

**KAISER**  
REFRACTORIES



**HANDBOOK OF  
REFRACTORY  
PRODUCTS**

---

NUMBER

ASSIGNED TO:



# KAISER REFRACTORIES

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Oakland, California 94604      Mexico, Missouri 65265      Columbiana, Ohio 44408

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## INTERNATIONAL DEPARTMENT

World Headquarters: 300 Lakeside Drive, Oakland, Ca. 94604, U.S.A.  
Cable: KAISEREF—Telex: 335-315  
European Offices: 3, Place Thomas Balis, Brussels 16, Belgium  
Paseo Manuel Girona 17, Barcelona, Spain  
Central American and Caribbean Office:  
Lucchetti 1308, Condado, Puerto Rico 00907

### Subsidiaries

Ceramica Industrial Haedo S.A., 964 Belgrano, Buenos Aires, Argentina  
Kaiser Refractories Pty. Ltd.—Port Kembla, N.S.W., Australia  
Kaiser Refractories Pty. Ltd.—Port Adelaide, S.A., Australia  
Kaiser Refractories Company—Oakville, Ontario, Canada  
Kaiser Refractories—Box TR-2, Whitehall Road, Leeds, England

### Licensees

Campbell Brothers Ltd., Box 4, Brisbane, Australia  
Refractarios Venezolanos. S.A. Apartado 61004 Este, Caracas, Venezuela

## PRODUCTS AND SERVICES:

Kaiser Refractories offers a complete line of modern basic refractories, high alumina refractories, fireclay and silica brick and specialties, and fused refractories. Kaiser Refractories engineering and gunning specialists assist in many types of applications.



Dealers and Distributors are located throughout the United States, and Representatives in the principal countries of the Free World.

## M-BLOCK INSULATION FOR TEMPERATURES UP TO 1900°F

M-Block, mineral wool block insulation, is made from chemically stable mineral fiber and other selected high temperature insulators. It combines physical stability and mechanical strength with high thermal efficiency. It is furnished in a wide range of convenient sizes to provide the industrial user with a single, easily worked insulation for every application from room temperatures to 1900°F.

### EASY TO INSTALL

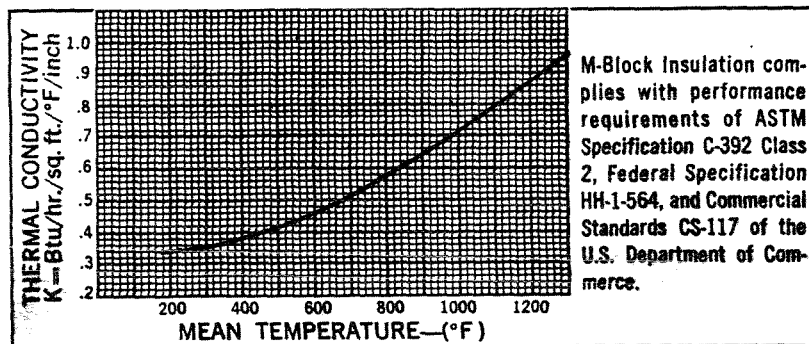
Light-weight, low-density M-Block is available in thicknesses up to 4 inches. Most installations will require only one layer, providing reduced installation cost and increased efficiency. Due to its high mechanical strength, M-Block requires a minimum of reinforcement. It is easily cut with knife or saw to form any shape, and it can be pressed over projections without cutting. The embossed surface of M-Block provides a strong grip for insulating cement finishes.

### RESISTANT TO MOISTURE

In refractory back-up insulation M-Block is often used in conjunction with castables. The water repellent surface reduces excessive absorption of water needed for proper hydration of cements and castable refractories.

### THERMAL CONDUCTIVITY

Pure mineral fibers combined with binder and other materials produce a product of low thermal conductivity and high refractoriness. M-Block Insulation possesses the necessary dead-air space, light weight and durability that make a truly good insulating material. Its density is 21 to 22 pounds per cubic foot. M-Block Insulation is an outstanding insulating material for heated equipment, as indicated by the conductivity chart below.



### ECONOMICAL

K/R M-Block Insulation costs less per board foot than many insulators of inferior thermal value and temperature range. Material, construction and maintenance costs are less, as are fuel costs. In fact, K/R M-Block Insulation will pay for itself in a short period of time in fuel savings alone. M-Block's durability and high efficiency insure sustained savings throughout the long life of the material.

**RECOMMENDED THICKNESSES**

Operating temperatures, cost of fuel, operating time, ambient temperature and other factors determine the most economical thickness for block insulation. The following table, taken from U.S. Department of Commerce Commercial Standards CS-117, offers a practical guide for typical applications—and maximum efficiency.

OPERATING TEMPERATURES °F	THICKNESS OF M-BLOCK	OPERATING TEMPERATURES °F	THICKNESS OF M-BLOCK
Up to 200°F	1"	700 to 900	3½"
200 to 400	1½"	900 to 1100	4"
400 to 500	2"	1100 to 1300	4½"
500 to 600	2½"	1300 to 1500	5"
600 to 700	3"	1500 to 1600	5½"

**PHYSICAL PROPERTIES**

Temperature Range . . . . .	Up to 1900°F
Thermal Conductivity . . . . .	See Graph
Compressive Strength . . . . .	18 psi
Breaking Strength (10" span) . . . . .	30 lb. per bd. ft.
Shrinkage at 1900°F (lineal) . . . . .	1.9%
Density . . . . .	1.8 lb. per bd. ft.
Stability . . . . .	Inert, durable
Resistance to Moisture . . . . .	Water repellent
Resistance to Corrosion . . . . .	Noncorrosive
Handling Characteristics . . . . .	Cleaner, less dusting



**TYPICAL APPLICATIONS**

- |                      |                |                        |
|----------------------|----------------|------------------------|
| Blast Furnace Stoves | Ovens          | Heat Treating Furnaces |
| Refractory Back-up   | Fan Housings   | Chilling Pits          |
| Ceramic Kilns        | Boiler Walls   | Turbines               |
| Tanks                | Melting Tanks  | Pit Covers             |
| Towers               | Annealing Pits | Breechings             |
|                      | Hot Air Ducts  |                        |



Start tab, pull tape completely around carton, leaving base as holding tray.



Note ease with which M-Block can be removed from base for ready use.

## **VEE-BLOCK INSULATION** VERMICULITE BLOCK INSULATION

Vee-Block is a vermiculite block insulation designed for applications up to 1800°F. It is lightweight, retains its strength at high temperatures, and shrinkage is negligible. Vee-Block can be easily sawed to fit odd shapes, areas and contours; it has an extremely low coefficient of heat transfer. It is furnished in 1" to 6" thicknesses, any size up to 12" x 36". Shipped in cartons.

## **VEE-BLOCK MIX** VERMICULITE-BASE CASTABLE

Vee-Block Mix is an extremely lightweight, vermiculite-base castable insulation material with an installed weight of only 24 pounds per cubic foot. It provides approximately the same thermal conductivity as block insulation. Vee-Block Mix provides a highly efficient insulation up to 1600°F. It is ideal for single coat applications in such furnace locations as walls, roofs, soot hoppers, arches, and other similar areas. It is shipped in 50-pound bags, ready for mixing with water.

## **HARD-TOP** FINISHING CEMENT

Hard-Top is a hydraulic-setting insulating and finishing cement designed for use on heated equipment of all types, including valves, fittings and pipes. It is commonly used as a one-coat finish over block and blanket insulation where temperatures do not exceed 1200°F. Sets up hard, without heat.

