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CROSS-INDEX OF SUBJECTS FOR THE MONTH

JULY 1950 • VOL 94 • NO. 7

PLANT OPERATING METHODS, MAINTENANCE AND SAFETY
STEAM GENERATION, FUELS, FIRING AND COMBUSTION
TURBINES, ENGINES, AUXILIARIES; HYDRO POWER
DIESELS, GAS ENGINES AND ACCESSORIES
AIR CONDITIONING AND REFRIGERATION
ELECTRICAL EQUIPMENT, ELEVATORS
PIPING, VALVES AND SPECIALTIES
TRANSMISSION, LUBRICATION
STEAM SERVICES, HEATING
INSTRUMENTS, CONTROLS
PUMPS, COMPRESSORS

FEATURE ARTICLES

DEPARTMENTS

VOLUME 94, NUMBER 7 • ABC • ABP •
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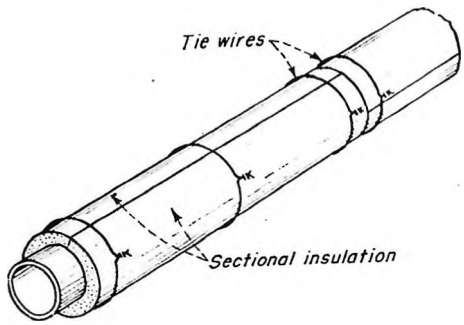
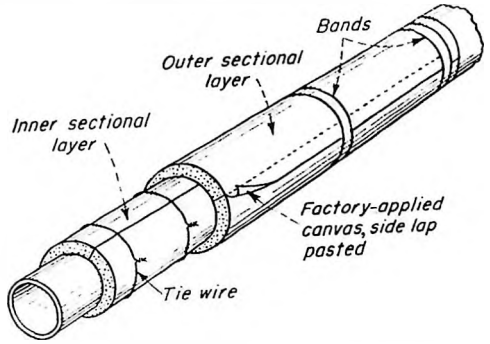
How to Apply 85% Magnesia Heat Insulation

By PHIL SWAIN, EDITOR



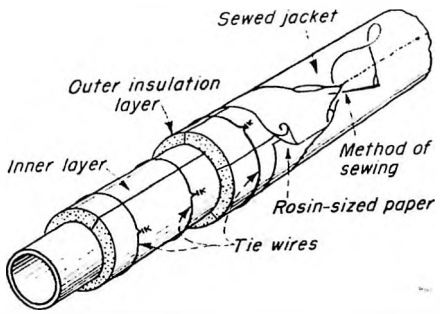
WIRED SECTIONAL

Here factory canvas is removed. Use at least 3 annealed iron wires per section. Twist wire ends together, bend over and press into insulation for protection. Stagger lengthwise joints. Point up all joints with 85% magnesia cement. An alternate method omits wiring, pastes down laps on factory canvas and applies metal bands



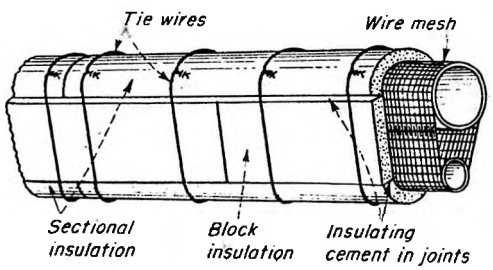
DOUBLE LAYER

Handle inner layer as before. Apply outer layer with all joints staggered. Outer layer may be wired without canvas like inner layer, or may be finished by pasting down factory canvas and banding



SEWED CANVAS JACKET

If cost of better looking, more durable job is warranted, remove factory canvas. Apply layers as above, followed by rosin-sized or sheathing paper. Stretch 8-oz canvas over paper, sew in place, coat with glue sizing, paint as desired. To avoid scorching canvas finish by heat from nearby flanges or other uninsulated surfaces, stop canvas and paper a few inches short of insulation end. Finish exposed ends with asbestos cement



