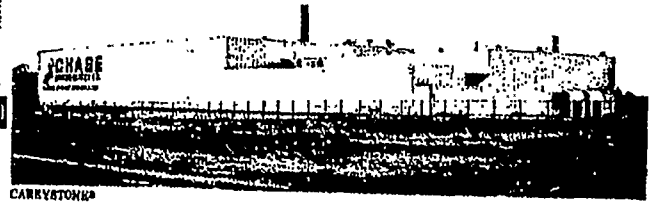
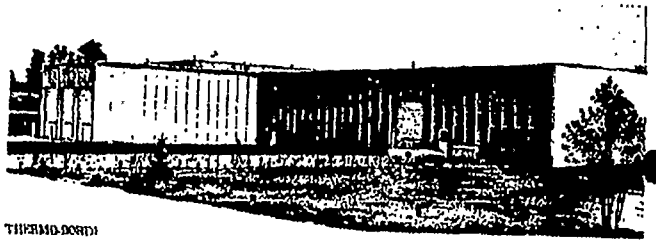
PHILIP CAREY

Philip Carey Asbestos-Cement Insulated Panels—Flat Sheets—4.2 Corrugated



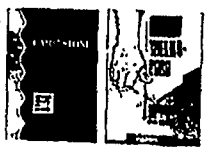
CARRYSTONE®



THERMO-BORD®

PHILIP CAREY **PHILIP CAREY COMPANY**
A DIVISION OF PANACON CORPORATION/CINCINNATI, OHIO 45213

PANACON



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South St. & Victory Bridge
Perth Amboy, N. J. 08861
201—826-6431

ST. LOUIS
12640 Maurer Industrial Dr.
St. Louis, Missouri 63132
314—423-1550

WASHINGTON, D.C.
9670 D Mann Street
Suite 4N, Maryland 20870
301—424-9612
Balt. 301—792-0942 (toll free)

ARCHITECTURAL SPECIFICATION ASSISTANCE. [illegible]

WARRANTY—We warrant our materials to be free of [illegible]

420745

Form 7316-5M70-30 Litho U.S.A.

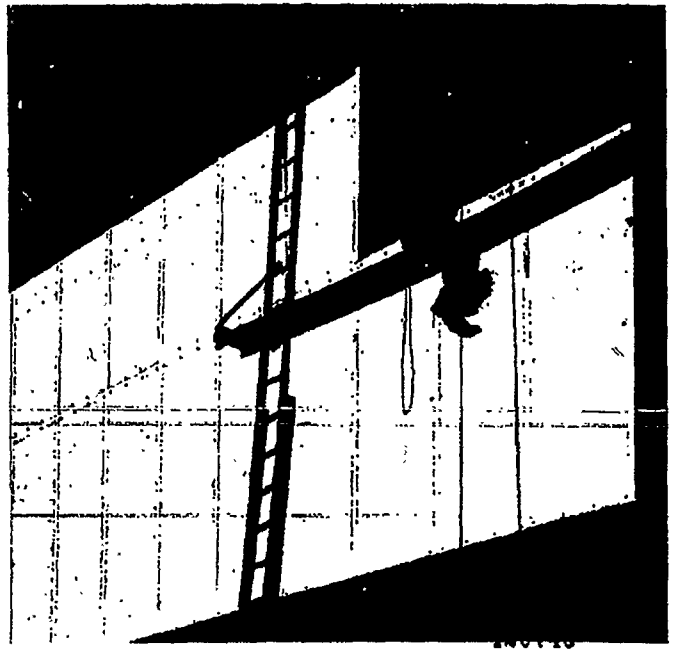
Philip Carey Company, A Division of Panacon Corporation
January, 1971

7 BITUMOID ROOFING AND SIDING
ASPHALT Corrugated Vinyl

Philip Carey Foam Core Thermo-Bord®

PHILIP CAREY

The economical, lightweight construction panel.



Philip Carey Company, A Division of Panacon Corporation
July 1971

8 CURTAIN WALL SYSTEMS
Curtain Wall Panels

PLAINTIFF'S
EXHIBIT
W-307

Philip Carey Foam Core Thermo-Bord®... saves weight and money, insulates

Carey Foam Core Thermo-Bord is an economical, lightweight construction panel with insulation *built-in*. It's versatile, too . . . can be used for external walls, roof decks, curtain walls, and interior partitions. Foam Core Thermo-Bord panels consist of two ¼" sheets of Careyflex Asbestos-Cement Board, bonded to both sides of a core of expanded polystyrene. They are easy to handle and transport, the thickest panel weighing less than 3 lb. per square foot. They can be sawed and drilled on site with ordinary hand tools..



Economical -High rigidity and insulating value for weight. Five sizes for minimum waste. Reduced shipping costs per unit area.

No maintenance -Won't rot or corrode. Withstands weather without special treatment. Asbestos-cement surface hardens and becomes stronger with age.

High Strength Rigid Panel — Warranted to perform with entire satisfaction in non-bearing curtain wall construction when applied in accordance to methods recommended in the Thermo-Bord Manual

Easy application -Uniform thickness and panel size make application easy by standard support methods. Large, light sheets go up fast -can be drilled, nailed, bolted, or clipped to steel or wood framing, or can be fitted into various types of channel grid systems. For hand sawing, a 5 point cross-cut saw works best. Carbide-tipped steel blades or silicon carbide resinoid blade in circular saws cut Foam Core Thermo-Bord easily.

Weather-resistant Resists attack by water, sun, freezing and thawing. Highly stable at temperatures up to 180°F.

Completely re-usable High salvage value. Drilled holes can be plugged with any standard caulking material. Not affected by age or rot.

Excellent thermal insulation -Reduces heat transfer. High insulation value with minimum thickness.

Fire-resistant Foam Core is FR Type having an Underwriters' Laboratories, Inc. flame spread classification of 5. The asbestos-cement facings are classified as flame spread 0, fuel contribution 0 and smoke contribution 0.

Reflective surface -Natural gray-white color gives nearly 60% light reflectivity. Painting not required to achieve good light reflectivity.

Physical Properties — See Page 4.

Economical Exterior Walls

Foam Core Thermo-Bord can be applied to building exteriors with any of the standard techniques for asbestos panel construction, including curtain grid-wall and window-wall systems. Offers a lightweight panel with high insulation value for thin-wall construction.

Produced in the standard thicknesses to meet the most popular grid wall requirements.

High Insulation Value Roof Decks

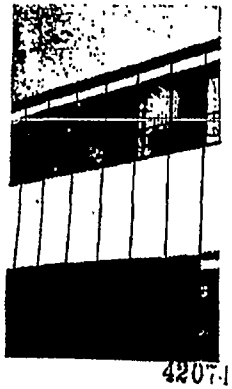
When sealed and overlaid with bituminous built-up roofing, Foam Core Thermo-Bord blocks thermal transmission in or out, deadens noise, and forms a lightweight, light-reflecting ceiling that needs no finishing for eye appeal.

For installation details, see the standard Thermo-Bord Manual.