## **PLASTIC INSULATION** APPLY TO HOT SURFACES—SAVES HEAT

Plastic Insulation is made with a base of specially prepared mineral fiber combined with other ingredients to provide a material of great adhesiveness, exceptional workability, resistance to severe usage and vibration, practically no shrinkage, and high insulating value in service to 1800°F. Applied by hand or troweled, it adheres readily to any clean, unpainted surface—without reinforcement—in thicknesses up to two inches. One 50-pound bag economically covers approximately 25 square feet of surface one-inch thick.

Plastic Insulation is recommended for insulating valves, large piping, flanges, steam gates, flues, ducts, boiler settings, tanks, heaters, furnaces—any hot surface where saving heat is worthwhile.



Plastic Insulation is excellent for patching or for new installations, over block or alone.

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(Bryn Mawr)  
Pittsburgh

FLORIDA  
Brandon

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Hillside

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OHIO  
Cleveland  
Marietta (DeVoia)

UTAH  
Salt Lake City

LOUISIANA  
Baton Rouge

TOLEDO  
Toledo

WASHINGTON  
Seattle

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## **INTERNATIONAL DEPARTMENT**

World Headquarters: 300 Lakeside Drive, Oakland, California, U.S.A.

Cable: KAISEREF — Telex: 03-3610

European Office: Coolsingel 75 — Rotterdam, The Netherlands

### **SUBSIDIARIES**

Kaiser Refractories Pty. Ltd. — Port Kembla, N. S. W., Australia  
Kaiser Refractories Company — Oakville, Ontario, Canada

### **LICENSEES**

The Leeds Fireclay Company, Ltd., Leeds 12, Yorkshire, England  
Ceramica Olivos, S.A., Sarmiento 470, Buenos Aires, Argentina  
Refractarios Venezolanos, S.A., Apt. 5004 Este, Caracas, Venezuela

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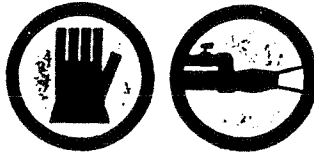
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THE REFRACTORIES GROUP



## INSULATING REFRACTORIES

### INSULATING FIREBRICK

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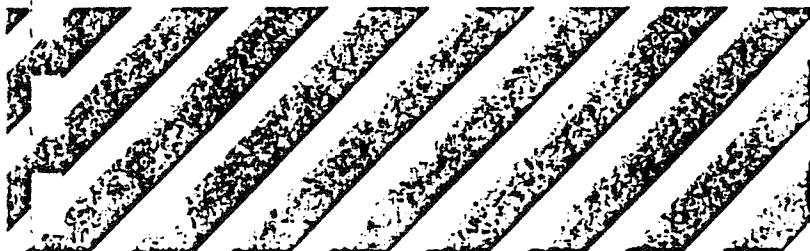
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## M-BLOCK INSULATION FOR TEMPERATURES UP TO 1900°F

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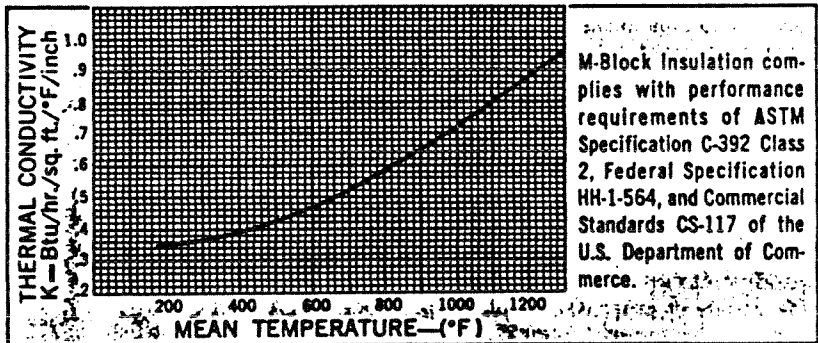
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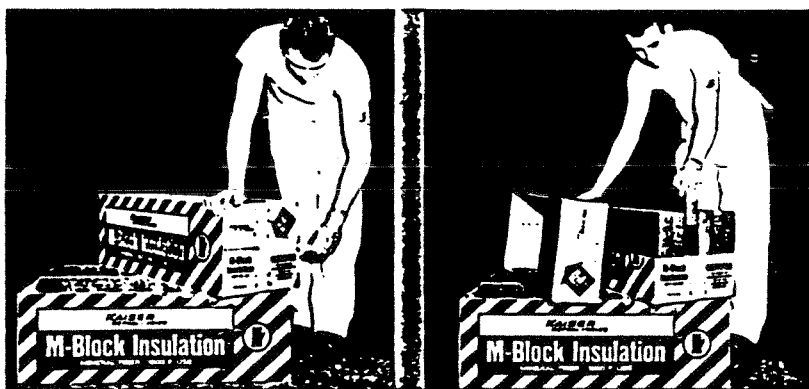
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INSULATING CASTABLES						
Product Name	ASTM Classification	Service Temperature Limit °F	Packaging	Material Required for Casting 1 Cu. Ft.	Method of Application	Water Required for Casting, %
I.R.C.	Q	2500	50 lb. Bag	70-80 lbs.	Cast or Gunned	40-47
ONE SHOT	Q	2400	50 lb. Bag	87-90 lbs.	Cast or Gunned	31-35
PURO-LITE	P	2250	50 lb. Bag	48-52 lbs.	Cast or Gunned	55-60
I.R.C.-22	P	2200	50 lb. Bag	48-50 lbs.	Cast or Gunned	40-47
I.R.C.-20	N	1800	50 lb. Bag	46-48 lbs.	Cast	46-55
I.R.C.-20-G	N	1800	50 lb. Bag	—	Gunned	—
PLASTIC INSULATION *		1800	50 lb. Bag	24 lbs.	Troweled	190-200
VEE-BLOCK MIX	Special	1600	50 lb. Bag	24 lbs.	Cast	170-200

\*Complies with requirements of ASTM C-195.

# KAISER REFRACTORY CASTABLES PRODUCT INDEX

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\*Trademarks Kaiser Aluminum & Chemical Corp.

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## **VEE-BLOCK MIX** (T.M.)

### **EXTREMELY LIGHTWEIGHT INSULATION**

Vee-Block Mix, extremely lightweight Vermiculite-base castable insulation, weighs only 24 pounds per cubic foot when matured in place. It has the same thermal conductivity, strength and weight as Kaiser Refractories M-Block insulation, but provides the added convenience of easy single-coat application in furnace walls, roofs, soot hoppers, top decks, drum coverings, etc. Vee-Block Mix is shipped dry in 50 pound bags.

## **PLASTIC INSULATION** (T.M.)

### **APPLY TO HOT SURFACES—SAVES HEAT**

Plastic Insulation is made with a base of specially prepared mineral fiber combined with other ingredients to provide a material of great adhesiveness, exceptional workability, resistance to severe usage and vibration, practically no shrinkage, and high insulating value in service to 1800°F. Applied by hand or troweled, it adheres readily to any clean, unpainted surface—without reinforcement—in thicknesses up to two inches. One 50-pound bag economically covers approximately 25 square feet of surface one-inch thick.

Plastic Insulation is recommended for insulating valves, large piping, flanges, steam gates, flues, ducts, boiler settings, tanks, heaters, furnaces—any hot surface where saving heat is worthwhile.