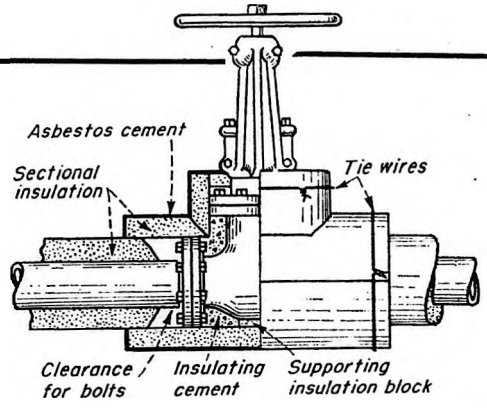
PARALLEL PIPING

Where two parallel pipes are too close for convenient separate insulation, or where a steam pipe must protect a water pipe from freezing, or keep oil line warm, arrangement pictured is convenient and practical

Practical know-how in convenient form. Drawings and condensed instructions summarize standard procedures in the *85% Magnesia Insulation Manual*, published by the Magnesia Insulation Manufacturers' Association, of Washington, D. C.

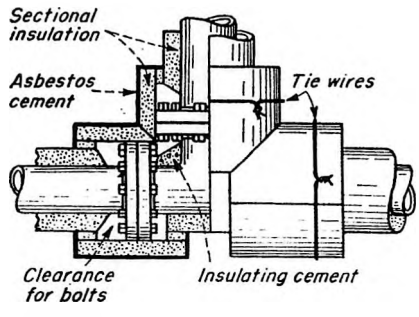
LARGE VALVES

To insulate valves of 4-inch pipe size or larger, build cover of block or sectional insulation of any convenient shape. Tie together with wires. Seal crevices with insulating cement. Use solid insulation half-inch thinner than pipe insulation to allow for cement finish. Then build to full thickness with asbestos cement, 2 coats.



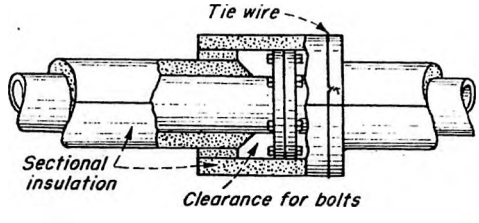
LARGE FITTINGS

Treat fittings, 4-inch and up, same as valves. Note: For valves and fittings under 4-inch, cover directly with asbestos cement in several half-inch layers to bring total thickness up to that of pipe covering. Allow each coat to dry before applying the next



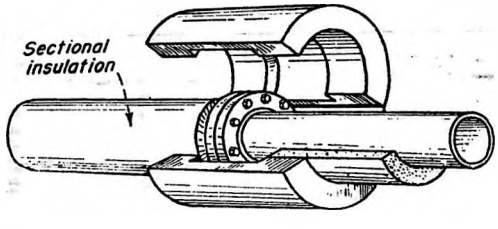
PERMANENT FLANGE INSULATION

Wire sectional insulation or blocks firmly in place and cover with asbestos cement. Extend flange insulation at least 2 inches over adjacent pipe insulation. Fill open space (in overlap) with insulating material. Cut back and bevel pipe insulation to allow removing bolts



REPLACEABLE FLANGE INSULATION

Design pictured can be removed and replaced. Wrap sectional insulation with wire mesh and finish with asbestos cement. Or build wire mesh in two halves, cover with blocks. Cover this with wire mesh and cement inside and out



For more insulation facts, turn page→

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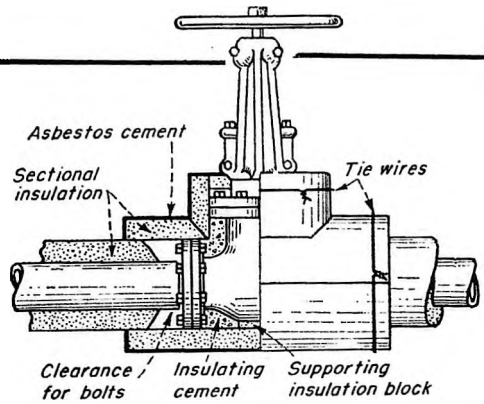

