COPY

THE DETROIT EDISON COMPANY

GENERAL OFFICES

2000 Second Avenue

Detroit, Michigan
Zone 26

November 10, 1943

Owens-Illinois Glass Company
Toledo, Ohio

Attention: Mr. H. W. Paul

Gentlemen:

In reply to your letter of November 4, we are enclosing test data obtained by our Research Department on K-LO Insulating Block that you submitted for our consideration. We have no objection to your discussing these data with the Bureau of Ships but request that thereafter this information be confined to your own organization and not used for any form of sales advertising.

If there are any questions about the test procedure, our Research Department will be glad to discuss it in greater detail.

Very truly yours,

/s/ F. A. Compton
WFK
F. A. Compton
Purchasing Department

DFK:JEM
Enc

Berlin, N.J.
Dec.11, 1943.

Data

(D)

UNOFFICIAL COPY OF TEST RESULTS ON K-LO BOILER LAGGING

ENGINEERING EXPERIMENT STATION
Annapolis, Md.

Block Insulation — Test No. - C-383
Type - Processed Calcium Silicate — Date Rec'd - 11/23/43
Brand - K-LO
Manufacturer - Owens-Illinois Glass Co.
Dimensions - 3" x 6" x 36"
Density - 12.17 — Modulus of Rupture 65.2 lbs/sq in
Abrasion Loss: First 10 min., 2.0%, Second 10 min. 6.0%
Hardness as Rec'd., -67.5 hundredths mm.
Soaking Heat: 500°F, 1000°F 1500°F
Hardness 85.1 86 (Cracked, spalled, crumbled and fell apart)
Loss in Weight 8.7% 9.5%
Lin.Shrink. .03% 1.3%

- - - - - - - -

Block Insulation — Test No.-C-383
Type - Processed Calcium Silicate — Date Rec'd - 11/23/43
Brand - K-LO
Manufacturer - Owens-Illinois Glass Co.
Dimensions - 3" x 6" x 36"
Density - 11.8 — Modulus of Rupture - 62.2 lbs/sq in
Abrasion Loss: First 10 min. 5.0%, Second 10 min. 10.0%
Hardness as Rec'd - 60.0 hundredths mm.

Soaking Heat:	500°F	1000°F	1500°F
Hardness	56.5	67.2	(Cracked, spalled, crumbled and fell apart)
Loss in Weight	7.8%	9.7%	
Lin. Shrink.	0.36%	1.08%	

- - - - - - - -

THERMAL CONDUCTIVITY DETERMINATIONS

	Mean Temp.	"K" Value	Allowed - K
Low Temp. Apparatus	82°	.446	300° - .560
High Temp. Apparatus	410	.574	
" "	415	.570	
" "	516	.593	
" "	507	.614	550° .660
" "	603	.642	

COPY

U. S. NAVAL ENGINEERING EXPERIMENT STATION

Annapolis, Maryland

File No. NP16/L5/S39

3 Jan 1944

Serial (13759-E) Test C-383

From: Director
To: Bureau of Ships

Subj: Insulation, Thermal Block, K-LO Brand - Product of the Owens-Illinois Glass Company, Toledo, Ohio - Test C-383

Ref: (a) BuShips ltr. JJ32(336) dated 12 October 1943 to EES.
(b) BuShips AG Interim Spec. 32I3(INT) dated 1 August 1943.

Encl: (A) Tabulated Results of Chemical and Physical Property Determinations.
(B) Tabulated Results of Flat Plate Test for Conductivity.
(C) Plotted Results of Conductivity vs Mean Temperature.

1. The test of the subject material to determine compliance with reference (b) was authorized by the Bureau's letter, reference (a).

2. Samples of the material in block form were received for the test from the Owens-Illinois Glass Company, Berlin, New Jersey on 23 November 1943.

3. The K-LO brand thermal block insulation is composed of processed calcium silicate, asbestos fibers and binders.

4. The material was subjected to test as described in paragraphs F3a(1) to F3a(9), inclusive, of reference (b). In addition, the material was also subjected to a stability test. Specimens of the material were examined for physcial change after subjection to saturated steam at 400°F. temperature in a digester for 24 hours.

5. The data recorded and results of chemical analysis, physical property determinations and stability test are tabulated on Enclosure (A). The data recorded and the results of the thermal conductivity determinations are tabulated on Enclosure (B) and shown plotted on Enclosure (C).

6. The results obtained in the test show the following:

(a) K-LO brand block insulation is composed of processed calcium silicate, asbestos fibers and binders.

(b) K-LO brand block insulation complies with the requirements of reference (b) for Class (A) and Class (B) material.

(c) K-LO brand block insulation does not comply with reference (b) for Class (C) material in view of the fact that the material cracked and spalled when subjected to 1500°F. temperature.

A. T. Church

NF16/L5/S39 (13759-E) Eng. Exp. Sta. Test C-383

CHEMICAL AND PHYSICAL PROPERTY DETERMINATIONS

Ultimate Chemical Analysis	K-LO Brand Block 1" Thick	3" Thick
Moisture, %	6.38	5.93
Carbon dioxide (CO_2) %	2.25	2.16
Loss on ignition, %	7.63	7.79
Silica, (SiO_2) %	42.34	42.18
Iron and Aluminum oxide (Fe_2O_3 & Al_2O_3) %	5.65	5.24
Calcium oxide (CaO) %	27.99	27.79
Magnesium oxide (MgO) %	8.78	8.94
Proximate Chemical Analysis		
Moisture, %	6.38	5.93
Asbestos, %	21.68	22.07
Calcium Silicate ($CaSiO_3$) %	51.01	51.83
Binder ($CaCO_3$ & Clay) %	20.93	20.17
Physical Property Determinations		
Density, lbs. per cu. ft.	12.17	11.6
Hardness, as received, 1/100 mm penetration	57.3	60.0
Resistance to Abrasion, loss in weight, %		
After first 10 minutes	2.0	5.0
After second 10 minutes	6.0	10.0
Modulus of rupture, lbs. per sq. in.	65.2	62.2
Change Under Soaking Heat for 6 hrs. — Hardness 1/100 mm Penetration — 500 deg. F.	55.1	56.5
Change Under Soaking Heat for 6 hrs. — Hardness 1/100 mm Penetration — 1000 deg. F.	64.0	67.2
Change Under Soaking Heat for 6 hrs. — Hardness 1/100 mm Penetration — 1500 " "	*	*
Change Under Soaking Heat for 6 hrs. — Loss in Weight, % — 500 deg. F.	7.8	7.8
Change Under Soaking Heat for 6 hrs. — Loss in Weight, % — 1000 deg. F.	9.5	9.7
Change Under Soaking Heat for 6 hrs. — Loss in Weight, % — 1500 " "	*	*
Change Under Soaking Heat for 6 hrs. — Linear Shrinkage, % — 500 deg. F.	0.30	0.36
Change Under Soaking Heat for 6 hrs. — Linear Shrinkage, % — 1000 deg. F.	1.30	1.08
Change Under Soaking Heat for 6 hrs. — Linear Shrinkage, % — 1500 " "	*	*
Moisture Absorption, % — By weight	4.4	4.5
Moisture Absorption, % — By volume	0.85	0.84
Stability Test in steam digester, Physical change due to	None	None

* Material cracked and spalled to such a degree that accurate measuring was impossible.

