

FILE NAME: Owens Illinois (OWILL)

DATE: 1951

DOC#: OWILL072

DOCUMENT DESCRIPTION: Industry Sales Literature



The Story of
KAYLO®

... First in Calcium Silicate

*Registered trade name for
A BETTER BUILDING AND INSULATING MATERIAL

KAYLO^{*} . . .

^{*}Registered trade name for

A BETTER BUILDING AND INSULATING MATERIAL

... Pioneered by

OWENS  ILLINOIS
GLASS COMPANY
Toledo 1, Ohio



KCS-1-512-25M
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Owens-Illinois Glass Company

First in Calcium Silicate

A new material is taking its place alongside the "old stand-bys" of construction and other industries—a material which combines the best properties of many others. It is a chemical compound of lime and sand (and small amounts of asbestos fibers) which the technically-minded call a "hydrous calcium silicate". Owens-Illinois introduced it to a limited market in 1943 and makes identification easier by using the trade name Kaylo for all their products made of this unique material.

The name "Kaylo" was taken from the symbol "k", meaning thermal conductivity (heat transfer) in engineering terminology, and "low", indicating that its thermal conductivity is low.

Not A Glass Product

Although Kaylo calcium silicate contains two of the raw materials which are used in making glass, it is not a glass product. Glass is made by fusion (melting together) of the raw materials. Calcium silicate is the result of a direct chemical reaction between lime and sand.

Unique Advantages for Variety of Uses

Lighter than wood, a better thermal insulator than gypsum, stronger than the common materials used for insulation and as incombustible as concrete, Kaylo material offers exciting possibilities for an almost unlimited number of uses. Application of Kaylo products all over the world has already established their superiority in a wide variety of uses. Others are being developed at this moment, both by Owens-Illinois and various manufacturers who make fabricated products. After reading this booklet, new uses may occur to you.

Kaylo calcium silicate and the products made from it will become increasingly important to you. This booklet tells you why.

WHAT KAYLO MATERIAL IS . . .

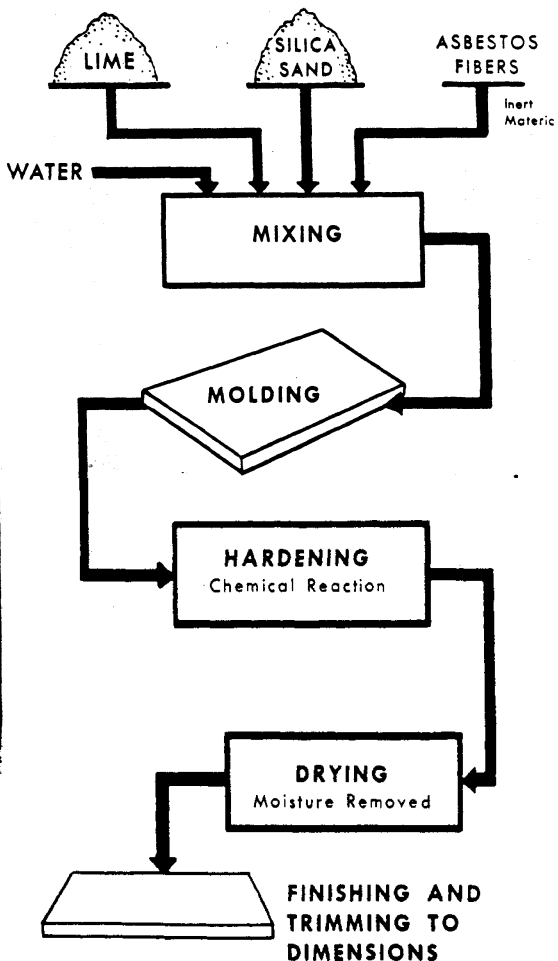
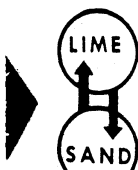


Sayreville Plant, Kaylo Division,
Owens-Illinois Glass Company

KAYLO CALCIUM ALUMINATE
IS THE RESULT OF A
CHEMICAL PROCESS

FLOW DIAGRAM

Kaylo Hydrous Calcium Silicate From Raw Material
To Finished Product



Insoluble In Water

In tests, Kaylo material has been boiled continuously for 24 hours and longer. After drying, it regains strength and insulating efficiency. Even when saturated, Kaylo material retains about 85% of its strength.