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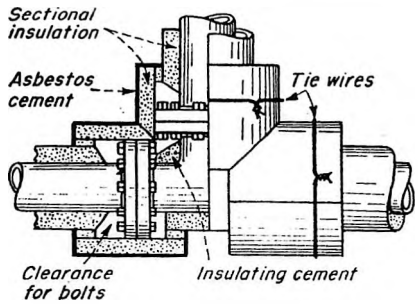

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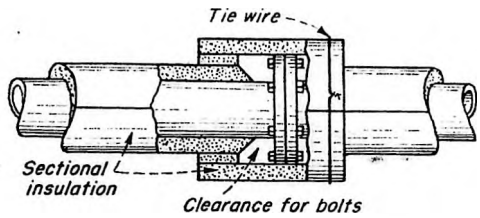

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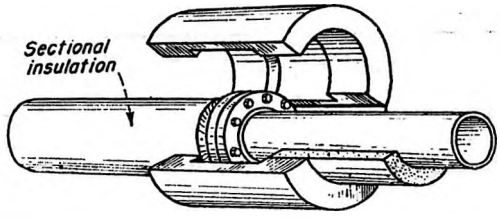
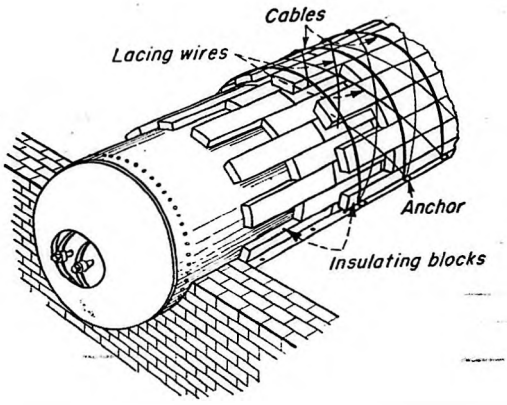
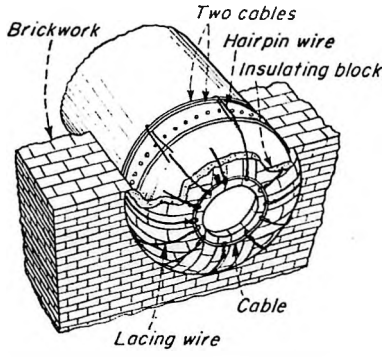


For more insulation facts, turn page→



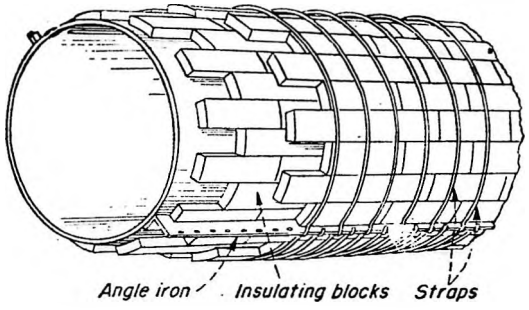
STEEL DRUMS

Where full circumference is not exposed, as with boiler drums, install firm anchorages. Fit blocks to cylinder, staggering joints, and bind firmly with annealed iron wire laced through steel straps or wire cables



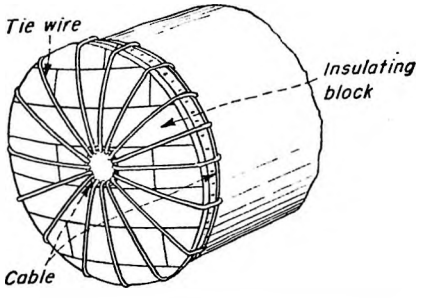
DRUM HEAD

Secure job requires anchoring blocks in manner shown, or equivalent. Since curved blocks are not available to fit round end of tank, pieces of flat block are used. These are held in place by network of wires. Finish with asbestos cement in one or several layers.



