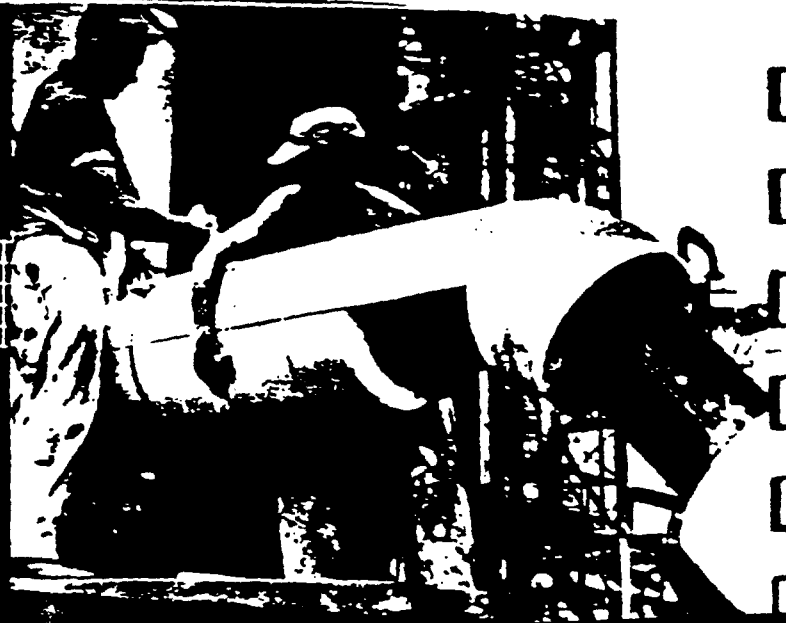


INSULATION

type: Pipe & Block
temp limit: 1200F



PLAINTIFF'S
EXHIBIT
K-1717

J-M THERMOBESTOS® pipe and block insulation

■ **DESCRIPTION:** A molded, high temperature pipe and block insulation, J-M Thermobestos is composed of hydrous calcium silicate bonded with asbestos fibers. It is a completely inorganic insulating material which, because of its light weight, low thermal conductivity, great structural strength and insolubility in water, is ideal for high temperature piping and equipment.

■ **AVAILABLE FORMS:** Thermobestos is furnished in both sectional pipe insulation and block form. The pipe insulation comes in a complete selection of sizes up to 24" x 3" half-sections. Larger sizes are available in quad segments from 25" to 33" P/S in 1½, 2, 2½ and 3" thicknesses. Bevelled and scored blocks are available for larger diameters. Regular blocks furnished in 6", 9", 12" x 18" widths by 36" length, in a full range of thicknesses.

■ **USES:** Especially recommended for use in the power generation and process industries on indoor and outdoor piping and equipment operating at temperatures to 1200F. Thermobestos is light enough for easy handling and fast application. Repeated wettings have no permanent effect on it which makes it ideal for installations subjected to weather, or for insulating underground steam lines. Because it will not burn or carry flame, it may also be advantageously specified for use in the presence of inflammable gases and liquids.

■ ADVANTAGES

Exceptional Strength

Similar in chemistry and composition to a very fine concrete, Thermobestos will withstand unusual operating abuse without appreciable damage.

Extreme Lightness

Thermobestos is as light as many insulating materials, possessing a fraction of its strength and durability.

Chemically Stable

100% inorganic, will neither burn nor rot.

Not Damaged by Water

Can be soaked in water without damage. After drying, conductivity will be as good as new.

Easy Application

Thermobestos is purposely made in large blocks and half-sections to facilitate handling and reduce number of joints.

Low Conductivity

Thermobestos offers the lowest k factor of all insulations in general use throughout the power generation and process industries.

DEFENDANT'S
EXHIBIT

QI-289

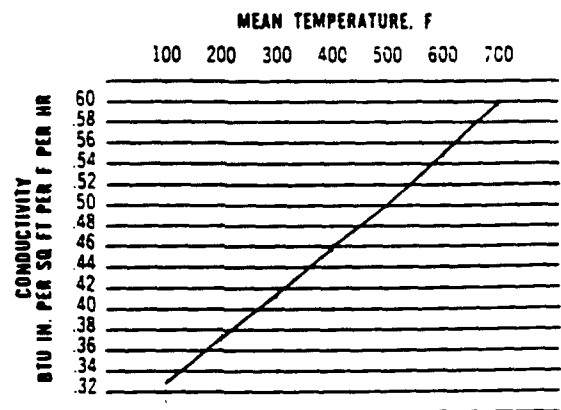
THERMOBESTOS

Specification Data

Density (dry)	11 lbs per cu ft
Transverse Strength (modulus of rupture)	95 psi
Compressive Strength (based on 2" thickness of block)	165 psi to produce 5% compression
Linear Shrinkage	1.5% after 24-hr soaking period at 1200F
Maximum Service Temperature	1200F

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

HEAT CONDUCTIVITY



COMPLIANCE WITH GOVERNMENT SPECS

Pipe Insulation:
MIL-I-2781 C
Grade I, class b, to 500F
Grade II, class d, to 750F
Grade III, class e, type I and II, to 1050F
FEDERAL HM-I-523 A Class 2, to 1200F

Block Insulation:
MIL-I-002819 B
Class 1, to 500F
Class 2, to 1000F
FEDERAL HM-I-523 A Class 1, to 1200F

COMPLIANCE WITH ASTM STANDARDS

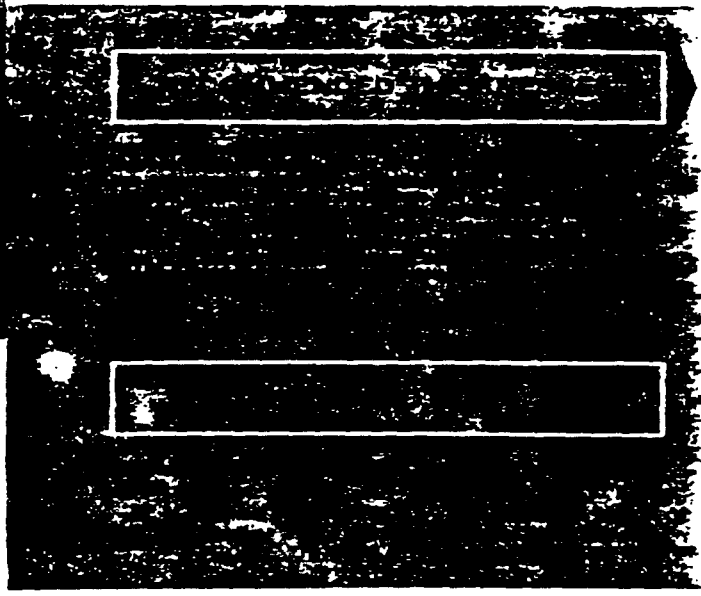
Pipe Insulation:
C345-54T, to 1200F

Block Insulation:
C344-54T, to 1200F

An Insulation for Every Commercial and Industrial Purpose



THERMOBESTOS Specification Data Pipe Insulation



Temperature of Pipe, F											
Nominal Pipe Size, inches	100 to 199	200 to 299	300 to 399	400 to 499	500 to 599	600 to 699	700 to 799	800 to 899	900 to 999	1000 to 1099	1100 to 1200
Nominal Thickness, inches											

Utility—Steam Generation

1 1/2 & less	1	1	1 1/2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
2	1	1	1 1/2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
2 1/2	1	1	1 1/2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
3	1	1	1 1/2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
3 1/2	1	1	1 1/2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
4	1	1	1 1/2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
4 1/2	1	1	1 1/2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
5	1	1 1/2	1 1/2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
6	1	1 1/2	1 1/2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
7	1 1/2	1 1/2	2	2	2 1/2	3	3	3	3	3	3
8	1 1/2	1 1/2	2	2	2 1/2	3	3	3 1/2	3 1/2	3 1/2	3 1/2
9	1 1/2	1 1/2	2	2 1/2	2 1/2	3	3	3 1/2	3 1/2	3 1/2	3 1/2
10	1 1/2	1 1/2	2	2 1/2	2 1/2	3	3	3 1/2	3 1/2	3 1/2	3 1/2
11	1 1/2	1 1/2	2	2 1/2	2 1/2	3	3	3 1/2	3 1/2	3 1/2	3 1/2
12	1 1/2	1 1/2	2	2 1/2	2 1/2	3	3	3 1/2	3 1/2	3 1/2	3 1/2
14 & up	1 1/2	1 1/2	2	2 1/2	3	3	3 1/2	4	4	4	4

Process

1 1/2 & less	1	1	1	1	1	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
2	1	1	1	1	1	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
2 1/2	1	1	1	1	1	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
3	1	1	1	1	1	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
3 1/2	1	1	1	1	1	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
4	1	1	1	1	1	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
4 1/2	1	1	1	1	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
5	1	1	1	1	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
6	1	1	1	1	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
7	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2	2
8	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2 1/2	2 1/2
9	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2 1/2	2 1/2
10	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2 1/2	2 1/2
11	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2 1/2	2 1/2
12	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2 1/2	2 1/2
14 & up	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2 1/2	2 1/2	2 1/2