Incombustible, Resistant to Heat Flow and to Temperature Change

Kaylo material has been tested at the Underwriters' Laboratories in Chicago and given the following rating, based on comparison with untreated Red Oak as 100.

Flame spread.....	0.0
Fuel contributed.....	negligible
Smoke produced.....	0.0

In another test, a section of Kaylo material is exposed to a flame temperature above 1600°F. The surface unexposed to flame remains cool enough to touch with the bare hand for an indefinite period.

Thirty seconds after the piece has been removed from the flame, the surface which has been exposed to the flame is cool enough to be touched. This also illustrates its low thermal diffusivity. In other words, fingers take the heat away faster from the surface than heat can come to the surface of the Kaylo calcium silicate.

Other Properties

Kaylo calcium silicate has exceptionally good dimensional stability. It does not warp. It is rotproof and vermin-proof. It does not support mold. Its near white color provides high light reflectivity. It is compatible with standard adhesives and may be bonded to nearly any other type of structural material.



Research and Development



In 1938, Owens-Illinois first turned its attention to this new field. By 1940 it was carrying on a comprehensive program of research and development on hydrous calcium silicates, beginning with a study of their fundamental chemistry.

Many other companies and groups had experimented with material of this type. Work had been done in Germany in the early 1930's. Several independent research organizations and manufacturing companies in the United States and Canada had attempted to develop commercial hydrous calcium silicates during this period.

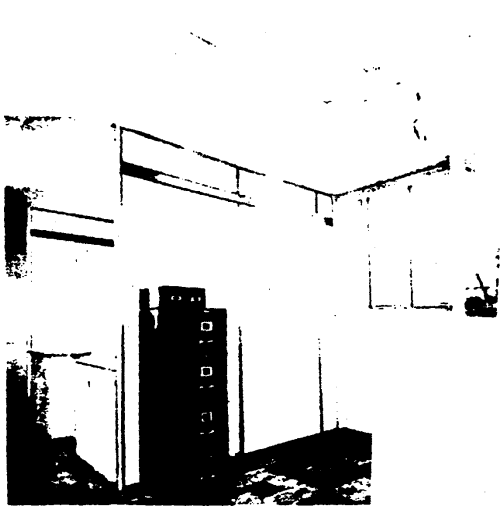
Until the physicists, chemists and engineers of Owens-Illinois studied the chemical structures of the component materials and learned the secrets of their reactions on each other, however, no one had produced a stable, uniform product with the advantages of Kaylo calcium silicate. The formulations and methods Owens-Illinois uses today were developed by themselves, independently of any other groups.

Even though Kaylo calcium silicate is now an accepted commercial material, Owens-Illinois continues an extensive development program. Research projects include studies of basic chemistry to improve the physical properties of the material, as well as work on product forms, installation methods and manufacturing techniques.

Tomorrow's better building and insulating products are being shaped today in Owens-Illinois laboratories.



(Above) Kaylo Laminated Panels provide a neat outside wall, resistant to fire and weather.



(Right) Inside walls are neat and clean with light-reflective surfaces.

Although nominally two inches thick, Kaylo Laminated Par with cement-asbestos facing have better insulating value than 16 inches of solid concrete. Installed with proper joint systems, the Kaylo Laminated Panels meet A.S.T.M. one-hour fire standards. They have remarkable resistance to deterioration from water or exposure to the elements, even in extreme weather cycles.

Easy to Erect

Each standard 4 x 8 foot panel with cement-asbestos facing provides a complete wall section, 32 square feet in area, which weighs only about 200 pounds. Two men can erect one of these panels in a few minutes. A brick wall of the same area would require 416 individually-laid bricks and weigh about 2700 pounds.



KAYLO®

● BUILDING AND INSULATING PRODUCTS

INSULUX®

● STRUCTURAL GLASS BLOCK

Duraglas®

● CONTAINERS



● CLOSURES AND PLASTIC PRODUCTS



● LABORATORY AND SPECIAL GLASSWARE



● TABLE GLASSWARE

HEMINGRAY®

● GLASS INSULATORS



● COATED BOARD ● FOLDING CARTONS

KIMBLE®

● ALL-GLASS TELEVISION BULBS

OWENS  **ILLINOIS**
GLASS COMPANY
Toledo 1, Ohio

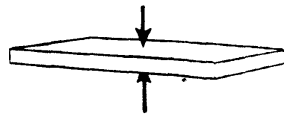
Characteristics

Light Weight

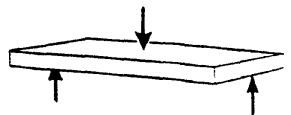
Billions of microscopic air spaces which are formed during manufacture give Kaylo material its extremely light weight and low thermal conductivity.