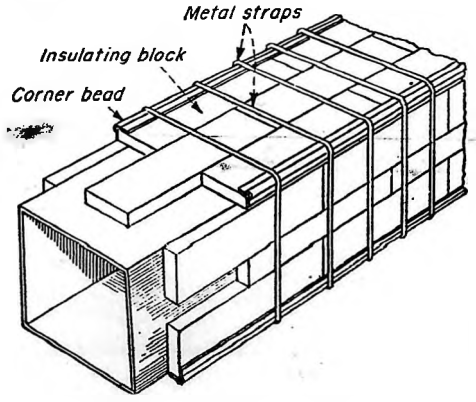
HORIZONTAL TANK

Horizontal tank pictured is completely encircled by insulation. Note that insulation in lower half tends to sag from tank, so must be more firmly held in place. Angle irons shown are one way. Asbestos cement finish



HORIZONTAL TANK END

Anchoring method, much like that for boiler-drum end but with more gradual curve, may allow use of full-size blocks. Asbestos cement finish

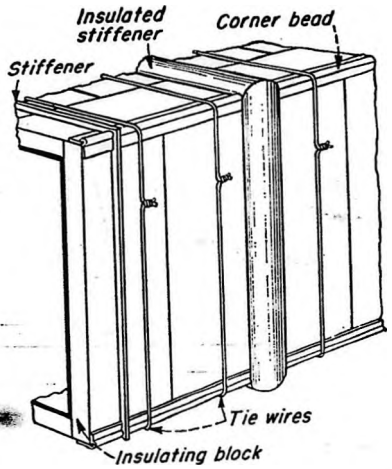


DUCTS WITHOUT STIFFENERS

Case pictured: breeching, duct or flue with no stiffeners or other projections. Nor is any provision needed for expansion. Blocks applied directly to surface and held by wire cables or metal straps. Metal heads protect corners

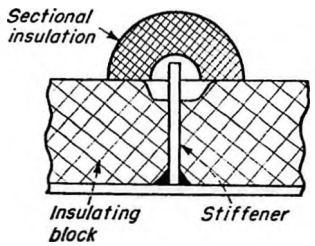
DUCT SURFACE WITH STIFFENERS

When projections are far apart and there's no need to allow for expansion and contraction, wire blocks directly to surface and insulate stiffeners as pictured below



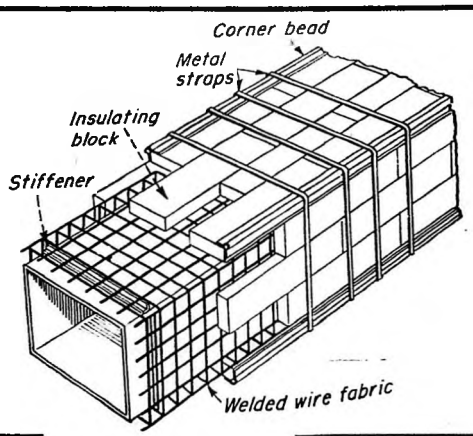
STIFFENER INSULATION

Half sections may be used to insulate stiffeners or other projections on ducts, shown above



DUCTS WITH PROJECTIONS

Where stiffeners or other projections are closely spaced, or where you must allow for expansion or contraction, stretch heavy-iron-wire fabric over the projections to form a foundation. Then wire blocks in place and finish with asbestos cement in the usual manner



Facts to Remember About 85% Magnesia

► As the name suggests, 85% magnesia contains not less than 85% of magnesium carbonate. To this white, crystalline, extremely light insulating material, the makers add 15% of asbestos fiber as a binder.

The wet mixture of magnesium carbonate and asbestos fibers is shaped first by molding and drying, then (usually) by machining to commercial dimensions. Usual commercial shapes are split shells—called sectional insulation—for piping, flat blocks, also curved blocks — segmental insulation—to fit large piping and tanks.

The K Factor

In a recent test of a commercial block of 85% magnesia, the U.S. Bureau of Standards measured the density as 13.2 lb per cu ft. The K value (Btu transmitted per hr per sq ft for a temperature gradient of 1 deg F per inch of thickness) was 0.39 at 130 F mean temperature. This compares with MIMA values of 0.39 at 100 F mean temperature, 0.45 at 300 F, and 0.51 at 500 F.

