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STEAM SERVICES, HEATING
INSTRUMENTS, CONTROLS
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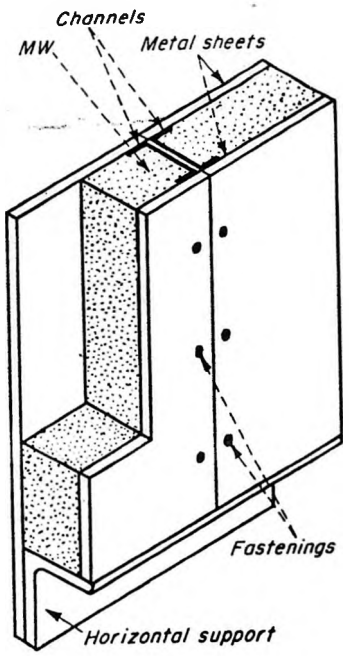
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Insulation Handbook: Part 5

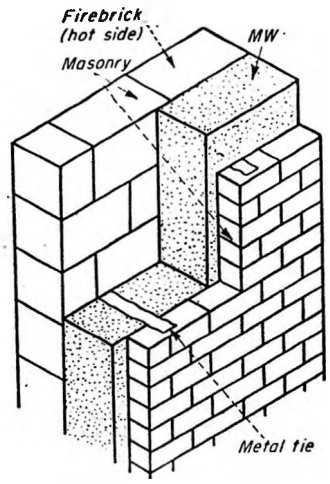
How To Apply Mineral Wool Heat Insulation

By PHIL SWAIN, *Editor*



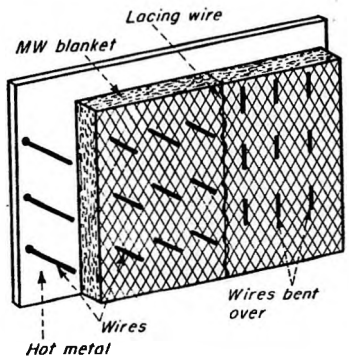
BETWEEN MASONRY WALLS

Use flat metal ties like those for building construction. Walls support insulation. Ties help hold masonry together



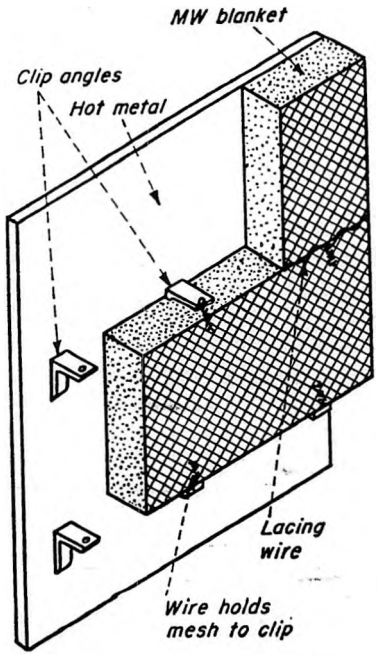
BETWEEN METAL SHEETS

Fasten outer and inner sheets to structural channels or I-beams. Support insulation from below



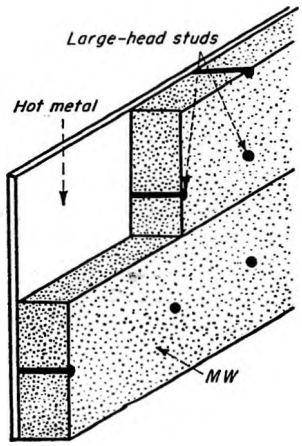
BLANKET, WIRE-IMPALED

Spot-weld wires to heated metal surface. Impale insulation and bend wires over its face. Lace edges of blankets together with galvanized wire



CLIP-ANGLE SUPPORTS

Blanket held in place by metal mesh wired to clip angles at suitable intervals. Lacing wire joins abutting edges



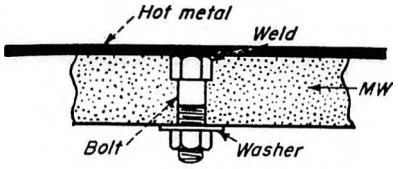
STUD-GUN WELDED

Insulation attached by studs inserted through it and welded to metal surface behind by gun-type equipment

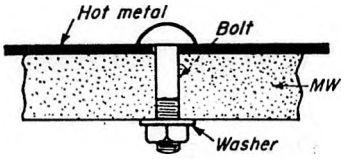
Note: In all the drawings shown here MW stands for mineral wool.