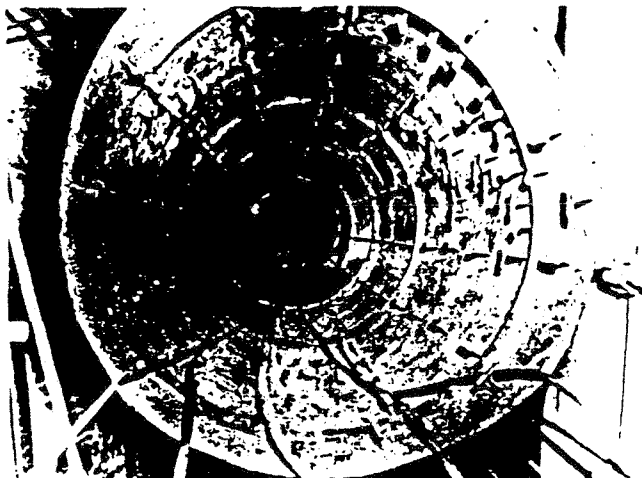
## **ONE-SHOT** (T.M.)

### **COMBINING STRENGTH AND INSULATION**

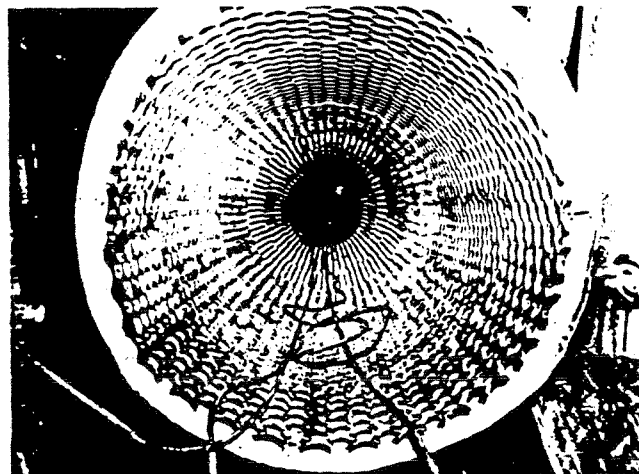
One-Shot combines into one product the most important characteristics of a high strength castable and an insulating castable. Used as a single lining, it can supplant the need for a duo-component lining. (See page 18.) One-Shot reduces heat loss, yet is dense and strong, withstanding moderate abrasion and erosion following normal installation procedures. It is highly recommended to the oil refinery, chemical and modern power plant fields, for lining oil heaters, reactors, regenerators, towers, stacks, flues, breechings and heat-treating furnaces. One-Shot weighs 94 pounds per cubic foot. It is packaged in 100-pound moisture-proof bags, ready for mixing with water for casting or gunning.

## **KAISER INSULATING MATERIALS**

In addition to insulating castables, a wide variety of other Kaiser insulating materials—insulating firebrick, block insulation, mortars and finishing cements—are available to meet various insulating needs. Ask for information.



Installation of a duo-component lining for a refinery regenerator duct begins by welding "T" studs to the steel shell.



After I-R-C 20-G insulation has been gunned up to the back of the studheads, 3/4-inch hex steel is welded to the studs.



A one-inch layer of Hi-Strength refractory castable, gunned to cover the hex steel, provides strong, durable finish.

**KAISER  
REFRACTERIES**



**PLASTIC INSULATION**  
**MINERAL WOOL FIBER INSULATION CEMENT**

# PLASTIC INSULATION — AN ALL

Kaiser Refractories' versatile Plastic Insulation is designed for use as backup in equipment operated at temperatures up to 1800° F. It is composed of high-temperature mineral wool fibers specially processed with other ingredients. The dry material is ready to mix with water for installation by trowel or gun methods.

This material is used in power plants, refineries, chemical plants, steel mills, etc., to control heat losses at relatively high temperatures. It also provides effective insulation value on drum heads, hot water fittings and low pressure steam equipment.

**HIGH INSULATING EFFICIENCY.** Exceptional resistance to heat transfer is achieved from the resilient balls of mineral wool fiber contained in the cement. These nodules are factory processed to correct size, then uniformly blended with adhesive binders. After Plastic Insulation is applied and dried, the thousands of tiny air cells entrapped in the resilient wool nodules impart high thermal value. Excellent Thermal Conductivity is shown in the chart below based on Guarded Hot Plate Tests conducted by J. L. Finck Laboratories, per ASTM Specifications C-177.

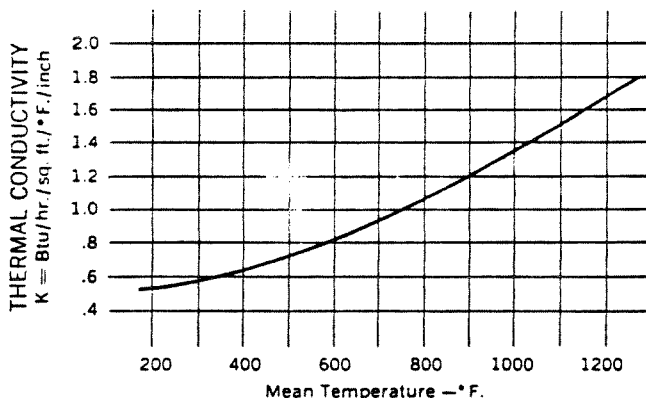
**MAXIMUM COVERAGE.** The primary reason for Plastic Insulation's high coverage is that its fibers do not collapse when mixed with water. Instead, they retain essentially their original size and shape. The wool nodules provide high bulk, yet are held together securely with the adhesive binders in the mixture. Coverage of Plastic Insulation is 50 board feet per 100 pounds. Thus, material requirements are computed on the basis of 2

pounds of Plastic Insulation per board foot in place. When Kaiser Plastic Insulation is applied in a monolithic layer over block or blanket insulation, 1 pound is needed per square foot one-half inch thick.

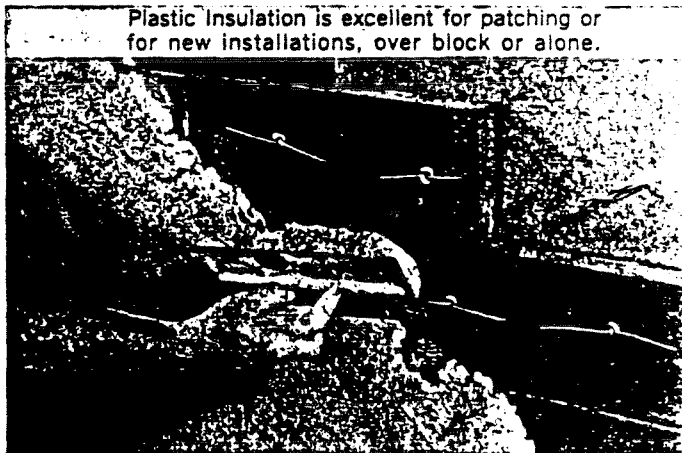
**LOW SHRINKAGE.** Insulating cements undergo linear or volumetric shrinkage as the mixing water dries out. The shrinkage is higher if an excess of mixing water is used than when mixed to a stiffer consistency. With Plastic Insulation, drying shrinkage is kept to a minimum. The lower shrinkage of Plastic Insulation is attributed in part to the resilient balls of mineral wool which tend to expand on drying. Other factors limiting the shrinkage are (a) the high bond strength that Plastic Insulation develops within itself as it dries, and (b) its good adhesive strength to surfaces on which it is applied.

**EASY TO APPLY.** Plastic Insulation has excellent workability and adhesion, suitable for installation by trowel or gun methods. Applied over block or blanket insulation it fills open joints and provides a monolithic surface for whatever type of subsequent finish is specified. In patented arch and wall fabrication and other refractory construction Plastic Insulation may be applied directly to the brickwork. This versatile insulating cement also is used on valves, fittings and similar irregular surfaces by building it up in several layers to the total desired thickness. One further use is as a caulk to seal annealing and heat treating furnace doors and openings. If service temperature reached does not exceed 1000° F., the material may be removed, reclaimed, mixed with water and reused.

THERMAL CONDUCTIVITY — PLASTIC INSULATION



Plastic Insulation is excellent for patching or for new installations, over block or alone.