Space-Saving Interior Partitions

Meets all requirements for a rigid, single-thickness panel compatible with a wide variety of steel and aluminum grid systems. Lightweight, insulating, smooth surfaced. Can be painted, papered, or otherwise covered as desired, or left in its light-reflecting, natural gray color

Produced in four standard lengths for minimum waste. Completely reusable.







Ideal for high-humidity installations







Because it combines insulation, vapor barriers, and inorganic exterior surfaces resistant to attack by dampness, mold, fungi and bacteria, Carey Foam Core Thermo-Bord is the ideal structural material for indoor swimming pool buildings, poultry houses, dairy barns, packing plants, and other damp-area structures where temperatures are held below 180°F. Edge sealing for moisture resistance is not required.



Specification Compliance

The Asbestos-Cement Facings are in compliance with the following specifications:

Federal Specifications SS-B-756 Type F

ASTM Specification C-220-67 Type F

The Polystyrene Core meets:

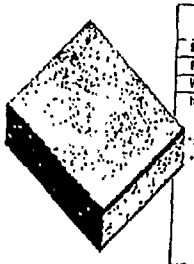
Federal Specification HH-I-524A
Type I Class A

Military Specification MIL-P-40619
Type I Class 1 & 2 Grade A

Thermo-Bord Manual

A complete architectural, engineering and design data manual for the use of Philip Carey Thermo-Bord, including Foam Core Thermo-Bord, is available through your Philip Carey distributor. Ask for Thermo-Bord Manual or write us directly.

PHILIP CAREY



Physical Data

Panel thickness	1"	1½"	1⅝"	2"
Panel sizes (all thicknesses) 4'-0" wide by 6', 8', 9', 10' and 12' long				
Weight, lb. per sq. ft. (approx.)	2.7	2.7	2.8	2.9
Insulating "U" value * Sidewalls	.235¢	.213¢	.157¢	.124¢
** Roof deck	not used	.204¢	.152¢	.121¢
* "R" value (at 75°F. mean)	4.25	4.70	6.38	8.07
* 50,020 Transmission Loss (in decibels) FREQUENCIES				
125	19	18	20	18
250	22	22	22	22
500	25	24	26	25
1,000	24	15	27	18
2,000	20	20	28	39
4,000	44	47	44	45
Average 125-4,000	26	28	27	28
Maximum girt spacing for outside walls	5'-0"	5'-6"	6'-6"	7'-0"
Purlin spacing for decks ***16 gauge sub-purlins	not used	4'-3"	5'-6"	6'-0"
***std. angle sub-purlins	not used	4'-9"	6'-6"	7'-0"
no sub purlins (sheets at right angle to purlins)	not used	2'-0"	2'-0"	2'-0"

* Based on temperature of 75°F. vs 10°F. ambient.
** Based on inside temperature of 72°F. - no air movement and includes bottom seating.
*** 3/8 joints must be welded every 4'-0" centers.
* Tests were conducted and data was developed in accordance with ASTM designations E90-70 and Section XI B 5, Building Materials Specimens Report No. 101 and the Office of Economic Research and Development Report No. 309 by the National Roofing Contractors Association.

Suggested Specifications

For exterior walls All exterior sidewalls to be Carey Foam Core Thermo-Bord of (1") (1⅛") (1½") (2") thickness. Application to be in strict accordance with details shown on pages ____ of Carey Thermo-Bord Manual.

For roof decks All roof decks to be of Carey Foam Core Thermo-Bord of (1⅛") (1½") (2") thickness. Application to be in strict accordance with details shown on pages ____ of Carey Thermo-Bord Manual.

For interior walls Interior partitions and non-load-bearing walls, as indicated on architect's drawings, shall be Carey Foam Core Thermo-Bord panels of (1") (1⅛") (1⅝") (2") thickness, supported by framework as follows

PHILIP CAREY **PHILIP CAREY COMPANY** | PANACON
A DIVISION OF PANACON CORPORATION · CINCINNATI, OHIO 45215

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513 871 3600

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Cleveland, Ohio 44142
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Houston, Texas 77055
713 466 3741

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901-324 3328

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201 826 6101

ST. LOUIS
10017 Manchester Road
St. Louis, Missouri 63122
314 961 3100

ARCHITECTURAL SPECIFICATION ASSISTANCE Carey's own Architectural Representatives through the United States, Mexico and Canada. In the New York area, contact Panacon Corporation, 370 Lexington Avenue, New York, N.Y. 10017. Phone: 212 679-3868.

WARRANTY - Warranted merchantable to be of good quality and not contain material proved defective. This warranty is in lieu of all others express or implied and may not be extended by representations, written sales information or drawings. While we recommend uses for our materials based on tests believed reliable, we do not warrant or guarantee particular aspects of use or application or performance under special conditions.

Descriptions and specifications contained herein were in effect at the time this publication was approved for printing. We reserve the right to discontinue products at any time or change specifications and/or designs without notice and without incurring obligation.

420719

Form 6887-1.30571-RP 1M to U.S.A.

PHILIP Carey

ASBESTOS PAPER AND ROLLBOARD

Strong, flexible, fire-resistant

Asbestos Paper and Rollboard are composed of pure Canadian asbestos fiber free from hard, rocky particles. This pure asbestos is mixed with a small quantity of very strong binding material, sturdied into a pulpy mass, formed into endless sheets of different weights on a specially equipped paper making machine, thoroughly dried, calendered to a smooth finish and put up in rolls ready for shipment. Asbestos Paper and Rollboard are strong, flexible, fire-resistant sheets.

Asbestos Paper tape, made from standard 15-lb. stock, also is available in 2" and 3" widths.

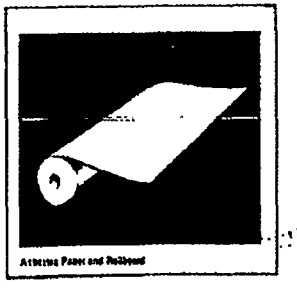
Commercial Grade Asbestos Papers entirely satisfactory for many purposes. The 6-lb. and 8-lb. papers are used extensively in the manufacture of various pipe insulation and electrical insulation. The 10-lb. and 12-lb papers are used for wrapping hot air furnace pipes. Heavier weights are used for lining stoves, ovens, gas ranges and for making gaskets, filters and discs.

SIZES

Asbestos Paper and Rollboard are furnished in standard widths of 18", 24", 36" and 37½" in rolls weighing approximately 25, 50 and 100 lbs. For manufacturing purposes, jumbo rolls of 200 to 2000 lbs. are furnished. Special sizes can be made to order. Asbestos paper tape is available in 2" and 3" widths.

PACKAGING

Asbestos Paper: 50 and 100-lb. rolls, or jumbo rolls
Asbestos Paper Tape: 2" wide 84-ft. rolls, 12 rolls per package
3" wide 84-ft. rolls, 12 rolls per package



Asbestos Paper and Rollboard

PHYSICAL PROPERTIES

Table of Weights and Thicknesses

Lbs./100 Sq. Ft. (as rec'd)	Approximate Thickness—In.
4 lb.	.010
6 lb.	.015
8 lb.	.019
10 lb.	.022
12 lb.	.026
14 lb.	.029
15 lb.	.032
1/16" (30 lb.)	.062
1/8" (60 lb.)	.094
1/6" (84 lb.)	.126

420731

ASBESTOS MILLBOARD

UP TO 1000° F.