Practical know-how for all types of power equipment. Drawings and condensed instructions summarize standard procedures in U S Dept of Commerce Commercial Standard CS117-49, *Mineral Wool Insulation For Heated Industrial Equipment*, 2nd Ed, 1949

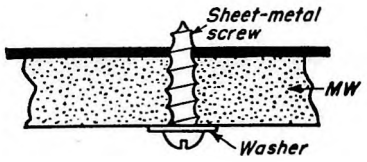
FOUR SUPPORTS



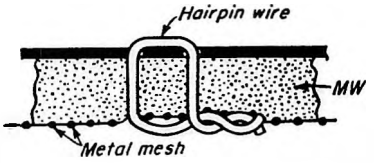
Bolt Heads welded to metal surface, *upper left*. Large washer increases bearing area on insulation



Sheet-Metal Screw and washer hold insulation in place on heated metal surface, *lower left*

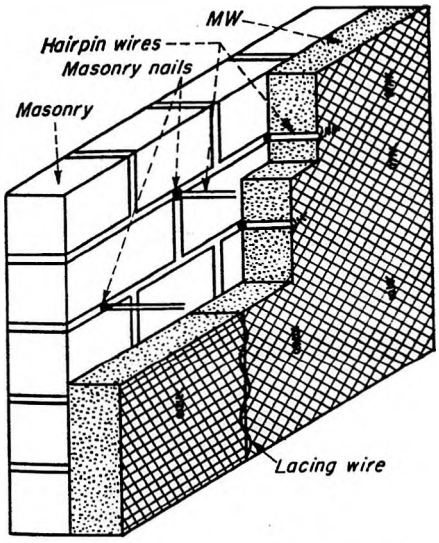


Bolts Through Drilled Holes in heated surface hold insulation. Washer gives larger bearing area, *upper right*



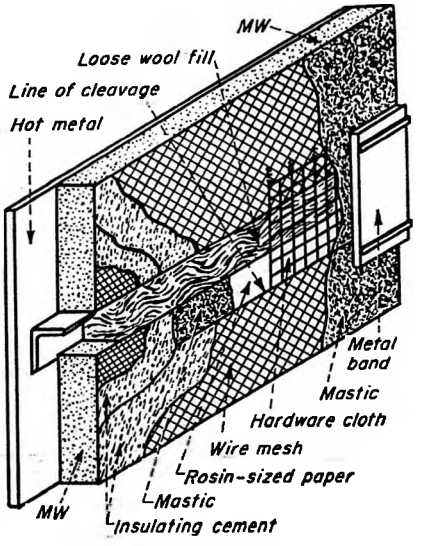
Hairpin Wires and metal mesh, *lower right*. Wires pass through twin holes in heated surface and insulation. Twist together to hold blanket in place

NAIL FASTENING, MASONRY WALLS



Drive masonry nails into joints and fasten hairpin wires to nail heads. Apply blanket insulation with metal-lath face exposed. Secure with hairpin wires. Tightly butt blanket edges and lace together or tie at frequent intervals with 16-gage galvanized wire

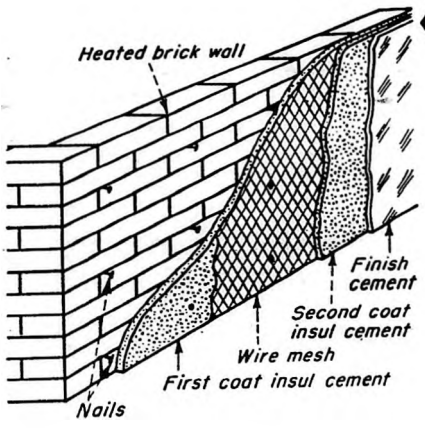
EXPANSION JOINT, LARGE METAL VESSEL



Use every 12 to 16 ft on equipment with temperature greater than 600 F. Leave 1½- to 2-in. space between rows of blanket. First apply a ¼-in. coat of insulating cement, then a 4-in.-wide strip of asphaltic mastic over cement just below space between blankets. When dry, fill space with loose mineral wool. Then apply second coat of cement over all except loose wool and mastic. Stretch 20-gage 1-in. wire mesh over cement and secure in place. Do not cover expansion-joint space. Cover mastic strip first with rosin-sized paper and then both expansion joint and paper strip with 1¼-in. mesh hardware cloth. Lace cloth to mesh, leaving bottom free to move with expansion and contraction. Cover entire vessel with weatherproof mastic leaving a line of cleavage at lower edge of each cloth. Metal-band protector may be added over expansion joint