# MOOSE MOLDABLE INSULATION

## APPLICATION RECOMMENDATIONS

Surfaces to be insulated should be free of dirt, paint, loose scale and other extraneous material. Drying is expedited if the equipment is heated during installation. Plastic Insulation is mixed with clean, fresh water at the ratio of 12 gallons per 50-pound bag. This affords a good, workable consistency ready for immediate use. Since Plastic Insulation contains no hydraulic-setting binders, it also can be kept on hand as a wet mixture, or use the following day.

It is usually applied over block or blanket insulation. Plastic Insulation is trowelled one-half inch thick to fill joints and to level up the surface. When dry, Plastic Insulation provides a firm base for smooth finish cement. On equipment located indoors, or protected from moisture, the pitted texture of Plastic Insulation may be left as is, but when dry, it can be painted with aluminum paint for pleasing appearance. For exterior uses an asphalt base covering may be applied as a weather-proofing measure.

For built-up applications on irregularly shaped equipment, valves and fittings, the initial layer of Plastic Insulation is spotted on by hand approximately three-fourths inch thick. Successive layers are roughed on after the preceding coats have dried. When the total desired thickness is reached, the final layer is palmed smooth. On equipment subject to vibration, a reinforcing layer of galvanized wire netting is recommended before applying the final coat.

On heated masonry surfaces, such as boiler settings, hearths, ovens, etc., Plastic Insulation helps reduce air

infiltration through mortar joints, in addition to improving the thermal value. A thickness of three-fourths inch offers good resistance to the entry of excess air. This thickness can be applied on most settings without adversely affecting common brick exteriors. When the setting is composed entirely of refractory brick, greater thicknesses of Plastic Insulation usually may be used with safety.

**MIXING FOR USE.** Mix thoroughly with fresh water, adding approximately 12 gallons of water per 50-pound bag of Plastic Insulation. Apply to clean surface in layers not over 1" thick.

**Dry Coverage:** One 50-pound bag of Plastic Insulation will cover an area of 25 sq. ft.— 1" thick.

**Material Requirements:** 2 lbs. per sq. ft.— 1" thick.

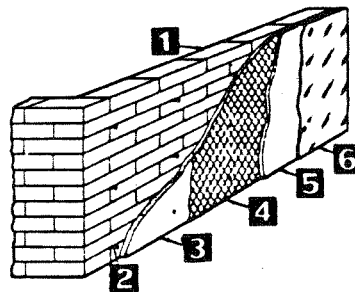
**TYPICAL APPLICATIONS**—Air pre-heaters • Annealing pit covers • Boiler drums, headers, shells • Boiler settings • Connectors • Core ovens • Digestors • Domestic furnaces • Ducts and breechings • Economizers • Fan housings • Feed-water heaters • Furnace arches and walls, doors and openings • Furnaces: Blast, Forge, Hot air, Normalizing • Hearths • Heat Exchangers • Ovens: Dry, Annealing, Heat-treating • Paper mill roll-ends • Steam cylinders and stills • Storage tanks: Hot water, Chemicals, Petroleum • Turbines and Pumps • Valves, pipes, fittings.

**MATERIAL SPECIFICATION REFERENCE:** "Mineral Wool Insulating Cement shall be Plastic Insulation, complying with the performance requirements of ASTM C-195; Federal Specification HH-C-168 (Class C); and/or Commercial Standard CS-117 of the U.S. Department of Commerce."

## PHYSICAL PROPERTIES

Compressive Strength	45 lbs. psi
Adhesion to Steel (wet)	6 psi
Adhesion to Steel (dry)	39 psi
Shrinkage (wet to dry) by volume	15%
Rust Resistant	No Oxidation of Steel
Stable up to	1000° F.
Density (Applied and Dried)	24 lbs. per cu. ft.
Applied	Over any Contour
Shipped In Weatherproof Paper Bags	50 lb.
MAXIMUM SERVICE TEMPERATURE	1800° F.

## APPLICATION OF PLASTIC INSULATION ON BRICK SURFACE



- 1 Heated brick surface.
- 2 Nails embedded in masonry joints spaced approximately on 12-inch centers with heads projecting about ¼ inch from the surface.
- 3 First coat of Plastic Insulation applied nearly flush with nail heads.
- 4 1-inch galvanized wire mesh secured in nail heads.
- 5 Second coat of Plastic Insulation.
- 6 Cement asphaltic finish.



## **OTHER KAISER REFRACTORIES INSULATION MATERIALS**

**I-R-C\*** I-R-C combines the advantages of a mix-and-pour castable with those of an insulating concrete. It is lightweight, easily mixed and poured, and has very low shrinkage on drying. I-R-C is ideal for lining breechings, flues, roofs, hearths, door linings and many others. It is usable as backup in furnaces operating to 2500°F; 78-80 pounds are required per cubic foot. I-R-C is shipped dry in 100-pound bags ready for adding water for use in casting or gunning.

**I-R-C 20\*** I-R-C 20 is similar to I-R-C except it is lighter in weight and has greater insulating properties. Installed weight ranges between 46 and 48 pounds per cubic foot, with thermal conductivity 70% less than fireclay brick. It can be cast or troweled. I-R-C 20 is designed for use up to 1800°F. Shipped in 50-pound bags.

**I-R-C 20-G\*** I-R-C 20-G is recommended where it is desirable to install lightweight insulating castable by gunning. It is sized specifically for gun application; otherwise, it possesses most of the characteristics of I-R-C 20. It is widely used as the back-up insulation layer (with Hi-Strength\* refractory castable) in gunned duo-component linings. It is shipped in 50-pound bags.

**HARD-TOP\*** Hard-Top is a hydraulic-setting insulating and finishing cement designed for use on heated equipment of all types, including valves, fittings and pipes. It is commonly used as a one-coat finish over block and blanket insulation where temperatures do not exceed 1200°F. Sets up hard, without heat.

**VEE-BLOCK MIX\*** Vee-Block Mix is an extremely lightweight, vermiculite-base castable insulation material with an installed weight of only 24 pounds per cubic foot. It provides approximately the same thermal conductivity as block insulation. Vee-Block Mix provides a highly efficient insulation up to 1600°F. It is ideal for single coat applications in such furnace locations as walls, roofs, soot hoppers, arches, and other similar areas.

**M-BLOCK\*** M-Block is a lightweight, low density insulating block designed for applications up to 1900°F. Manufactured of chemically stable mineral fiber, M-Block combines low thermal conductivity, mechanical strength and durability, with high refractoriness. Available in thicknesses up to 4 inches, M-Block is furnished in a wide range of convenient sizes to provide a single, easily worked insulation for most every application.

**INSULATING FIREBRICK** Kaiser Refractories' seven brands of insulating firebrick combine excellent insulating properties with the ability to withstand direct exposure to flame, heat and furnace atmospheres. They are available in a temperature use range from 1600°F. to 3000°F. in standard and special shapes — all accurate in size.

\*TRADEMARKS KAISER ALUMINUM & CHEMICAL CORPORATION

# **KAISER REFRACTORIES**

Kaiser Center, 300 Lakeside Drive, Oakland 12, California

# KAISER REFRACTORIES

## M-BLOCK

Kaiser Refractories M-BLOCK insulation provides high thermal efficiency and mechanical strength from room temperatures to 1900 F.

### HIGHEST QUALITY

Kaiser Refractories M-Block is made from chemically stable mineral fiber and other selected high temperature insulators. It combines physical stability and high thermal efficiency with a wide range of convenient sizes to provide the industrial user with a single, easily worked insulation for every application.