ENCLOSURE (A)

Registered Jan. 19, 192

Rights granted

UNITED S

ILLINOIS ASBESTOS PRODUC
ASSIGNMENTS, TO UNI
CORPORATION OF DELA

Applica

I

To the Commissioner of Patents

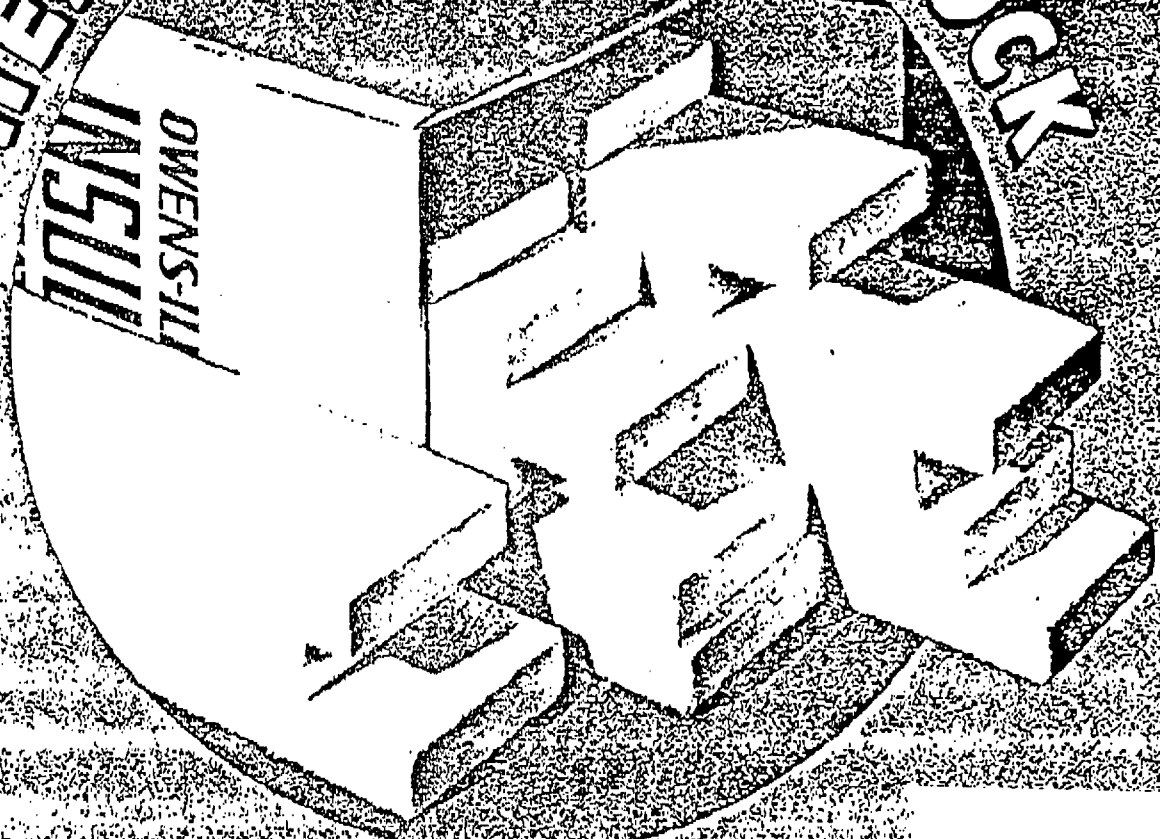
The undersigned, Illinois As
nets Company, a corporation o
existing under the laws of t
Illinois, and having a place of
140 South Dearborn Street, Chi
of Cook, and State of Illinois,
and used the trade-mark shown
companying drawing, for COM
CONSTRUCTION AND INS
MATERIALS SUCH AS SL
ELS, BOARDS, BLOCKS,
LIKE AND THE MIXTURE
INGREDIENTS USED IN PR
THE AFORESAID MATEI
Class 12, Construction material.
sents herewith five facsimiles si
trade-mark as actually used by
cant on the goods, and requests t
registered in the United States P.
in accordance with the act of Fe
1905, as amended. The trade-mar
continuously used and applied to
in the applicant's business and t

1944

OWENS-ILLINOIS

INSULUX

HEAT INSULATING BLOCK



INSULUX PRODUCTS DIVISION

OWENS-ILLINOIS GLASS COMPANY

TOLEDO, OHIO

1944

1944

A NEW HEAT INSULATION WITH A REN

★ LIGHT WEIGHT ★ STRONG ★ UNUSU

Insulux heat insulation is a new type of insulating block or lagging used throughout the normal range of steam temperatures. It is a product of the Owens-Illinois Glass Company, developed by Owens Illinois engineers and made by compounding raw materials that Owens-Illinois has worked with for more than half a century. It is the result of many years' work to produce a fireproof insulating material having light weight and good structural strength.

Although made by the manufacturers of Insulux glass block, Insulux insulating block is not a glass material and is not to be confused with glass block. It is a crystalline compound made of sand, lime, asbestos and other materials. It is white in appearance. About ninety per cent of its structure is composed of air cells, too tiny even to be seen by a microscope. It is exceptionally strong for its weight, in fact is outstanding in its combination of light weight and strength. Although a non-organic material it can be cut, sawed and otherwise worked much the same as fibrous boards or slabs.

Low Density

Insulux insulating block has a density of approximately 13 pounds to the cubic foot, or just slightly more than a pound to the board foot. This is an aid in handling, shipping and application. On equipment such as ships and locomotives it contributes substantially to weight reduction.

Crushing Strength

Crushing strength is unusually high for a mineral product of such light weight. The block readily withstands compression comparable to that of a man walking on it or even to that of a heel ground into it.

High Flexural Strength

Flexural strength is high, 60 pounds per square inch for a 13-pound density, as compared with a normal requirement for a material of this kind of approximately three times the density or 39 pounds. This strength at this weight is an aid to easy handling and application. It also contributes to long service and low maintenance.

Relatively Insoluble in Water

Because of its cellular structure with cells intercommunicating, Insulux insulating block will absorb moisture when immersed. However, its structure is not injured by saturation with water, hot water, or even steam. It is almost completely insoluble in water—can be boiled for hours with almost no loss in weight or strength after being dried out again.

Also its strength while wet, although reduced, is still substantial. It can be submerged in boiling water for several days and while still wet and hot can carry the weight of a person walking on it. (This applies to crushing strength—assumes uniform and continuous support on the underside, as would typically be the case in an actual application on a hot surface.)

Physical Characteristics of INSULUX INSULATING BLOCK

Density	Approx. 13 lb. per cu. ft.
Flexural Strength	60 lbs. per sq. in.
Flexural Strength after Heating for 24 hrs. at 750°F.	41.7 lbs. per sq. in.
Crushing Strength	100 lbs. per sq. in.
Crushing Strength after Heating for 24 hrs. at 750°F.	65 lbs. per sq. in.
Crushing Strength while wet after Boiling for 24 hrs.	50 lbs. per sq. in.
Loss in weight after Heating for 24 hrs. at 750°F.	6.7%
Loss in weight after Boiling for 24 hrs.	0.17%
Linear Shrinkage after Heating for 24 hrs. at 750°F.	1.04%
Moisture absorption (by volume) after 6 hrs. at 120° in atmosphere 90° relative humidity	0.90%
Loss in Weight due to abrasion after ASTM Tumbling Test	
First 10 Minutes	5.9%
Second 10 Minutes	8.1%
Conductivity "K" at 300°F. Mean Temperature	0.525

Low Moisture Absorption

Insulux insulating block does not readily pick up moisture from humid air. Test specimens dried for twenty-four hours at 215°F., cooled and then subjected to an atmosphere of 90% relative humidity and a temperature of 120°F., absorbed less than 1% of moisture by volume.

Low Loss in Weight

Loss in weight in tests that simulate long application to hot surfaces is low when compared with most other materials. Also, such loss in weight as is experienced on continuous exposure to heat, throughout the range of temperatures for which the block is recommended, has remarkably little effect on it. The block remains strong, free from excessive powdering which usually accompanies calcination.