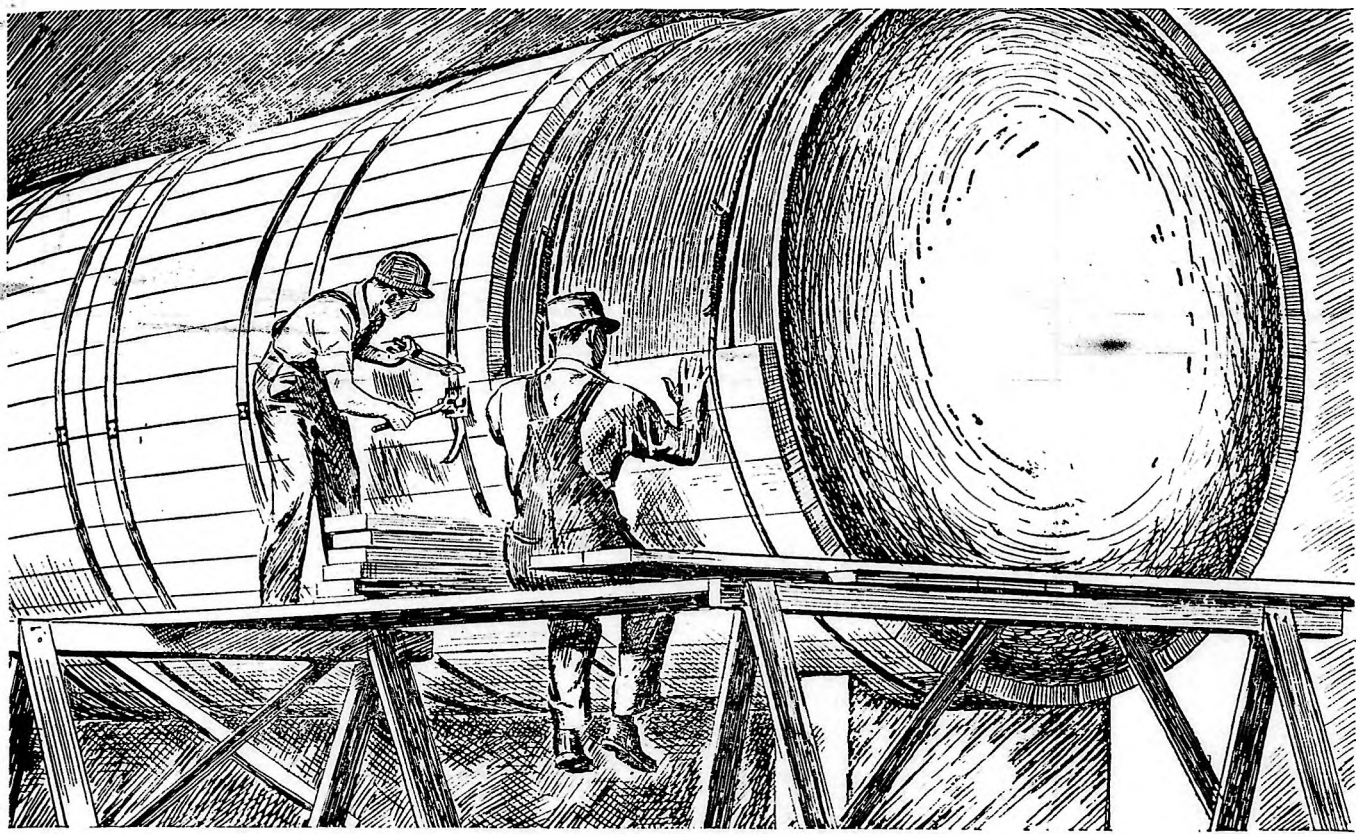
85% magnesia insulation withstands temperatures up to 600 F without damage. Above 600 F the material begins to calcine. It withstands repeated wetting and drying.

For heated surfaces operating above 600 F, an 85% magnesium outer layer is customarily applied over an inner layer of high temperature insulation—usually "diatomaceous silica," molded with a binding component of asbestos fiber.