Strong

COMPRESSIVE STRENGTH



FLEXURAL STRENGTH

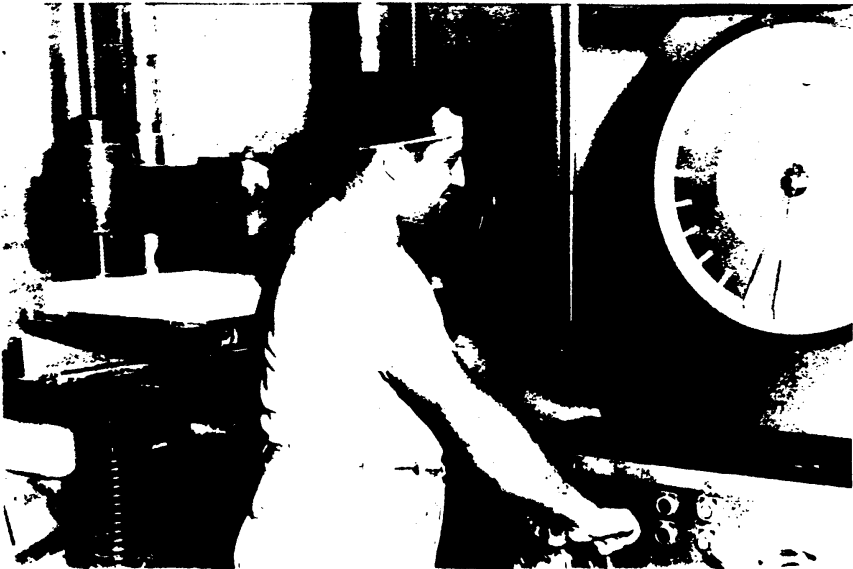


FIRST SUCCESSFUL COMMERCIAL MANUFACTURER

In 1943, Owens-Illinois began manufacturing limited quantities of calcium silicate. Material then being made at the plant at Berlin, New Jersey was used by government agencies in the form of heat insulating block and pipe covering.

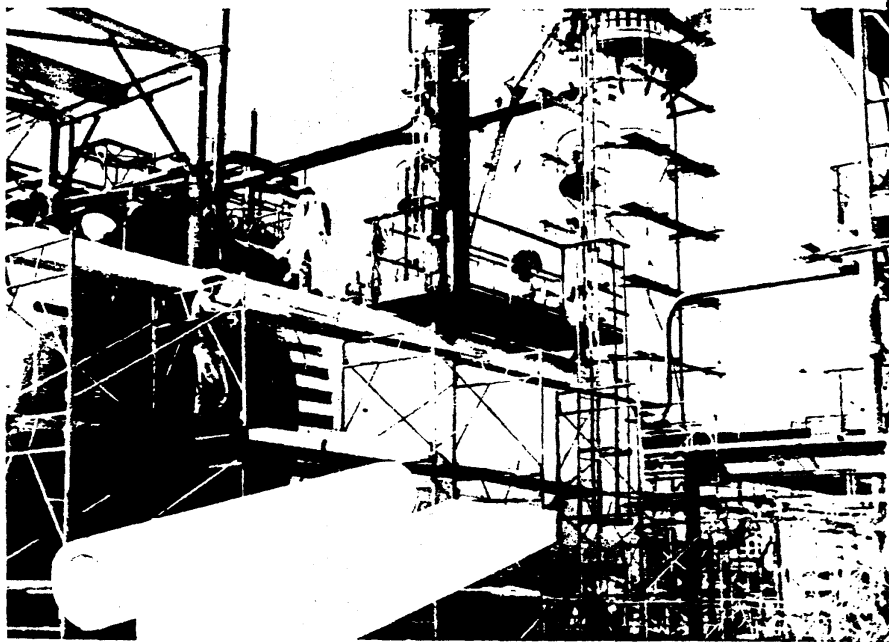
A few years later, construction began on a quarter-mile-long manufacturing plant at Sayreville, New Jersey, and actual commercial manufacturing of Kaylo products started there in March, 1948. Since that time the capacity of the Berlin plant has also been expanded several times.