01 034 0067

1B-56-442 5M—Printed in U.S.A.

ARKABLE COMBINATION OF ADVANTAGES

URABLE ★ HAS WIDE RANGE OF USES ★

and changes little in surface hardness. Even standard tumbling tests run after prolonged heating produce but little crumbling or breakdown of the material.

Low Shrinkage

Shrinkage, which is closely related to loss in weight is low as will be noted from the table on the left hand page. This helps to solve many problems. It helps produce a good job because low shrinkage at high temperatures cuts to a minimum any tendency to open up at the joints.

Encourages Good Application Work

Individual blocks are noticeably clean cut and trim as to edges, ends and corners. Their strength helps to keep them this way until they get in the hands of the applicator, and once in his hands these clean cut pieces help him to turn out a good looking finished job. Finishes that go over the block whether cement or other types, such as cloth, canvas, etc., can be applied with a minimum of wrinkling and irregularity.

Good Insulation Value

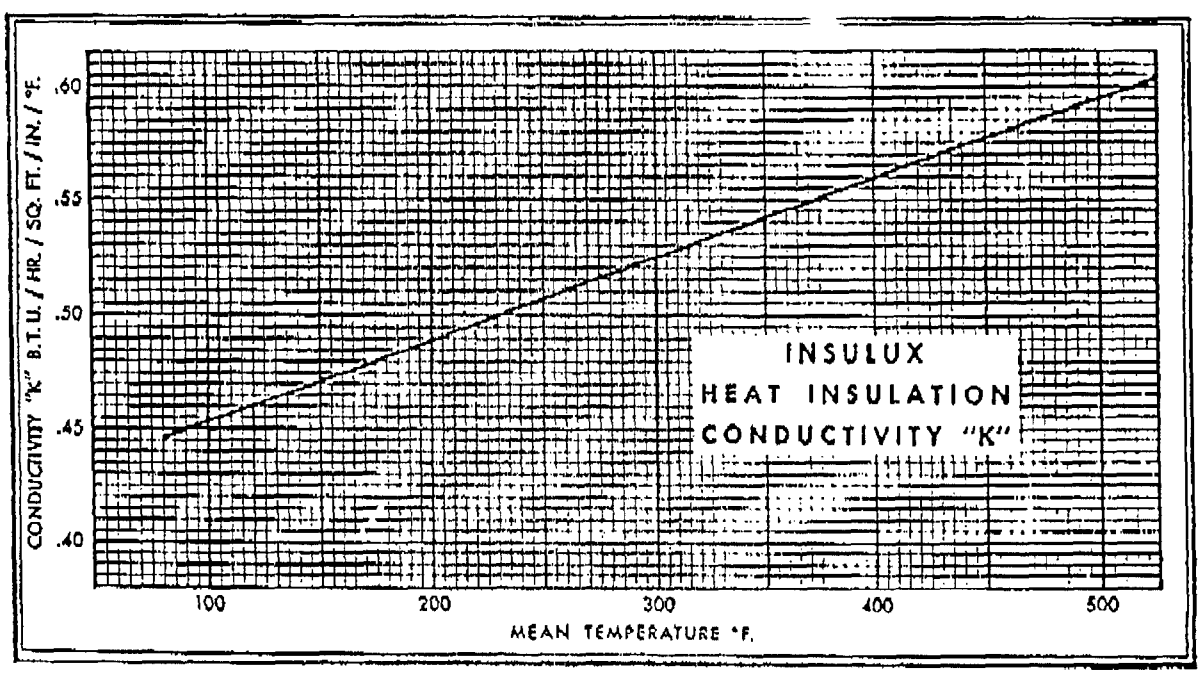
Insulux insulating block has been developed to produce the best combination of advantages obtainable in fireproofness, strength, durability and insulating values. Although some materials may excel it in a single individual quality, probably none excels it in this combination of desirable qualities. Its conductivity coefficient or *k*, given in the curve here, places it among the more efficient insulations for medium high temperatures. Also its conductivity curve is relatively flat and straight, indicating that it not only does a good job on temperatures typical with low pressure steam or even hot water, but also on superheated steam. Also its *k* value is conservatively stated. Actually, the values shown are taken as the highest of several from tests run by different well known laboratories. It is significant too that its *k* value tends to improve (that is to drop) after the material is in service on hot surfaces.

No Binder

Insulux heat insulation is actually its own binder. It is a uniform compound or series of compounds produced by reacting together the raw materials that go into its manufacture. These materials with some asbestos added for reinforcing make up the finished product. The performance of the finished product is therefore the performance of the material itself, not limited as to temperature, water solubility or otherwise by the limitations of a binder added to the insulating material.

Sizes

Insulux insulating block is made in a standard size 6 x 36 inches and in thicknesses of 1, 1½ and 2 in. Greater widths are available on special order. If there is a special problem that requires larger sizes and higher densities and strengths, that justify special manufacture, Owens-Illinois engineers are available for discussion of your problem.



A VERSATILE MATERIAL

...Has Many Uses!

Light weight, strength, good insulation value and capacity to meet severe service conditions give Insulux insulating block a wide range of use. Through its recommended temperature range it is adapted to use throughout the industries in which heat insulation is required.

Central power plants and related distribution systems subjected to conditions of vibration, humidity, and periodic or occasional cycles of saturation and drying will find of practical value the capacity of this block to resist deterioration under such conditions.

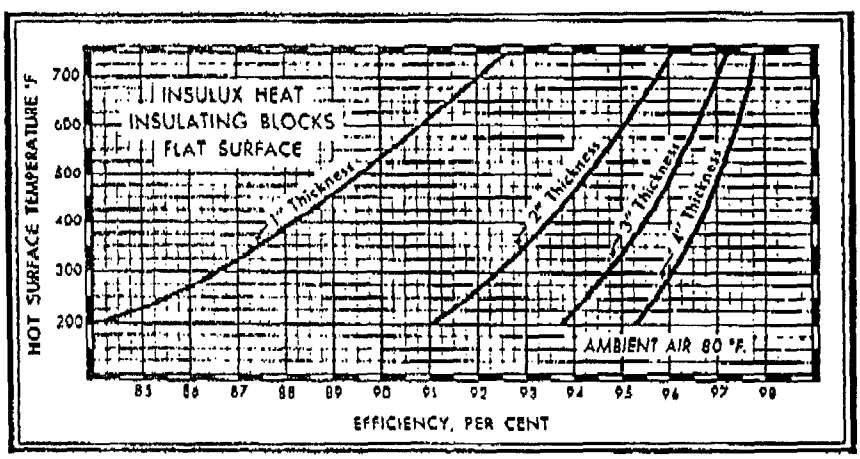
The history of the oil industry is one of rapid and radical changes both in processes and equipment, with a trend toward higher temperatures and more stringent requirements placed on its equipment and insulation. Ruggedness and strength of Insulux heat insulation coupled with its good insulating value help it to meet oil industry requirements. These advantages help to secure clean-cut efficient installations on new work and also to provide greater salvage of usable material when subsequent changes become necessary.

Equipment manufacturing industries find Insulux insulating block a dependable material because of its strength and light weight and because of its capacity to give continuous and efficient service at the top temperatures recommended here.