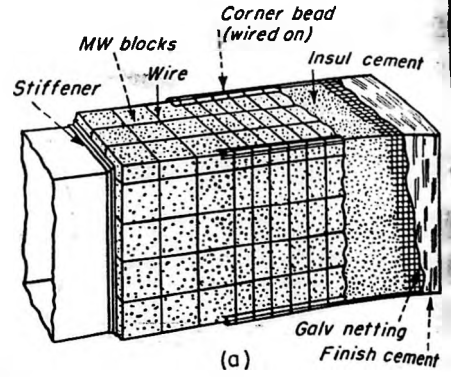
For more insulation facts, turn page→

CEMENT ON BRICK WALL

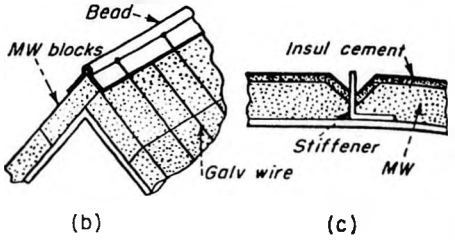


Drive masonry nails into joints on about 12-in. centers, heads projecting about ¾ in. Apply layer of insulating cement until proper thickness is obtained. Apply wire netting and secure to nails before last layer of insulating cement. Then apply cement or asphaltic finish

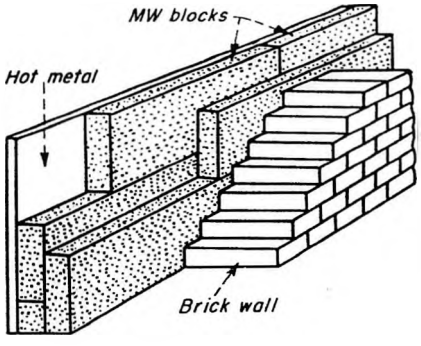
FLAT SURFACES



(*a*) shows application where insulation thickness is greater than stiffener height
(*b*) is detail of a corner bead
(*c*) applying insulation when thickness equals or is less than stiffener height

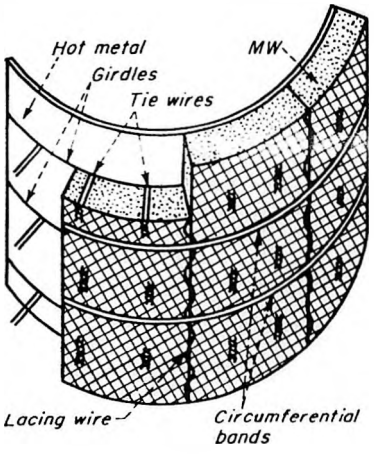


FURNACE WALLS



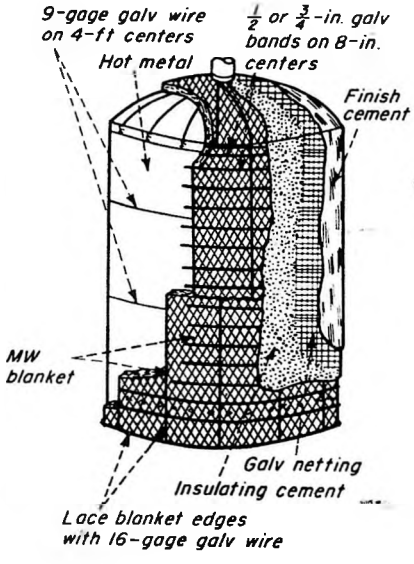
With each wall self-supporting merely lay in blocks or boards, staggering the joints. Butt tightly

BLANKET ON TANK: 1



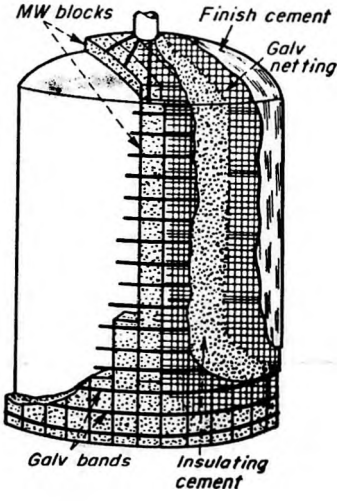
With expanded-lath side exposed, secure blanket to supports. Butt edges tightly, then lace together or tie at frequent intervals along the edges with 16-gage galvanized wire. Lastly, band or wire circumferentially