Quality control plays an important part throughout the manufacture of Kaylo calcium silicate—from raw materials to finished products. Here a flexural test is being made on a block of structural density Kaylo material.



Two Densities

The term *density*, as used here, means the weight of one cubic foot of Kaylo material. By varying formulations, the density of Kaylo material can be changed to obtain the features and characteristics most desired in the end product. During manufacture, the density is controlled within narrow limits—well within plus or minus one pound per cubic foot. Two densities, 11 and 20 pounds per cubic foot, have proved to be the most useful.

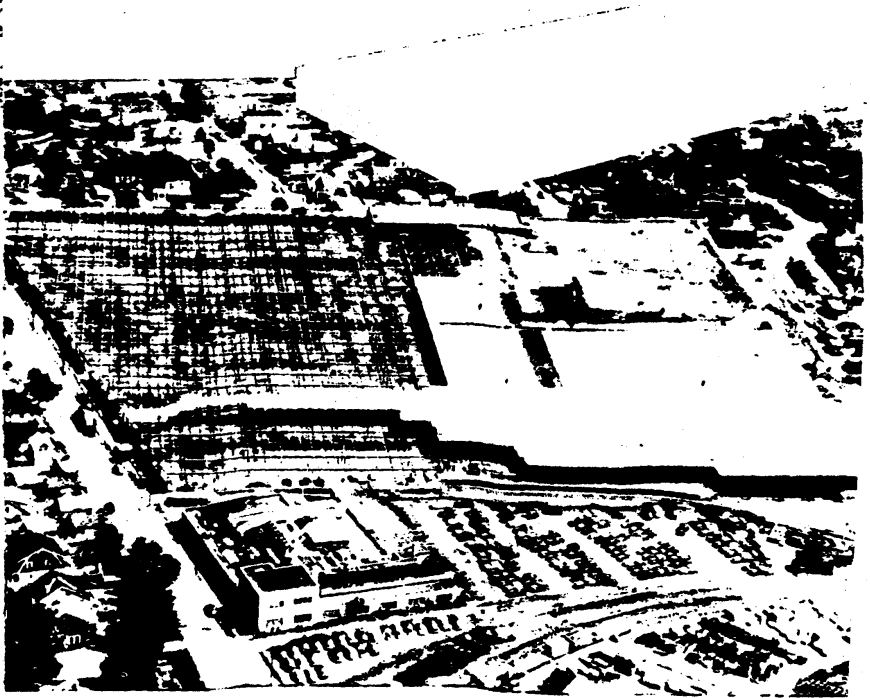


Thermal Density

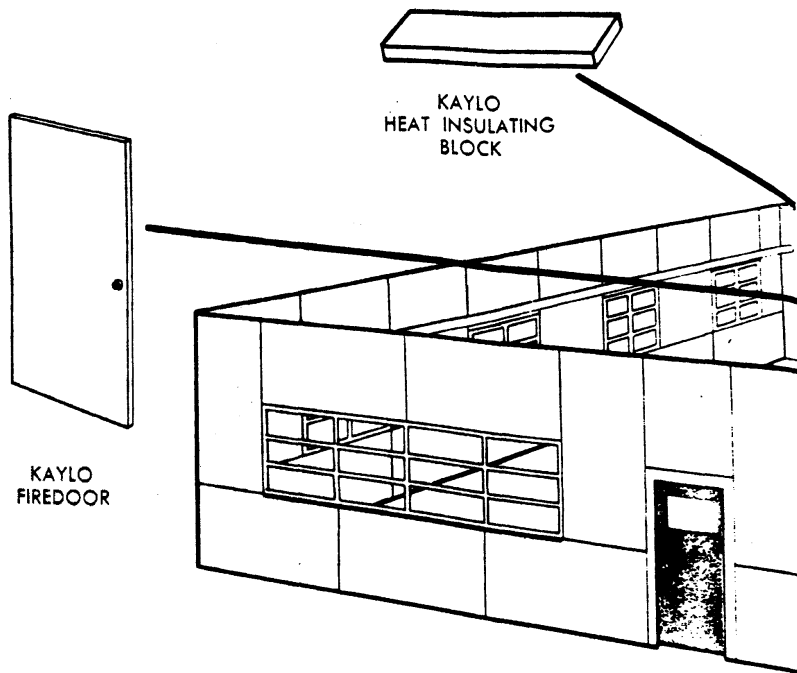
Thermal density (11 pounds per cubic foot) is used where heat insulating value is the primary need and mechanical strength secondary but still important. Thermal Kaylo density material is approximately 90 per cent air by volume, but the air spaces are too small to be seen.