### EASY TO INSTALL

Light weight, low density M-Block is available in thicknesses up to 4 inches. Most installations will require only one layer, providing reduced installation cost and increased efficiency. Due to its high mechanical strength, M-Block requires a minimum of reinforcement. It is easily cut with knife or saw to form any shape, and it can be pressed over projections without cutting. The embossed surface of M-Block provides a strong grip for insulating cement finishes.

### RESISTANT TO MOISTURE

In refractory back-up insulation, Kaiser Refractories M-Block is often used in conjunction with castables. The water repellent surface reduces excessive absorption of water needed for proper hydration of cements and castable refractories.

### RECOMMENDED THICKNESSES

Operating temperatures, cost of fuel, operating time, ambient temperature and other factors determine the most economical thickness for block insulation. The following table, taken from U.S. Department of Commerce Commercial Standards CS-117, offers a practical guide for typical applications—and maximum efficiency.

Operating Temperatures	Thickness of M-Block	Operating Temperatures	Thickness of M-Block
Up to 200 F.	1"	700 to 900 F.	3½"
200 to 400	1½"	900 to 1100	4"
400 to 500	2"	1100 to 1300	4½"
500 to 600	2½"	1300 to 1500	5"
600 to 700	3"	1500 to 1600	5½"

### APPLICATIONS

Blast Furnace Stoves • Refractory Back-up • Ceramic Kilns • Tanks • Towers • Ovens  
Fan Housings • Boiler Walls • Melting Tanks • Annealing Pits • Hot Air Ducts • Heat  
Treating Furnaces • Chilling Pits • Turbines • Pit Covers • Breechings

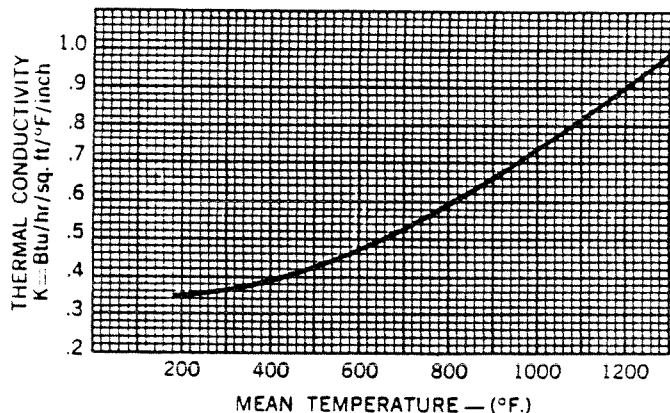
### PHYSICAL PROPERTIES

Temperature Range . . . . .	Up to 1900°F.
Thermal Conductivity . . . . .	See graph below
Compressive Strength . . . . .	18 psi
Breaking Strength (10" span) . . . . .	30 lbs. per inch thick
Shrinkage @ 1900°F. (lineal) . . . . .	1.9%
Density . . . . .	1.25 lbs. per bd. ft.
Stability . . . . .	Inert, durable
Resistance to Moisture . . . . .	Water repellent
Resistance to Corrosion . . . . .	Noncorrosive
Handling Characteristics . . . . .	Durable; Cleaner, less dusting

Kaiser Refractories M-Block Insulation complies with performance requirements of ASTM Specification C-392 Class 2, Federal Specification HH-1-564, and Commercial Standards CS-117 of the U.S. Department of Commerce.

### THERMAL CONDUCTIVITY

Pure mineral fibers combined with binder and other materials produce a product of low thermal conductivity and high refractoriness. M-Block insulation possesses the necessary dead air space, light weight and durability that makes a truly good insulating material. Its density is 15 to 16 pounds per cubic foot. In checking the thermal conductivity chart below it is readily apparent that M-Block Insulation is an outstanding insulating material for your heated equipment.



### ECONOMICAL

Kaiser Refractories M-Block insulation costs less per board foot than many insulators of inferior thermal value and temperature range. Material, construction and maintenance costs are less, as are fuel costs. In fact, M-Block insulation will pay for itself in a short period of time in fuel savings alone. M-Block's durability and high efficiency insure sustained savings throughout the long life of the material.

**PACKAGING DATA — KAISER REFRACTORIES M-BLOCK INSULATION**

Standard Sizes		Standard Thicknesses						
		1"	1½"	2"	2½"	3"	3½"	4"
6" x 18"	Pieces/Ctn.	48	32	24	20	16	12	12
	Sq. ft./Ctn.	36	24	18	15	12	9	9
	Bd. ft./Ctn.	36	36	36	37.5	36	31.5	36
	Weight/Ctn. (lbs.)	45	45	45	45	45	39.5	45
6" x 36"	Pieces/Ctn.	24	16	12	10	8	6	6
	Sq. ft./Ctn.	36	24	18	15	12	9	9
	Bd. ft./Ctn.	36	36	36	37.5	36	31.5	36
	Weight/Ctn. (lbs.)	45	45	45	45	45	39.5	45
12" x 18"	Pieces/Ctn.	24	16	12	10	8	6	6
	Sq. ft./Ctn.	36	24	18	15	12	9	9
	Bd. ft./Ctn.	36	36	36	37.5	36	31.5	36
	Weight/Ctn. (lbs.)	45	45	45	45	45	39.5	45
12" x 36"	Pieces/Ctn.	12	8	6	5	4	3	3
	Sq. ft./Ctn.	36	24	18	15	12	9	9
	Bd. ft./Ctn.	36	36	36	37.5	36	31.5	36
	Weight/Ctn. (lbs.)	45	45	45	45	45	39.5	45
18" x 24"	Pieces/Ctn.	12	8	6	6	4	4	3
	Sq. ft./Ctn.	36	24	18	18	12	12	9
	Bd. ft./Ctn.	36	36	36	45	36	42	36
	Weight/Ctn. (lbs.)	45	45	45	56	45	52.5	45
24" x 36"	Pieces/Ctn.	6	4	3	3	2	2	2
	Sq. ft./Ctn.	36	24	18	18	12	12	12
	Bd. ft./Ctn.	36	36	36	45	36	42	48
	Weight/Ctn. (lbs.)	45	45	45	56	45	52.5	60

\*Packaged in telescope type carton, not Tear-Tape.

SPECIAL SIZES: Write for prices and packaging on non-standard sizes and thicknesses not tabulated above.

**TEAR-TAPE CARTON CONVENIENCE**

M-Block insulation is packaged in handy tear-tape cartons that simply zip in half, baring the contents for easy removal. No flaps to hinder access. Two men can work from one carton.



Start tab; pull tape completely around carton, leaving base as holding tray.



Note ease with which M-Block can be removed from base for ready use.

**JOB-MATCHED KAISER REFRACTORIES INSULATING PRODUCTS**

**Plastic Insulation**

A dry mixture of high-temperature mineral fibers combined with other ingredients. Provides great adhesiveness and workability; resistance to severe usage and vibration; practically no shrinkage; high insulating value in service to 1800 F. Applied over block or blanket insulations, it provides a monolithic surface.

**Hard-Top®**

A hydraulic setting insulating and finishing cement. Designed for use on heating equipment of all types—valves, fittings, pipes, etc. Used as a one-coat finish over block and blanket insulation where temperatures do not exceed 1200 F. Sets up hard, without heat.

**Vee-Block Mix**

Extremely lightweight, vermiculite-base, castable insulation material. Weights only 24 lbs. per cu. ft., installed. Provides approximately same thermal conductivity as block insulation. Highly efficient insulation up to 1600°F.