Commercial—Full Year Operation

1 1/2 & less	1	1 1/2	2	2 1/2	3	—	—	—	—	—	—
2	1	1 1/2	2	2 1/2	3	—	—	—	—	—	—
2 1/2	1	2	2 1/2	3	3 1/2	—	—	—	—	—	—
3	1	2	2 1/2	3	3 1/2	—	—	—	—	—	—
3 1/2	1	2	2 1/2	3	3 1/2	—	—	—	—	—	—
4	1	2	2 1/2	3	3 1/2	—	—	—	—	—	—
4 1/2	1	2	2 1/2	3	3 1/2	—	—	—	—	—	—
5	1	2	2 1/2	3	3 1/2	—	—	—	—	—	—
6	1	2	3	3 1/2	4	—	—	—	—	—	—
7	1 1/2	2	3	3 1/2	4	—	—	—	—	—	—
8	1 1/2	2	3	3 1/2	4	—	—	—	—	—	—
9	1 1/2	2 1/2	3	3 1/2	4	—	—	—	—	—	—
10	1 1/2	2 1/2	3	3 1/2	4	—	—	—	—	—	—
11	1 1/2	2 1/2	3	3 1/2	4	—	—	—	—	—	—
12	1 1/2	2 1/2	3	3 1/2	4	—	—	—	—	—	—
14 & up	1 1/2	2 1/2	3 1/2	4	4 1/2	—	—	—	—	—	—

Commercial—Seasonal Operation

1 1/2 & less	1	1	1	1 1/2	1 1/2	—	—	—	—	—	—
2	1	1	1	1 1/2	1 1/2	—	—	—	—	—	—
2 1/2	1	1	1	1 1/2	2	—	—	—	—	—	—
3	1	1	1 1/2	1 1/2	2	—	—	—	—	—	—
3 1/2	1	1	1 1/2	1 1/2	2	—	—	—	—	—	—
4	1	1	1 1/2	1 1/2	2	—	—	—	—	—	—
4 1/2	1	1	1 1/2	1 1/2	2	—	—	—	—	—	—
5	1	1	1 1/2	1 1/2	2	—	—	—	—	—	—
6	1	1	1 1/2	2	2	—	—	—	—	—	—
7	1 1/2	1 1/2	1 1/2	2	2	—	—	—	—	—	—
8	1 1/2	1 1/2	1 1/2	2	2	—	—	—	—	—	—
9	1 1/2	1 1/2	1 1/2	2	2	—	—	—	—	—	—
10	1 1/2	1 1/2	1 1/2	2	2 1/2	—	—	—	—	—	—
11	1 1/2	1 1/2	1 1/2	2	2 1/2	—	—	—	—	—	—
12	1 1/2	1 1/2	1 1/2	2	2 1/2	—	—	—	—	—	—
14 & up	1 1/2	1 1/2	1 1/2	2	2 1/2	—	—	—	—	—	—

Block Insulation

RECOMMENDED THICKNESSES

Temperature of Surface, F											
100 to 199	200 to 299	300 to 399	400 to 499	500 to 599	600 to 699	700 to 799	800 to 899	900 to 999	1000 to 1099	1100 to 1199	1200 to 1299
Nominal Thickness, inches											
Utility—Steam Generation											
1 1/2	1 1/2	2	2 1/2	3	3	3 1/2	4	4	4 1/2	4 1/2	4 1/2
Process											
1 1/2	1 1/2	1 1/2	2 1/2	2 1/2	2	2	2 1/2	2 1/2	2 1/2	3	3
Commercial—Full Year Operation											
1 1/2	2 1/2	3 1/2	4	4 1/2	—	—	—	—	—	—	—
Commercial—Seasonal Operation											
1	1	1 1/2	2	2 1/2	—	—	—	—	—	—	—

Note: For special sizes and curved blocks consult your nearest J-M office.

†Tabular thicknesses are optimum thicknesses calculated on an economic basis for heat conservation under average operating conditions and assure adequate temperature control. Unusual conditions may warrant the use of other thicknesses.

STANDARD SIZES

Length, inches	Width, inches	Thickness, inches
36	6, 9, 12 and 18	1, 1 1/2, 2, 2 1/2, 3, 3 1/2 and 4

Johns-Manville

INSULATION

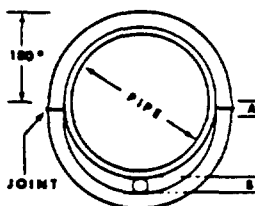
PRODUCT INFORMATION

type: Extended Legs
for Traced
Pipe Lines

temp limit: 1200F

J-M THERMOBESTOS® extended legs for steam or electrical traced pipe lines

■ **DESCRIPTION:** Composed of hydrous calcium silicate bonded with asbestos fibers, J-M Thermobestos with extended legs is a high-temperature pipe insulation molded with $\frac{3}{8}$ " legs on each end of the half circles—or $\frac{3}{8}$ " straight beyond 180° ($\frac{1}{2}$ dimension "A" on adjacent sketch). Extended legs provide allowance for the traced line and the dimension of "B", as shown on the sketch, will be $\frac{3}{4}$ ". For special size extended legs, consult J-M sales representative.



■ **AVAILABLE FORMS:** Thermobestos is furnished in a complete selection of sectional pipe sizes up to 24" x 3" thick half-sections. Larger sizes are available in quad segments from 25" to 33" P/S in 1½, 2, 2½ and 3" thicknesses. For special applications, Thermobestos with extended legs can be

furnished as Metal-On®—a factory-applied aluminum or stainless steel jacket.

■ **USES:** For indoor and outdoor piping and equipment, operating at temperatures to 1200F that have either steam or electrical traced pipe lines. Especially recommended for use in the power generation and chemical and process industries.

■ **ADVANTAGES:** Traced lines present a shape problem for insulations which are furnished in half circles; to fit both the main line and the traced line would require an oval insulation—much larger than normal. An oversize insulation does not provide a snug fit and, consequently, lacks physical strength. Extended legs provide an elliptical shape that fits both the main pipe and the traced line properly. In addition, the smaller size insulation made possible by extended legs permits substantial savings in material costs.

Thermobestos with extended legs also offers these advantages:

An Insulation for Every Commercial and Industrial Purpose



INSULATION

type: Pipe
temp limit: 1200F



J-M METAL-ON® pipe insulation

■ **DESCRIPTION:** J-M Metal-On pipe insulation consists of high temperature Thermobestos pipe insulation pre-jacketed at the factory with top-quality aluminum. Furnished as an integral package (including a built-in isolation felt), a section of Metal-On snaps on the pipe and locks tightly in place to seal out weather and protect insulation indefinitely. Joints are sealed with either "Regular" or "One Piece" aluminum "snap straps." No sheet metal screws are used. The aluminum alloy jacket is especially selected to give superior corrosion resistance and strength.

■ **AVAILABLE FORMS:** Furnished in pipe insulation form only. Available in 36" sections in a complete range of sizes up to 24" pipe size by 3" thickness.

■ **USES:** Particularly recommended for use in the power generation, petroleum, chemical and allied industries, especially on outdoor installations, at operating temperatures to 1200F.

■ ADVANTAGES

Installation Savings

Both insulation and jacket are furnished in a single package, installed in a single operation.

Excellent Weather Protection

Keeps insulation dry during installation, thus avoiding electrolytic corrosion of aluminum through direct contact with wet insulation common where jacket is installed as a separate operation.

Proper Jacket Thickness

Jacket thickness designed to provide, at lowest cost, outstanding appearance, stiffness, workability, and resistance to abuse.

Integral Isolation Felt

A built-in, properly designed barrier between jacketing and insulation.

Easy to Remove

Rapid, easy removability for repairs and maintenance.

For Specification Data, including physical and thermal properties, recommended thicknesses, compliance with specifications, etc., see Thermobestos pipe insulation brochure IN-169A.

METAL-ON

Application Details



Section of Metal-On pipe insulation is held open lengthwise, snapped onto pipe, and locked securely in place with one movement.



One piece aluminum "snap strap" containing a permanently plastic sealing compound is snapped around joint to seal out water. This type snap strap is available up to 12% OD Metal-On and requires no additional bending.



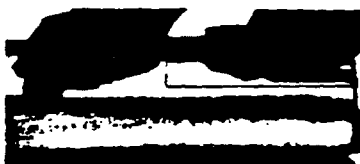
Ordinary metal band is quickly and easily applied to hold regular snap strap tightly in place with J-M Metal-On Banding Wrench.



Metal-On can be made to fit elbows, tube turns, sweeps and bends by cutting mitered sections. A preformed Miter Seal aluminum band is placed over the joint and secured with a banding wrench.