Structural Density

Structural density (20 pounds per cubic foot) is used where substantial strength and fireproofing needs are important as well as heat insulation. While heavier than thermal density, it is extremely light when compared to other structural materials used for the same purpose. Structural density Kaylo material is approximately 80 per cent air by volume.



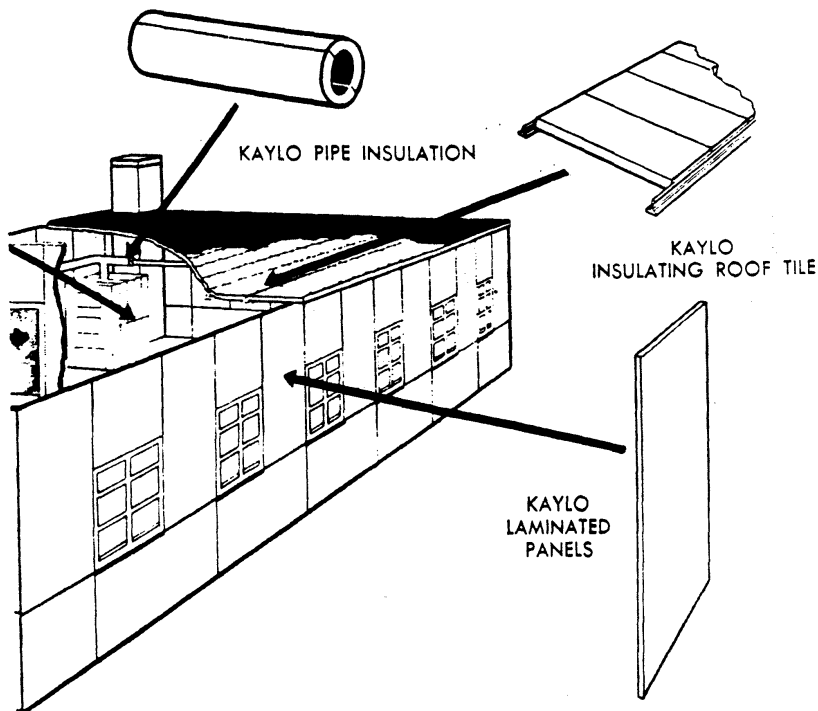
KAYLO[®] CALCIUM SILICATE



Uses Developed By Other Companies

Kaylo calcium silicate is used not only by Owens-Illinois for products which they market under the brand name of Kaylo, but also by other manufacturers who use it as a part of fabricated products marketed under their own names. For example, other manufacturers are using Kaylo calcium silicate as a core material for prefabricated wall sections, firedoors, ventilating units and for absorption units in humidifiers.

PRODUCTS BY OWENS-ILLINOIS



One of the most unusual products made of this material by other manufacturers is a tapper for blast furnaces. Structural density Kaylo material is molded into bullet-like units. They carry a directed charge of explosives which open holes in furnaces to release molten metal. The charge in the tapper is detonated electrically by remote control, and if the electrical system fails, the thermal characteristics of the Kaylo material force the tapper to ignite automatically in a predetermined time by the heat of the furnace. This improvement over former hand methods of tapping furnaces provides greater safety for workmen.

KAYLO *Heat Insulation*

For Temperatures Up to 1200° F.

Kaylo Heat Insulation, with its remarkable combination of advantages, has gained recognition as the first major advancement in high-temperature insulation. It is rapidly replacing other materials long used in this field.

Kaylo Heat Insulation is of thermal density (11 pounds per cubic foot) and has a high effective temperature limit—1200°F. The extremely low thermal conductivity of Kaylo material assures high insulating efficiency throughout its entire temperature range.

Kaylo Heat Insulation is available in two forms: Kaylo Pipe Insulation and Kaylo Heat Insulating Block. Both have exceptionally good dimensional stability. Both are insoluble in water, incombustible, lightweight and strong... easy to handle and apply. Cutting and fitting is done with standard tools.

Simplified Dimensional Standards

Kaylo Pipe Insulation is produced in what is known as Simplified Dimensional Standards for tube and pipe sizes from $\frac{1}{4}$ in. to 72 in. in diameter. With this system the outside diameter of each piece of pipe covering is the same as the diameter of a standard pipe. This allows one piece of pipe covering to fit over another for snug nesting, when necessary.