A versatile, fire-safe asbestos board for industrial use

Completely inorganic

Asbestos Millboard is made from pure Canadian asbestos fiber pulp mixed with binding materials and formed in sheets. Commercial Millboard is available in two grades, No. 7 Medium and No. 1 Hard. The No. 7 grade withstands temperatures up to 800° F., and the No. 1 grade withstands temperatures up to 1000° F. Though these two grades satisfy the vast majority of requirements, special grades can be developed by Carey laboratories.

Millboard with pin-point (louded) finish can also be supplied.

Asbestos Millboard is used extensively in the electric heating field and glass industry. It is recommended for use in fire screens and partitions, as a fireproof lining for ceilings, walls, floors, elevator shafts, moving picture machine booths, ranges, stoves, grates, electric ovens, stackpipes and roasters.

SIZES

Asbestos Millboard is furnished in 42" by 48" sheets in thicknesses from ⅛" to 1". (⅛"—¼"—½" are laminations of two pieces).

PACKAGING

Asbestos Millboard is packed in 100-lb. cartons unless otherwise specified.

GOVERNMENT SPECIFICATIONS

Both No. 1 and No. 7 grades of Asbestos Millboard meet Federal Specification HH-M-51b.

PHYSICAL PROPERTIES

Table of Thicknesses and Weights for No. 1 and No. 7 Grade

Thickness—Inches	Per Sheet Pounds**	Per Sq. Ft. Ounces**
1/16	4.1	4.2
1/8	8.1	8.3
3/16	12.2	12.5
1/4	16.2	16.5
5/16	20.3	20.8
3/8	24.4	25.0
7/16	28.4	29.2
1/2	32.5	33.3
9/16	36.5	37.5
5/8	40.6	41.7
3/4	48.7	50.0
1	64.9	66.7

**Correct to ± 10%.

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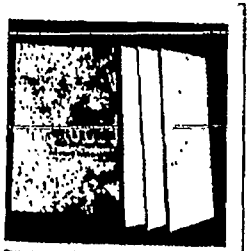


Clay Asbestos Millboard is lighter in weight than ordinary millboards—has higher insulation value per pound

PHILIP Carey

ASBESTOS SHEETS AND PANELS

UP TO 600° F.

Asbestos-cement boards for industrial uses

THERMO-BORD

Thermo-Bord is composed of ½" asbestos-cement board bonded to both sides of a special resin tested type insulation board. The bonding material is moisture resistant, forming a vapor resistant film between the asbestos-cement board and insulation board.

Thermo-Bord is recommended for roof decks, outside walls, partitions, grid system panels, and low-temperature ovens (not over 200°F.).

SIZES

Standard sheets are available 4' wide in lengths of 8', 9', 10' and 12'. Overall thicknesses: ¾", 1⅛", 1½" and 2".

4.2 CAREYSTONE CORRUGATED

Careystone Corrugated is made from Portland cement and asbestos fiber, compressed under enormous hydraulic pressure to form a homogeneous monolithic sheet. Careystone Corrugated actually becomes stronger with age.

These sheets are excellent for roofing and siding on industrial and commercial buildings. They are also widely used as a decorative building material.

Careystone Corrugated sheets have 10 corrugations in the 42-inch width.

SIZES

Sheets are available in standard lengths from 5' to 12' in multiples of 8". Average thickness is ¼".

PHYSICAL PROPERTIES

Weight: Average weight per sq. ft. both is 4 lbs.) weight per sq. ft. varied is 4½ lbs.

INDUSTRIAL A-C BOARD

This board is composed solely of Portland cement and asbestos fiber. It is fire-resistant and actually becomes stronger with age. Industrial A-C Board is unaffected by most acids and alkalies, heat and cold. It is rot-proof, vermin-proof, termite-proof, rodent-proof, and it does not corrode. Having a natural cement gray color, Industrial A-C Board does not require protective coatings or paint, although it can be painted if desired. This board withstands temperatures up to 600° F.

420733

SIZES

Industrial A-C Board is available in standard sheets 42" by 48", 48" by 48", 42" by 96", and 48" by 96" in thicknesses of ¼", ⅜" and ½".

CAREYFLEX BOARD

Careyflex is a pressure-made board containing selected Asbestos Fibre from our own Canadian mines blended with Portland Cement. Panels are Stone Gray in color and have a surface-finished smooth on one side. It can be finished by brush or spray painting if desired. The board is very dense, and has a high degree of flexibility. Even after years of exposure to all kinds of weather it remains immune to deterioration. Careyflex Board is non-combustible, resists corrosion, decay, rodents, termites and is impervious to all weather conditions. This board withstands temperatures up to 600° F.

PACKAGING

The 4' x 8', 4' x 10' and 4' x 12' sheets in ½" thickness are furnished packaged two sheets face to face and taped. All other sizes and thicknesses are furnished in bulk, unless ordered crated.