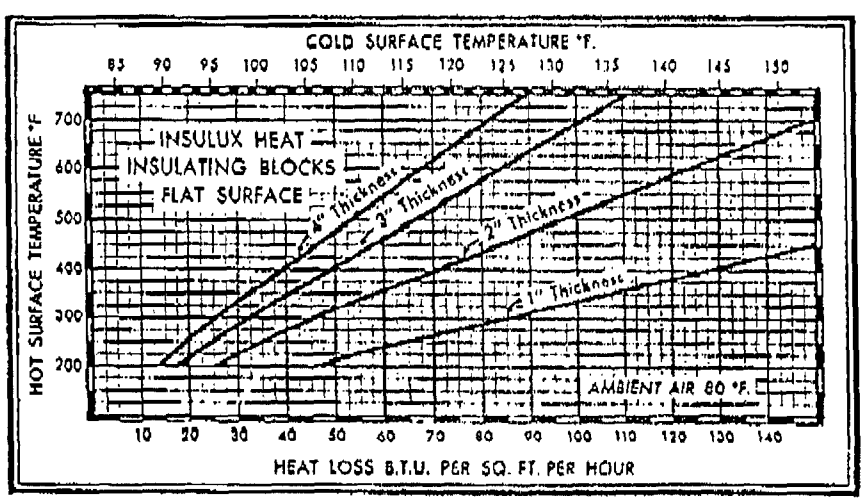
Some of the typical recommended uses are for installations on construction or equipment such as the following:

Breechings	Melting Tanks	Ovens
Boiler Walls	Evaporators	Heat Treating Furnaces
Hot Air Ducts	Heat Exchangers	Turbines
Tanks	Condensors	Chilling Pits
Towers	Lehrs	Pit Covers

Efficiencies —Insulux Heat Insulating Block



Heat Loss—and Cold Surface Temperatures — Insulux Heat Insulating Block.

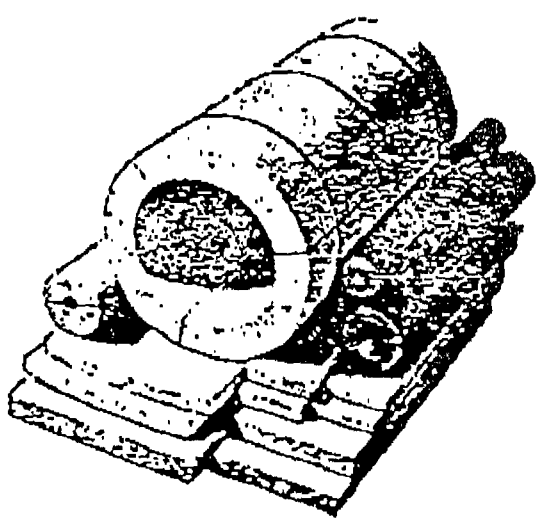


SOURCES OF TEST DATA

The data presented on these pages is supported by tests run at different laboratories all of which are well known to the insulation industry. Values are in all cases, we believe, conservatively stated. Where laboratories have differed in their findings — as they do in almost all tests — it has been our policy to publish the data least favorable to the product.

Does Your Present Heat Insulation Have All These Advantages?

Kaylo Heat Insulation is a hydrous calcium silicate—a revolutionary heat-saving material—outstanding both in performance and ease of application.



KAYLO PIPE INSULATION is made to Simplified Dimensional Standards of thicknesses and diameters for snug nesting, when necessary.

1 **LOW "K" FACTOR**—Billions of sub-microscopic air spaces which compose the structure of Kaylo Heat Insulation give it exceptional insulating value.

2 **TEMPERATURE RANGE UP TO 1200° F.**—Kaylo Heat Insulation eliminates the need for combination coverings in nearly all operating conditions.

3 **LONG SERVICE LIFE**—Kaylo Heat Insulation remains dimensionally stable, strong and efficient over the years—although exposed to temperatures up to 1200°F.

4 **INSOLUBILITY IN WATER**—Even when saturated, Kaylo Heat Insulation retains about 85% of its strength. It returns to its original strength after drying.

5 **HIGH STRENGTH**—Breakage of Kaylo Heat Insulation is almost negligible in shipping and installation—workmen can walk on insulated equipment without causing breakage.

6 **LIGHT WEIGHT**—Since Kaylo Heat Insulation weighs only 11 pounds per cubic foot, it is exceptionally easy to handle and apply.

7 **WIDE RANGE OF SIZES AND SHAPES**—Kaylo Heat Insulation's unmatched selection of sizes and shapes reduces the number of pieces required per job.

8 **EASE OF CUTTING AND FITTING**—Ordinary tools of the trade are used to install Kaylo Heat Insulation. The material is non-irritating to the skin and non-toxic.

For complete details on all of the advantages of Kaylo Heat Insulation, write Dept. N-227, Owens-Illinois Glass Company, Kaylo Division, Toledo 1, Ohio.

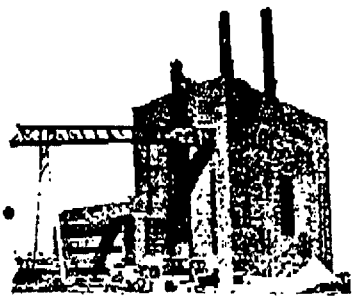
KAYLO ... first in calcium silicate

...pioneered by OWENS-ILLINOIS Glass Company

MAIN OFFICES: TOLEDO 1, OHIO—KAYLO SALES OFFICES: ATLANTA • BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND DETROIT • HOUSTON • MINNEAPOLIS • NEW YORK • OKLAHOMA CITY • PHILADELPHIA • PITTSBURGH • ST. LOUIS • WASHINGTON

COVERED

WITH ADVANTAGES...



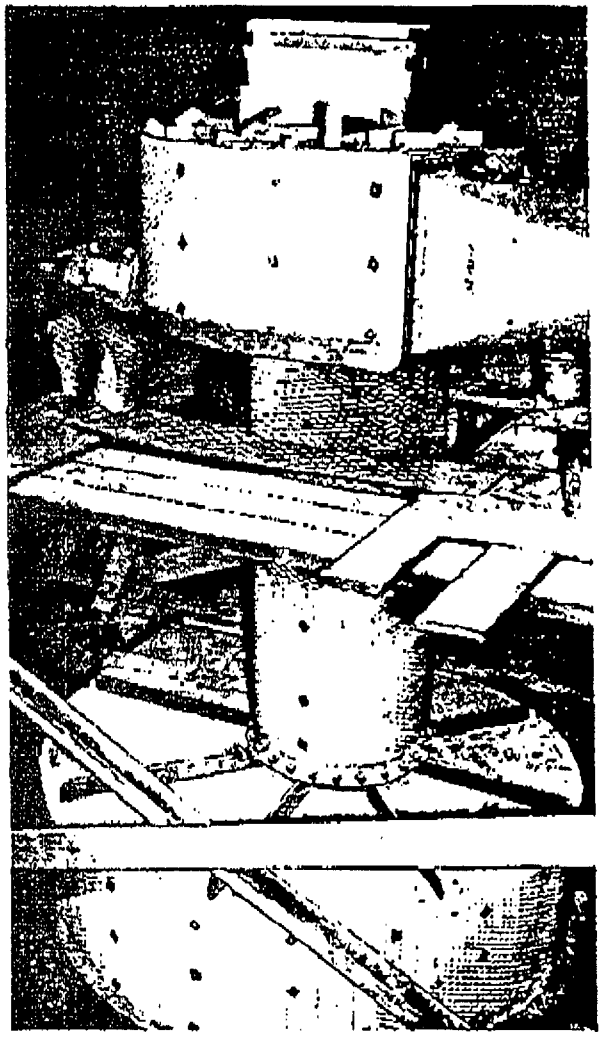
Leading Utilities Are Switching to KAYLO HEAT INSULATION

1 A Better Basic Material. Kaylo Heat Insulation is hydrous calcium silicate — a revolutionary material (not glass) developed after many years of research. Proved in thousands of field installations, it combines to a high degree the most desirable physical qualities of heat insulating materials.