BLANKET ON TANK: 2



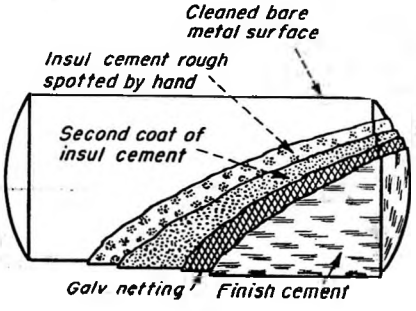
Round surface makes it easy to bind blanket insulation firmly to the metal. Blanket is held by wire girdles, lacing, netting and bands

BLOCK, BOARD ON TANK



Butt blocks or boards closely together with joints staggered. Anchor blocks. Then fill voids with insulating cement. Stretch galvanized-wire netting over blocks and apply insulating cement. Stretch second layer of netting and finish with cement or asphaltic

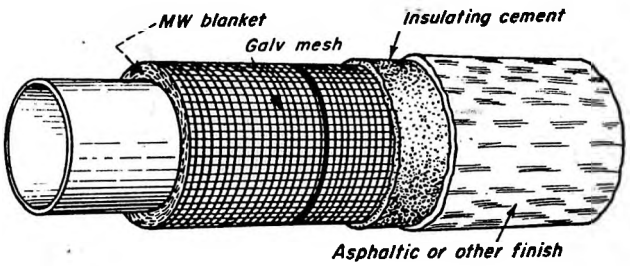
CEMENT ON TANK



Spot first ¾-in. layer by hand, roughing in completely. When dry, apply single layers, ¾-in. thick or less. Use netting for total thickness over 2 in., tanks which vibrate, or on under sides

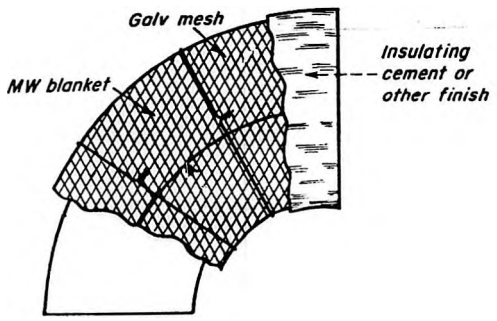
BLANKET ON PIPE

Form insulation roughly to fit pipe before applying. Put on pipe and pull longitudinal edges tightly together. Tie or lace with 16-gage galvanized soft-iron wire. Keep seam on lower side of pipe. Space insulation far enough from flanges to allow bolt removal. Apply insulating cement and finish



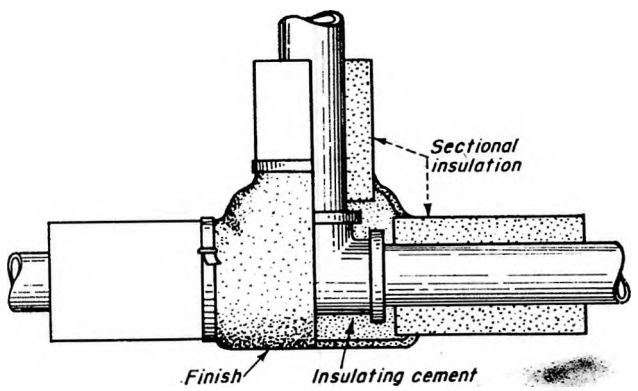
BLANKET ON PIPE FITTINGS

Valves, flanges and fittings for pipes 2-in. and larger should be insulated with blankets the same thickness as on adjacent piping. This insulation is applied after that on pipe. It is formed to fit by cutting, wired in place. Lace the edges. Insulating cement or blocks may be used instead of blankets



