must be forced around the shaft in the limited and comparatively inaccessible space near the bearing cavity.

J-M Split Clipper Seals have been designed and carefully built so that they can be easily and quickly forced around the shaft. The self-adjusting garter spring is made with a hook-and-eye so that it can also be installed around the shaft and then slipped into position on the seal.

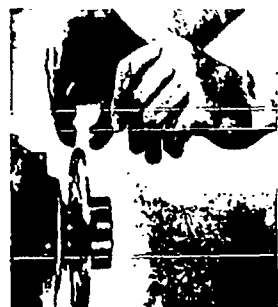
Split Clipper Seals provide important economies through quicker installation and easier replacements with a minimum of downtime. They are available in Type RPD, as described in the chart above.



The J-M Clipper Seal consists only of a one-piece molded body, which is the seal, and a garter spring. No cover plate is necessary for pressures under 5 psi.



There is no cavity too deep or too shallow for a Clipper Seal. Note the two seals shown which are of the same OD but vary in flange widths.



No need to fit the job to the seal when there's a J-M Clipper Seal to fit the job. Split Clipper Seals provide a quick fit in tight, hard-to-reach spots.



PACKINGS AND GASKETS

For Chemical Service



Chempac Teflon-Protected Asbestos Packings and Gaskets offer long-lasting protection for almost any type of equipment handling acids, alkalis or caustic solutions and solvents of all degrees of activity.

CHEMPAC® PACKINGS AND GASKETS

TEFLON®-PROTECTED • CHEMICALLY INERT • HEAT-RESISTANT • LONG-LASTING

Johns-Manville Chempac, a packing outstanding in service against virtually all chemicals, solvents and reagents, is composed of strong, resilient asbestos fibers thoroughly treated with chemically-inert Teflon, combining the excellent sealing and heat-resistant qualities of asbestos with the added protection of Teflon against corrosive chemical action. Chempac reduces to a minimum the styles required for packing equipment handling chemicals. Storage is no problem because its inert ingredients do not deteriorate. Chempac can be used to pack pump rods or shafts, valve stems, agitator shafts, expansion joints, rotary filters, mixers and similar apparatus handling strong acids, alkalis, caustic solutions, active solvents and many other reagents at temperatures to 500°F.

Chempac Interlocked Packings—Teflon-impregnated Chrysotile asbestos fibers braided so that each strand is securely interlocked . . . cannot unravel or come apart in service. *Style No. 2001:* Teflon yarn interlocked braided, no lubrication. *Style No. 2003:* Lubricated with Fluorohal grease. *Style No. 2006:* Teflon suspension impregnated. *Style No. 2007:* Braided Teflon yarn over blue asbestos core lubricated with Fluorohal grease. *Style No. 2008:* Requires mechanical lubrication for higher than average pressure service. *Style No. 2009:* Specially lubricated.

Following styles in coil, spiral and ring forms:

Style No. 2011—General purpose packing especially suited for repressuring units. Harder than the styles fol-

lowing. It requires mechanical lubrication. For use where fluid contamination is to be avoided and higher than average pressures are encountered.

Style No. 2012—Softer than 2011. It contains a lubricating medium. Particularly adapted to valve stems and centrifugal pumps and recommended where sealing with minimum gland pressure is required.

Style No. 2013—Similar to 2012 but lubricated for sealing against gas or liquid chlorine.

Style No. 2014—Similar to 2011 but made of Blue Crocidolite Asbestos treated with Teflon. For acids and acid-bearing solvents.

Chempac Gaskets have a base of asbestos impregnated with Teflon, resulting in a gasketing material offering higher mechanical strength and heat-resistance than Teflon alone. The Teflon suspension used to protect these gaskets has an almost universal immunity to chemical and solvent breakdown. *Style No. 91* for solvent and caustic service. *Style No. 92* for acid service. **Chempac Filled Gaskets** (*Style No. 117* for strong solvent and caustic solutions and *Style No. 138* for acids or acid bearing solvents) for use on glass lined equipment and highly lined woven flanges. **Spiral-Gaskets**—metal-asbestos gaskets with Chempac construction for temperature and pressure extremes.

For specific recommendations, consult your J-M Packing Distributor or the J-M sales office near you.

*Trademark of DuPont Teflon Chemicals Division.



ELECTRICAL PRODUCTS

Transite Asbestos-Cement Ducts

Provide Complete Cable Protection

Transite, a premier electrical material, meets every requirement of the ideal duct material because of its many unique properties. It is available in two duct types: *Transite Conduit* for exposed work and installation underground without concrete encasement, and *Transite Korduct* for installation in concrete.

Strong and Permanent—Transite Ducts are made of asbestos and cement, formed and compacted under pressure on a highly polished steel mandrel. The millions of asbestos fibers dispersed throughout the structure reinforce the cement in much the same manner as steel. Consequently, Transite has six times the tensile strength and three times the compressive strength of best quality ordinary concrete. The special steam-curing process achieves an insurable calcium silicate bond equivalent to that of concrete exposed for many years to the elements.

Corrosion-Resistant—The asbestos-cement composition of Transite Ducts is highly resistant to corrosive attack from alkaline or acid soils. These ducts stand up to corrosive cluding hills, salt marshes and other troublesome soils. They cannot rot or rust. Non-toxic, they are immune to galvanic action or electrolysis and will outlast other types of duct materials, even when corrosive action is accelerated by shock and vibration.

Incombustible—Transite Ducts combine burn-outs, safeguard adjacent cables from damage and reduce the possibility of panic and explosions. Made of incombustible asbestos and cement, they will not burn, smolder or generate smoke or fumes. The smooth interior surface of the duct remains smooth in service. The heat of an arcing cable cannot cause the duct to sag or to adhere to the cable sheath and interfere with the pulling of cables. Furthermore, Transite cannot contribute to the formation of explosive or toxic gases.

Rapid Heat Dissipation—System losses can be reduced by improving the dissipation of heat from conductors under load. Studies show that cables run cooler in Transite Ducts, resulting in lower IRT losses, increased system capacity and longer insulation life.

Lower Installation Costs—Light in weight, Transite Ducts are easily installed. They are available in 10-foot sections which mean fewer joints in the line. . . . and these joints are quickly assembled using the Transite Tapered Coupling which forms a tight joint and assures correct duct alignment. Transite Ducts are also easily and rapidly cut and machined on the job.

Transite Fittings—Fittings made of the same asbestos-cement material as the ducts themselves and machined to a standard taper are available in a wide range to provide maximum flexibility in laying out or constructing a duct system.



When installed without a concrete envelope under streets and highways, Transite Conduit has sufficient strength to resist any load that will normally be put upon it.



The high heat dissipation and permanence of Transite Korduct make it the desirable duct to use for steel power cables.

DIMENSIONS AND WEIGHTS OF TRANSITE DUCTS

Transite Conduit				Transite Korduct			
Size (I.D.), inches	Wall thickness, inches	Standard length, feet	Weight, lb per foot	Size (I.D.), inches	Wall thickness, inches	Standard length, feet	Weight, lb per foot
2	.75	5	2.3	2	.75	5	2.0
3	.75	10	2.3	3	.75	10	2.3
3 1/2	.75	10	2.9	3 1/2	.75	10	3.0
4	.75	10	4.4	4	.75	10	3.5
5	.75	10	6.0	4 1/2	.75	10	4.0
6	.75	10	7.0	5	.75	10	5.0
				6	.75	10	6.0

*Weights shown include one Transite tapered coupling per length.