The J-M Metal-On Cutter has been specially developed for easy hand cutting of aluminum jacket only.



Jacket cut is started by pressing cutter point through aluminum with heel of hand.

COLORED SNAP STRAPS AVAILABLE FOR EASY COLOR CODING

Colored Metal-On snap straps may be installed in place of regular straps on any Metal-On job for color coding purposes. The following colors, which are permanent and require no maintenance, are available: scarlet red, cascade blue, sunburst yellow, meadow green, ebony black, and orange orange.



GUIDE SPECIFICATIONS

STRAIGHT PIPING

All piping shall be insulated with Johns-Manville Thermobestos according to recommended thicknesses. (See Thermobestos specification data in brochures IN-169A or IN-244A.)

The insulation shall be applied over clean dry pipe with all joints butted firmly together. Double layer insulation, when required, shall be applied with joints staggered, the inner layer secured with wire loops on 12-inch (maximum) centers, and outer layer applied in the same manner as single layer construction. The Thermobestos shall be jacketed with a minimum thickness of .016-inch aluminum, of alloy No. 5005 or No. 3003. A moisture barrier shall be provided between the Thermobestos and the aluminum. The insulation and alu-

minum shall be secured in place by a continuous friction type joint to provide a positive weatherproof seal along the entire length of the aluminum jacket. Also, a .016-inch aluminum preformed strap of minimum width of 2 inches and containing a permanently plastic weatherproof seal shall be centered and secured over each circumferential joint.

FITTINGS

All elbows, tube turns, sweeps and bends shall be insulated with mitered sections of aluminum jacketed calcium silicate insulation (Metal-On). Joints shall be sealed with a sealing compound and preformed aluminum bands (J-M Miter Seals).

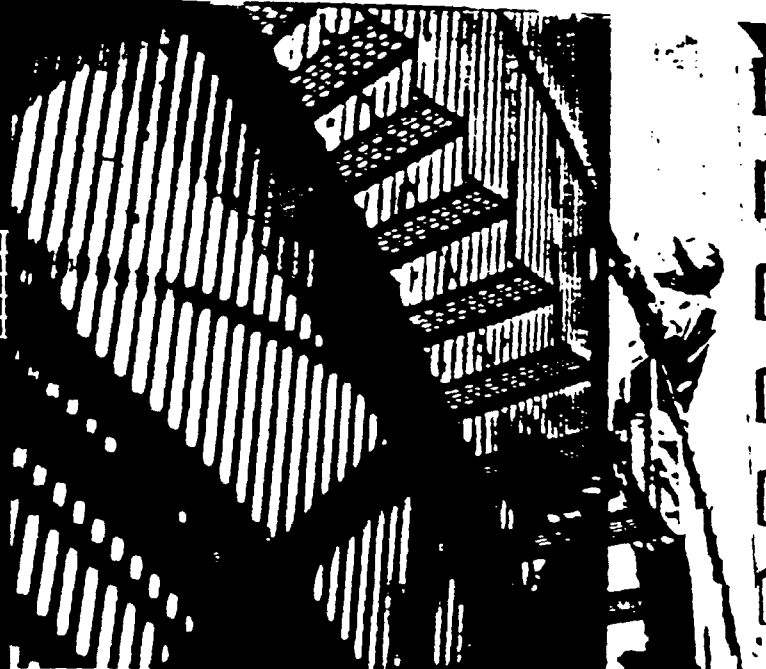
An Insulation for Every Commercial and Industrial Purpose



INSULATION

-400F

type: Insulated Panel
temp limit: 450F



J-M METAL-ON® tank panels

■ **DESCRIPTION:** J-M Metal-On tank panels combine specially formulated J-M Spintex insulation and a facing of embossed diamond rib aluminum sheet for weather protection and good appearance. Metal-On tank panels are secured to a tank by nine ¼" steel studs welded to the tank through pre-drilled holes in the panel. A specially designed nut and washer assembly closes the holes and holds the panels firmly and permanently.

■ **AVAILABLE FORMS:** Regularly furnished in panels covering a net area of 32 sq. ft. Aluminum facing is 100" x 50.3", Spintex is 96" x 48", by 1", 1½", 2" or 3" thick. Special ¼" threaded studs with suitable nuts are furnished with panels.

■ **USES:** J-M Metal-On tank panels were designed primarily for the insulation of heated tanks and vessels, but can be used for housings and other surfaces to which securement can be made by welding studs.

■ ADVANTAGES:

Highly Efficient
Insulation

8 Spintex conductivity at 200F mean is below 0.32.

Rapid Installation

Metal-On tank panels are applied rapidly, saving labor costs and providing a really economical installation. Cut-outs for manholes, pipes, etc. are made readily.

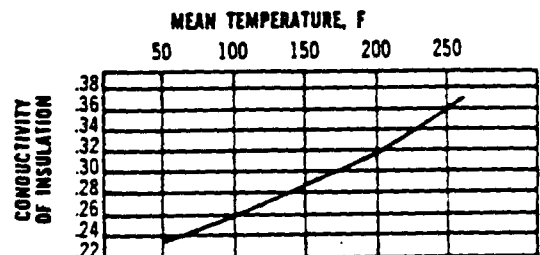
Incombustible

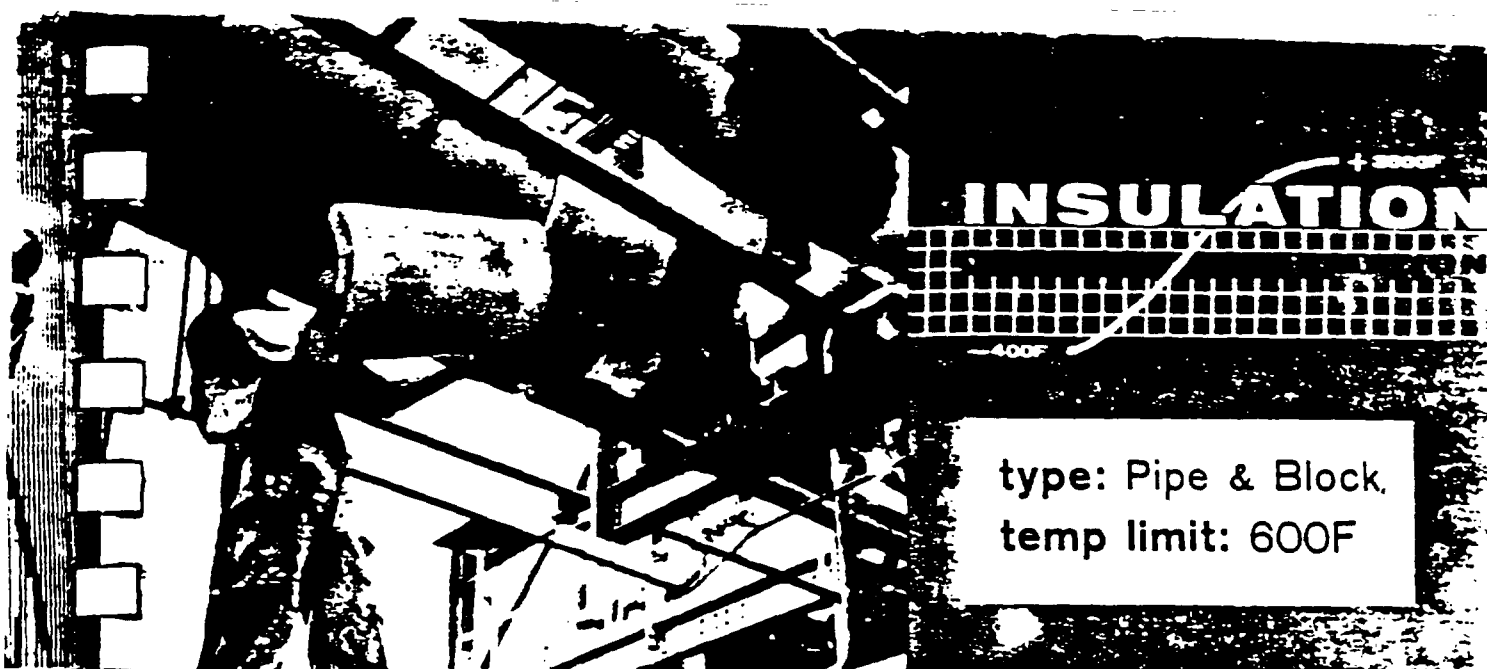
Spintex insulation rates as incombustible when tested according to Commercial Standards 131-46.

Good Appearance

Metal-On tank panels provide long-lasting weather protection and attractive appearance under normal atmospheric conditions. Horizontal laps are 4", vertical side laps are 2½".

THERMAL CONDUCTIVITY





type: Pipe & Block.
temp limit: 600F

J-M 85% MAGNESIA pipe and block insulation

■ **DESCRIPTION:** Johns-Manville 85% Magnesia is composed of hydrated basic carbonate of magnesia bonded with asbestos fiber and molded into both pipe and block form. The Johns-Manville manufacturing process provides the material 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.