GOVERNMENT SPECIFICATIONS

Federal Specification SS-B-775a, Type F
ASTM C220-48, Type F, ASTM C221-48

PHYSICAL PROPERTIES

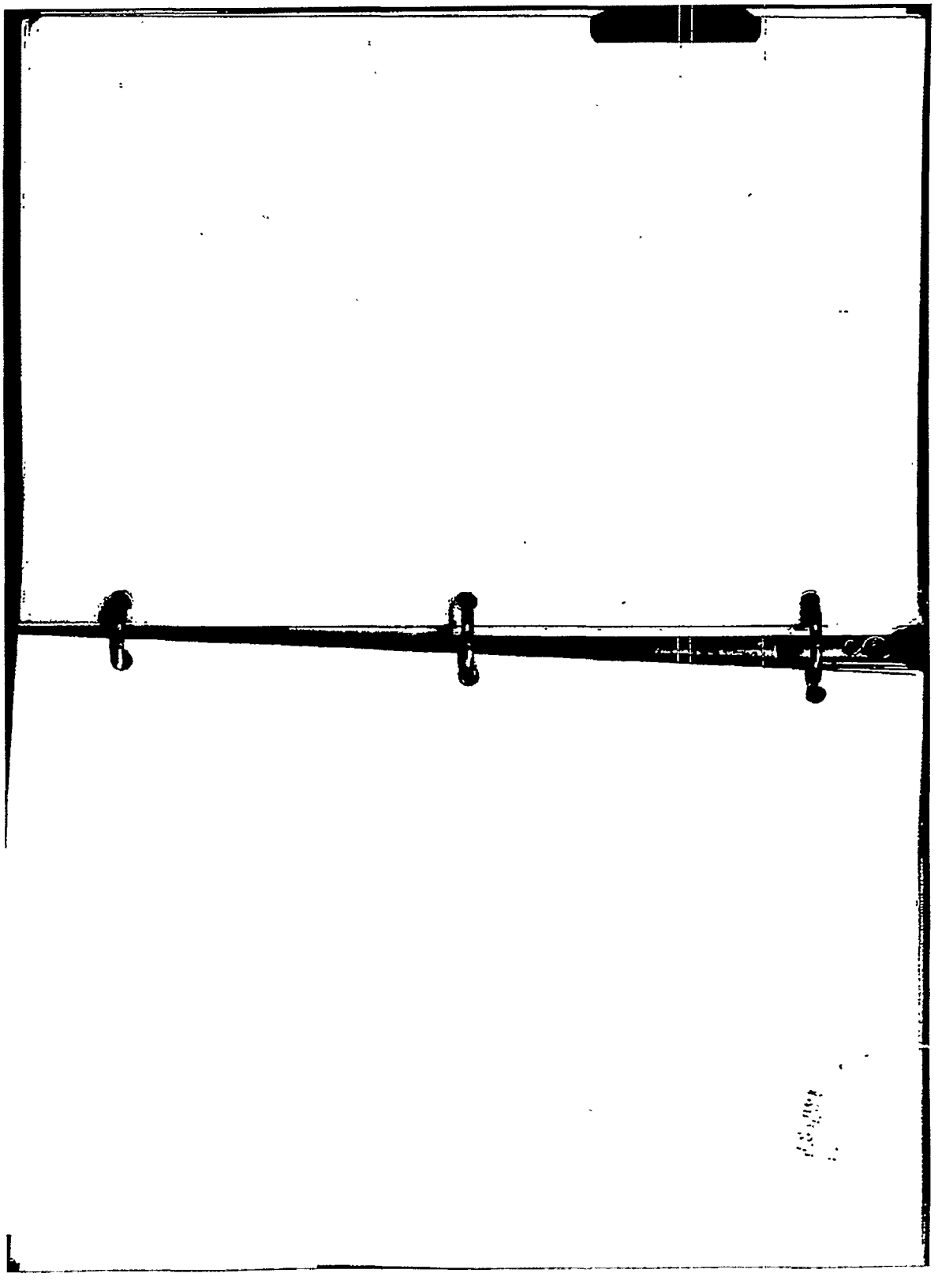
Boarding Careyflex Board can be bent to fit curved surfaces in accordance with the following table:

Thickness	Radius
¼"	30" Radius along 8', 10', 12' axis 24" Radius along 4' axis
⅜"	42" Radius along 8', 10', 12' axis 33" Radius along 4' axis
½"	65" Radius along 8', 10', 12' axis 84" Radius along 4' axis

Fire Hazard Classifications (Underwriters' Laboratories, Inc.):

Flame Spread	"0"
Fuel Contributed	"0"
Smoke Density	"0"

Water Absorption (Meets or exceeds Fed. Spec. & ASTM Spec.):
24 Day Weight Maximum (After 24 hours immersion): 22
Thickness Tolerance: Meets or exceeds Federal Specifications SS-B-775a Type U or ASTM Specification C 220-50 Type F.
Sheet Dimension Tolerances:
Length [illegible] Plus ½" Minus ¼"
Width [illegible] Plus or Minus ⅛"
Squareness Per Lineal Foot:
¼" per foot between—Maximum



PHILIP Carey

MW-ONE CEMENT

UP TO 1000° F.

A combination insulating and finishing cement

Carey mineral wool pellets and other ingredients (including rust inhibitor) are combined in MW-One Insulating Cement to form a monolithic, all-purpose, fast-setting finish cement that insulates as well as protects, giving a white surface.

MW-One is applied quickly, easily, in a single coat—saves valuable time and dollars. It has a tough, smooth surface—can be painted. MW-One is fast setting—in two to three hours. It is rust inhibitive, noncorrosive, fire-resistant, noncombustible, and water resistant.

MW-One Insulating Cement has excellent cohesion to all types of insulation, with many uses inside and out. Has good workability—is fast wetting, easy to mix and spread, and very plastic under trowel.

MW-One is used for insulating valves, fittings, tanks, ovens, hot air ducts. It can be applied directly over any insulation or MW-50 Cement as a finishing cement.

PACKAGING

MW-One is packaged 50 lbs. per multi-wall Kraft bag. Mixing instructions are printed on each bag.

RECOMMENDED THICKNESSES

Finished coat varies from ½" to ½" thick. Figure MW-One as a part of total insulation thickness. When making up fittings or insulating irregular surfaces use ½" thickness for each 100° F.

PHYSICAL PROPERTIES

Thermal Conductivity:



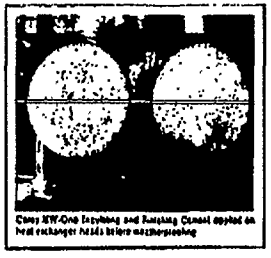
Coverage. Approx. 20 bd. ft. per 50 lb. bag

420750

GOVERNMENT SPECIFICATIONS

Carey MW-One Cement meets the following military and federal specifications.

MIL-C-19036A, Type I
SS-C-148 Type III, Grade I
ASTM-C-449-64



Carey MW-One Insulating and Finishing Cement applied on heat exchanger heads before weatherproofing

PHILIP Carey

MW-50 CEMENT

UP TO 1800° F.

A versatile mineral wool insulating cement

MW-50 Cement is a complete insulating material in itself. Special MW-50 nodular mineral fibers are combined with bonding materials, asbestos fiber and a rust inhibitor to produce a mixture with excellent physical and thermal properties.

High Insulation Value—More than double that of ordinary asbestos cements. MW-50 mineral fiber has remarkably low heat conductivity.

Highly Adhesive—MW-50 adheres to both warm and cold surfaces.

Economical—One-inch coat of MW-50 Cement insulates as well as a two- or three-inch thickness of ordinary asbestos cement. MW-50 goes further, too. One 50-pound bag covers approximately 25 sq. ft. to one-inch thickness. A 100-pound bag of ordinary asbestos cement covers only about 17 sq. ft. to same thickness.

For durable weather protection of MW-50 cement apply Thermotex-B or Insulation Seal. When using Thermotex-B a layer of 20 Ga. galvanized mesh wire should be installed before application. A 20-20 glass fabric is recommended to reinforce insulation seal.

MW-50 Cement is an excellent monolithic insulation for valves, fittings, expansion joints, heaters, exchangers, access doors, water tube boiler walls, tanks, drumheads and other heated equipment operating at temperatures up to 1800° F. It is particularly recommended for irregular surfaces due to ease of application. MW-50 Cement bonds firmly to metal, masonry and block installations.

PACKAGING

MW-50 is furnished in 50-lb. multi-wall Kraft bags.