ELECTRICAL PRODUCTS

Transite Asbestos-Cement Ducts

TRANSITE® CONDUIT

For exposed work and installation underground without concrete encasement

Transite Conduit, the thicker-walled asbestos-cement duct, has all of the advantages described in a duct designed for installation underground without concrete reinforcement. Through elimination of concrete, it enables the installer to make substantial savings in time, labor and materials.

The crushing strength of Transite Conduit is greater than is ordinarily required for current work. Up to its ultimate strength, there is no deformation under sustained loads over an indefinite period of time.

For exposed locations, both indoors and out, Transite Conduit offers durability and low cost. Its appearance is pleasing, but it can be painted for decorative purposes if desired. It will withstand for ages the deteriorating effects of the worst weather and corrosive gases, and will save as much as 50% of the installed cost of the duct materials commonly used for exposed installations.



The inherent resistance of Transite Conduit to the corrosive action of many chemicals, smoke fumes and other corrosive atmospheric gases is the ideal duct for exposed runs.

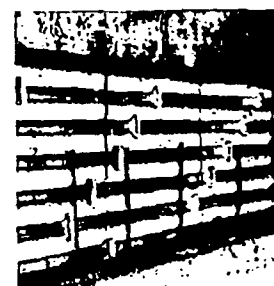
TRANSITE KORDUCT®

For installation in concrete

Transite Korduct, the thinner-walled Transite Duct, provides all requirements for a duct for concrete-in systems. Its outstanding properties make it the unanimous choice for concrete duct systems of leading electric and telephone utility engineers and designers of industrial plants. Proportionately as strong as Transite Conduit, Transite Korduct maintains its strength in service. Because of its asbestos-cement composition, the wall itself is a fireproof barrier, which can be utilized to reduce the separation between ducts. This closer spacing provides a saving in all items of construction cost of a duct bank—concrete, trench width, depth, etc. Used for high voltage lines, its high thermal conductivity cuts operating losses.

Newly designed J-M Plastic Spacers for positioning Transite Korduct before concrete is poured in built-up or rammed type of duct bank construction are molded in one-way units at high temperatures and pressures. Their skeleton design provides anchored construction and permits maximum amount of concrete between ducts. They provide maximum strength with minimum weight. For complete design details, write for EL-41A.

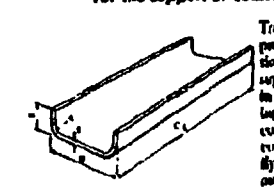
Brochures EL-29A and EL-45A give complete details on Transite Ducts. Installation instructions are also available (EL-45A).



The incombustibility of Transite Korduct is especially advantageous in increased safety and protection against panic fire in tunnels, since this asbestos-cement duct will not burn under the heat of a short circuit.

TRANSITE CABLE TRAYS

For the support of control and power cables



Transite Cable Trays provide a fireproof, mechanically strong, corrosion-resistant construction for the support of power and control cables in power plants and industrial buildings. Constructed with the usual steel channel systems, they give advantages in cost and maintenance. They are easily installed and have a good appearance. A complete line of fittings is available to provide continuous runs.

ENGINEERING DATA

Tray No.	W	R	L	R	T
1	2 1/2"	3 1/2"	100"	1 1/2"	2 1/2"
2	3 1/2"	4 1/2"	110"	1 1/2"	2 1/2"
3	4 1/2"	5 1/2"	120"	1 1/2"	2 1/2"
4	5 1/2"	6 1/2"	130"	1 1/2"	2 1/2"
5	6 1/2"	7 1/2"	140"	1 1/2"	2 1/2"

Tray No.	Weight lbs per sq. ft.	Average ultimate breaking load lbs per sq. ft.	Span
1	2.3	15	8'
2	2.9	20	10'
3	3.5	25	12'
4	4.4	30	14'
5	5.0	35	16'



SHEET MATERIALS

FRICTION TAPES		
Mo-Value (Meets A.S.T.M. specifications) 4-Star	For every purpose in the shop, on the plant and in the home. All use constructed with 4 layers of insulating rubber compound thoroughly impregnated into fabric sheeting of finest quality.	No. 4 (41½") and No. 8 (81½") rolls in individual cartons. No. 4 (42") and No. 8 (82") rolls in individual cartons. No. 1 (15"), No. 2 (12 ½"), No. 4 (30") and No. 8 (60") rolls. 10 No. 8 rolls in cylindrical Handy Shop package.
J-M		

RUBBER TAPES

Ml-Valve (Melin A.S.T.M. specifications) Brooklyn	A self-welding natural rubber containing lugs free from sulphur and corrosive chemicals. Fuses into a solid bond without application of heat.	No. 4 (15 lb) and No. 8 (30 lb) rolls in individual cartons.
	General purpose rubber tape, especially suited for easy splice making. Contains no sulphur or corrosive chemicals. Good aging and tack-retaining characteristics.	No. 4 (10 lb) and No. 8 (22 lb) rolls in individual cartons.

PLASTIC ELECTRICAL TAPE

Jenenco	High quality electrical insulating tape composed of a vinyl plastic backing good resistance to water, oil, acids, alkalis and corrosive chemicals and a film of pressure sensitive rubber adhesive. High dielectric strength.	.007 in. thick in 20, 30 and 60 ft. rolls. 1 1/2" wide. .007 and .010 in. thick in 100 ft. rolls 1 1/2" to 2" wide.
---------	---	---



Permanently Plastic

	STANDARD DOWEXAL ¹	TYPE X DOWEXAL	E-100 DOWEXAL	STANDARD DOWEXAL ¹	TYPE Y DOWEXAL	DOWEXAL ²
Color	Gray-Green	Gray-Green	Gray-Green	Dark Brown	Black	Dark Brown
Vehicle (Base)	Vegetable Oil	Vegetable Oil	Solignum	Mixed Oil	Mixed Oil	Mixed Oil
Odor	Very slight Cedar oil	Slight Cedar Oil	Slight wood-smell	None	None	Slight Mixed Oil
Consistency (Packhouse) Half Size ASTM D-57	1000 gram load 140-175	1000 gram load 130-145	1000 gram load 110-130	1000 gram load 100-100	1000 gram load 75-90	1000 gram load 125-145
Tensile Strength	1.34	1.43	1.38	1.57	1.54	1.55
Temperature Range	125°	125°	120°	150°	150°	150°
Maximum Continuous	200°	200°	200°	250°	250°	250°
Brief Periods	-35°	-35°	-35°	-35°	-35°	-35°
Detachment for Sealing Agent or in Contact With	Alk. (Dist. & Hydrof. Acet. Water) (Sub.)	Alk. (Dist. & Hydrof. Acet. Water) (Sub.)	Alk. (Dist. & Hydrof. Acet. Water)	Alk. (Dist. & Hydrof. Acet. Water, Oil, or Alk.)	Alk. (Dist. & Hydrof. Acet. Water)	Alk. (Dist. & Hydrof. Acet. Water, Oil, or Alk.)
Corrosion Action on Rubber or Reinforcement of Pulverized Substrates of Wood	None	None	None	None	None	None
Comments and Notes	For testing around wires and cables as well as other substances. A good general purpose sealant because of adhesion, heat resistance and resistance to moisture in contact. Used to fill in interstices in	A modification of Standard Dowexal formulated for Navy cable manufacture. Cables made with Type Y Dowexal show better results on cable "drip test."	Better handling properties than Standard Dowexal. Makes faster than standard Dowexal.	An addition compound for use in vulcanization systems where the dark color is not objectionable. An excellent general purpose sealant with a wide temperature range. Best aging characteristics.	Similar consistency and better adhesion than Standard Dowexal. An excellent general purpose sealant. Specimens tested in parallel light test in presence of oil or fuel products.	A general purpose sealant with good resistance to moisture. Specimens tested in parallel light test in presence of oil or fuel products.