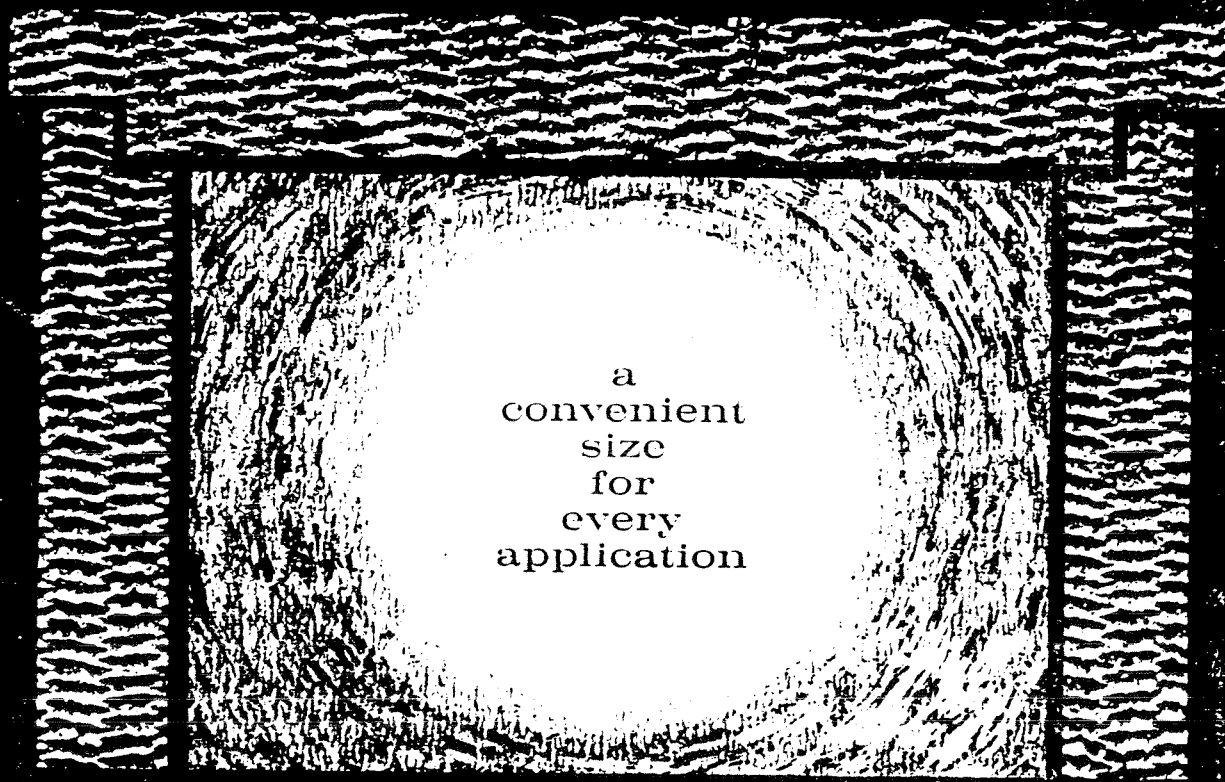
**INSULATING CASTABLES**

Product Name	ASTM Classification	Service Temperature Limit °F	Packaging	Material Required for Casting 1 Cu. Ft.	Method of Application	Water Required for Casting, %
I.R.C.	Q	2500	50 lb. Bag	70-80 lbs.	Cast or Gunned	40-47
ONE SHOT	Q	2400	50 lb. Bag	87-90 lbs.	Cast or Gunned	31-35
PURO-LITE	P	2250	50 lb. Bag	48-52 lbs.	Cast or Gunned	55-60
I.R.C.-22	P	2200	50 lb. Bag	48-50 lbs.	Cast or Gunned	40-47
I.R.C.-20	N	1800	50 lb. Bag	46-48 lbs.	Cast	46-55
I.R.C.-20-G	N	1800	50 lb. Bag	—	Gunned	—
PLASTIC INSULATION	*	1800	50 lb. Bag	24 lbs.	Troweled	190-200
VEE-BLOCK MIX	Special	1600	50 lb. Bag	24 lbs.	Cast	170-200

\*Complies with requirements of ASTM C-195.

**KAISER  
REFRACTORIES**

# M-BLOCK INSULATION



a  
convenient  
size  
for  
every  
application

KA KAISER  
REFRACTORIES

**TEMPERATURES  
UP TO  
1900° F**

# Kaiser M-BLOCK

Insulation provides high thermal efficiency and mechanical strength from room temperatures to 1900° F.

## HIGHEST QUALITY

Kaiser M-Block is made from chemically stable mineral fiber and other selected high temperature insulators. It combines physical stability and high thermal efficiency with a wide range of convenient sizes to provide the industrial user with a single, easily worked insulation for every application.

## EASY TO INSTALL

Light weight, low density Kaiser M-Block is available in thicknesses up to 4 inches. Most installations will require only one layer, providing reduced installation cost and increased efficiency. Due to its high mechanical strength, Kaiser M-Block requires a minimum of reinforcement. It is easily cut with knife or saw to form any shape, and it can be pressed over projections without cutting. The embossed surface of Kaiser M-Block provides a strong grip for insulating cement finishes.

## RESISTANT TO MOISTURE

In refractory back-up insulation M-Block is often used in conjunction with castables. The water repellent surface reduces excessive absorption of water needed for proper hydration of cements and castable refractories.

## RECOMMENDED THICKNESSES

Operating temperatures, cost of fuel, operating time, ambient temperature and other factors determine the most economical thickness for block insulation. The following table, taken from U. S. Department of Commerce Commercial Standards CS-117, offers a practical guide for typical applications — and maximum efficiency.

Operating Temperatures	Thickness of M-Block	Operating Temperatures	Thickness of M-Block
Up to 200 F.	1"	700 to 900	3 1/2"
200 to 400	1 1/2"	900 to 1100	4"
400 to 500	2"	1100 to 1300	4 1/2"
500 to 600	2 1/2"	1300 to 1500	5"
600 to 700	3"	1500 to 1600	5 1/2"

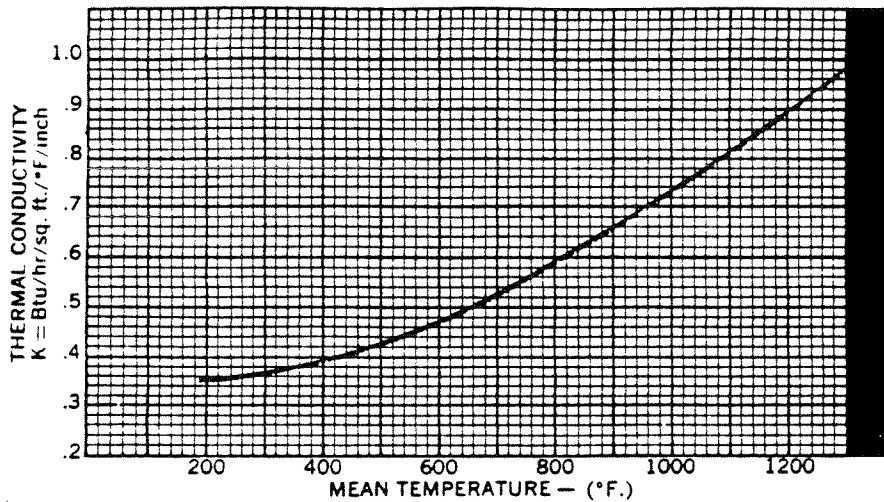
## PHYSICAL PROPERTIES

Temperature Range	Up to 1900° F.
Thermal Conductivity	See Graph
Compressive Strength	18 psi
Breaking Strength (span)	30 lb. per inch thick
Shrinkage at 1900° F. (lineal)	1.9%
Density	1.8 lb. per bd. ft.
Stability	Inert, durable
Resistance to Moisture	Water repellent
Resistance to Corrosion	Noncorrosive
Handling Characteristics	Cleaner, less dusting

Kaiser M-Block Insulation complies with performance requirements of ASTM Specification C-392 Class 2, Federal Specification HH-I-564, and Commercial Standards CS-117 of the U. S. Department of Commerce.