2 Outstanding in Performance. Kaylo Heat Insulation has a wide effective temperature range —up to 1200° F.—thus eliminating the need for combination coverings in nearly all operating conditions. The material's unique cellular structure, composed of countless sub-microscopic dead-air spaces, provides high insulating value. It remains efficient and stable through years of service. Even when saturated with water, Kaylo Heat Insulation retains about 85% of its strength. It regains its normal strength and insulating efficiency after drying. It has high flexural strength, compressive strength and resistance to impact and abrasion. Workmen can walk on insulated equipment without causing breakage.

3 Easy to Apply. Kaylo Heat Insulation's light weight makes it extremely easy to handle and apply. The ease with which it can be cut and fitted simplifies application—saves time on the job. Breakage during installation is usually negligible. The material is non-irritating to the skin and non-toxic.

With the widest selection of sizes and shapes in the industry, Kaylo Heat Insulation reduces the number of pieces required per job. Get the complete details.



NEW JUSTIN R. WHITING STEAM POWER PLANT of Consumer's Power Company located near Erie, Michigan. Included are two Babcock & Wilcox boilers with a rated output each of 690,000 lb. per hr. at 1480 psi. and 1000° F. Each boiler supplies one 85,000-kw turbine-generator for total of 170 000 kw. More than 20 carloads of Kaylo Heat Insulation are used in this installation.

WRITE FOR FREE BOOK—"Kaylo Heat Insulation." Address: Dept. N-284, Owens-Illinois Glass Company, Kaylo Division, Toledo 1, Ohio.

KAYLO ... first in calcium silicate

...pioneered by OWENS (I) ILLINOIS Glass Company

01 039 1409

MAIN OFFICE: TOLEDO 1, OHIO — KAYLO SALES OFFICES: ATLANTA • BOSTON • CHICAGO • CINCINNATI • CLEVELAND • DETROIT HOUSTON • MINNEAPOLIS • NEW YORK • OKLAHOMA CITY • PHILADELPHIA • PITTSBURGH • ST. LOUIS • WASHINGTON

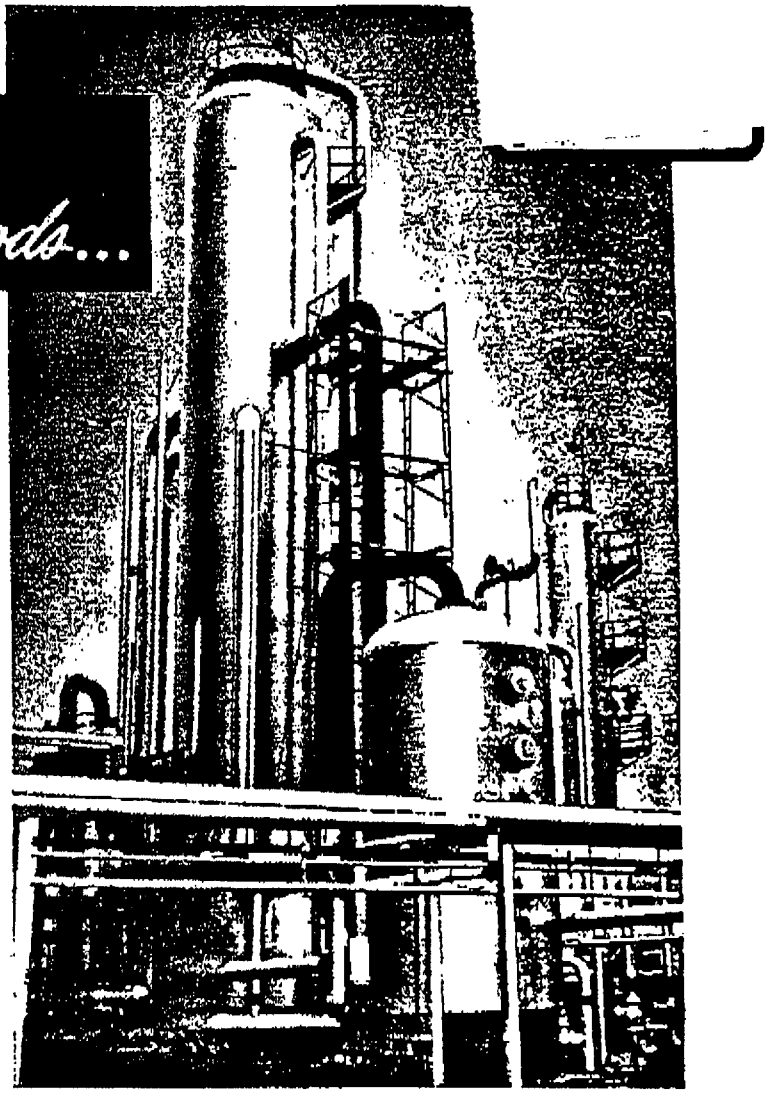
Marks of Progress in Modern Methods...

KAYLO HEAT INSULATION

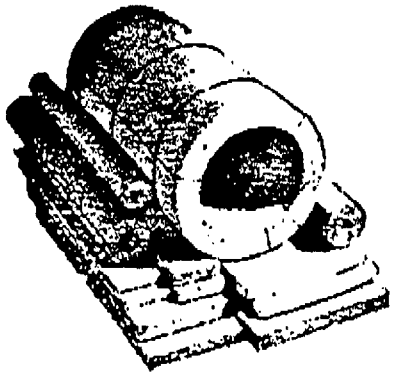
Keeping pace with advancements in modern processing methods is a revolutionary heat-saving material—Kaylo Heat Insulation. This unique material, a hydrous calcium silicate introduced by Owens-Illinois after many years of research, offers outstanding advantages to the chemical industry.

Kaylo Heat Insulation is *effective* up to 1200° F. Therefore, it eliminates the need for combination coverings in nearly all operating conditions. What's more, Kaylo Heat Insulation is incombustible and insoluble in water; has exceptionally good dimensional stability. It retains its original insulating *efficiency* in long service.

The high strength of Kaylo Heat Insulation practically eliminates breakage, in transit or on the job—even permits workmen to walk on insulated equipment. Yet Kaylo Heat Insulation is extremely lightweight. Its ease of handling, cutting and fitting helps speed application.



Mississippi Chemical Corporation's new nitrogen fertilizer plant, Yazoo City, Mississippi. Gas reforming plant, Girbotol acid gas units, ammonia synthesis unit, nitric acid process unit, ammonium nitrate prilling plant, steam and utility piping are insulated with Kaylo Heat Insulation. Girdler Corporation, Louisville, Ky., general contractor; Industrial Insulators, Houston, Tex., insulation contractor.



KAYLO PIPE INSULATION is made to Simplified Dimensional Standards of thicknesses and diameters. Coverings are sectional for tube and pipe sizes ¼" to 12"; tri-segmental up to 23"; quad-segmental up to 41"; K-segmental (18" wide segments) up to 72" in diameter.

KAYLO HEAT INSULATING BLOCK is made in all standard sizes and thicknesses from 1" to 6" for flat surfaces and for vessels larger than 60' in diameter; curved block 18" wide for smaller vessels.

For complete details on Kaylo Heat Insulation, write Dept. H-183, Owens-Illinois Glass Company, Kaylo Division, Toledo 1, Ohio.