[illegible]



CELITE[®] DIATOMITE FILTER AIDS

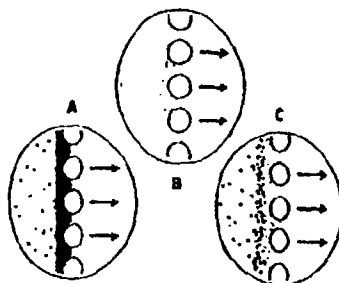
Cellulose filter aids, the original diatomaceous silica filter powders, provide efficient, low-cost clarification in the filtration of numerous liquids ranging from sugar syrups, beer and water to edible oils and petroleum products.

Celulose is simply added in small quantities to the liquid to be filtered. The microscopic, multi-shaped particles inter-lace and overlap to form a porous film on the filter cloth. This "cake" of Celulose filter and traps the finest suspended solids and allows the clear liquid to pass through at high flow rates. It prevents the filter cloth from clogging, permits the longest possible filtering cycle and, therefore, maximum production capacity. Any filtering equipment of convenient design may be used.

White filter aids are available in many different grades—each with a microscopically controlled particle size range designed to filter out a certain size of suspended material.

These three greatly-enlarged cross-sections of a typical filter element show why C-100 filter aids are needed and how they improve filtration.

- A. If Celite is not used, fine solids form a seal over the filter surface and stop the flow of liquids.
- B. The first step in the use of Celite is to build up a "precoat" of Celite filter aid on the filter medium.
- C. During filtration, additional small amounts of Celite are added to keep forming a fresh filter surface.



CELITE DIATOMITE MINERAL FILLERS

Properties of Six Standard Cellite Mineral Fillers

	CELTIC HC	CAMEL ASC	CELTIC NBC	SNOWY FLOES	CELTIC SIS	GRIPPER FLOES
Color	Light Gray	Light Pink	White	Light Gray	Light Pink	White
Screen Design - 125 Mesh, 1" Max. + 225 Mesh, 1/2" Max	3 —	5 —	7 —	— 0.3	— 0.1	— 0.5
Impact, Kwh Miner (Bumped)	4.6	6.4	7.9	1.2	2.3	2.4
Test Method (ASTM, 1" Max.)	4	1	1	6	1	1
Absorpt. % (Average)						
Water	215	210	220	180	180	180
Excess Oil	205	210	180	185	155	180
10% Density After 60 Days						
Water	8	9	10	8	2.5	9
Oil	12	17	17	22	25	27
Specific Gravity	2.02	2.15	2.30	1.00	2.15	2.30

Cable mineral fillers are being used in an ever growing number of products and processes to help improve quality and reduce costs because of their unusual combination of properties.

As compared to any high quality mineral filler, Celite is chemically inert. However, Celite's unusual physical properties are of primary importance in improving the performance or quality of the product. They are irregular, fibrous, porous particle structure, great bulk per unit weight and high absorptive capacity. Special products have a low refractive index, good color characteristics and excellent dielectric properties.

Cellulose mineral fillers are available in several different grades of varying particle fineness, bulk density and adsorptive capacity. The cavendish method of process control employed at the Johns-Manville plant in Los Angeles, California, make certain that each shipment of filler is always dependably uniform.

For complete information on U.S. Diatomite Filter Applications and Mineral Fillers, write for today's FREE.

*Golden Coleman Method - 1 lb of bait per 100 lb of Catfish



Celite Diatomite Catalyst Carriers, Metal Raschig Rings

CELITE® DIATOMITE CATALYST CARRIERS

Chemically inert... Dependably Uniform

Properties of Cellulose Diatomite Catalyst Carriers

	TYPE I	TYPE II	TYPE III	TYPE IV	TYPE V	TYPE VI	TYPE VII
DOSE	Powder	Powder	Powder	Powder	Granule	Pellet	Stable Powder
Ignition Loss @ 300°C, % Dry	0.2	0.3	3.5	3.5	1.2	0.2	0.0
Physical Phase	Colloidal	Shoe Colloidal	Amorphous	Amorphous	Colloidal	Colloidal	Colloidal
Relative Stability @ 25°C	2.3	2.0	2.0	2.0	1.3	1.3	0.3
Isotonic Density @ 25°C (mEq/g)	0.29	0.27	0.33	0.33	0.30	0.34	0.40
Stability @ 37°C (mEq/g)	1.0	1.1	3.0	1.0	0.70	0.30	0.60
Stability @ 37°C (mEq/g)	2.3	3.3	2.7	3.0			
Stability @ 37°C (mEq/g)	2.0-2.5	3.0	10-20	10-20			
Stability @ 37°C (mEq/g)	2.4	3.3	0-6	4-4			

Cerine Diatomic Catalyst Carriers are available in a wide variety of extruded shapes and sizes and also in granular form. These ceramic type supports offer high porosity, high absorption, low density and large surface area . . . have a compressive strength that makes them extremely resistant to breakdown . . . and exhibit exceptional thermal and steam stability.

Cholic aggregates and powdered catalyst supports are now giving economical service in such processes as desulfurization, hydrogenation, dehydrogenation, polymerization, reduction, isomerization . . . or wherever the use of silica is indicated. They are resistant to the action of phosphoric acid in the presence of steam at elevated temperatures.

Two new Cellulose Catalyst Carriers—Cellulose 408 and Cellulose 410—offer new catalyst carrier efficiency at low volume (packed density) cost. Available as preformed extruded pellets, they have a much larger pore size than most catalysts . . . will absorb up to 66% of their own weight in water . . . have large surface area (2.4 square meters per gram) which is equivalent to about 12,300 sq. ft. per lb.

J-M SPLIT METAL RASCHIG RINGS

Increase Operating Capacity of Packed Towers

Made from any required metal to diameters from 5" to 3". J-M split metal flange Range are precision-made for economical operation of packed towers in absorption, fractionation, extraction and other related processes. They can be made in almost any size and thickness of metal—in many different ratios of diameter to length. The metal walls are uniformly thin—yet the split is always less than the metal thickness to prevent interlocking.

The smooth-surfaced J-M metal rings offer high surface area together with high void space, low pressure drop and minimum liquid hold-up which all contribute to getting the maximum capacity from any packed tower. Because of these outstanding advantages, J-M split metal Moschig Rings make it possible to put more material through existing towers and to design more compact new towers for a given capacity.