■ **AVAILABLE FORMS:** J-M 85% Magnesia is furnished in both sectional pipe insulation and block form. The pipe insulation comes in a complete selection of sizes up to 14" x 2" half-sections. Larger sizes are available in segments and curved blocks. Blocks are available in widths of 3, 6, 9 and 12", and lengths of 18 and 36", in a full range of thicknesses. 6" wide curved blocks are available for larger diameters.

■ **USES:** Recommended for use to 600F on heated piping and equipment in schools, hotels, hospitals, public buildings, ships and industrial installations of all types. For temperatures above 600F, J-M 85% Magnesia is often used as an outer layer over J-M Superex. This construction—known as Superex Combination—combines the high heat resistance of Superex with the greater insulating value of 85% Magnesia.

■ ADVANTAGES

Good Compressive Strength

J-M 85% Magnesia has the compressive strength necessary to withstand all normal abuse to which exposed piping and equipment may be subjected.

Chemically Stable

100% inorganic, will neither burn nor rot.

Low Maintenance

For practical purposes J-M 85% Magnesia is ageless and will last as long as the masonry in a building.

Withstands Wetting

Will withstand repeated wetting and drying without deterioration.

High Insulating Value

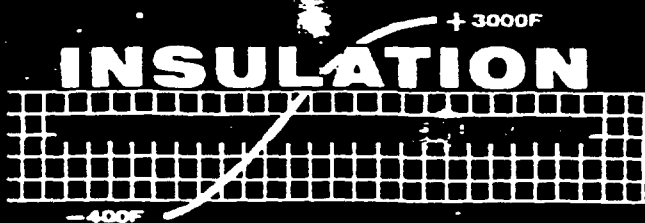
Has a thermal conductivity of .46 at 400F mean temperature.

Light Weight

Easy to handle and install.

An Insulation for Every Commercial and Industrial Purpose





type: Block
temp limit: 1900F

J-M SUPEREX® block insulation

DESCRIPTION: J-M Superex block insulation is composed of calcined diatomaceous silica blended with other insulating materials and bonded with asbestos fiber. These light weight, large size blocks will withstand temperatures up to 1900F with negligible shrinkage. Their unique combination of low conductivity and high stability at elevated temperatures provide excellent efficiency and long, maintenance-free service.

Ever since its introduction, Superex has demonstrated its versatility as a high temperature insulation. Today, for example, it economically insulates 90% of this country's hot blast stoves.

AVAILABLE FORMS: Furnished in flat or curved blocks in the following sizes: Flat or curved, 3" or 6" wide by 18" or 36" long. Flat only, 9" or 12" wide by 18" or 36" long. Thicknesses range from 1" to 4".

USES: Superex blocks are widely used for equipment operating at temperatures to 1900F including boiler furnaces, hot blast stoves, mains and bustle pipes, hot gas flues, soaking pits, petroleum cracking furnaces, producer gas mains, and metallurgical furnaces of various types.

ADVANTAGES

High Compressive Strength

Compresses only $\frac{1}{8}$ " (2" thickness) under a pressure of 85 lbs per square inch.

Low Conductivity at High Temperatures

Superex has a conductivity of .82 at 1000F mean temperature.

Low Heat Shrinkage

Has a linear shrinkage of only 2.7% at 1900F

Dimensional Uniformity

Straight, true edges and close tolerances make possible snug joints.

Light Weight

Ideal for insulating movable high temperature equipment.

Large Size Blocks

Large 12" x 36" blocks speed application and reduce the number of joints.

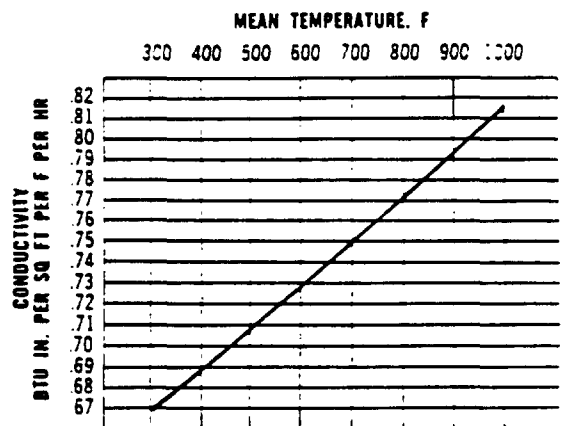
SUPEREX

Specification Data



Density (dry)	24 lbs per cu ft
Transverse Strength (modulus of rupture)	100 psi
Compressive Strength	85 psi to produce 1/4" compression in 2" thickness
Linear Shrinkage (after 24 hr soaking heat at indicated temperature)	2.7% at 1900F
Maximum Service Temperature	1900F

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



COMPLIANCE WITH GOVERNMENT SPECS

STANDARD SIZES AND THICKNESSES

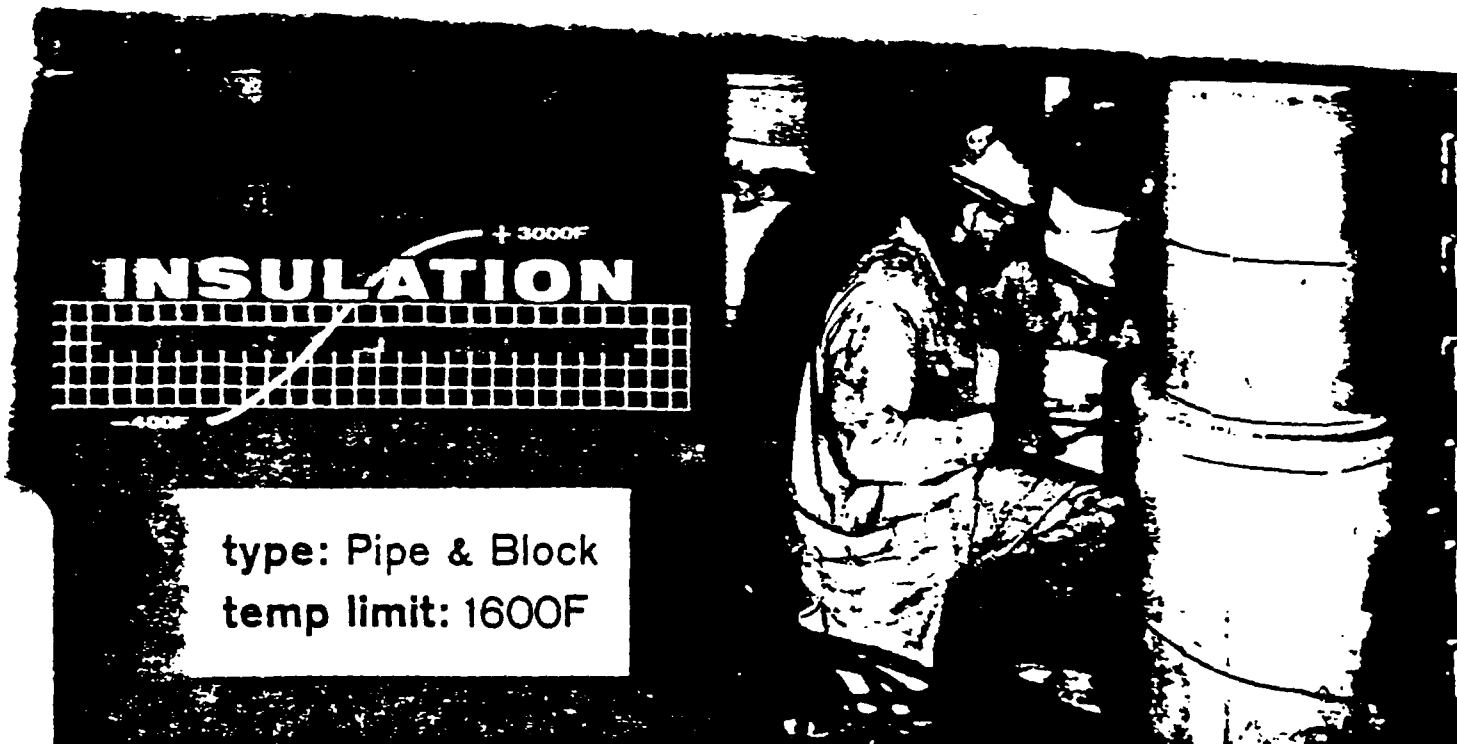
MIL-I-002819 B, Class 3 and 4

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

NOTE: For special sizes and curved blocks consult your nearest Johns-Manville office.

An Insulation for Every Commercial and Industrial Purpose





INSULATION



type: Pipe & Block
temp limit: 1600F

J-M SUPEREX-M® pipe and block insulation

DESCRIPTION: Superex-M pipe and block insulation is, like Superex, a high temperature product composed of calcined diatomaceous silica blended with other insulating materials and bonded with asbestos fiber. Recommended for use at service temperatures to 1600F, it possesses lower density and conductivity than regular Superex.