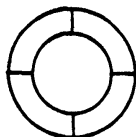
For Tube and Pipe Sizes From $\frac{1}{4}$ to 72 Inches
in Diameter



SECTIONAL



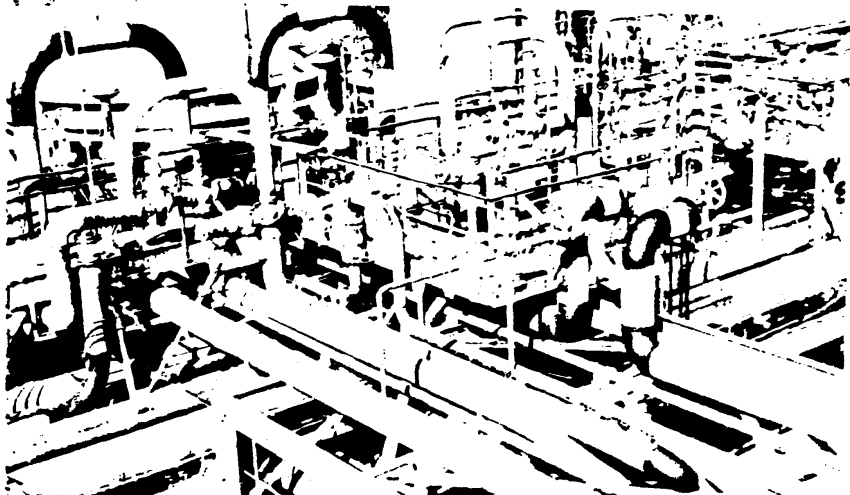
TRI-SEGMENTAL



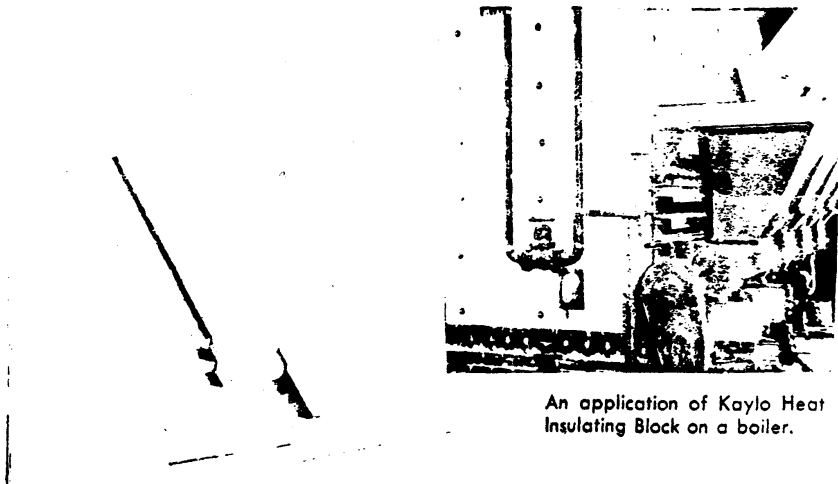
QUAD-SEGMENTAL



K-SEGMENTAL



An application of Kaylo Pipe Insulation in an oil refinery. Standard weather-proofing wrappings have been applied.



An application of Kaylo Heat Insulating Block on a boiler.

Kaylo Heat Insulating Block

For insulating boilers or other equipment with surfaces that are flat or nearly flat, (diameters larger than 60 ft.) Kaylo Heat Insulating Block is available in units for single layer application. It is made in thicknesses from 1 in. to 6 in. and in all standard sizes up to 18 in. x 36 in. For vessels less than 60 ft. in diameter it is made in curved block 18 in. wide.

KAYLO *Insulating Roof Tile*



For A Better, Longer-Lasting Roof Deck

Kaylo Insulating Roof Tile of structural density (20 pounds per cubic foot) presents an outstanding advancement in roof design and construction. For flat or pitched roofs—for almost all kinds of buildings, Kaylo Roof Tile offers a combination of advantages never before obtainable in one material.

Fire Protection

Kaylo Insulating Roof Tile is incombustible. The tile themselves will withstand building fire temperatures up to three hours and are still strong enough to be walked on.

Insulating Value

Since Kaylo Roof Tile provides insulating value equal to that of an inch and one-half of standard insulating board, no additional insulation is needed for usual installations.