APPROXIMATE DATA ON J-M METAL RASCHIG RINGS

DIRECTIONS OF STRESS			IMPRESS PER CU. FT.	SMALL FEET SQUARE PER CU. FT.	PER CU. FT.	DENSITY OF GROUT 1 1/2 " 5" PO	EMPIR- ICAL TEST RESULTS (PULVER- IZED)	WEIGHT IN POUNDS											
								SAND		GRAVEL SAND		COPPER		ALUMINUM		IRON		NICKEL	
D.S.	LENGTH	WIDTH						Per Cubic Foot	Per Cubic Foot	Per Cubic Foot	Per Cubic Foot	Per Cubic Foot	Per Cubic Foot	Per Cubic Foot	Per Cubic Foot	Per Cubic Foot	Per Cubic Foot	Per Cubic Foot	
5	1/2	1/2	10.500	202	75	172	0.75	1.3	120	5	64	1.36	1.5	1.5	1.5	1.5	1.5	1.5	
15	1/2	1/2	10.500	190	81	101	0.75	6.6	70	4	7.3	2.2	2.4	6.0	6.1	7.1	7.1	7.1	
15	1/2	1/2	10.500	413	74	81	0.41	12	130	10	131	64	146	42	64	116	145	16	
15	1/2	1/2	10.500	4	88	83	0.41	30	11	55	12	60	3.6	20	9.7	30	12	63	
15	1/2	1/2	10.500	20	70	70	0.51	40	104	20	90	27	116	6	20	18	27	117	
15	1/2	1/2	10.500	80	71	67	0.51	15	10	15	10	56	5.3	17	43	57	56	17	
15	1/2	1/2	10.500	78	67	67	0.54	30	80	20	90	32	100	9	20	81	104	31	
1	1	1	10.500	41	62	54	0.54	57	30	51	30	30	41	9.2	23	30	43	20	
1	1	1	10.500	36	55	45	0.51	55	36	35	36	36	77	15	23	63	77	30	
1 1/2	1 1/2	1 1/2	10.500	405	89	60	0.73	32	51	84	93	62	31	90	75	60	47	63	
1 1/2	1 1/2	1 1/2	10.500	215	81	64	0.53	100	46	139	47	131	55	47	160	47	160	52	
2	2	2	10.500	100	71	62	0.93	70	36	270	34	280	60	70	12	200	60	200	
2 1/2	2 1/2	2 1/2	10.500	85	71	64	1.20	20	20	253	20	150	11	60	216	27	201	204	
3	3	3	10.500	49	64	61	1.40	70	20	210	75	150	77	160	400	32	200	200	

NOTE: ONLY STANDARD SIZE ARE ALLOWED. IN REDUCED SIZES AS WELL AS THOSE WITH DIMENSIONS EITHER GREATER OR LESS THAN THE LISTED ARE 50% APPLICABLE.



CELITE DIATOMITE PRODUCTS

Synthetic Silicates

J-M SYNTHETIC SILICATES

Diatomite is the source of reactive silica in the production of J-M synthetic magnesium and calcium silicates. The physical and chemical properties of both Micro-Cel (synthetic calcium silicates) and Celkate (synthetic magnesium silicates) make them adaptable to many uses.

Liquid Absorption: Preparation of high percentage liquid concentrates as "dry" powders.

Anti-caking Agents: For good flow properties in deliquescent crystals.

Viscosity: Inducing body or viscosity in a liquid product.

Bulking Agents: To "bulk" up a compounded powder.

Pigment Extenders: Large surface area helps extend prime pigment.

Suspension Agents: Small particle size aids in suspension of heavier particles in a liquid system.

Flattening Agents: Low refractive index. High flattening efficiency. Compatible with all vehicles.

Reinforcing Pigments: Small particle size. Large surface area. Easily dispersed.

For further information on J-M synthetic silicates and their applications, write Johns-Manville.

MICRO-CEL®

Synthetic Calcium Silicates

Micro-Cel is a synthetic calcium silicate with high absorptive capacity, large surface area and finely divided particle size. It is an excellent bulking agent and absorbent for liquids.

Micro-Cel used as processing aids for insecticides is designed specifically to provide a means of producing free-flowing high percentage concentrates with either dry, viscous or liquid poisons. It is excellent for bulking of insecticide dusts.

Micro-Cel as a conditioning agent for cleansers and detergents permits dry, non-caking concentrates of liquid detergents and wetting or dispersing agents to be prepared easily and quickly. It also permits a means of controlling the release of aromatics which may be added.

Typical Properties of Micro-Cel®

Color	Light gray
Absorption, % by weight	
Water (Candler-Coleman)	300-500
Oil (Candler-Coleman)	275-450
Bulk Density, lbs. cu. ft.	8-15
Screen Size, #325 mesh, % by weight	1-2
Ultimate particle size	Less than 0.1 micron
pH	8.0-9.5
Moisture (free), wt	5-8%
Refractive index	1.52-1.54
Available surface area, sq. m./gm.	175-200

CELKATE®

Synthetic Magnesium Silicates

Celkate, a newly developed Johns-Manville synthetic magnesium silicate, is a uniform free flowing powder which exhibits both high absorption and absorption characteristics. It possesses excellent flow and bulking properties.

Celkate is a surface active material which provides a means of selectively removing components, either dissolved or undissolved, from any liquid system.

In addition to the applications given above, Celkate is a highly effective absorbent for the decolorization and purification of many types of liquids. As a filter aid, it removes undissolved solids to obtain complete clarification.

Typical Properties of Celkate®

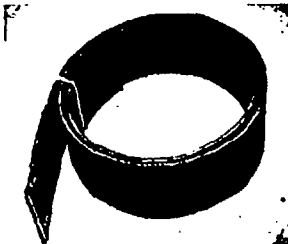
Color	Light gray
Absorption	Positive
Density, loose weight, lbs. cu. ft.	12-18
Absorption, % by weight	
Water (Candler-Coleman)	130
Oil (Candler-Coleman)	155
Specific Gravity, True	2.2
Ultimate particle size, microns, av.	0.05
pH	7.0-8.0
Surface area, sq. m./gm.	200
Refractive index	1.52-1.54

*Technical data shown is considered accurate and reliable. However, no guarantee is made or intended.

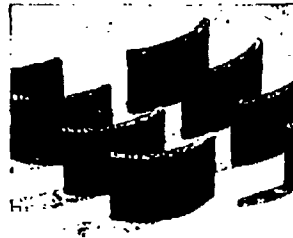


FRICITION MATERIALS

Brake Linings, Clutch Facings



Folded and compressed lining.



Molded friction blocks.



Woven linings.



Flexible molded lining.

Johns-Manville has served industry for many years with a complete line of dependable friction materials. These products have established outstanding records for economies in power and maintenance on shovels, drag lines, hoists, winches, cranes, presses and a variety of other industrial and marine equipment. The following table identifies style numbers and types. For further details write for brochure FM-12A.