AVAILABLE FORMS: Superex-M is furnished in both block and pipe insulation form. The pipe insulation comes in 3 ft half sections, in thicknesses ranging from 1" to 3½", in pipe sizes up to 14". Segments furnished for pipe sizes larger than 14". Blocks come in the following sizes: Flat or curved, 3" or 6" wide by 18" or 36" long. Flat only, 9" or 12" wide by 18" or 36" long. Thicknesses range from 1" to 4".

USES: In addition to being used (to 1600F) for the installations listed under Superex, Superex-M is also often specified in combination with J-M 85% Magnesia or Thermobestos to give greater insulating value for a given service temperature and insulation thickness. In such cases, the Superex-M is always placed next to the hot surface in sufficient thickness to reduce the temperature on the outer layer to its safe limit.

ADVANTAGES

High Compressive Strength

Compresses only ¼" (2" thickness) under a pressure of 70 lbs per square inch.

Low Conductivity at High Temperatures

Superex-M has a conductivity of .74 at 1600F

Dimensional Uniformity

Straight, true edges and close tolerances make for snug joints.

Low Heat Shrinkage

Has a linear shrinkage of only 2.0% at 1600F

Large Sizes

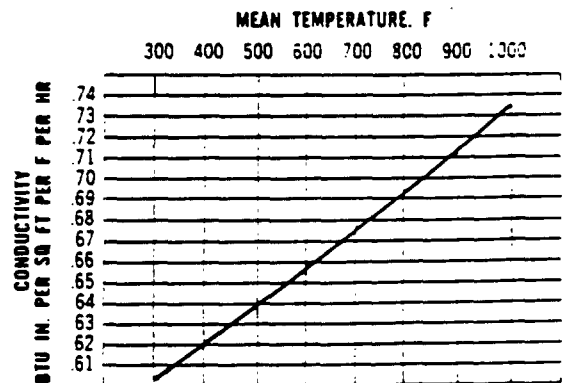
In both block and sectional pipe insulation, Superex-M comes in large sizes which means faster, more economical installation.

SUPEREX-M

Specification Data

Density (dry)	21 lbs per cu ft
Transverse Strength (modulus of rupture)	90 psi
Compressive Strength	70 psi to produce $\frac{1}{8}$ " compression in 2" thickness
Linear Shrinkage (after 24 hr soaking heat at indicated temperature)	2.0% at 1600F
Maximum Service Temperature	1600F

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



COMPLIANCE WITH GOVERNMENT SPECS

Pipe Insulation:
MIL-I-2781 C
Grade III, Class E, Type 2

Block Insulation:
MIL-I-002819 B
Class 2 and 3

STANDARD SIZES AND THICKNESSES

Pipe Insulation:		Thickness, inches (to fit standard pipe sizes)
Length	3-ft sections and segments	Nominal 1 (through 6" pipe size only), 1½, 2, 2½ and 3
Block Insulation:	Length, inches	Width, inches
	18 and 36	Thickness, inches
		3 & 6 flat or curved 9 & 12 flat only
		1 through 4 1½ through 4

An Insulation for Every Commercial and Industrial Purpose



INSULATION

type: Brick
temp limit: 3000F



J-M INSULATING FIRE BRICK

■ **DESCRIPTION:** Johns-Manville produces six types of Insulating Fire Brick to provide operators and builders of high temperature equipment six opportunities to get the one insulating fire brick that's right for a given service.

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.

Made from high quality refractory clays (plus alumina in the case of JM-3000), these insulating fire brick contain a carefully graded organic filler which is burned out during manufacture to give a uniform, controlled pore structure.

■ AVAILABLE TYPES:

- JM-3000*—for temperatures to 3000F exposed.
- JM-28—for temperatures to 2800F exposed.
- JM-26—for temperatures to 2600F exposed.
- JM-23—for temperatures to 2300F exposed.
- JM-20—for temperatures to 2000F exposed.

JM-1620—for temperatures to 1600F exposed; to 2000F back-up.

*JM-3000 Insulating Fire Brick is the newest of the six types. It provides long-life insulation at a full 3000F, in back-up or direct exposure service, and is molded from specially selected kaolin clays plus alumina.

■ **USES:** Recommended for use as refractory lining or as back-up insulation behind other refractory protection in kilns, furnaces, flues, refining vessels, regenerators, gas producers and mains, soaking pits, stress-relieving furnaces, reactor chambers and similar high temperature industrial equipment.

■ ADVANTAGES

High
Insulating Value

The light weight and high insulating value of J-M Insulating Fire Brick make possible thinner furnace walls, improved efficiency and lower operating costs.

Quick Heat Up

Furnaces can be brought up to operating temperatures with unusual speed, resulting in increased production.

INSULATING FIRE BRICK

Specification Data

PHYSICAL PROPERTIES*

PACKAGING

	JM-3000	JM-28	JM-26	JM-23	JM-20	JM-1620	Type	No. of Brick per Carton
Temperature Limit	3000F**	2800F**	2600F**	2300F**	2000F**	2000F***		
Approximate Density	65 pcf	58 pcf	51 pcf	31 pcf	29 pcf	27 pcf	JM-3000	20
Transverse Strength	200 psi	175 psi	140 psi	140 psi	100 psi	80 psi	JM-28	20
Cold Crushing Strength	400 psi	300 psi	210 psi	210 psi	150 psi	95 psi	JM-26	25
Linear Shrinkage	†0.8% at 3000F	1.4% at 2800F	1.0% at 2600F	0.1% at 2300F	0.0% at 2000F	0.0% at 2000F	JM-23	25
Reversible Thermal Expansion	0.65-0.75% at 2000F	0.65-0.75% at 2000F	0.65-0.75% at 2000F	0.5-0.6% at 2000F	0.5-0.6% at 2000F	0.5-0.6% at 2000F	JM-20	25
							JM-1620	25

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

**Back-up or exposed.

***Back-up only.

†24-hr Simulative Service Panel Test; all others 24-hr soaking period.

COMPLIANCE WITH GOVERNMENT SPECIFICATIONS

THERMAL CONDUCTIVITY.

JM-20 complies with MIL-B-16305 A, class A
JM-28 complies with MIL-B-16305 A, class B

MEAN TEMPERATURE, F

	500	1000	1500	2000
JM-3000	3.22	3.30	3.37	3.46
JM-28	2.55	2.80	3.06	3.32
JM-26	2.22	2.44	2.68	2.93
JM-23	1.01	1.18	1.34	1.50
JM-20	0.95	1.18	1.27	1.27
JM-1620	0.90	1.07	1.27	—

CONDUCTIVITY: BTU IN. PER SQ FT PER F PER HR

STANDARD SIZES

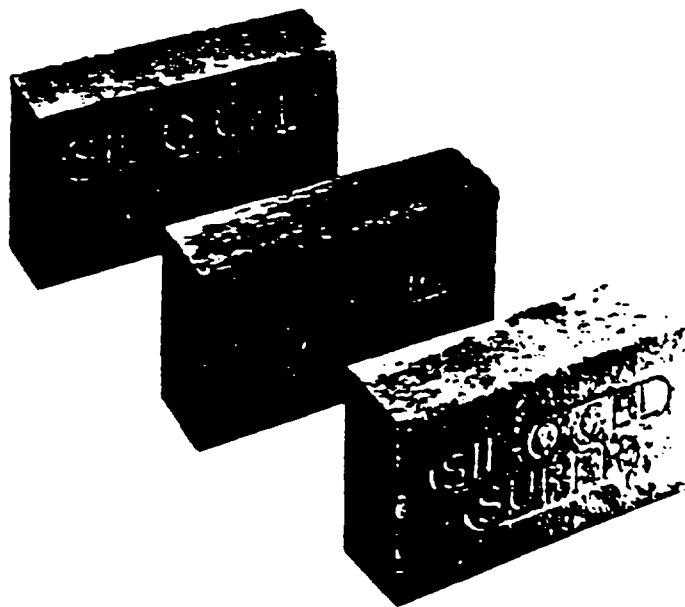
Type	Size
JM-3000	Accurately sized in all standard 9 in. shapes of the 2½ and 3 in. series, as well as special shapes.
JM-28	
JM-26	
JM-23	
JM-20	
JM-1620	

An Insulation for Every Commercial and Industrial Purpose



+ 3000F
INSULATION

type: Brick
temp limit: 2500F



J-M SIL-O-CEL® INSULATING BRICK

■ **DESCRIPTION:** Made from 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 load-bearing 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 may also be used for exposed as well as back-up service.

■ AVAILABLE TYPES:

Sil-O-Cel Insulating Brick are furnished in three different types as follows:

Sil-O-Cel Super—for temperatures to 2500F back-up only.