Structural Strength

The structural strength of this steel mesh reinforced Kaylo Roof Tile is more than adequate for typical roof loads.

Inorganic Composition

Kaylo Insulating Roof Tile, made of inorganic calcium silicate, is rotproof, verminproof and insoluble in water.

Light Weight

Substantial savings are effected because the lightweight tile (only 5 pounds per square foot) permits the use of lighter and more economical supporting structural members and foundations.

Simple Fast Construction

Kaylo Insulating Roof Tile are laid quickly and easily on steel sub-purlins or standard structural shapes, or may be nailed to wood joists.

When Owens-Illinois sub-purlins are used, a Kaylo roof deck is constructed in only three steps—erecting the sub-purlins, laying the tile and grouting the end joints. Then the deck is ready for covering by conventional roofing materials such as built-up roofing, asphalt, asbestos slate or terra cotta tile shingles.

No Special Tools Needed

Kaylo Insulating Roof Tile can be fitted to odd-sized spaces without special tools. Any saw which will cut the reinforcing wire mesh is suitable. Tile can be readily chipped or gouged to fit irregular surfaces. One man easily handles the 23-pound tile.

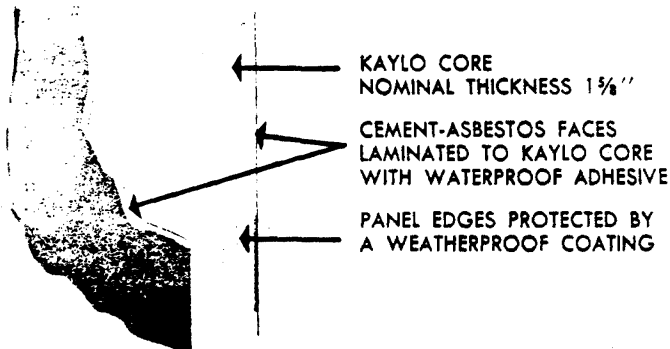
The smooth under-surface of Kaylo Insulating Roof Tile has a light reflection factor of approximately 80 per cent. Note the lightweight supporting structure made possible by a Kaylo roof deck.



KAYLO *Laminated Panels*

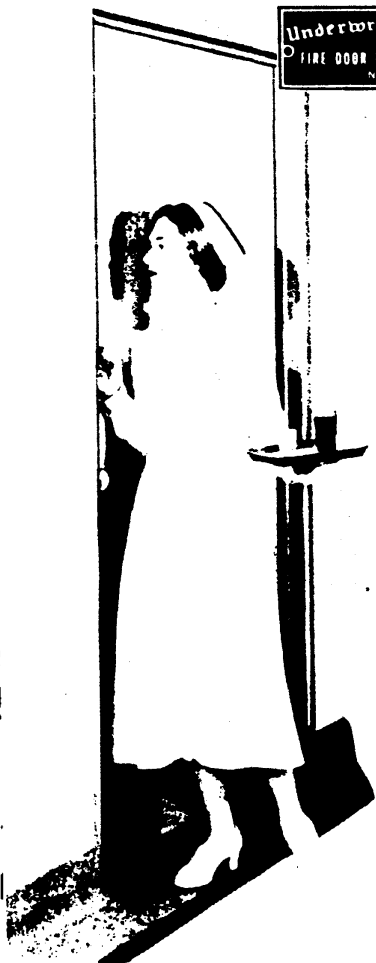
Kaylo material of structural density 20 pounds per cubic foot is used as the core in panels faced with wood veneer, cement-asbestos or any of a variety of metals. The incombustible Kaylo core is securely bonded to facings with a waterproof adhesive. This sandwich type of construction and the strong Kaylo core give Kaylo Laminated Panels exceedingly high strength, dimensional stability and resistance to impact. Kaylo cores are being used in a number of laminated products now on the market, in which fire resistance is the prime consideration.

Cement-Asbestos Board Facing



Kaylo Laminated Panels with cement-asbestos facing provide complete curtainwall or non-load-bearing partition sections which require no finishing on either side—no painting, furring, plastering, siding or insulation. While not required, paint may be applied to these panels by conventional means.

KAYLO *Firedoors*



Kaylo Firedoors, with their incombustible core of Kaylo calcium silicate, carry an Underwriters' label. This means they have passed tests under conditions similar to actual fire conditions. Many other important advantages are combined in the Kaylo Firedoor.