Structure	Style no.	Construction	Composition
Flexible Lining	300	Woven (standard)	Brass wire-lashed asbestos yarn
	304	Woven	Brass wire-lashed asbestos yarn
	305	Woven	Wire-lashed asbestos yarn
	510	Woven (heavy duty)	Multi-metal wire-lashed asbestos yarn
Semi-flexible Lining	302	Molded	Metal particles, no reinforcing backing
	332	Molded	With zinc particles
	342	Molded	With brass particles
	400	Woven (light)	Multi-metal wire-lashed asbestos yarn
	404	Woven	Multi-metal wire-lashed asbestos yarn
	600	Folded and compressed	Brass wire-lashed asbestos cloth
	900	Woven and compressed	Asbestos yarn
Rigid Flexible Linings	350	Woven	Brass wire-lashed asbestos yarn
	354	Woven	Brass wire-lashed yarn, oil-resistant impregnation
	450	Woven	Brass wire-lashed asbestos yarn
	454	Woven	Brass wire-lashed yarn, oil-resistant impregnation
Rigid Linings	751	Molded	Cut from asbestos composition
Rigid Brake Blocks	100 Δ	Molded	With brass particles
	140 Δ	Molded	With brass particles
	150 Δ	Molded	With brass particles
Rigid Lining	200	Molded	Metal particles, no reinforcing backing
	230	Molded	With zinc particles
	240*	Molded	With brass particles

* These linings are provided with a reinforcing backing material, therefore, discs from this sheet are not suitable for floating disc clutches.
Δ Can be molded into discs and special shapes.

Insert type clutches: Blocks for these clutches can be made from block materials and sintered metal structures. Insert Holo Plugs are available.



PIPE PROTECTION MATERIALS

Asbestos Pipe Line Felt, Tape

TRANSHIELD® ASBESTOS PIPE LINE FELT

For Average Soil Conditions

Transshield, a strong, lightweight asbestos felt shield for pipe lines, is designed to protect against corrosion and give long life to protective coatings on underground pipe lines. It consists of a lightweight, coal-tar saturated asbestos felt, reinforced with continuous glass yarns parallel spaced on 2" centers, providing exceptional tear strength, while weight is kept to a minimum.

Positive Protection For Enamels Because it is a continuous asbestos membrane between the pipe line enamel and the soil, Transshield preserves a continuous protective film of enamel on the pipe. It guards the enamel coating during construction of the pipe line, and after installation, it reduces cold flow of the enamel, acting as a surface barrier to restrict soil stress. As an external shield, Transshield protects the full thickness of the enamel. The strong asbestos fibers will not rot or decay and present an almost indestructible barrier against soil chemicals.

Easy to Apply Designed for easy, high-speed application by modern machine methods, Transshield is strong and highly tear-resistant. Longer length rolls increase application speeds since fewer stops to replace rolls are required. Lighter weight makes it easy to handle and reduces freight expense.

J-M 15-LB. ASBESTOS PIPE LINE FELT

For Severe Soil Conditions

J-M 15-Lb. Asbestos Pipe Line Felt (perforated or unperforated) is particularly suitable where a heavier material than J-M Transshield is desired. It provides long life, toughness, flexibility, resistance to rot, decay, cracking and impact. J-M 15-Lb. Asbestos Felt now protects more than 100,000 miles of oil and gas pipe lines.

TRANTEX® POLYVINYL TAPE

Easily Applied . . . Pressure-Sensitive

TranTex Poly(vinyl) Tape, a cold-applied protective coating for underground pipe lines, is easy to apply by hand or simple wrapping devices. Pressure-sensitive, it sticks to pipe on contact, forming a firm, stable bond. Its unusually high electrical resistance will control corrosion for many years.

TranTex Tape is widely used where ease of application is important—over field-welded joints of oil and coal-coated pipe, for a coating where repainting or reconditioning pipe lines, for trench coating tunnels and sheet piling of pipe, for pipe lines through difficult terrain.



Transshield provides a lightweight, economical felt shield for pipe lines with exceptional tear resistance.

Sizes of Transshield Asbestos Felt

Width, inches	2 to 36
Length of rolls, feet	Any length desired. Length of rolls varies with different methods of application. In general 400 ft. rolls are used for trenching operations coating and wrapping machines, 200 ft. rolls for hand-applied rotary type machines, 100 ft. rolls for hand-applied wrapping.
ID (inside) of rolls, inches	2 standard 3 available on request
Net weight	5 lb. per square

Sizes of J-M 15-Lb. Asbestos Felt

Width, inches	2 to 36
Length of rolls, feet	Any length desired. Length of rolls varies with different methods of application. In general 400 ft. rolls are used for trenching operations coating and wrapping machines, 200 ft. rolls for hand-applied rotary type machines, and 100 ft. rolls for hand-applied wrapping.
ID (inside) of rolls, inches	2 standard 3 available on request

Properties of TranTex Tape

	V-10*	V-20**
Tensile strength per mil thickness, approx.	1,000*	1,000*
Insulation Resistance, greater than (ASTM D-257-49)	100,000 megohms	100,000 megohms
Temperature limit	200°	100°
Adhesion at per inch width	30	20
Bonding Strength lbs. per inch	30	36
Elongation at Break	250%	300%

TranTex is a black polyvinyl tape available in 2 thicknesses—
*V-10 is a 10 mil tape for average conditions, and
**V-20 is a 20 mil thickness for use where a more rugged coating is specified.



FLOORINGS

Decorative, Industrial

DECORATIVE FLOORING

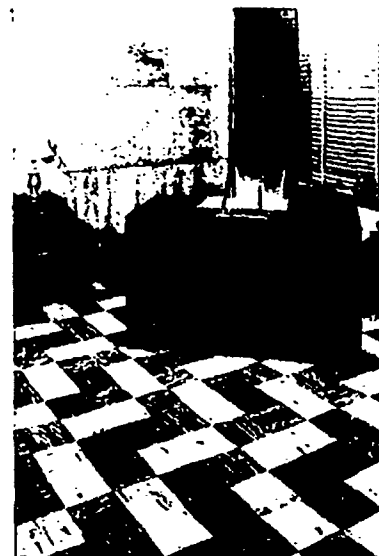
Johns-Manville Decorative Floorings, available in a variety of colors, combine beauty, durability and economy in floor covering for schools, offices, churches, lobbies, restaurants, banks, manufacturing areas, drug stores, bakeries, kitchens, etc. Two types are available: J-M Asphalt Tile and Terraflex, the Vinyl Plastic Asbestos Flooring.



J-M Asphalt Tile Flooring, far exceeds the standard of quality for a floor covering at low initial cost, is long-wearing and easy to maintain. The units come in a wide range of attractive colors in a standard size of 9 x 9 in., in thicknesses of 1/8 and 3/16 in.

Terraflex® Plastic-Asbestos Floor Tile, the revolutionary new flooring, was pioneered by Johns-Manville after 15 years of testing and development. Terraflex will outwear other types of resilient floor coverings. The resilient units are unaffected by grease, oil, alkaline solution or mild acid solutions. Terraflex, due to its large asbestos content, is highly fire-resistant and will not support combustion. Colors are clear and bright. Standard size, 9 x 9 in., 1/8 and 3/16 in. thicknesses.

For additional details and illustrations in color, see Secret's File, Architectural or write Johns-Manville for Brochure FL-73A.



For the office reception room, J-M Decorative Floorings combine modern appearance with practical utility and reduced maintenance.