SEND FOR OUR CATALOG

KAYLO® ... *first in calcium silicate*

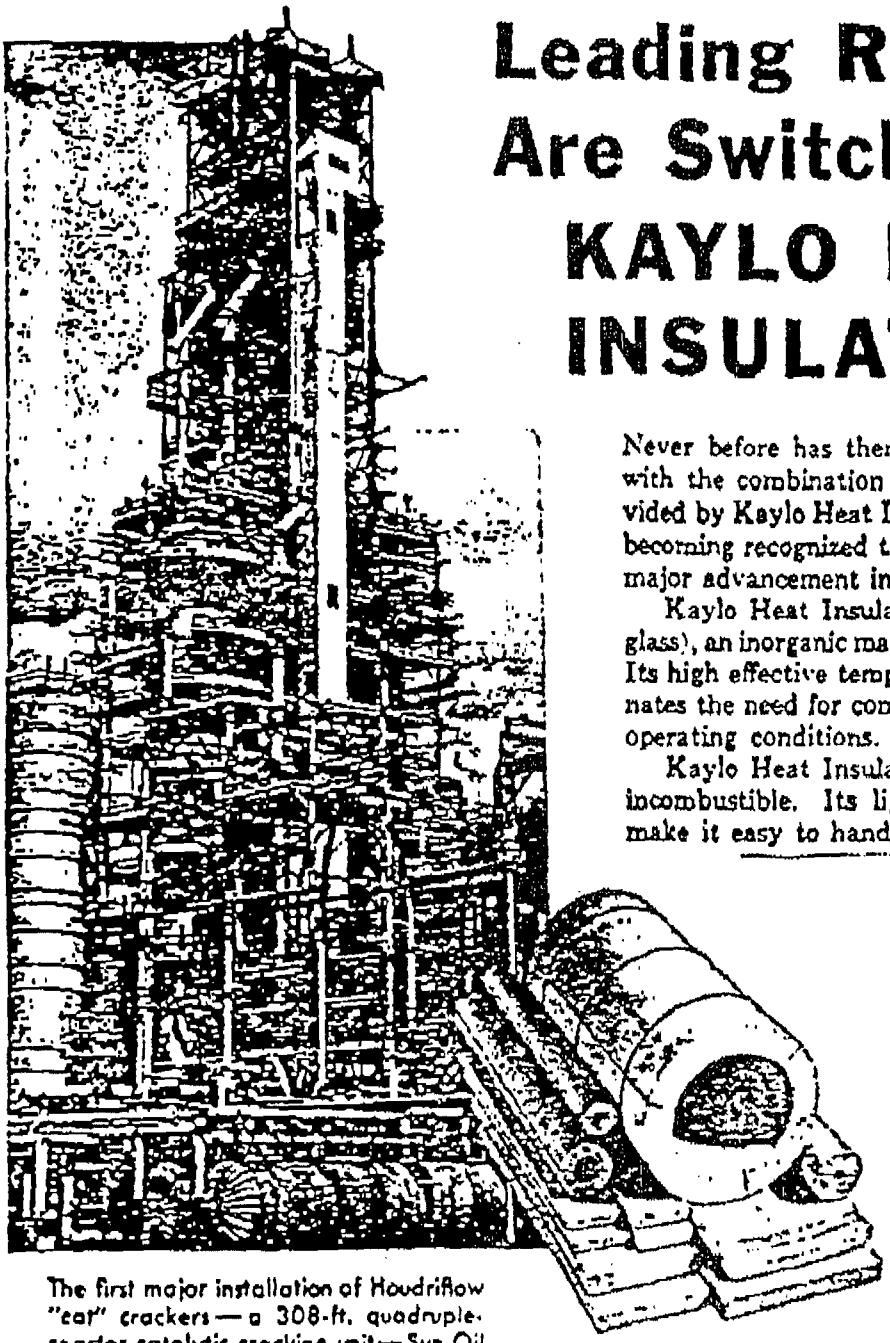
...pioneered by OWENS (I) ILLINOIS Glass Company

01 039 1411

MAIN OFFICE: TOLEDO 1, OHIO—KAYLO SALES OFFICES: ATLANTA • BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND DETROIT • HOUSTON • MINNEAPOLIS • NEW YORK • OKLAHOMA CITY • PHILADELPHIA • PITTSBURGH • ST. LOUIS • WASHINGTON

Another Example of the Trend.

Leading Refiners Are Switching to KAYLO HEAT INSULATION



The first major installation of Houdriflow "cat" crackers — a 308-ft. quadruple-reactor catalytic cracking unit — Sun Oil Company's Plant 5 at Toledo, Ohio. The entire catalyst system is insulated with Kaylo Heat Insulation.

Never before has there been an insulating material with the combination of important advantages provided by Kaylo Heat Insulation. More and more it is becoming recognized throughout industry as the first major advancement in the high-temperature field.

Kaylo Heat Insulation is a calcium silicate (not glass), an inorganic material with remarkable stability. Its high effective temperature limit—1200°F.—eliminates the need for combination covering in nearly all operating conditions.

Kaylo Heat Insulation is insoluble in water and incombustible. Its light weight and high strength make it easy to handle and apply.

KAYLO PIPE INSULATION is made to Simplified Dimensional Standards of thicknesses and diameters. Coverings are sectional for tube and pipe sizes ¼" to 12"; tri-segmental up to 23"; quad-segmental up to 41"; K-segmental (18" wide segments) up to 72" in diameter.

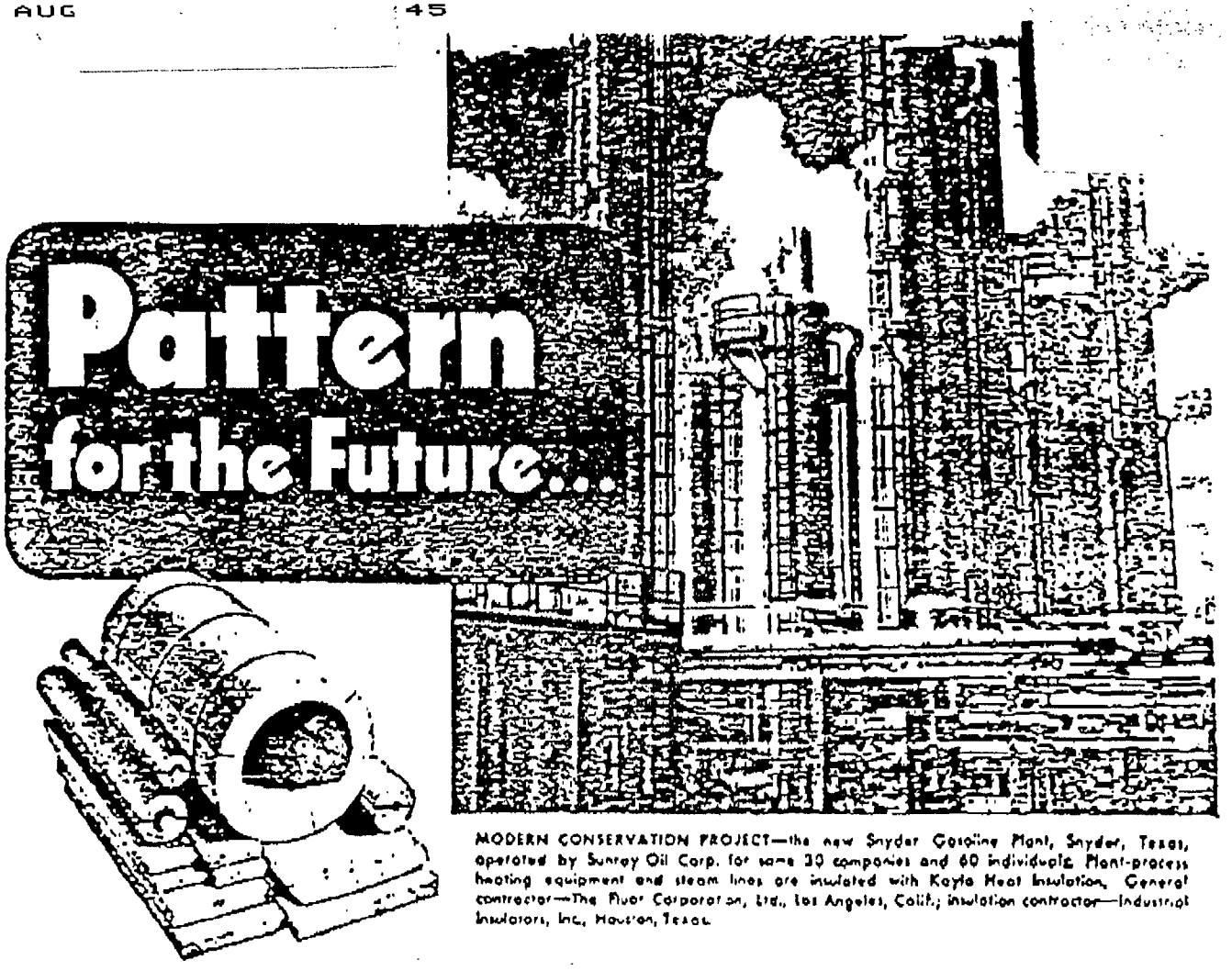
KAYLO HEAT INSULATING BLOCK is made in all standard sizes and thicknesses from 1" to 6" for flat surfaces and for vessels larger than 60' in diameter; curved block 15" wide for smaller vessels.