Handsome Appearance—The wood veneer-faced Kaylo Firedoor equals the richness of the most striking conventional wood doors. It offers rated fire protection, without sacrifice in beauty.

Insulating Value—Installed in an exterior opening with weather stripping, the Kaylo Firedoor insulates more effectively than a conventional door, *plus* a storm door.

Dimensional Stability—A Kaylo Firedoor does not warp, swell or shrink—even when subjected to extremes of heat or cold, dampness or dryness.

Light Weight Plus Strength—A standard 3'4"x7' Kaylo Firedoor weighs only 90 pounds, but can support an 8,000-pound distributed load with only one-half inch deflection while loaded. After unloading it returns to its original position.

This label on doors means rated fire protection, safety and reduced insurance rates for building owners. It appears on every Kaylo Firedoor.

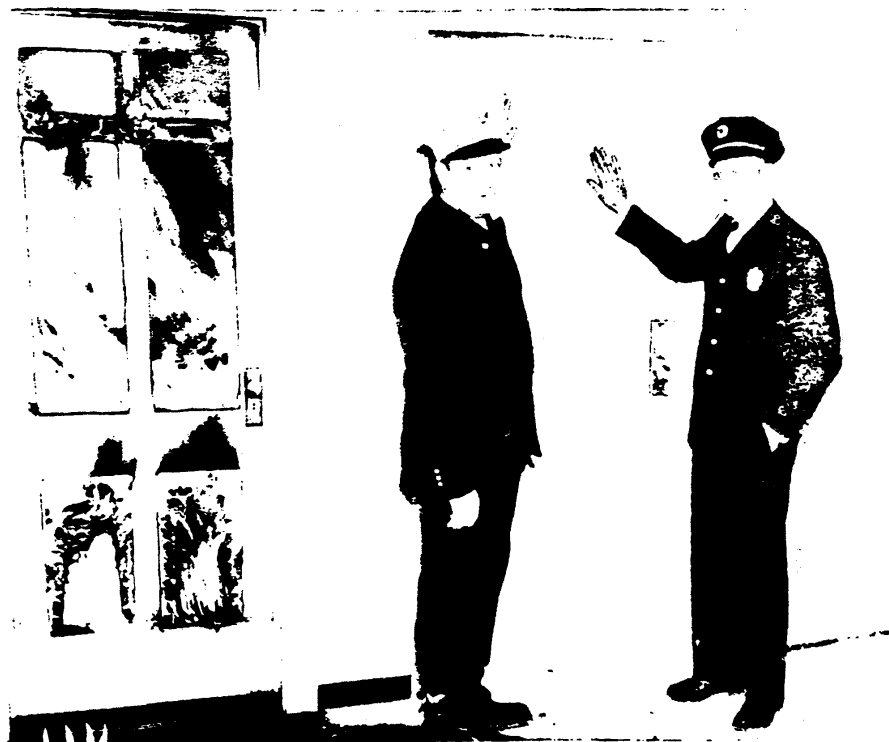




1 To test comparative fire-resistance, a Kaylo Firedoor and conventional wood door, set side by side in a concrete block wall are exposed simultaneously to fire.



2 The fire is set in a wood pile soaked with fuel oil. This is an unretouched photograph of the "hot side" after less than 10 minutes direct exposure to flame.



3 On the opposite side of the wall, flames lick through the conventional wood door. But the Kaylo Firedoor has completely checked the fire and most of the heat as well. Note the men holding their bare hands on the Kaylo Firedoor—snow on the sill—while fire rages.

KAYLO® *Building and Insulating Products*

Members of a Distinguished Family of



Quality Products

Owens-Illinois has been best known as a manufacturer of glass containers, although through its various divisions and subsidiary companies it manufactures a diversity of products.

It was natural that Owens-Illinois should pioneer in the development of hydrous calcium silicate. As a manufacturer of glass products for more than a century it has had long experience with the two principal raw materials used in calcium silicate—lime and sand. Among the developments of Owens-Illinois are glass block which the company introduced in the early 1930's. Having thus entered the building material field, the company saw the great possibilities in this market and the need for a broader line. Hydrous calcium silicate, with its unique properties and great potentialities, was a logical development.

Owens-Illinois' success in calcium silicate, covering over a decade of research and several years of commercial manufacture, means better buildings and products for industry—and very likely for you.