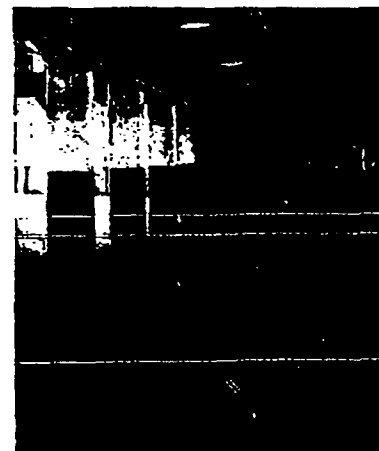
INDUSTRIAL FLOORING PLANK

J-M Industrial Flooring Plank is strong, durable and resilient floor covering that is practically wear-proof. It is capable of supporting heavy loads; it is quiet, dustless, vermin-proof and odorless. Industrial Flooring Plank will not chip, warp or decay and requires little or no maintenance. Rapidly and easily applied, Industrial Flooring Plank is ready for use as soon as it is laid.

Industrial Flooring Plank is used over smooth sub-floors in warehouses and manufacturing buildings where heavy static loads are not resting on small bearing areas, and where floor is not exposed to oils and greases, extremes or abnormal temperatures.

Industrial Flooring Plank is a mixture of tough fiber, high melting point—low penetration asphalt and a graded mineral filler, closely compressed and sliced into rectangular slabs, 12 x 24 in., in 1/2 in. thickness and black in color. Weight approximately 4 lb per sq ft.

For detailed information, ask for Data Sheet Series 110.



A floor of Johns-Manville Industrial Flooring Plank is capable of supporting heavy loads. Once in place, it is ready for immediate use.



ROOFING AND SIDING

Transite Asbestos-Cement Sheets

CORRUGATED AND FLAT TRANSITE ASBESTOS-CEMENT SHEETS FIREPROOF • ROT-PROOF • STRONG • DURABLE

Transite Sheets, both flat and corrugated, are made of asbestos filler and cement, formed under great pressure into dense asbestos-cement sheets possessing unusual strength, rigidity and durability. They are easily applied and need no periodic maintenance or painting. They are strong, fireproof, highly corrosion-resistant and will not rot or shrink.

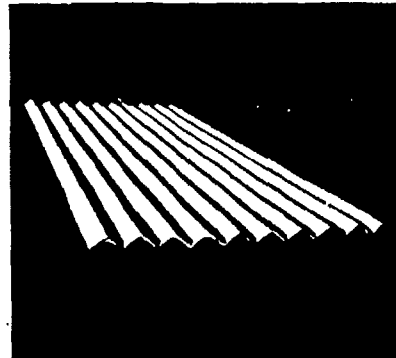
Corrugated Transite

Corrugated Transite has been widely used for over thirty years as roofing, siding and partitioning, particularly over skeleton frame construction. It has been used extensively by railroads, public utilities and industrial plants because of its exceptionally high resistance to acid fumes, alkaline vapors, adverse atmospheric conditions and extreme and sudden temperature changes. For roofing and siding, Corrugated Transite shall be applied with a wide lap of one corrugation, 42", to give a weather exposure of approximately 37.8". Purlins should be spaced on not greater than 34" centers and side-girts on centers not greater than 60". Minimum roof pitch, 3" per ft.

Flat Transite

Flat Transite is the same material as Corrugated Transite except for form. Because of the many advantages inherent in this product, its applications are practically unlimited. A few of these include: Walls, ceilings and partitions in all types of industrial plants; casings on furnaces, boilers, tanks and other heated equipment; hoods, dampers, hollies and ducts; electrical cell structures; interior and exterior use for various types of residential construction.

Both Corrugated and Flat Transite are easily applied. They can be drilled with an electric twist drill, fastened with screws or bolts and sawed with a hand saw though a portable power saw with an abrasive wheel or carbide-tipped blade should be used if much sawing is to be done.



Corrugated Transite is composed of asbestos filler and cement. This durable material can be applied to any skeleton-frame structure.



This large building here was designed with durable maintenance-free walls of Corrugated Transite.

STANDARD SIZES

Type	Size Sheets	Thicknesses	Approx weight, un-crated, lb per sq ft	Type	Size Sheets	Thicknesses	Approx weight, un-crated, lb per sq ft
CORRUGATED TRANSITE	42 in wide, lengths from 6 in to 11 ft, in increments of 6 in	4.2 in. girth; approx 1 1/2 in. depth 1/2 in. thick at edge and valley, 1 1/2 in. at longest 1 1/2 in. average	4.1	FLAT TRANSITE	36 x 48,	1/4	2.2
					42 x 48,	1/4	3.3
					42 x 96,	1/4	4.0
					48 x 48 and 48 x 96 in.	1/2	5.1
						3/4	6.5
						1	7.8
						1 1/4	9.0
						1 1/2	10.3
						1 3/4	12.2
						1 7/8	14.6
						2	17.0
						2 1/4	19.4

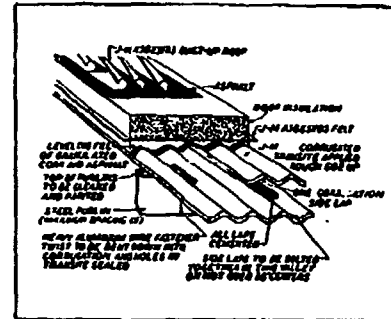
8 1/2 girth, average and heavier than all the other asbestos-cement sheets and is also the one with Corrugated Transite sheets.



ROOFING AND SIDING

Special Constructions

INSULATED ROT-PROOF ROOF

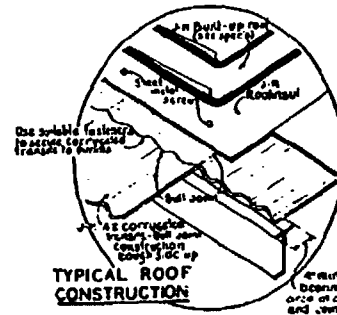


Insulated Rot-Proof Roof construction details.

The J-M Insulated Rot-Proof Roof was originally designed to withstand the severe moisture, heat and acid conditions encountered over the machine room in paper mills. Fastened directly to the steel purlins, its erection presents no unusual problems, it being designed specifically for application over skeleton frame construction.

An approved sheet insulation of the required thickness under the J-M Built-up Roof prevents the deposition of moisture under the calculated humidity conditions. While the problem of rot alone could be eliminated by the use of concrete, condensation and roof-drip remain. The Johns-Manville Insulated Rot-Proof Roof meets all the difficulties satisfactorily.

TRANSITE INSULATED ROOF



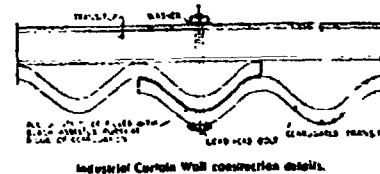
Transite Insulated Roof construction details.

The Johns-Manville Transite Insulated Roof was designed for use where construction less expensive than the Insulated Rot-Proof Roof is desired, and where condensation conditions are not as severe.

In the Transite Insulated Roof, Corrugated Transite is used for the roof deck. Over this is applied a minimum of 1 in. of Johns-Manville Roofinsul. This serves as a base for a standard Johns-Manville Built-up Roof (see page 48). Maximum purlin spacing in this type of construction is 36 in. The type of J-M Built-up Roof selected is then applied in accordance with standard Johns-Manville specifications.

Complete information and detailed drawings of Transite Insulated Roof are available on request. Write for Data Sheet Series 168.