Sil-O-Cel C-22—for temperatures to 2000F back-up only.

Sil-O-Cel 16L—for temperatures to 1600F back-up or exposed.

■ **USES:** Sil-O-Cel Insulating Brick are recommended for use as back-up insulation in furnaces, kilns, hot blast stoves, soaking pits, boiler walls, oil heaters, regenerators, and similar high temperature equipment in the steel, chemical, ceramic, power, petroleum and glass industries.

■ ADVANTAGES

Good Insulating Value

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 substantial savings in furnace wall construction for all the types of high temperature equipment in which these brick are recommended.

High Load Bearing Strength

Sil-O-Cel Insulating Brick are made from diatomaceous silica, a natural fossilized material which imparts to the finished brick great strength. The Sil-O-Cel C-22 brick, for example, has a cold crushing strength of 700 lbs per square inch.

SIL-O-CEL INSULATING BRICK

Specification Data

PHYSICAL PROPERTIES

THERMAL CONDUCTIVITY

	Super	C-22	16L		MEAN TEMPERATURE, F			
Temperature Limit	2500F**	2000F**	1600F***		500	1000	1500	2000
Approximate Density	40 pcf	38 pcf	34 pcf	Super	1.70	1.95	2.19	2.45
Transverse Strength	90 psi	115 psi	60 psi	C-22	1.67	1.88	2.08	—
Cold Crushing Strength	300 psi	700 psi	350 psi	16L	0.92	1.07	1.22	—
Linear Shrinkage	2.0% at 2500F	0.8% at 2000F	0.7% at 1600F	CONDUCTIVITY: BTU IN. PER SQ FT PER F PER HR				
Reversible Thermal Expansion	1.3% at 2000F	0.7% at 2000F	less than 0.1% at 1600F					

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

**Back-up only.

***Back-up or exposed.

COMPLIANCE WITH GOVERNMENT SPECS

STANDARD SIZES

Sil-O-Cel Super complies with MIL-B-16182B

Type

Sil-O-Cel Super
Sil-O-Cel C-22
Sil-O-Cel 16L

Size

Furnished in all standard 9 in. spaces of the 2½ and 3 in. series as well as special shapes.

PACKAGING INFORMATION

All Sil-O-Cel Insulating Brick are packaged 25 to a carton.

An Insulation for Every Commercial and Industrial Purpose



INSULATION

type: Castable
temp limit: 3000F



J-M FIRECRETE® hydraulic setting refractory cement

■ **DESCRIPTION:** Johns-Manville produces seven types of hydraulic setting castable refractory cements to meet practically every castable requirement for temperatures through 3000F. Each of these refractories is economical and efficient in the service range for which it is recommended. All harden rapidly and are highly resistant to spalling.

■ AVAILABLE TYPES:

3X Firecrete—For service to 3000F. Composed principally of high aluminous materials calcined at high temperatures. Recommended for casting thicknesses of 2 inches or more.

H.T. Firecrete—For service to 2800F. Recommended for casting thicknesses 2 inches or more.

Standard Firecrete—For service to 2500F. Develops exceptional strength on air curing. Can be used to cast thicknesses as thin as 1 inch.

L.W. Firecrete—A light weight, insulating refractory concrete for service to 2400F. 75 lbs of dry material required for one cubic foot.

CA Insulating Firecrete—A light weight, low iron content refractory for use in controlled atmospheres. For service to 2600F.

CA 2200 Insulating Firecrete—A light weight, low iron content refractory for use in controlled atmospheres. For service to 2200F.

No. 20 Firecrete—Similar to L.W. Firecrete but lighter. 58 lbs of dry material required for one cubic foot. Service to 2000F.

C-31 M Refractory Cement—A chrome base castable refractory for service to 3000F.

Lo-D Firecrete—Designed primarily for use as a back-up insulating refractory in naval boilers. Service to 2500F.

■ **USES:** Firecrete is used extensively for monolithic furnaces and linings and is recommended for such special shapes as those required for burner rings, baffle tile, header protection tile, pipe linings, furnace bottoms and similar installations.

■ ADVANTAGES

**Hardens
Rapidly**

Firecrete permits casting and use of any desired shape within 24 hours.

**Resists
Spalling**

All seven types are highly resistant to spalling.

**Negligible
Shrinkage**

Firecrete has no drying shrinkage and only negligible fire shrinkage at recommended temperatures.

**Easy and
Economical to Use**

The adaptability of Firecrete makes possible the easy construction of monolithic furnaces, linings and the like which would otherwise require the use of special shapes or involve costly cutting and fitting of brick.

FIRECRETE

Specification Data

PHYSICAL PROPERTIES

	3X 3000F	H.T. 2800F	STD. 2500F	L.W. 2400F	CA Insulating 2600F	CA 2200 Insulating Firecrete 2200F	No. 20 2000F	C-31 M Refractory Cement
Highest Recommended Service Temperature	33 (3173F)	30 (3002F)	16 (2669F)	15 (2615F)	32½ (3135F)	16-17 (2740F)	14 (2550F)	35 (3270F)
Pyrometric Cone Equivalent	33 (3173F)	30 (3002F)	16 (2669F)	15 (2615F)	32½ (3135F)	16-17 (2740F)	14 (2550F)	35 (3270F)
Weight								
As Placed	148 pcf	131 pcf	130 pcf	109 pcf	109 pcf	97 pcf	95 pcf	191 pcf
Oven Dried at 220F	134 pcf	113 pcf	116 pcf	80 pcf	80 pcf	66 pcf	62 pcf	131 pcf
After 5-Hr Firing at 1750F	130 pcf	110 pcf	110 pcf	75 pcf	75 pcf	57 pcf	55 pcf	121 pcf
Crushing Strengths								
After 5-Hr Firing at:								
220F	3500 psi	700 psi	1310 psi	630 psi	580 psi	310 psi	220 psi	2500 psi
1200F	2680 psi	560 psi	1190 psi	595 psi	475 psi	320 psi	220 psi	1900 psi
1750F	2350 psi	300 psi	780 psi	490 psi	595 psi	375 psi	220 psi	1500 psi
2000F	—	—	—	—	—	—	320 psi	—
2200F	2490 psi	580 psi	1190 psi	690 psi	650 psi	—	—	1500 psi
2400F	2950 psi	1500 psi	2130 psi	1690 psi	840 psi	—	—	1500 psi
Linear Change								
After 5-Hr Firing at:								
1200F	-0.2%	0.0%	0.0%	-0.2%	-0.1%	-0.1%	-0.2%	-0.2%
1750F	-0.1%	0.0%	-0.2%	-0.3%	-0.2%	-0.1%	-0.4%	-0.3%
2000F	-0.1%	—	—	—	—	-0.1%	-0.6%	—
2200F	-0.2%	0.0%	-0.6%	-0.5%	-0.3%	—	—	—
2400F	-0.7%	+0.6%	+1.6%	-2.4%	-0.8%	—	—	—
2800F	-0.9%	+0.9%	—	—	—	—	—	—
3000F	—	—	—	—	—	—	—	—

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

THERMAL CONDUCTIVITY

PACKAGING INFORMATION

	MEAN TEMPERATURE, F							Pounds Required for 1 cubic foot	Packaging
	800	1000	1200	1400	1600	1800	2000		
3X	—	7.0	7.2	7.5	7.8	8.4	9.4	130	50 lb bags
H.T.	—	4.45	4.76	5.08	5.41	5.74	—	110	50 lb bags
Std.	4.16	4.34	4.59	4.88	5.19	5.52	—	110	50 lb bags
L.W.	1.99	2.09	2.21	2.36	2.56	2.82	—	75	50 lb bags
CA Ins.	—	2.57	2.70	2.90	3.12	3.33	3.65	75	50 lb bags
No. 20	1.43	1.54	1.65	1.76	1.87	1.98	—	57	50 lb bags
C-31 M	—	6.0	6.1	6.3	6.5	6.7	6.9	58	50 lb bags
CONDUCTIVITY: BTU IN. PER SQ FT PER F PER HR									
								180	50 lb bags
								44	50 lb bags

COMPLIANCE WITH GOVERNMENT SPECS

Lo-D Firecrete complies with MIL-C-19794A

An Insulation for Every Commercial and Industrial Purpose





INSULATION

type: Gunning-Troweling
temp limit: 3000F

J-M BLAZECRETE® hydraulic setting refractory cement

■ **DESCRIPTION:** Four types of dry monolithic, hydraulic setting refractory cements have been developed and produced by Johns-Manville for gunning and slap-troweling applications.

These four refractories are especially adaptable for gun application in building new refractory linings and repairing old ones. They adhere readily with a minimum of loss when "shot" in place. Mixed with water at the gun nozzle, they are pneumatically projected with great force, resulting in a dense, homogeneous lining.

Blazecrete is equally effective for heavy patching by troweling, especially where brickwork has eroded deeply. It eliminates the laborious ramming or tamping required with "plastics," and patches need not be prefired.