426751

GOVERNMENT SPECIFICATIONS

Federal Specification SS-C-160, Type III, Grade U
MIL-C-2851, Type B
ASTM-C-195-54

RECOMMENDED THICKNESSES

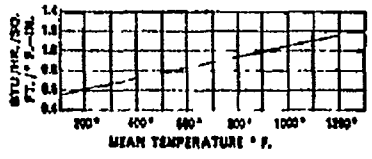
Temp.—° F.	Thickness—Inches
100 to 225	1
225 to 325	1½
325 to 425	2
425 to 525	2½
525 to 625	3
625 to 725	3½
725 to 825	4
825 to 925	4½
925 to 1000	5
Over 1000	Consult Carey

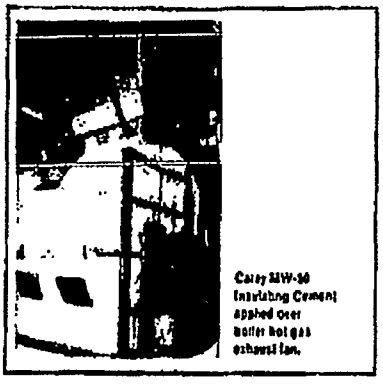
*As a finish coat over block insulation ½" thickness is recommended.

PHYSICAL PROPERTIES

Coverage: Approx. 25 sq. ft. 1" thick per 50 lb. bag.

Thermal Conductivity:





Carey MW-50 Insulating Cement applied over boiler hot gas exhaust fan.

4 59 15 5M



PHILIP Carey

FINISHING CEMENTS

UP TO 1000° F.

LF-20 ASBESTOS CEMENT
(Long Fiber)

Composed of long asbestos fibers and bonding clays. It is a medium hard finish cement for final surfacing of insulation where expansion strains are severe, such as over boiler water walls. This cement trowels to a smooth white finish.

PACKAGING

LF-20 Cement is furnished in 50-lb. paper bags and 100-lb. burlap bags.

GOVERNMENT SPECIFICATIONS

LF-20 meets Military Specification MIL-C-2208.

PHYSICAL PROPERTIES

Conductivity: At 100° F.—1.0. At 300° F.—1.0.
Coverage: Approximately 20 sq. ft., 1" thick, per 100 lbs.

NO. 100 ASBESTOS CEMENT
(Hard Finish)

Composed of asbestos fibers and bonding clays, No. 100 Cement is specifically designed to give a hard, smooth white finish over block work or other insulation. This cement has very low shrinkage.

PACKAGING

No. 100 Cement is furnished in 50-lb. paper bags and 100-lb. burlap bags.

PHYSICAL PROPERTIES

Conductivity: At 100° F.—1.20.
Coverage: 18-20 bd. ft. per 100 lbs.

NO. 303 ASBESTOS CEMENT
(General Utility)

Composed of asbestos fibers and bonding clays, No. 303 Cement is a general utility cement for finishing and pointing up fittings. It sticks to all surfaces and finishes medium hard.

PACKAGING

No. 303 Cement is furnished in 50-lb. paper bags and 100-lb. burlap bags.

PHYSICAL PROPERTIES

Conductivity: At 100° F.—1.4. At 300° F.—1.9.
Coverage: 18-20 bd. ft. per 100 lbs.

7M-20 ASBESTOS CEMENT
(Sheets)

Asbestos 7M-20 Mine Cement is recommended as a finish over preformed insulations such as Calcium Silicate for temperatures up to 1600° F. Asbestos 7M-20 Cement may be applied straight or white Portland Cement may be added up to 15 to 20% by weight to produce a whiter, harder surface.

The advantages of an asbestos mine cement over other types of insulation cement are low cost and a smooth, light colored surface. Asbestos mine cements often are applied over other types of cements to obtain smooth, light colored surfaces. The advantages of Carey-Canadian 7M-20 Asbestos Cement over other mine cements are: less shrinkage and better drying characteristics; very good troweling characteristics; excellent dry white finish; hard, non-dusting surface; good adhesion.

PACKAGING

7M-20 Asbestos Mine Cement is furnished in 100-lb. loose filled jute bags, 100-lb. pressure packed jute bags, 100-lb. loose filled 4 ply paper bags and 50-lb. loose filled 4 ply paper bags.

PHYSICAL PROPERTIES

Conductivity: At 100° F.—1.5 to 1.8.
Wet Coverage (1-1 ratio): 22.5 bd. ft. per 100 lbs.
Dry Coverage: 18.8 bd. ft. per 100 lbs.
Volumetric Shrinkage: 33.7%.

GOVERNMENT SPECIFICATIONS

7M-20 Asbestos Cement meets Military Specification MIL-C-2208A.

CAREYTEMP ASBESTOS CEMENT

Due to the high resistance of Careytemp insulation to moisture, ordinary asbestos cements are not recommended. Careytemp Asbestos Cement has been developed for installation where an asbestos cement is required over Careytemp. Careytemp Asbestos Cement dries to a smooth, hard white surface, will take an initial set in two to three hours and reach a satisfactory condition of dryness in 24 hours.

PACKAGING

Cement is furnished in multi-wall 50-lb. paper bags.

PHYSICAL PROPERTIES

Wet Coverage: Approximately 20 bd. ft. per 100 lbs.
Volumetric Shrinkage: 8% Maximum.
Wet Dry Coverage: Approximately 20 bd. ft. per 100 lbs.

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FINISHING CEMENTS AND ADHESIVES

PHILIP Carey

CAREYTEMP 2000 CEMENT

Careytemp 2000 Cement is recommended for finishing and pointing high temperature diatomaceous silica block, such as Careytemp 2000 Block.

PACKAGING

Cement is furnished in 50 lb. paper bags.

GOVERNMENT SPECIFICATIONS

Careytemp 2000 Cement meets Government Specifications SS-C-150, Type 5.

PHYSICAL PROPERTIES

Coverage: Approximately 35 sq. ft., 1" thick, per 100 lb.

VITRICEL CEMENT
(Refractory Finishing)

Composed of asbestos fibers and bonding materials, Vitricel Cement is a dry, semi refractory hydraulic setting cement for temperatures up to 1900° F. It is designed for pointing up joints and cracks in stack and breeching lining, covering metal parts exposed to hot corrosive gases, and surfacing block insulation installed inside breechings, ducts, economizers. Vitricel Cement resists moisture and has a very low drying and heat shrinkage.

PACKAGING

Vitricel Cement is furnished in 50-lb. paper bags.

PHYSICAL PROPERTIES

Coverage: Approximately 17 sq. ft., 1" thick, per 100 lbs.



Careytemp 2000 Blocks are finished with ½" thick Vitricel cement inside boiler breeching

FIBROUS ADHESIVE
(Bonding)

Composed of asbestos fibers, silicate of soda and filler materials, Fibrous Adhesive is a fibrous plastic cement of thin troweling or brushing consistency. It is designed for laying up insulating blocks and making fittings, and it makes a very strong heat-proof bond that is unaffected by temperatures up to 800° F.

PACKAGING

Fibrous Adhesive is furnished in 1-gal. pails weighing approximately 12 lbs. gross; 5-gal. pails weighing approximately 67 lbs. gross; 55-gal. barrels weighing approximately 670 lbs. gross.

GOVERNMENT SPECIFICATIONS

Fibrous Adhesive meets Navy Specification 52-C-22 (INT).