INDUSTRIAL CURTAIN WALL



Industrial Curtain Wall construction details.

The J-M Industrial Curtain Wall consists of an interior wall of 1 1/2" J-M Transite (impregnated insulating board core faced on both sides with asbestos-cement board) and an exterior wall of Corrugated Transite. Both inside and outside surfaces of the curtain wall are a pleasing light gray color. No painting is required to preserve the material, although they may be easily painted for decorative effect if desired. Light in weight, this modern "dry" wall construction will provide insulating value equivalent to approximately 22 in. of brick.

M.S. Pat. No. 2,837,844.



ROOFING AND SIDING

Built-Up Roofing



Flexstone Built-up Roofs, made of Asphelt and asphalt adhesives, need no periodic coating.

FLEXSTONE BUILT-UP ROOFS

WILL NOT SUPPORT COMBUSTION • RESIST DRYING OUT ACTION OF SUN

Flexstone roofs combine the best in roofing materials, engineering practice and application methods to achieve a smooth-surfaced asbestos built-up roof which has no superior. More than 95 years of experience in the manufacture of roofing materials, and all the lessons Johns-Manville has learned over that period about the effects of time and weather on roofing, have gone into the making and building of this superior roof.

Today Flexstone roofs are protecting buildings all over this country and Canada. In many cases, they are still giving satisfactory service after 20, 25 and even 35 years. Since Flexstone roofs are made of asbestos felts, they have all the advantages of that ageless mineral. The result is literally a flexible covering of stone, which effectively resists the drying out action of the sun... will not support combustion... and is waterproof, long-lived and easy to maintain. It's economical in cost, too.

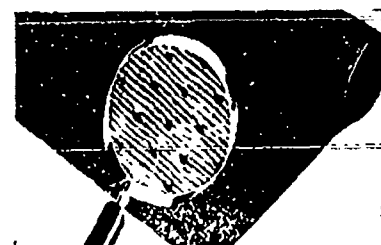
ON INCLINES $\frac{1}{2}$ " TO 6" PER FOOT. The best, most durable and longest lived is the "Flexstone Super A." Where a less permanent roof will be satisfactory, or where bridge restrictions exist, the "Flexstone Standard" or "Flexstone Service" are designed to give adequate protection.

FROM DEAD LEVEL TO $\frac{1}{2}$ " PER FOOT. After extensive experimentation, including years of field testing, Johns-Manville has developed the "Flexstone Spec. F..." a smooth-surfaced roof for pitch and asbestos built-up roof for dead level decks and for pitches of less than

5 in. to the foot. This new development in roofing permits the elimination of slag and gravel on dead level and low pitch roofs. And full advantage has been taken in this roof of the superior qualities inherent in J-M Asbestos roofing felts.

Complete details and specifications on various Johns-Manville Built-up Roofs are published in the Roofing and Siding section of the Sweets Architectural File, and may also be obtained by writing Johns-Manville. Ask for your free copy of Brochure RM-51A.

The table on the following page gives the bill of materials per 100 sq ft for Flexstone Asbestos Built-up Roofs.



Flexstone felts are perforated with numerous small holes.



ROOFING AND SIDING

Built-Up Roofing, Roof Insulation

BILL OF MATERIALS PER 100 SQ FT FOR FLEXSTONE ASBESTOS BUILT-UP ROOFS

For Inclines $\frac{1}{2}$ " to 6" Per Foot

Application over	J-M designation	Primer, lb	Asphalt-Saturated Felts				Asphalt, lb	Coating, lb	Bond, years
			Base	1st	Finishing	2nd			
Wood, inclines, $\frac{1}{2}$ to 6 in. per ft	Super A	—	No. 20 Ash.	32	2, 15-lb Ash.	45	90	8	20
	Super A	—	No. 45 Sug.	32	2, 15-lb Ash.	45	90	8	20
	Standard	—	No. 30 Ash.	32	2, 15-lb Ash.	30	60	8	15
	Standard Service	—	No. 45 Sug.	32	2, 15-lb Ash.	30	60	8	15
Non-combustible, inclines, $\frac{1}{2}$ to 6 in. per ft	Super A	—	No. 20 Ash.	32	2, 15-lb Ash.	30	90	8	20
	Standard	—	No. 45 Sug.	32	2, 15-lb Ash.	30	90	8	15
	Service	—	No. 30 Sug.	30	2, 15-lb Ash.	30	90	8	10
Approved insulation, inclines, $\frac{1}{2}$ to 6 in. per ft	Super A	—	—	—	4, 15-lb Ash.	60	120	8	20
	Standard	—	—	—	2, 15-lb Ash.	45	100	8	15
	Service	—	—	—	1, No. 15 Sug. & 2, 15-lb Ash.	45	100	8	10

* Including soluble types but excluding dust. ** On concrete, 1 gal or 4 lb, green. 1 1/2 to 2 gal or 12 to 16 lb.

For Dead Level To $\frac{1}{2}$ " Per Foot

Application over	J-M designation	Primer, lb	Asphalt-Saturated Felts				Roofing Felt, lb	Finish Coating-Roofing Felt, lb	Bond, Years
			Base	1st	Finishing	2nd			
Wood, inclines, to $\frac{1}{2}$ in. per ft	Spec. No. 200	—	Special No. 20 Ash.*	32	2, Special 15-lb Ash.	45	90	20	20
Non-combustible, inclines, to $\frac{1}{2}$ in. per ft	Spec. No. 201	—	Special No. 30 Ash.	32	2, Special 15-lb Ash.	30	90	20	20
Approved insulation, inclines, to $\frac{1}{2}$ in. per ft	Spec. No. 225	—	—	—	4, Special 15-lb Ash.	60	120	20	20
Approved insulation, inclines, to $\frac{1}{2}$ in. per ft	Spec. No. 226	—	—	—	2, Special 15-lb Ash.	45	100	20	15

*First lay one thickness of J-M felt dead covering paper.

JOHNS-MANVILLE ROOF INSULATION

Johns-Manville specifications for the application of roof insulation have been carefully drawn to insure that it will retain its initial efficiency throughout the lifetime of the roof. Specifications call for the insulation to be sealed below and above from moisture that would cause loss of efficiency.

More complete details will be found in the Roofing and Siding section of the Sweets Architectural File. Two types of roof insulation are briefly described below.

ROCK CORK® INSULATION is basically a mineral insulation that cannot rot or decay. It is exceptionally efficient and moisture resistant.

ROOFINSUL® is a rigid and structurally strong insulation, made of saturated pine fibre, interwoven, felted and

rolled into boards of practical size. It provides a light weight, efficient, low cost roof insulation for all types of roof decks. Four types are available.

Standard Roofinsul is made of pine fibres interwoven, felted and rolled into board form.

Coated Roofinsul is the Standard material coated with asphalt on all six sides.

Weatherlite® Roofinsul is impregnated with an asphalt admixture, but is not coated with asphalt.

Coated Weatherlite Roofinsul is both impregnated with an asphalt admixture and coated with asphalt on all six sides, assuring a board which is highly resistant to surface moisture, mold and fungus growth.

There is a Johns-Manville Sales Office near you...

Your J-M representative will be glad to call at your convenience.