# THERMAL CONDUCTIVITY

Pure mineral fibers combined with binder and other materials produce a product of low thermal conductivity and high refractoriness. Kaiser M-Block Insulation possesses the necessary dead air space, light weight and durability that make a truly good insulating material. Its density is 21 to 22 pounds per cubic foot; in checking the thermal conductivity chart below it is readily apparent that Kaiser M-Block Insulation is an outstanding insulating material for your heated equipment.



## ECONOMICAL

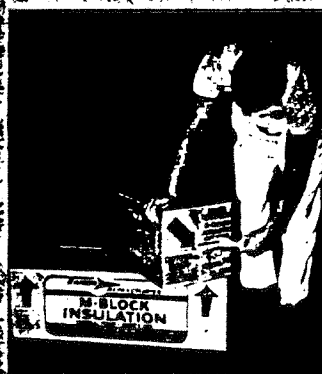
Kaiser M-Block Insulation costs less per board foot than many insulators of inferior thermal value and temperature range. Material, construction and maintenance costs are less, as are fuel costs. In fact, Kaiser M-Block Insulation will pay for itself in a short period of time in fuel savings alone. M-Block's durability and high efficiency insure sustained savings throughout the long life of the material.

## APPLICATIONS

- |                      |                        |
|----------------------|------------------------|
| Blast Furnace Stoves | Melting Tanks          |
| Refractory Back-up   | Annealing Pits         |
| Ceramic Kilns        | Hot Air Ducts          |
| Tanks                | Heat Treating Furnaces |
| Towers               | Chilling Pits          |
| Ovens                | Turbines               |
| Fan Housings         | Pit Covers             |
| Boiler Walls         | Breechings             |

## TEAR-TAPE CARTON CONVENIENCE

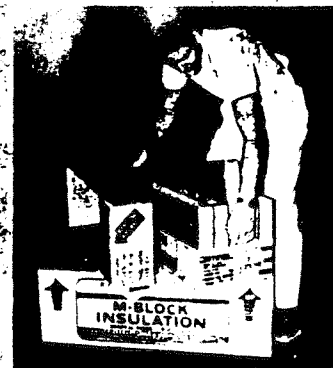
Kaiser M-Block is packaged in handy tear-tape cartons that simply zip in half, barring the contents for easy removal. No flaps to hinder access. Two men can work from one carton.



Start tab — pull tape completely around the carton.



Lift top half of carton from M-Block Insulation.



Note the ease with which M-Block can be removed from carton.

# KAISER M-BLOCK INSULATION / packaging data

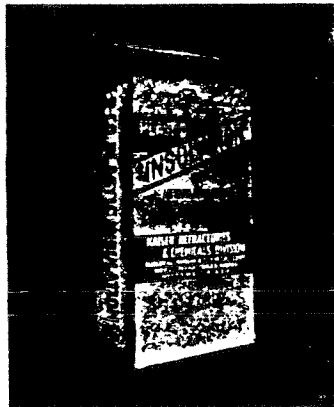
STANDARD SIZES		STANDARD THICKNESSES						
		1"	1½"	2"	2½"	3"	3½"	
6" x 18"	Pieces Ctn.	48	32	24	20	16	12	
	Sq. ft. Ctn.	36	24	18	15	12	9	
	Bd. ft. Ctn.	36	36	36	37.5	36	31.5	
	Weight Ctn. (lbs.)	65	65	65	65	65	56	
6 x 36"	Pieces Ctn.	24	16	12	10	8	6	
	Sq. ft. Ctn.	36	24	18	15	12	9	
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	Bd. ft. Ctn.	36	36	36	37.5	36	31.5	
	Weight Ctn. (lbs.)	65	65	65	65	65	56	
18 x 24"	Pieces Ctn.	12	8	6	6	4	4	
	Sq. ft. Ctn.	36	24	18	18	12	12	
	Bd. ft. Ctn.	36	36	36	45	36	42	
	Weight Ctn. (lbs.)	65	65	65	81	65	76	
18" x 36"	Pieces Ctn.	6	4	3	3	2	2	
	Sq. ft. Ctn.	27	18	13.5	13.5	9	9	
	Bd. ft. Ctn.	27	27	27	33.75	27	31.5	
	Weight Ctn. (lbs.)	50	50	50	60	50	56	
24" x 36"	Pieces Ctn.	6	4	3	3	2	2	
	Sq. ft. Ctn.	36	24	18	18	12	12	
	Bd. ft. Ctn.	36	36	36	45	36	42	
	Weight Ctn. (lbs.)	65	65	65	81	65	76	

\* Packaged in telescope type carton - not Tear-Tape

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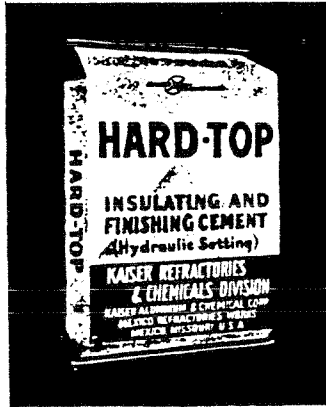
## JOB-MATCHED KAISER INSULATING PRODUCTS



### PLASTIC INSULATION \*

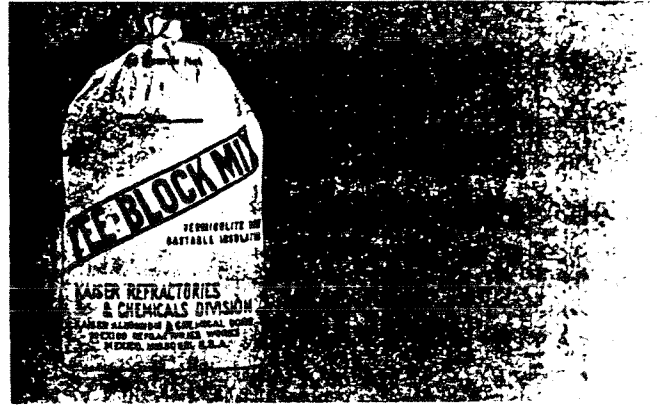
Kaiser PLASTIC INSULATION is a dry mixture of high temperature mineral fibers specially processed with other ingredients to produce a mouldable insulation. Applied over block or blanket insulations, it fills open joints and provides a monolithic surface. Use temp. to 1800° F.

\*TRADE NAME



### HARD-TOP \*

A hydraulic-setting insulating and finishing cement. Designed for use on heated equipment of all types, valves, fittings, etc. Kaiser HARD-TOP Insulating Cement is used as a one-coat finish over block and blanket insulation. Sets up hard without heat being applied.



### VEE-BLOCK MIX \*

Kaiser VEE-BLOCK MIX is an extremely light-weight vermiculite base castable insulation material. Installed weight is only 24 pounds per cubic foot. It possesses approximately the same thermal conductivity as block insulation. A highly efficient insulation up to 1600° F.

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\*TRADEMARKS OF KAI SER ALUMINUM & CHEMICAL CORPORATION

# KAISER REFRACTORIES

Kaiser Center, 300 Lakeside Drive, Oakland 12, California



M-16  
M-20  
M-23  
M-26  
M-28  
M-30

**KAISER**  
**INSULATING**  
**REFRACTORIES**

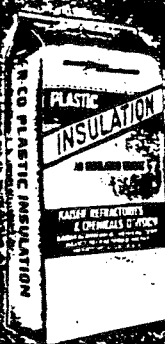
**KAISER**  
**REFRACTORIES**

# KAISER INSULATING MATERIALS

A wide variety of Kaiser insulating materials — mortars, castables, finishing cement and block insulation — are available to meet various insulating needs.