■ AVAILABLE TYPES:

3X Blazecrete—For service to 3000F. High alumina content. Particularly adaptable for gun applications and for heavy patching by slap-troweling.

Standard Blazecrete—For service to 2400F. Alumina silicate base.

L.W. Blazecrete—For service to 2000F. Light weight, alumina silicate base refractory. Used extensively for stack linings, heaters and other appli-

cations where gunning mix with low rebound loss is required.

C-2 Refractory Cement—For service to 2300F. Used to advantage in making a protective abrasion-resistant refractory surface over L.W. Blazecrete.

■ **USES:** Recommended for lining or patching forge furnaces, ashpits, cyclones, heaters, boilers, oil refining equipment, furnace bottoms, ladles and similar applications. L.W. Blazecrete is extensively used on tanks, structural steel and skirts for fire protection purposes.

■ ADVANTAGES

**Hardens
Rapidly**

Applications ready for use within 24 hours of gunning or slap-troweling.

**Resists
Spalling**

All four types are highly resistant to spalling.

Easy to Use

Can be applied by gunning or slap-troweling.

BLAZECRETE

Specification Data

	3X	STD.	L.W.	C-2 Cement
Highest Recommended Service Temperature	3000F	2400F	2000F	2000F
Pyrometric Cone Equivalent	33 (3173F)	16 (2669F)	14 (2552F)	15 (2602F)
Weight Slap Troweled:				
As Placed	148 pcf	132 pcf	104 pcf	140 pcf
Oven Dried at 220F	133 pcf	116 pcf	63 pcf	125 pcf
After 5-Hr Firing at 1750F	130 pcf	110 pcf	65 pcf	120 pcf
Weight Gunned:				
As Placed	153 pcf	134 pcf	117 pcf	142 pcf
Oven Dried at 220F	142 pcf	124 pcf	76 pcf	133 pcf
After 5-Hr Firing at 1750F	140 pcf	118 pcf	73 pcf	128 pcf
Crushing Strengths After 5 Hours Firing at:				
220F	570 psi	1350 psi	275 psi	550 psi
1200F	700 psi	1070 psi	338 psi	570 psi
1750F	790 psi	1130 psi	400 psi	580 psi
2000F	—	—	461 psi	—
2200F	1040 psi	1480 psi	—	—
2400F	2390 psi	2870 psi	—	—
Linear Change After 5 Hours Firing at:				
1200F	0.0%	-0.1%	-0.3%	-0.1%
1750F	0.0%	-0.4%	-0.6%	-0.1%
2000F	—	—	-0.8%	-0.1%
2200F	-0.2%	-0.6%	—	—
2400F	-0.2%	-0.4%	—	—

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

THERMAL CONDUCTIVITY

	MEAN TEMPERATURE, F							
	600	800	1000	1200	1400	1600	1800	2000
3X	—	—	4.10	4.30	4.68	5.40	6.35	7.68
Std.	—	3.89	3.95	4.05	4.24	4.57	5.09	—
L.W.	1.42	1.52	1.64	1.76	1.89	2.01	—	—
C-2	—	—	3.40	3.50	3.80	4.30	5.10	5.90

CONDUCTIVITY: BTU IN. PER SQ FT PER F PER HR

PACKAGING INFORMATION

	Pounds required for 1 cu ft	Packaging
3X Blazecrete	130 (slap-troweling) 140 (gunning)	100 bags
Standard Blazecrete	110 (slap-troweling) 118 (gunning)	100 bags
L.W. Blazecrete	65 (slap-troweling) 73 (gunning)	60 bags
C-2 Refractory Cement	120 (slap-troweling) 140 (gunning)	100 bags

An Insulation for Every Commercial and Industrial Purpose



INSULATION



type: Fill
temp limit: 2400F



J-M AGGREGATES AND FILLS

■ **DESCRIPTION:** Johns-Manville lightweight aggregates and fills are available in a wide selection for temperatures through 2400F.

Zelie L.W. and JM-2400 L.W. Aggregates may be mixed with calcium aluminate cement to form an insulating refractory concrete for various operating conditions. Sil-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 cores, jacking and enameling ovens, foundations and bases of heated equipment, furnace doors, and many special shapes. In addition, all materials listed below 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.

AVAILABLE TYPES

Name	Composition	Temperature limit, F	Approx density to which fills are normally packed, lbs per cu ft	Packaging
JM-2400 L.W. Aggregate	al. silicate	2400	50	80-lb bags
Zelie L.W. Aggregate	al. silicate	2400	31	65-lb bags
Sil-O-Cel C-3	calcined, coarse-graded diatomaceous silica	2000	31	50-lb bags
Sil-O-Cel Insulating Powder	finely ground diatomaceous silica	1600	17	50-lb bags
Sil-O-Cel Coarse Grade	similar to Sil-O-Cel Insulating Powder, but more coarsely ground	1600	22	50-lb bags



INSULATION INFORMATION

type: Refractory Mortar
temp limit: 3200F

J-M BONDING MORTARS

■ **DESCRIPTION:** J-M Refractory Bonding Mortars are recommended for bonding together many relatively small units into a stable, strong, and gas-tight structure. The use of refractory mortars reduces slag or gas penetration and cuts down heat loss caused by open joints. There are two general classifications of bonding mortars: heat setting

and air setting. Heat setting mortars will develop a bond only with the application of heat. Air setting mortars develop a strong bond without the application of heat.

J-M Bonding Mortars have been scientifically formulated to insure good workability, low shrinkage, and long shelf life.

AVAILABLE TYPES

Mortar	Type	Temperature Limit, F	Uses	Packaging
Blakite®	air setting	3200	laying insulating fire brick or refractory brick; shallow patching hot or cold surfaces	200, 100, 50, 25, 15, 10 and 5-lb containers
Super Blakite®	air setting	3000	for coating over vertical industrial boiler tubes, shallow patching, laying brick	200, 100 and 50-lb containers
Hellite®	air setting	3000	laying fire brick; shallow patching	200, 100 and 50-lb containers
No. 20	air setting	2700	laying fire brick	200, 100, 50, 25, 15, 10 and 5-lb containers
No. 26	air setting	2600	laying fire brick; patching	100-lb bags
No. 31	(coarse) heat setting	3100	laying fire brick	100-lb bags
No. 32	(fine) heat setting	3100	laying fire brick	100-lb bags

An Insulation for Every Commercial and Industrial Purpose



INSULATION

+ 3000F

type: Refractory Felt
temp limit: 2300F



J-M CERAFELT[®] refractory fiber felt

■ **DESCRIPTION:** J-M Cerafelt is a lightweight, refractory-fiber insulation notable for its excellent thermal and chemical stability. Made predominantly of alumina and silica, it combines lightness, heat resistance, low conductivity and high sound-absorption qualities.

■ **AVAILABLE FORMS:** Furnished in densities ranging from 3 to 24 lbs per cu ft. Also available in loose form (J-M CERAFIBER) in 25-lb bags.

■ **USES:** Recommended for a great variety of high temperature industrial applications such as insulation protection in repairing open hearth roofs; on cover-type annealers to fill openings for electrical access; expansion joints in kilns, furnaces and boiler walls.

■ ADVANTAGES

High Heat Resistance

Will withstand continuous exposure to a full 2300F.

Low Thermal Conductivity

Unusually low conductivity at high temperatures due to opacity of basic fibers to infra-red radiation.

Light Weight

Weights as little as 1/40th equal volume of hard fire brick.

Chemically Stable

Non-alkaline and chemically stable. Contains no corrosion-promoting agents.

THERMAL CONDUCTIVITY

Density, lbs per cu ft	MEAN TEMPERATURE, F									
	300	400	500	600	700	800	900	1000	1100	1200
3	.40	.48	.57	.68	.80	.93	1.08	1.25	1.45	1.65
4	.38	.44	.52	.61	.71	.82	.94	1.08	1.25	1.45
6	.36	.41	.47	.54	.62	.70	.80	.92	1.08	1.25
8	.34	.39	.45	.51	.57	.64	.73	.84	1.00	1.15
10	.33	.38	.43	.49	.55	.61	.69	.79	.95	1.10
12	.33	.37	.42	.47	.53	.59	.67	.77	.92	1.05
14	.33	.37	.41	.46	.51	.57	.65	.75	.90	1.02
18	.32	.36	.40	.45	.50	.55	.63	.73	.88	1.00
24	.31	.35	.39	.44	.48	.53	.61	.71	.86	1.00

CONDUCTIVITY: BTU IN. PER SQ FT PER F PER HR

STANDARD DENSITIES AND THICKNESSES

Type	Density*, lbs per cu ft	Available Thicknesses,* inches									
		1/8	1/4	1/2	3/4	1	1 1/2	2	3	4	6
CRF-300	3				0	0	0	0	0	0	0
CRF-400	4				0	0	0	0	0	0	0
CRF-600	6				0	0	0	0	0	0	0
CRF-800	8	0	0	0	0	0	0	0	0	0	0
CRF-1000	10	X	X	X	X	X	X	X	X	X	X
CRF-1200	12	X	X	X	X	X	X	X	X	X	X
CRF-1400	14	X	X	X	X	X	X	X	X	X	X
CRF-1800	18	X	X	X	X	X	X	X	X	X	X
CRF-2400	24	X	X	X	X	X	X	X	X	X	X

*Other thicknesses and densities available on request
0 denotes availability of 4' and 8' sheets and 26' rolls
X denotes availability of 4' and 8' sheets only
Standard width is 42 inches

INSULATI

type: Sheet
temp limit: 1200F

J-M ASBESTOS MILLBOARD insulating sheet material

DESCRIPTION: Johns-Manville Asbestos Millboard is a dense, rigid sheet or board material formed of asbestos fibers and a small amount of binder. A natural light gray in color, Millboard sheets are furnished in standard sizes of 42" x 48", in thicknesses ranging from 1/32" to 1 2". Cut pieces can also be supplied.