INSULATING CEMENT ON FITTINGS

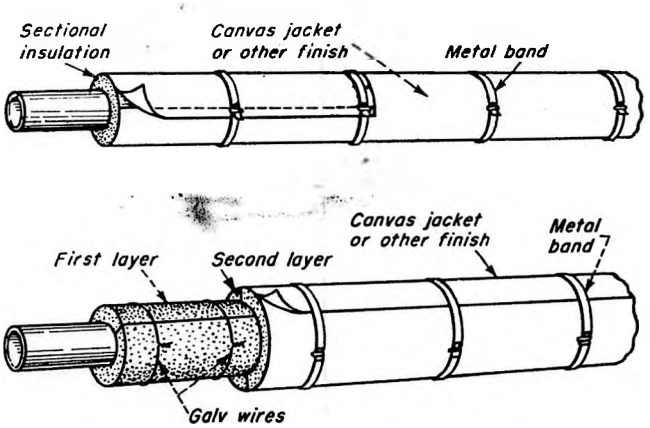
First coat of sufficient thickness must dry and form an even base for two separate ¼-in. finishing layers. Pipes, valves, flanges and fittings may be finished with roofing-felt, an asphaltic coating or a canvas jacket. Roofing-felt is held in place with copper-clad steel wires, copper wires or galvanized bands. Asphaltic finish is reinforced by galvanized-wire netting. Canvas jackets must be sewn or pasted over a layer of flame-proof asbestos paper or a ¼-in. coat of insulating or finishing cement



SECTIONAL PIPE COVERING

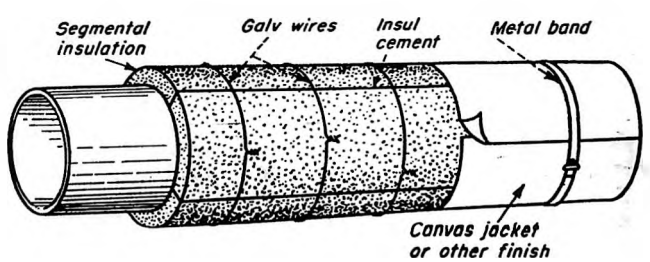
Single Layer, *upper sketch,* is applied by butting sections closely and banding canvas jacket or other finish over insulation. Insulation must be kept far enough from flange to permit bolt removal

Double Layer, *lower sketch,* is applied by wiring first layer in place with separate loops spaced on about 8-in. centers. Omit canvas jacket between layers. Second layer is banded in place over first, using canvas jacket or other finish. Never leave any sharp projections on bands. They may cut finish

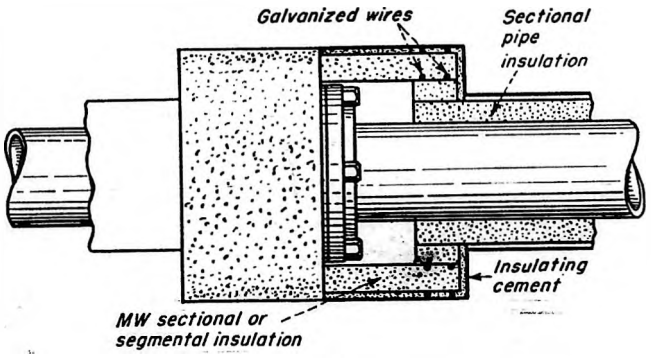


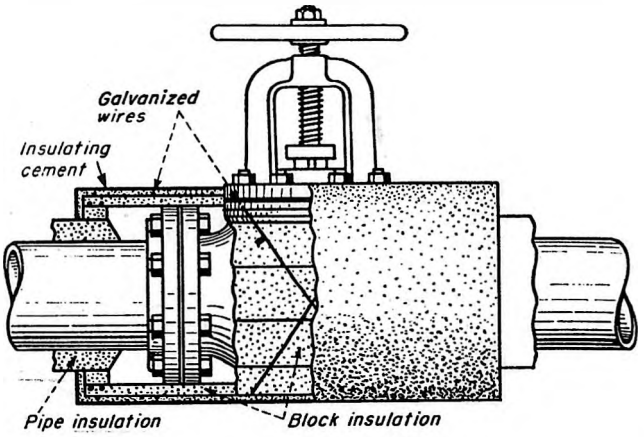
SEGMENTAL PIPE COVERING

To get a good job, butt segments tightly before wiring in place with 16-gage galvanized wire spaced on about 8-in. centers. Use insulating cement in joints where needed. Bend over ends of wires and press into insulation. Finish with canvas jacket or other material and band with metal