AKRON 2, OHIO 227 West Exchange St.	ERIE, PA. 1001 State St.	PORTLAND 8, ORE. 1220 S.W. Harrison St.
ALBANY 8, N. Y. Maplewood & Kraft Aves.	FORT WAYNE, IND. 1401 S. Main St.	PROVIDENCE 2, R. I. 111 Westminster St.
*ATLANTA 3, GA. 101 Marietta St.	GRAND RAPIDS 1, MICH. 782 Building and Loan Bldg.	RICHMOND 21, VA. 200 Ferry Bldg.
BALTIMORE 3, MD. St. Paul Pl. & Franklin St.	HONOLULU 2, T. H. P. O. Box 3140	ROCKLEIGH 4, N. Y. 154 2nd Ave.
*BOSTON 16, MASS. 100 Newbury St.	*HOUSTON 4, TEXAS 3115 Bladgth St.	*ST. LOUIS 8, MO. 7912 Babson Ave., Clayton
BUFFALO 2, N. Y. 120 Delaware Ave.	INDIANAPOLIS 4, IND. 19 West 38th St.	ST. PAUL 1, MINN. 524 Exchange-Forth Bldg.
CHARLESTON 1, W. VA. 481 Terminal Bldg.	KANSAS CITY 8, MO. 2010 Main St.	SALT LAKE CITY 1, UTAH 507 Deely Bldg.
CHARLOTTE 2, N. C. 212-224 S. Tryon St.	*LOS ANGELES 17, CALIF. 814 West 5th St.	SAN ANTONIO 4, TEX. 404 West Moore St.
*CHICAGO 84, ILL. Merchandise Mart Plaza	LOUISVILLE 7, KY. 121 Breckinridge Lane	*SAN FRANCISCO 5, CALIF. 116 New Montgomery St.
*CINCINNATI 2, OHIO Central Plaza, at Walnut St.	*MILWAUKEE 9, WIS. 4260 North Tennessee Ave.	*SEATTLE 9, WASH. 777 Thomas St.
*CLEVELAND 18, OHIO 45 Prospect Ave., N.W.	MINNEAPOLIS 16, MINN. 3407 Zenith Bldg.	SOUTH BEND 9, IND. 110 E. Madison St.
COLUMBUS 18, OHIO 12 N. Third St.	*NEW ORLEANS 14, LA. 2400 Canal St.	SYRACUSE 3, N. Y. 221 Sweet Ave.
CORPUS CHRISTI 1, TEXAS 1721 N. Marquette St.	*NEW YORK 16, N. Y. 270 Madison Ave.	TOLEDO 2, OHIO 1220 Madison Ave.
DALLAS 12, TEXAS 1019 Dragon St.	OAKLAND 9, CALIF. 436-466 St.	TULSA 1, OKLA. 1701 E. Seventh St.
DAYTON 2, OHIO 31 W. Monument Ave.	OMAHA 1, NEB. 918 Foreman Ave.	WASHINGTON 8, D. C. 15th & N St., N.W.
*DENVER 2, COLO. 1755 Glenora Pl.	*PHILADELPHIA 3, PA. 1617 Pennsylvania Bldg.	WILKES-BARRE, PA. Franklin & Market St.
DETROIT 2, MICH. W. Grand Blvd. at 2nd Blvd.	*PITTSBURGH 18, PA. 2228 Koppers Bldg.	YOUNGSTOWN 7, OHIO 2714 Market St.

*District Office

Johns-Manville

GENERAL HEADQUARTERS
22 East 40th Street, New York 18, N. Y.

CANADIAN JOHNS-MANVILLE COMPANY, LTD.
Montreal • Ottawa • Toronto
Winnipeg • Vancouver

JOHNS-MANVILLE INTERNATIONAL CORP.
New York • London • Buenos Aires
Mexico City

JOHNS-MANVILLE INDUSTRIAL PRO

J-M Insulating Cements

For temperatures as noted (see tables)

Johns-Manville Insulating Cements possess excellent coverage, finishing, insulating and protective finishing properties. They are especially suitable for insulating irregular surfaces such as valves, flanges, heating furnaces, kettles, etc., where it would be impracticable to apply pipe insulation, sheets or blocks. . . . Finishing cements are generally used over insulation to provide a

smooth, attractive finish or a surface to which may be applied. On heated equipment, they should be applied at equipment operating temperature. The J-M Insulating Fills are used for irregular where insulation in regular forms is impracticable. See table on reverse of this sheet for maximum temperatures and other pertinent data.

Finishing Cements

No. 301 Cement is a hydraulic-setting, insulating and finishing cement especially designed for one-coat application to desired thickness. Because of extremely low drying shrinkage, it hardens in a few hours to a smooth, crack-free surface. It may be painted with a water-base paint as soon as firm, thus permitting completion of the job at one time. No. 301 is recommended for insulating small steel (not copper, brass or aluminum) pipe fittings and as a finish over block insulation. It should not be applied to surfaces below 32 F or above 150 F. When applied to a heated fitting, the cement should be "spotted on" and held symmetrically to allow steam to escape. The desired thickness may then be applied over the "spotting." Since No. 301 hardens quickly, no more cement should be mixed than will be used within two hours.

No. 302 Cement, made of asbestos fiber materials, is a high-grade finishing cement to mix and apply. It produces a hard, durable surface which does not crack, break or

No. 352 Cement is an all asbestos fiber of good traveling and finishing properties. It is finish over block insulation and for general purposes. For a hard finish, No. 352 may be (2) parts by weight to one (1) part portland. This mixture is required when used as a coat under Insulate ET or EG weatherproofing.

No. 0352 Cement is a factory-made cement for many requirements of the plumbing and

Insulating Cements

Suprex® Insulating Cement is Suprex in cement form for pointing up Suprex blocks or for use on irregular surfaces.

No. 500 Cement is an expanded vermiculite insulating cement. It has exceptionally high covering capacity combined with good working and insulating qualities. It has good adhesion and can be applied in thick coats.

No. 450 Cement is a mineral wool cement with good covering capacity and excellent adhesion to both

hot and cold surfaces. It is a very good insulator compared with other cements, and its excellent permits ready application in thick layers. It contains a rust inhibitor. For a hard out mixture by weight of one (1) part No. 450 (13) parts portland cement is used.

J-M 85% Magnesia Cement is 85% Magnesia cement form for pointing up 85% Magnesia has high insulating value compared to other

Protective-Finishing Cements

No. 678 Cement, a hydraulic-setting, semi-refractory finishing cement, is used as a protective coating over block insulation linings exposed to gases in flues, breechings and stacks. Where corrosive action is severe as in pulverized coal units and particularly in areas

where the gases change direction sharply, it should be protected with temperature-resisting. No. 819 Cement is a heat-setting, semi-finish cement for use in setting and sealing blocks in rotary kilns.

Insulating Fills

Fillcoat® is a mixture of atomized silica and long fiber asbestos. Due to the asbestos fiber, this material has certain characteristics different from the ordinary powdered fill. The fibers offset any tendency to settle or filter through cracks, making the material well adapted for use as a fill in gas generator sets, etc.

Fillcoat is used as an insulating fill in spaces where insulation in block or brick form is impracticable and where a resilient high-grade material is needed. It will permit considerable expansion and contraction because of its fibrous nature which prevents any settling or shifting through

J-M INSULATING CEMENTS AND FILLS

Printed in U.S.A. (1978-802)