Commercial thicknesses of sectional insulation and blocks include 1½, 2, 2½, and 3 in. Sectional insulation is also available in graded sizes known as "standard" and "double standard." See table below:

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

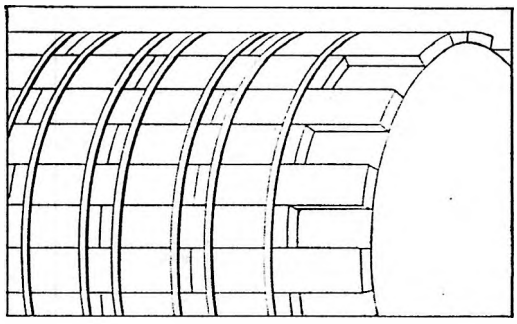
Pipe size, nominal	*S*	*DS*
½ to 1-½	7/8	1-29/32
2 to 3-½	1-1/32	2-5/32
4	1-⅛	2-¼
5 & 6	1-⅛	2-5/16
8 & 10	1-¼	2-½
12 and over	1-½	3



What's wrong with this picture?

Applying 85% Magnesia Block to an outdoor tank the way these men are doing it may lead to future trouble. They're banding the insulation on in regular courses instead of staggering the blocks. This will not cause appreciable heat loss, but it will focus the effects of expansion and contraction on definite circumferential lines. Eventually the weatherproof finish will crack all the way around the tank along the line where the ends of the insulation blocks butt together.

The way to guard against this failure is simply to stagger the insulation block for block, as shown in the small drawing at the bottom of page. These interlocking courses distribute the strain of expansion and contraction evenly among all the joints, reducing the danger of breaks in the weatherproof finish.



The correct way to line up insulating block is common knowledge with experienced insulation mechanics. They don't make the kind of mistakes that will shorten the life of the work and lessen its efficiency. That's one reason why it pays to have your heat insulation done by a contracting organization like Armstrong, that employs well-trained men to work under experienced foremen and superintendents.

The next time you need any heat insulation work done, why not call in this experienced contractor? Just phone the Armstrong office nearest you or write direct to Armstrong Cork Company, 7007 Maple Avenue, Lancaster, Pennsylvania.

ARMSTRONG'S INDUSTRIAL INSULATIONS

MATERIALS - INSTALLATION

FOR ALL TEMPERATURES FROM 300° F. BELOW ZERO TO 2800° F.

iate future in the U.S.? (3) What general policies of the coal industry would be indicated to best improve position of power and coal? An accompanying table shows the relative competitive position of bituminous coal, petroleum products, and natural gas as fuel. The author points out several places where there is no competition between the basic fuels. For instance, bituminous coal used for the manufacture of metallurgical coke, or kerosene for use as range oil in New England where it has displaced anthracite.

Coal's immediate future competition is (1) continued conversion of steam motive power to diesel operation (2) expansion of natural-gas pipelines (3) tendency for increased yield of fuel oil from domestic petroleum sources. The author then discusses in some detail dieselization of the transportation industry, expansion of natural-gas pipelines, and the possible future for fuel oil. As he sees it, coal stands to lose in the next five years 20,000,000 tons by dieselization, 80,000,000 tons to natural gas, 20,000,000 tons from additional sales of fuel oil. Coal consumption for fuel purposes only may well drop to within range of 210,000,000 to 230,000,000 tons annually before population increases or energy requirement per capita, or lowering of supply of competitive fuels changes this picture.

Future promise for coal seems to lie in the central-station field. Total consumption of bituminous coal by the electric-power utilities for electricity is now twice what it was in 1939, and over 40,000,000 tons more coal are being required yearly to meet this increase. The author feels the additional planned increase in generating capacity for the public utility industry will require an added coal tonnage because (1) supply of distillate fuel oil will increase faster than supply of residual oil and there will be no competition from this source (2) natural gas has not and probably will not be a serious competitor to coal in this field of use. *MWi paper. No number.*

FIRING FUELS

STANDARDS AND RULES, *by G T Kauman, Oil-Heat Institute of America, In*. The oil-heat industry's condition with respect to standards is the paradoxical one of starvation in the midst of plenty. The industry itself has no standards yet there are hundreds that cover i operation. These standards are in t form of codes, ordinances, regulation

Few of these standards have anythi whatever to do with quality or p formance. Almost all are devoted safety. Only four are concerned at with quality or performance. These a