For more insulation facts, turn page→





MOLDED-TYPE FOR COUPLINGS

You can use molded-type pipe insulation to insulate flanged couplings. Wire rings of sectional pipe covering 1½ to 2 in. wide on each side of the flange. Rings should have an OD greater than flange diameter. Band a piece of sectional pipe insulation in place over flange and rings. Finish with insulating cement or other material

BLOCKS ON FITTINGS

For large fittings use blocks that are ¼ in. less thick than the insulation on the adjacent piping. Fit carefully and wire securely in place with 16-gage galvanized wire. Then apply ¼-in. coat of insulating cement over blocks, troweling it well into all cracks between adjacent blocks. Other specified finishes may be used in place of insulating cement

Facts to Remember About Mineral Wool

Mineral wool is rock, slag or glass processed from molten to fibrous form. It is used in loose, granulated, felt, blanket, batt, block, board, molded and blanket (for pipes) form. Insulating cement is a dry mixture of mineral wool and other ingredients which when mixed with water can be troweled.

Commercial mineral wool is classed according to maximum temperature limits as:

Class	Temperature, F
A	600
B	1000
C	1200
D	1600
E	1800

The K Factor

The K value (Btu transmitted per hr per sq ft for a temperature gradient of 1 deg F per inch of thickness) varies from a low of 0.35 for batts at 200-F mean temperature to a high of 0.80 for insulating cement at a mean temperature of 400 F. Other forms fall in between these values. Density and physical properties depend on form and intended use.

For low temperatures K doesn't exceed value of 0.28 at 50-F mean temperature. Minimum thicknesses recommended for refrigerated spaces vary from 3 to 4 in. at 35 F to 12 in. or more at –10 F and below—*Commercial Standard CS105-48.*

Pipe Insulation

Molded-type pipe insulation comes in 1, 1½, 2, 2½, 3 and 4-in. thicknesses for all nominal pipe sizes. It is also available in "standard" and "double standard" thicknesses. table below:

Insulation Thickness: Standard (S) And Double Standard (DS)

Pipe size, nominal	*S*	*DS*
1/2 to 1 1/2	7/8	1 3/4
2 to 3 1/2	1 1/32	2 1/16
4 to 6	1 1/8	2 1/4
8 & 10	1 1/4	2 1/2
12 and over	1 1/2	3

Flat-Surface Insulations

Loose or granulated mineral wool for use at temperatures up to 1600 F is packaged in bags containing up to 40 lb each. Felts suitable for use up to 600 F come in sizes 1 to 4 in. thick x 24 in. wide, 30 or 48 in. long. Blankets suitable up to 1200 F come in 1 to 6-in. thicknesses x 24 in. wide, 4 or 8 ft long.

Industrial batts usable up to 1200 F are 1 to 4 in. thick x 24 in. wide, 4 ft long. Blocks are 1 to 4 in. thick x 6 or 12 in. wide, 18 or 36 in. long. 1 to 3-in.-thick boards, 12 to 36 in. wide, 3 or 4 ft long, are also standard. These blocks and boards can be used at temperatures up to 1200 F, according to class.

Insulating cement can be used at any temperature up to 1800 F. It is packaged in 50 lb bags. Minimum coverage is 45 sq ft, 1 in. thick, per 100 lb of dry cement.

Application

Here are a few characteristics important in using mineral wool:

Loose, Granulated and Batt Wool: Low in cost but need structural retention and protective finish such as a metal shell or masonry.

Felts and Blankets: Low in cost, good thermal value with some rigidity. Not designed for load-bearing service.

Blocks and Boards: Rigid with good compressive strength. Can be installed where operators may have to cross insulation for maintenance, etc.

Blanket-Type Pipe Insulation: Flexible with good thermal properties.

Molded-Type Pipe Insulation: Rigid and strong, it is easy to install.

Insulating Cement: Good adhesive properties and easy to spread over valves and fittings. It can be re-used.



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EAGLE-PICHER DE-85 BLOCKS

A highly efficient, rigid-type insulating material composed almost entirely of pure, lightweight, Eagle-Picher Diatomaceous Earth. High physical strength enables these blocks to stand up under usage normally encountered in installation. Adaptable to virtually all types of heated equipment. Can be cut with a knife, or sawed, to fit irregular shapes. DE-85 Blocks for temperatures to 1300°F. DE-95 Blocks for temperatures to 2000°F.

EAGLE-PICHER "99" FINISHING CEMENT

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