PHYSICAL PROPERTIES

Coverage: One gallon covers 25-30 sq. ft. of block insulation to approximately ½" thickness.

CAREYTEMP ADHESIVE
(Bonding)

This special composition of asbestos fibers, silicate of soda and additives provides a satisfactory adhesive for use with highly moisture-resistant Careytemp insulation, as well as other types of insulation. Careytemp Adhesive is similar to Fibrous Adhesive in consistency, application procedures, coverage and temperature limitations.

PACKAGING

Careytemp Adhesive is available in 1-gal. cans or 5-gal. pails.

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PIPE DIMENSIONS FITTINGS AND FLANGES

Standard dimensions; wrought iron and steel—steam, gas and water pipe

DIAMETER			NOMINAL THICKNESS	CIRCUMFERENCE		TRANSVERSE AREA			LINEAR FEET PER SQUARE FOOT		LENGTH OF PIPE CONTAINING 1 cu. foot	NOMINAL WEIGHT PER FOOT
Nominal Internal	Actual External	Actual Internal		External	Internal	Internal	Internal	Metal	External surface	Internal surface		
INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	SQ. INCHES	SQ. INCHES	SQ. INCHES				POUNDS

Asbestos cement for standard fittings

THIS TABLE gives the approximate number of pounds of asbestos cement which will make standard screwed fittings and flanges (1 in. thick) to be keyed from 200 lbs. cement having a covering capacity of 11½ sq. ft. 1 in. thick per 100 lb. bag.

11 31½ Separate cement is used and enough the cement will be required.

Where fittings are covered from each 1 sq. ft. thick pipe covering only one fitting is used, 11 sq. ft. thick mass is required and consequently one half the amount specified in this table.

For flanged fittings figure the amount required for some of fittings and in addition the amount required for the number of bolts of flanges on each flanged fitting.

Where elbows of sectional coverings or blocks are used around the outer surface of flanges only one third the amount of cement specified in the table will be needed for fitting cracks and filling up space between each sleeve and the outer surface of 1 in. thick pipe covering.

For 45-degree ells approximately one half the amount specified for 90-degree ells will be required.

For long radius ells approximately two thirds the amount specified for 90 degree ells will be required.

NOMINAL PIPE SIZE INCHES	POUNDS ASBESTOS CEMENT			
	90 ELLS	VALVES AND ELLS	UNIONS	ONE BASE FLANGES
½, ¾, and 1	20	24	12	24
1¼, 1½, and 2	35	42	17	44
2½ and 3	60	75	26	80
3½ and 4	90	122	120	131
4½ and 5	125	164	167	241
6	150	201	206	251
7	165	201	243	250
8	195	242	250	320
9	210	280	320	360
10	250	351	325	375
12	325	410	500	511

Fittings and Flanges—Insulation Areas

FLANGED FITTINGS			FLANGES		
PIPE SIZE INCHES	AREA EACH 90 F.L. ELL OR METAL CONTACT	SQ. FT. CEMENT USED EACH	PIPE SIZE INCHES	SQUARE FOOT OF METAL	SQ. FT. CEMENT OR BLOCK USED EACH FLANGE
¾	01	10	¾	10	21
1	01	12	1	12	25
1¼	10	15	1¼	14	27
1½	12	17	1½	15	25
2	15	19	2	17	30
2½	17	21	2½	19	33
3	22	26	3	21	35
3½	27	33	3½	23	40
4	31	35	4	27	45
5	36	45	5	31	45
6	45	59	6	37	58
7	51	69	7	41	67
8	62	80	8	48	78
9	72	105	9	58	90
10	220	130	10	61	100
11	235	155	11	71	110
12	171	185	12	77	127
14	210	223	14	100	154
15	240	250	15	110	167
16	270	275	16	130	169
20	300	310	20	151	176

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USE WATER AREA to secure area of sheets.

For area of 3½ in. covered over 6 in. block use 110% of metal area.

For area of 4½ in. covered over 7½ in. block use 100% of metal area.

For area of 5½ in. covered over 2 in. block use 130% of metal area.

The second column of the fittings indicates the square feet area of blocks required to cover them with the third column shows the square feet area of cement used and.

USE NUMBER EIGHTEEN BLOCK FLANGES because their square feet area of block insulation required to cover them, while the third column shows the square feet area of cement 21 in. thick used over 3½-in. block blocks.

PROPERTIES OF SATURATED STEAM STANDARD AREA TABLES

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For Blocks and Lagging

FLAT SURFACES		CURVED SURFACES OVER 15½ IN. RADIUS*		
THICKNESS		LESS THAN 6½ INCHES	6½ INCHES TO 24 INCHES INCLUSIVE	OVER 2 INCHES
LENGTH BLOCK, INCHES	AREA BLOCK, SQUARE FEET	AREA BLOCK SQUARE FEET	AREA BLOCK SQUARE FEET	AREA BLOCK SQUARE FEET
½	.892	.884	.888	.892
¾	.902	.893	.898	.902
1	.905	.896	.900	.903
1¼	.909	.900	.904	.907
1½	.913	.904	.908	.911
1¾	.917	.908	.912	.915
2	.921	.912	.916	.919
2½	.931	.922	.926	.929
3	.941	.932	.936	.939
3½	.951	.942	.946	.949
4	.961	.952	.956	.959
4½	.971	.962	.966	.969
5	.981	.972	.976	.979
5½	.991	.982	.986	.989
6	1.001	.992	.996	.999
6½	1.011	1.002	1.006	1.009
7	1.021	1.012	1.016	1.019
7½	1.031	1.022	1.026	1.029
8	1.041	1.032	1.036	1.039
8½	1.051	1.042	1.046	1.049
9	1.061	1.052	1.056	1.059
9½	1.071	1.062	1.066	1.069
10	1.081	1.072	1.076	1.079
10½	1.091	1.082	1.086	1.089
11	1.101	1.092	1.096	1.099
11½	1.111	1.102	1.106	1.109
12	1.121	1.112	1.116	1.119
13	1.141	1.132	1.136	1.139
14	1.161	1.152	1.156	1.159
15	1.181	1.172	1.176	1.179
16	1.201	1.192	1.196	1.199
17	1.221	1.212	1.216	1.219
18	1.241	1.232	1.236	1.239
19	1.261	1.252	1.256	1.259
20	1.281	1.272	1.276	1.279
21	1.301	1.292	1.296	1.299
22	1.321	1.312	1.316	1.319
23	1.341	1.332	1.336	1.339
24	1.361	1.352	1.356	1.359
25	1.381	1.372	1.376	1.379
26	1.401	1.392	1.396	1.399
27	1.421	1.412	1.416	1.419
28	1.441	1.432	1.436	1.439
29	1.461	1.452	1.456	1.459
30	1.481	1.472	1.476	1.479
31	1.501	1.492	1.496	1.499
32	1.521	1.512	1.516	1.519
33	1.541	1.532	1.536	1.539
34	1.561	1.552	1.556	1.559
35	1.581	1.572	1.576	1.579
36	1.601	1.592	1.596	1.599
37	1.621	1.612	1.616	1.619
38	1.641	1.632	1.636	1.639
39	1.661	1.652	1.656	1.659
40	1.681	1.672	1.676	1.679
41	1.701	1.692	1.696	1.699
42	1.721	1.712	1.716	1.719