AVAILABLE FORMS

No. 106 Millboard—A general purpose, high utility millboard suitable for most uses. It will withstand temperatures to 800F.

No. 102 Millboard—A higher quality millboard than No. 106. Will withstand temperatures to 1000F.

No. 219 Millboard—This is a premium grade millboard, specially treated for greater strength. Suitable for temperatures to 1100F, it can be used up to 1800F where some loss of strength is not detrimental.

C Grade Millboard—This millboard contains an especially long grade of asbestos fiber. It is suitable for temperatures to 1200F; embrittlement occurs above this limit. Where brittleness is not objectionable, may be used at temperatures up to 1800F.

Silicated Millboard—All grades of millboard can be specially treated to increase surface hardness. Where such sheets are required, the word "silicated" should appear on the order before the millboard type.

Special—Millboards for special purposes can tailored to service requirements.

USES: J-M Asbestos Millboard is recommended for applications which require a sheet board insulation for protection against fire, heat, acid fumes, etc. Frequently used as a fire-resistant lining for floors, partitions, ceilings, stoves and grates. It has been found particularly valuable in the steel industry where literally scores of uses have been discovered for this versatile material.

ADVANTAGES

Versatile

Adapted to literally scores of industrial applications.

Fireproof

Made of asbestos, the world's most famous fireproof material.

THICKNESSES, TOLERANCES AND WEIGHTS*

Thickness, inches	Tolerance, inches ±	Lbs per 42" x 48" sheet	
		No. 106, 102 and "C" Grade	No. 219
1/32	0.007	2.5	1.5
1/16	0.008	3.5	2.5
3/32	0.008	4.6	3.5
1/8	0.008	6.0	4.6
5/32	0.009	7.0	5.5
3/16	0.014	9.0	7.0
1/4	0.015	11.3	8.2
5/16	0.016	13.3	11.1
3/8	0.025	17.6	15.0
7/16	0.029	21.4	18.4
1/2	0.034	25.2	21.9
5/8	0.045	32.5	28.3

*Actual weights may vary plus or minus 10 percent

An Insulation for Every Commercial and Industrial Purpose



INSULATION

type: Cements & Fills
temp limit: Various

J-M CEMENTS & FILLS insulating & finishing

■ **DESCRIPTION:** Johns-Manville Insulating and Finishing Cements have been produced for use with J-M insulating materials. The Insulating Cements are ideal for insulating irregular surfaces where it would be impracticable to apply pipe or block insulation. Finishing Cements are used to give insulation a hard, smooth finish which can be painted or weatherproofed. J-M Insulating Fills are recommended for use in filling irregular spaces.

■ AVAILABLE TYPES:

FINISHING CEMENTS

No. 301 Cement A hydraulic-setting, insulating and finishing cement especially designed for one-coat application. 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 job in one operation. Recommended for insulating small steel pipe fittings and as a finish over block insulation.

No. 302 Cement A high grade, long fiber, asbestos cement.

No. 352 and 0352 Cements General purpose, all asbestos fiber cements with good troweling and finishing properties. Generally used as a finish over block insulation and for general utility applications.

INSULATING CEMENTS

85% Magnesia Cement For use with 85% Magnesia pipe and block insulation for patching, pointing up joints, and covering irregular shapes.

Superex Insulating Cement For use with Superex or Thermobestos pipe and block insulation for patching, pointing up joints, and covering irregular shapes.

No. 450 Cement A mineral wool cement with excellent adhesion qualities on both hot and cold surfaces. A good insulator, compared with other types of cements, it can be applied in heat-treated areas. No. 450 contains a rust inhibitor to minimize staining of metal with which it may come in contact.

No. 500 Cement An expanded vermiculite cement recommended for specialized uses in the heat-producing industries. Effectively seals against gas infiltration. Particularly adapted to gun applications.

INSULATING FILLS

Fibrofil® A mixture of diatomaceous silica and long fiber asbestos. Due to the asbestos content, this material has certain characteristics which differ from those of ordinary powdered fills. These characteristics offset any tendency to settle or filter through cracks, making the material well adapted for use in filling spaces on gas generator sets, etc.

Fil-Insul® An insulating fill for use in irregular spaces where block or brick insulations are not practicable and where a high-grade resilient material is needed. Fil-Insul will permit considerable expansion and contraction because of its fibrous nature, which also serves to prevent any settling or settling through cracks.

INSULATING & FINISHING CEMENTS AND FILLS

Specification Data

	FINISHING CEMENTS				INSULATING CEMENTS				FILLS	
	301	302	352	0352	85% Magnesia 25	Superex 50	450 50	500 50	Fibrofil 60	Fil-Insul 65
Packaging (lbs per bag)	50	50 or 100	50 or 100	50 or 100						
Temperature Limit	1400F	1000F	1000F	1000F	600F	1900F	1800F	1800F	1800F	1000F
Coverage per 100 lbs Applied & dried 1" thick	36 sq ft	25 sq ft	19 sq ft	19 sq ft	55 sq ft	45 sq ft	50 sq ft	78 sq ft	-	-
Approximate Ratio water to mix per 100 lbs	15 gals	21 gals	12 gals	12 gals	42 gals	30 gals	30 gals	36 gals	-	-
Density, Dry	18 pcf	20 pcf	20 pcf	30 pcf	20 pcf	12 pcf	8 pcf	10 pcf	18 pcf	15 pcf
Base Material	hydraulic setting cement	asbestos	asbestos	asbestos	mag. carbonate	diatoma- ceous silica	mineral wool	expanded vermiculite	packing diatoma- ceous silica & asbestos fiber	packing mineral fiber
Color	light gray dries white	light gray	gray	gray	white	light brown	gray	golden gray	-	-

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

	MEAN TEMPERATURE, F									
	200	300	400	500	600	700	800	900	1000	
No. 301	-	.85	.86	.87	.88	.90	.91	.93	.95	
No. 302	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	
No. 352	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	
No. 0352	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	
No. 450	.67	.72	.76	.81	.86	.91	.96	.99	1.01	
No. 500	.74	.79	.83	.88	.92	.97	1.02	1.06	1.11	
85% Magnesia	.51	.54	-	-	-	-	-	-	-	
Superex	.75	.77	.79	.82	.84	.86	.89	.91	.94	
Fibrofil	.59	.61	.62	.63	.65	.66	.68	.69	.70	
Fil-Insul	.53	.58	.64	.70	.76	.83	.91	-	-	

CONDUCTIVITY: BTU IN PER SQ FT PER F PER HR

Navy 450 Cement meets MIL-C-2861, HH-C-168 and HH-I-00500, Type III.

85% Magnesia Cement meets HH-I-00500, Type I

Superex Cement meets HH-I-00500, Type V.

352 Asbestos Cement meets MIL-C-2908.

SHORT FORM SPECIFICATIONS

FINISH OVER BLOCKS

Asbestos cement (J-M No. 352, 0352 or 302) in two coats, or hydraulic setting cement (J-M No. 301) in one coat, shall be applied over hexagonal wire mesh stretched tightly over blocks and securely wired in place. The first coat of asbestos cement shall be left rough and allowed to dry thoroughly before applying second coat. Second coat of asbestos cement shall be mixed 2 to 1 by weight with portland cement and troweled smooth. Insulating cement (J-M No. 450) may be substituted for first coat in lieu of asbestos cement.

VALVES, FITTINGS AND FLANGES

On piping 4" and larger, valves, fittings and flanges shall be insulated with pipe or block insulation of same material fabricated in sections, or pieces wired in place, and finished with a filling and smoothing coat of asbestos cement. On pipe sizes smaller than 4" insulating cement (J-M No. 450) shall be used with an asbestos cement (J-M No. 352, 0352 or 302) finish. J-M No. 301 shall be applied in one coat over small pipe fittings.

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