For complete details on Kaylo Heat Insulation, write Dept. N-182, Owens-Illinois Glass Company, Kaylo Division, Toledo 1, Ohio.

KAYLO ... first in calcium silicate

...pioneered by OWENS ILLINOIS Glass Company

MAIN OFFICE: TOLEDO 1, OHIO—KAYLO SALES OFFICES: ATLANTA • BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND DETROIT • HOUSTON • MINNEAPOLIS • NEW YORK • OKLAHOMA CITY • PHILADELPHIA • PITTSBURGH • ST. LOUIS • WASHINGTON



MODERN CONSERVATION PROJECT—the new Snyder Gasoline Plant, Snyder, Texas, operated by Sunray Oil Corp. for some 30 companies and 60 individuals. Plant-process heating equipment and steam lines are insulated with Kaylo Heat Insulation. General contractor—The Fluor Corporation, Ltd., Los Angeles, Calif.; insulation contractor—Industrial Insulators, Inc., Houston, Texas.

Leading Refiners Are Switching to KAYLO HEAT INSULATION

The growing trend to Kaylo Heat Insulation is a logical result of the outstanding combination of advantages offered by this revolutionary heat-saving material.

Kaylo Heat Insulation, a hydrous calcium silicate, has high insulating value over a wide temperature range. It is *effective* up to 1200°F.—thus eliminating the need for combination coverings in nearly all operating conditions.

In addition, Kaylo Heat Insulation has these excellent physical characteristics: it is insoluble in water and incombustible. It has dimensional stability . . . high strength . . . light weight — properties vital to a superior heat insulation.

Its ease of handling, cutting and fitting simplifies application—saves time on the job. With these important extra advantages, *at no extra cost*, little wonder that leading refiners are switching to Kaylo Heat Insulation.

KAYLO . . . *first in calcium silicate*

For complete details on Kaylo Heat Insulation, write Dept. N-230, Owens-Illinois Glass Company, Kaylo Division, Toledo 1, Ohio.

...pioneered by OWENS-ILLINOIS Glass Company

MAIN OFFICE: TOLEDO 1, OHIO—KAYLO SALES OFFICES: ATLANTA • BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND DETROIT • HOUSTON • MINNEAPOLIS • NEW YORK • OKLAHOMA CITY • PHILADELPHIA • PITTSBURGH • ST. LOUIS • WASHINGTON

INSULUX HEAT INSULATING MATERIALS

Bulletin R-2:0
Issued Mar. 1, 1944
PAGE 1
OWENS-ILLINOIS GLASS COMPANY

ZONE 2 — DISCOUNTS

Insulux Blocks, and Pipe Covering, and Prices on Insulux Insulating Cement For Delivery in Zone 2

Classes of Buyers	1 & 2		3		5		4 & 6	
Discounts	CL	LCL	CL	LCL	CL	LCL	CL	LCL
Insulating Blocks, Sheets, Lagging and Pipe Covering—	52	43	52	49	50	41	44	33
Prices								
Insulating Cement in Bags, Per Cwt.	$7.20	$7.60	$7.20	$7.60	$7.20	$7.60	$8.40	$10.00

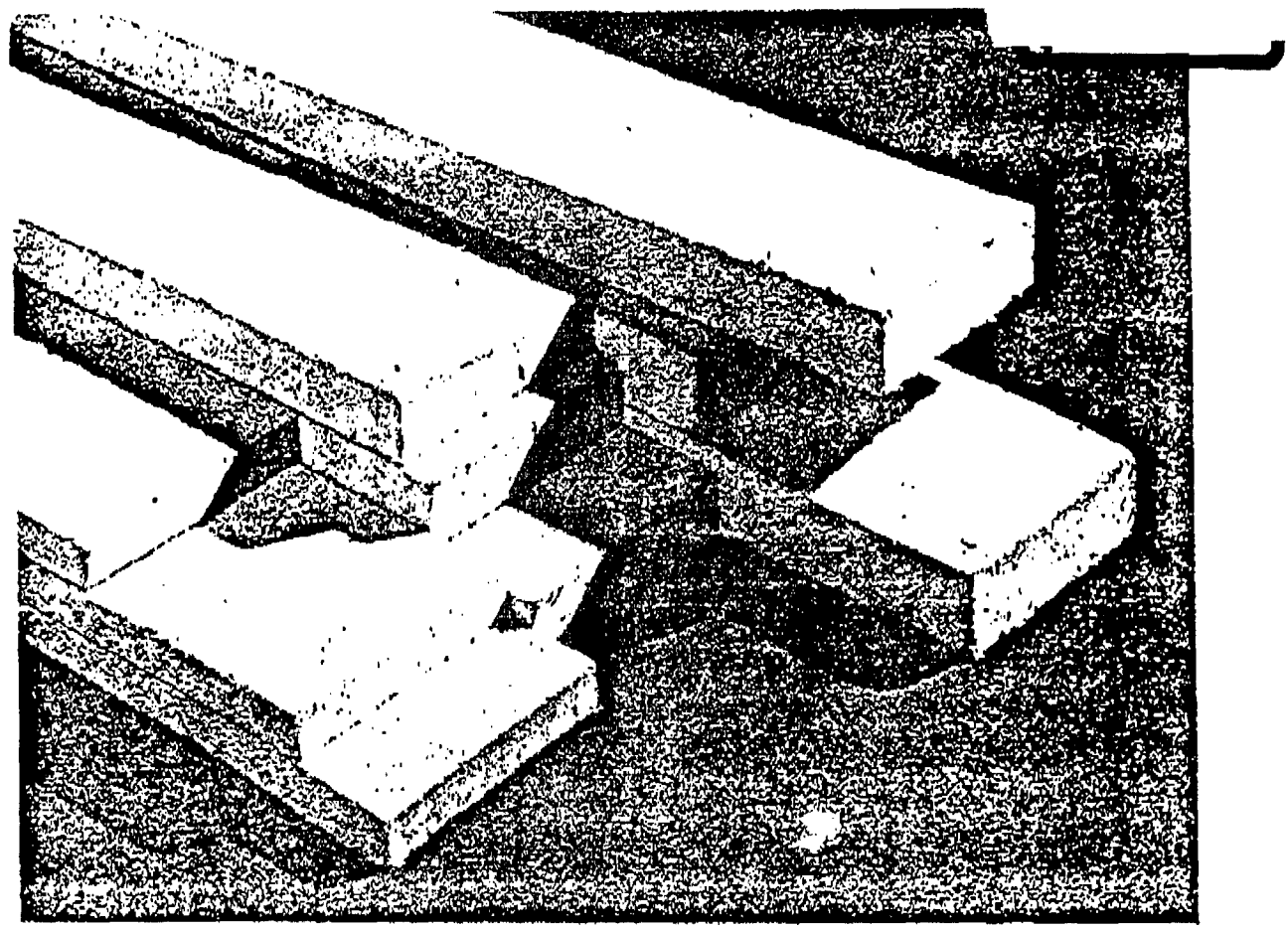
ACCESSORIES OTHER THAN STANDARD

Below are extra charges which must be made where covering is sold with accessories other than those specified as Standard. Determine size of covering and accessories required. Then refer to tables below for extra charge which must be deducted from discount to arrive at proper selling price.