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HEAT TRANSMISSION FROM SURFACES

R. H. Heilman's paper "Surface Heat Transmission," Trans. Am. Soc. Mech. Engrs., Fuels Steam Power, 51, 257 (1929), gives a sound basis for determining losses, savings to be made by the use of heat insulation, and the per cent efficiency of such insulation. Many and conflicting claims of efficiency have been made for various commercial heat insulations. It is obvious that the efficiencies and savings cannot be compared unless the same heat losses from the bare surfaces are used as a basis. As mentioned in the paper above, several types of commercial shapes, such as pipes and flat plates, were tested. From the results of those tests a formula was developed for the transfer by free convection, and emissivity values were determined for various surfaces for use in the Stefan-Boltzmann radiation formula. The separation of heat transmission from a surface to the surrounding air into its two components radiation and convection—greatly extends the range of usefulness of former tests on bare and insulated surfaces. By means of these two formulae and the emissivity of various surfaces, one is able to calculate the rate of heat transfer under still air conditions for practically any shape or type of surface and for any temperatures ordinarily met with in engineering practice.

The formulae are as follows:

$$q_c = C\left(\frac{1}{D}\right)^{.52}\left(\frac{1}{T_{avg.}}\right)^{.181}\Delta t^{1.266}$$

$$q_r = 17.4 \cdot 10^{-10} \cdot e\,(T_1^4 - T_2^4)$$

where q_c = heat transfer by free convection in Btu per sq. ft. per hr.

C = a constant depending upon the shape of the surface.

(C 1.016 for horizontal cylinders, 1.235 for long vertical cylinders, 1.394 for vertical plates, 1.79 for horizontal plates facing upward, and 0.89 for horizontal plates facing downward. The constants for the horizontal plates facing upward and facing downward are reversed when the plates are cooler than the surrounding air.)

D = cylinder diameter in inches or height of vertical plane in inches. (The effect of diameter or height becomes constant at a value of approximately 24 inches.)

$T_{avg.}$ = 460 plus the average of cylinder or plate surface and surrounding air temperature in deg. Fahr.

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Δt = temperature difference deg Fahr.) between surface and air.

q_r = heat transfer by radiation in Btu per sq. ft. per hr.

e = emissivity of surface. (A value of 0.9 can be assumed as the emissivity of most industrial surfaces, such as brick, stone, glass, canvas, asphalt roofing and various colored flat paints at temperatures below 400 deg. Fahr. For highly polished metals "e" may be as low as 0.02.)

T_1 = temperature of the hotter surface, deg. Fahr.+460.

T_2 = temperature of surrounding objects, deg. Fahr.+460.

The bare pipe loss curves, the bare pipe loss tables, the surface loss curves for various outside diameters and the surface heat transmission from flat bare steel surfaces, contained in this bulletin, were all calculated with the above formula for free convection and radiation. The calculations were all based on an air temperature of 80 deg. Fahr. and with the surfaces at higher temperatures than the surrounding atmosphere.

Effect of Wind

The formula given above for free convection cannot be used for conditions where extraneous air currents are blowing over the surfaces. In this case the heat transfer takes place by forced convection and radiation. The forced convection for large bare plane surfaces greater than two feet on a side, can be obtained from the formula

$$q_f = .4 + 0.22\sqrt{V}.$$

where q_f = heat transfer by forced convection in Btu per hr. per sq. ft. per deg. Fahr. temp. diff.

V = air velocity in feet per sec.

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This formula is an approximate average of formula proposed by various investigators. The heat transmission curves shown on page 10 for large bare surfaces with various wind velocities were calculated from the above formula and the radiation formula. In this case an air temperature of 70 deg. Fahr. was assumed.

The data available on forced convection at present are not sufficient to enable one to differentiate to any degree of accuracy between the losses from plane surfaces in the various positions.

Considerable experimental work has been done on forced convection from wires and cylinders. The forced convection for air flowing at right angles to various sized single horizontal cylinders can be obtained from Reiher's equation which is as follows:

$$q_{fc} = .35\,\frac{k}{D}\left(\frac{DV\rho}{\mu}\right)^{.6}$$

where q_{fc} = surface conductance, Btu/sq. ft., hr./°F.

k = thermal conductivity of air, Btu, ft. hr., °F.

D = outside diameter of pipe, ft.

V = air velocity, ft./hr.

ρ = density of air, lb./ft.^{3}

μ = viscosity of air, lb./ft. hr.

The heat transmission curves shown on page 9 for various diameter bare steel pipes with various wind velocities were calculated from the above formula and the radiation formula. In this case also, an air temperature of 70° F. was assumed

Losses From Horizontal Bare Steel Steam Pipes

From 100 Linear Feet of Pipe per Month of 30 Days With Steam in Pipe 24 hours per Day.
Coal at $5.00 per Ton of 2000 Lbs.