## KAISER M-5

An air-setting, high temperature mortar, M-5 was developed for laying and coating insulating firebrick. It has high tensile strength, a high fusion point, and forms a permanent ceramic bond that provides a properly sealed, heat-retardant bond. Only 850-400 pounds are required to lay 1,000 insulating brick.



## KAISER PLASTIC INSULATION

Plastic Insulation is a dry mixture of high temperature mineral wool fibers and other ingredients, designed to provide an easily moldable insulation. It is recommended for insulating valves, large piping, flanges, steam gates, flues, ducts, boiler setting tanks, heaters, furnaces — any hot surface up to 1800° F. where the savings is worthwhile.



## KAISER HARD-TOP

Hard-Top is a hydraulic-setting insulating and finishing cement designed for use on heated equipment of all types, including valves, fittings and pipes. It is commonly used as a one-coat finish over block and brick insulation where temperatures do not exceed 1200° F. Sets up hard, without heat.



## KAISER I-R-C

I-R-C combines the advantages of a mix-and-pour castable with those of an insulating concrete. It is lightweight, easily mixed and poured, and will not shrink on drying. I-R-C is ideal for lining breechings, flues, roofs, hearths, door linings and many others. It is usable up to 2500° F.; 78-80 pounds required per cubic foot.

## I-R-C GUNNING MIXES

Both I-R-C and I-R-C 20 lightweight castable refractory products are available in specially prepared mixes designed for air emplacement. Where gunning application is preferred — specify I-R-C G or I-R-C 20-G at time of ordering. Consult the specialty department for recommendations and application details — no obligation.



## KAISER I-R-C 20

I-R-C 20 is similar to I-R-C except it is lighter in weight and has greater insulating properties. Installed weight ranges between 46-48 pounds per cubic foot with thermal conductivity 70% less than firebrick. It can be cast or trowel. I-R-C 20 is designed for use up to 1800° F. Shipped in 50 pound bags.

## KAISER VEE-BLOCK MIX

Vee-Block Mix is an extremely lightweight, vermiculite-base castable insulation material with an installed weight of only 24 pounds per cubic foot. It provides approximately the same thermal conductivity as block insulation. Vee-Block Mix provides a highly efficient insulation up to 1600° F. It is ideal for single coat applications in such furnace locations as walls, roofs, soot hoppers, arches, and other similar areas.

## KAISER VEE-BLOCK

Vee-Block is a vermiculite block insulation designed for applications up to 1800° F. It is lightweight, retains its strength at high temperatures, and shrinkage is negligible. Vee-Block can be easily sawed to fit odd shapes, seams and contours. It has an extremely low coefficient of heat transfer. Furnished in blocks 6" thick, any size up to 12" x 36". Shipped in cartons.



## KAISER M-BLOCK

M-Block is a lightweight, low density insulating block designed for applications up to 1900° F. Manufactured of chemically stable mineral fiber, M-Block combines low thermal conductivity, mechanical strength and durability, with high refractoriness. Available in thicknesses up to 4 inches. M-Block is furnished in a wide range of convenient sizes to provide a single, easily worked insulation for most every application.



*For Performance Dividends...*  
**USE and SPECIFY**  
**KAISER**  
**REFRACTORY**  
**CASTABLES**

**KAISER REFRACTORIES & CHEMICALS DIVISION**

KAISER ALUMINUM & CHEMICAL SALES, INC.

# KAISER INSULATING MATERIALS

A wide variety of Kaiser insulating materials — mortars, castables, finishing cement and block insulation — are available to meet various insulating needs.



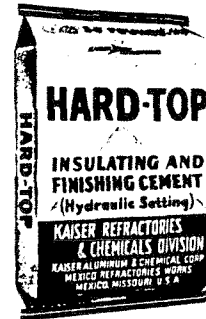
### KAISER M-5\*

An air-setting, high temperature mortar, M-5 was developed for laying and coating insulating firebrick. It has high tensile strength, a high fusion point, and forms a permanent ceramic bond that provides a properly sealed, heat retardant bond. Only 350-400 pounds are required to lay 1000 insulating brick.



### KAISER PLASTIC INSULATION\*

Plastic Insulation is a dry mixture of high temperature mineral wool fiber and other ingredients, designed to provide an easily moldable insulation. It is recommended for insulating valves, large piping, flanges, steam gates, flues, ducts, boiler setting tanks, heaters, furnaces — any hot surface up to 1800°F. where heat saving is worthwhile.



### KAISER HARD-TOP\*

Hard-Top is a hydraulic-setting insulating and finishing cement designed for use on heated equipment of all types, including valves, fittings and pipes. It is commonly used as a one-coat finish over block and blanket insulation where temperatures do not exceed 1200°F. Sets up hard, without heat.



### KAISER I-R-C\*

I-R-C combines the advantages of a mix-and-pour castable with those of an insulating concrete. It is lightweight, easily mixed and poured, and will not shrink on drying. I-R-C is ideal for lining breechings, flues, roofs, hearths, door linings and many others. It is usable up to 2500°F.; 78-80 pounds required per cubic foot.

### I-R-C GUNNING MIXES

Both I-R-C and I-R-C 20 lightweight castable refractory products are available in specially prepared mixes designed for air emplacement. Where gunning application is preferred — specify I-R-C G or I-R-C 20-G at time of ordering. Consult the specialty department for recommendations and application details — no obligation.



### KAISER I-R-C 20\*

I-R-C 20 is similar to I-R-C except it is lighter in weight and has greater insulating properties. Installed weight ranges between 46-48 pounds per cubic foot, with thermal conductivity 70% less than fireclay brick. It can be cast or troweled. I-R-C 20 is designed for use up to 1800°F. Shipped in 50-pound bags.

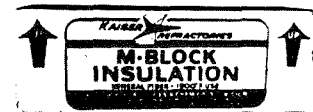


### KAISER VEE-BLOCK MIX\*

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# KAISER ALUM + CHEM CORP.

Plastic K-N: Dark-colored, wet, dense, pliable, moldable refractory. (1974) (Didn't release airborne ash because it was a wet product.)

K/R1202: A direct-bonded basic refractory brick (non-asbestos) but did supply the brick to certain customers. Asbestos-containing paper after 74-78 which then covered metal casing but not within geographic area.

Coelex 60 Unitab Liners: Supplied asbestos paper sold to cement for use in the interior burn areas of rotary kilns. Mid-1960s to 1970s. Sold 1959-72.

K/R M-Block Insulation: Sold by K/R only. Packaged and manufactured by others.  
(Manufacturer: M.H. Detrick Co., 1939-64)  
(Manufacturer: C-E Refractories, 1970-74)  
(Manufacturer: Keene Corp., 1974-84)

K/R Hard-Top Finishing Cement: Sold from 1959-1972.  
(Manufacturer: M.H. Detrick Co., 1956-64)  
(Manufacturer: Refractories & Insulation Corp., 1964-70)  
(Manufacturer: C-E Refractories Division, 1970-74)  
(Manufacturer: Keene Corp., 1974-Dec. 31, 1984)

K/R Plastic Insulation: Sold from 1959-1972.  
(Manufacturer: M.H. Detrick Co., 1956-64)  
(Manufacturer: Refractories & Insulation Corp., 1964-70)  
(Manufacturer: C-E Refractories Division, 1970-74)

K/R Vee Block Insulation: 1959-mid 74.

K/R Vee Block Mix: 1959-74.

K/R Super D Block Insulation: 1971-74.



NET WEIGHT-MADE

**KAISER**  
REFRACTORIES

**Vee-Block Mix**

VERMICULITE BASE  
CASTABLE INSULATION

KAISER REFRACTORIES; Vermiculite Vee-Block Mix