ACCESSORIES The furnishing of accessories is subject to their availability and subject to our being able to obtain and furnish them.	EXTRA CHARGE—DEDUCT FROM DISCOUNT For Pipe Sizes 11 In. and Smaller	 For Pipe Sizes Larger Than 11 In.
Canvas ..3.80 or 4 oz.	No Deduction	2
" 5 oz.	2	4
" 6 oz.	3	5
" 7 oz.	3	5
" 8 oz.	4	6
" 10 oz.	5	7
" 12 oz.	6	8
Bands—Black or Gold Lacquered Steel		
Up to 2½ per section of covering	No Deduction	1
Over 2½, up to and including 5 per section of covering	1	2
Over 5, up to and including 7½ per section of covering	2	3
Over 7½ per section of covering	Base calculation on figures above. Deduct one point of discount for each additional 2½ bands (or fraction thereof) per section of covering.	
Bands—Brass (Solid)		
2½ per section	5	6
3 per section	6	7
3½ per section	7	8
Over 3½ per section	Base calculation on figures above. Deduct one point of discount for each additional 1 band (or fraction thereof) per section of covering.	
Waterproof (Roofing) Jackets (Cut to size and/or affixed to covering at factory)	8 (Does not include canvas or bands. If canvas and bands required add 3 points of discount, making extra charge 11 points of discount.)	11
Rosin Sized Paper Jackets (Furnished from factory, cut to size or integral with covering)	5	5

Terms: 2% ten days—net 30 days (class 3 and 4 purchasers, 1% 10th prox., net 30th prox.) on net amount of invoice after deducting transportation charges.

INSULUX HEAT INSULATING BLOCKS AND LAGGING



Insulux Heat Insulating Blocks and Lagging provide efficient insulation for application to flat, curved and irregular surfaces such as tanks, boilers, breechings, ovens, heat treating furnaces, pickling tanks, oil stills, heat exchangers, evaporators and similar equipment for temperatures up to 750° F.

Although made by the manufacturers of Insulux glass block, Insulux insulating block is not a glass material and is not to be confused with glass block. It is a crystalline compound made of sand, lime, asbestos and other materials. It is white in appearance. About ninety per cent of its structure is composed of air cells, too tiny even to be seen by a microscope. It is exceptionally strong for its weight, in fact is outstanding in its combination of light weight and strength. Although a non-organic material it can be cut, sawed and otherwise worked much the same as fibrous boards or slabs.

The blocks are highly resistant to abrasion. They do not deteriorate under the effects of moisture, immersion in water or when subjected to repeated cycles of saturation and drying. Their ability to withstand continuous exposure to recommended operating temperatures without undue physical or mechanical changes make their use of particular value to those interested in permanent installations and low maintenance costs.

Patented Oct. 11, 1938

2,132,702

UNITED STATES PATENT OFFICE

2,132,702

COMBINED ASBESTOS AND GLASS FIBER YARN

Donald C. Simpson, Newark, Ohio, assignor to Owens-Illinois Glass Company, a corporation of Ohio

Application May 22, 1937, Serial No. 144,247

14 Claims. (Cl. 117—53)

The present invention is a novel combination of asbestos and glass fibers for use in yarns, interwoven cloth, knitted articles, felts, or other fabricated articles, particularly adapted for electrical insulation, packing material, gaskets, friction elements, heat insulation, cements, fillers in fabricated boards, acoustical insulation, battery separators, and various other uses.

Both glass and asbestos fibers taken by themselves have inherent shortcomings which limit their application and use in industry and commerce. Asbestos, for example, is composed of relatively short and weak fibers which prevent them from being fabricated into strong yarns, cloth, and fabrics. Short asbestos fibers have not been fabricated into any type of yarn or fabric without the incorporation of organic fibers such as cotton, or the like, which serve to hold the short asbestos fibers together. Fine wires have also been used for this purpose. Both of these additional components, however, have definite shortcomings and disadvantages, as, for example, the admixture of organic cotton fibers or the like immediately brings down the temperature or fire resistance of the fabric to that of cotton. The incorporation of wires, on the other hand, prevents the use of the product as an electrical insulation. The use of metal wires or the like is also inferior from the point of view of pliability, flexibility, cost, ease of manufacture, and feltability between the metal wires and the asbestos.

Ordinary glass fibers also have serious shortcomings and limitations in their fabrication into woven fabrics. These limitations are generally traceable to the inherent nonstretchability of glass fibers, the stretchability being limited to one or two percent or so, according to the exact fiber diameter, the type of glass, and the perfection of the fiber. When a series of glass threads are fed into a conventional loom to form a warp, the sudden stresses and loads inherent in a loom are concentrated in the tightest threads which cannot carry the entire load themselves and, therefore, tend to break rather than stretch. Of course, whenever an end or thread breaks in a loom, the entire operation must be stopped and the broken end fed through again before the weaving may be resumed. A similar condition exists when ordinary glass yarns or threads are fed into the weft or filler of a fabric. Moreover, fabrics composed solely of glass fibers, especially if made particularly sheer or thin, have considerably less resistance to folding or creasing than ordinary fabrics. If the fabric is flexed to any degree, or creased, it tends to crack or break and fall apart. Merely reducing the diameter size of the glass fibers does not necessarily cure this condition because, as the fiber diameter is reduced, so is the radius of curvature around which the fibers have to be bent. That is to say, the fibers of the warp are bent around the fibers of the filler and if they are bent around a small enough radius of curvature, the fibers of the warp are cracked and broken. The same condition, of course, obtains when the fibers of the filler are bent around the fibers of the warp.

Another difficulty caused by the inherent nonstretchability of the glass fibers, is the concentration of stresses induced in the outermost fibers at a fold or flexure in the cloth. The glass fibers being more or less unyielding in and of themselves, prevent the load caused by a flexure or creasing from being distributed uniformly throughout the body of fibers to permit their full combined strength to be brought into play.

I have discovered that the above mentioned individual shortcomings of the asbestos and glass fibers may be overcome by a combination of the two, and that a superior product, having properties superior to any of the individual properties of the ingredients, may be produced by a combination of the two types of fibers.

An object of the invention is the provision of a fabric which is flexible, soft, strong, and completely fireproof, fire resisting, rot proof, and chemically resistant.

Another object of the invention is the provision of a fabric composed of inorganic fibers which may be fabricated into felt or interwoven tape suitable for electrical, heat and/or sound insulation.

Another object of the invention is to utilize the softness, pliability and yieldability more naturally inherent in the asbestos fibers in combination with glass fibers, which are much stronger and longer than the asbestos fibers. The individual glass fibers are sufficiently fine and long so that they may be intertwisted or interfelted with the asbestos fibers to form strong yarns which may be safely subjected to the rigors of a conventional loom. The asbestos fibers serve as cushions for the adjacent glass fibers to assist in the distribution of loads throughout the glass fibers, and to lend yieldability and pliability and strength to the final fabric.

In addition, if the glass fibers have been intertwisted or interfelted with the asbestos fibers, this arrangement will prevent the individual glass fibers from being laid out in straight lines, but, on the contrary, will permit them to assume heli-