Pipe Diameter Inches	Hot Water 180°F.		10 Lbs. 239.4°F.		80 Lbs. 324.6°F.		120 Lbs. 340.0°F.		160 Lbs. 370.2°F.		200 Lbs. 387.9°F.		200 Lbs. and 100°F. Superheated 487.9°F.		275 Lbs. and 250°F. Superheated 464.1°F.	
	Btu/sq. ft./°F. Diff./hr.	Dollars Per Year	Btu/sq. ft./°F. Diff./hr.	Dollars Per Year	Btu/sq. ft./°F. Diff./hr.	Dollars Per Year	Btu/sq. ft./°F. Diff./hr.	Dollars Per Year	Btu/sq. ft./°F. Diff./hr.	Dollars Per Year	Btu/sq. ft./°F. Diff./hr.	Dollars Per Year	Btu/sq. ft./°F. Diff./hr.	Dollars Per Year	Btu/sq. ft./°F. Diff./hr.	Dollars Per Year
Bare	.528	5.27	.625	5.34	.793	6.46	.780	7.44	.809	8.19	.884	10.86	.998	12.47	1.330	24.49
Canvas	.466	4.76	.564	4.84	.721	5.87	.710	6.77	.736	7.45	.804	9.88	.908	11.34	1.210	22.28
Bare	.466	4.76	.564	4.84	.721	5.87	.710	6.77	.736	7.45	.804	9.88	.908	11.34	1.210	22.28
Canvas	.411	4.20	.497	4.27	.636	5.18	.626	5.97	.649	6.57	.709	8.71	.801	10.00	1.067	19.65
Bare	.392	4.00	.474	4.07	.606	4.94	.597	5.69	.619	6.27	.676	8.31	.764	9.54	1.017	18.73
Canvas	.349	3.57	.422	3.62	.540	4.40	.532	5.07	.551	5.58	.602	7.40	.680	8.49	.906	16.68
Bare	.349	3.57	.422	3.62	.540	4.40	.532	5.07	.551	5.58	.602	7.40	.680	8.49	.906	16.68
Canvas	.311	3.18	.376	3.23	.481	3.92	.474	4.52	.491	4.97	.536	6.59	.606	7.57	.807	14.86
Bare	.311	3.18	.376	3.23	.481	3.92	.474	4.52	.491	4.97	.536	6.59	.606	7.57	.807	14.86
Canvas	.278	2.84	.336	2.89	.430	3.50	.423	4.03	.438	4.43	.479	5.88	.541	6.76	.720	13.26
Bare	.278	2.84	.336	2.89	.430	3.50	.423	4.03	.438	4.43	.479	5.88	.541	6.76	.720	13.26
Canvas	.248	2.53	.300	2.58	.384	3.13	.378	3.60	.391	3.96	.428	5.25	.483	6.04	.643	11.84
Bare	.248	2.53	.300	2.58	.384	3.13	.378	3.60	.391	3.96	.428	5.25	.483	6.04	.643	11.84
Canvas	.222	2.27	.268	2.31	.343	2.80	.338	3.22	.349	3.54	.383	4.70	.432	5.40	.575	10.59
Bare	.222	2.27	.268	2.31	.343	2.80	.338	3.22	.349	3.54	.383	4.70	.432	5.40	.575	10.59
Canvas	.199	2.03	.240	2.07	.307	2.51	.303	2.88	.312	3.17	.343	4.21	.387	4.84	.515	9.48
Bare	.199	2.03	.240	2.07	.307	2.51	.303	2.88	.312	3.17	.343	4.21	.387	4.84	.515	9.48
Canvas	.179	1.83	.216	1.86	.276	2.26	.272	2.59	.281	2.85	.308	3.78	.348	4.35	.463	8.53
Bare	.179	1.83	.216	1.86	.276	2.26	.272	2.59	.281	2.85	.308	3.78	.348	4.35	.463	8.53
Canvas	.161	1.65	.194	1.68	.248	2.03	.245	2.33	.252	2.56	.277	3.40	.313	3.91	.416	7.67
Bare	.161	1.65	.194	1.68	.248	2.03	.245	2.33	.252	2.56	.277	3.40	.313	3.91	.416	7.67
Canvas	.145	1.49	.175	1.52	.224	1.84	.220	2.09	.227	2.31	.249	3.06	.282	3.52	.375	6.91
Bare	.145	1.49	.175	1.52	.224	1.84	.220	2.09	.227	2.31	.249	3.06	.282	3.52	.375	6.91
Canvas	.131	1.35	.158	1.37	.202	1.66	.199	1.89	.205	2.09	.225	2.77	.255	3.18	.339	6.25
Bare	.131	1.35	.158	1.37	.202	1.66	.199	1.89	.205	2.09	.225	2.77	.255	3.18	.339	6.25
Canvas	.119	1.22	.143	1.24	.183	1.50	.180	1.71	.186	1.89	.204	2.51	.231	2.88	.307	5.66
Bare	.119	1.22	.143	1.24	.183	1.50	.180	1.71	.186	1.89	.204	2.51	.231	2.88	.307	5.66
Canvas	.108	1.11	.130	1.13	.166	1.37	.163	1.55	.169	1.72	.185	2.28	.210	2.62	.279	5.15
Bare	.108	1.11	.130	1.13	.166	1.37	.163	1.55	.169	1.72	.185	2.28	.210	2.62	.279	5.15
Canvas	.098	1.01	.118	1.03	.151	1.25	.148	1.41	.153	1.56	.168	2.07	.191	2.38	.254	4.68
Bare	.098	1.01	.118	1.03	.151	1.25	.148	1.41	.153	1.56	.168	2.07	.191	2.38	.254	4.68
Canvas	.089	.92	.107	.94	.138	1.14	.135	1.29	.140	1.42	.153	1.89	.174	2.17	.232	4.27
Bare	.089	.92	.107	.94	.138	1.14	.135	1.29	.140	1.42	.153	1.89	.174	2.17	.232	4.27
Canvas	.081	.84	.098	.86	.126	1.04	.123	1.18	.128	1.30	.140	1.73	.159	1.98	.212	3.91
Bare	.081	.84	.098	.86	.126	1.04	.123	1.18	.128	1.30	.140	1.73	.159	1.98	.212	3.91
Canvas	.074	.77	.089	.79	.116	.96	.113	1.08	.117	1.19	.128	1.58	.146	1.81	.194	3.58
Bare	.074	.77	.089	.79	.116	.96	.113	1.08	.117	1.19	.128	1.58	.146	1.81	.194	3.58
Canvas	.068	.71	.082	.73	.106	.88	.104	1.00	.108	1.09	.118	1.46	.134	1.66	.179	3.30
Bare	.068	.71	.082	.73	.106	.88	.104	1.00	.108	1.09	.118	1.46	.134	1.66	.179	3.30
Canvas	.063	.65	.076	.67	.098	.81	.096	.92	.100	1.01	.109	1.35	.124	1.53	.165	3.04
Bare	.063	.65	.076	.67	.098	.81	.096	.92	.100	1.01	.109	1.35	.124	1.53	.165	3.04
Canvas	.058	.60	.070	.62	.091	.75	.089	.85	.093	.94	.101	1.25	.115	1.42	.153	2.82
Bare	.058	.60	.070	.62	.091	.75	.089	.85	.093	.94	.101	1.25	.115	1.42	.153	2.82
Canvas	.053	.55	.064	.57	.084	.69	.082	.78	.086	.87	.094	1.16	.107	1.32	.142	2.62
Bare	.053	.55	.064	.57	.084	.69	.082	.78	.086	.87	.094	1.16	.107	1.32	.142	2.62
Canvas	.049	.51	.059	.52	.078	.64	.076	.72	.080	.81	.087	1.08	.099	1.22	.132	2.44
Bare	.049	.51	.059	.52	.078	.64	.076	.72	.080	.81	.087	1.08	.099	1.22	.132	2.44
Canvas	.045	.47	.055	.48	.072	.59	.070	.67	.074	.75	.081	1.00	.092	1.13	.123	2.27
Bare	.045	.47	.055	.48	.072	.59	.070	.67	.074	.75	.081	1.00	.092	1.13	.123	2.27
Canvas	.042	.44	.051	.45	.067	.55	.065	.62	.069	.70	.075	.93	.086	1.06	.115	2.12
Bare	.042	.44	.051	.45	.067	.55	.065	.62	.069	.70	.075	.93	.086	1.06	.115	2.12
Canvas	.039	.41	.048	.42	.063	.52	.061	.58	.065	.66	.071	.88	.081	1.00	.108	2.00
Bare	.039	.41	.048	.42	.063	.52	.061	.58	.065	.66	.071	.88	.081	1.00	.108	2.00
Canvas	.037	.38	.045	.39	.059	.48	.057	.54	.061	.62	.067	.83	.076	.94	.102	1.89
Bare	.037	.38	.045	.39	.059	.48	.057	.54	.061	.62	.067	.83	.076	.94	.102	1.89

In these Tables Coal has been figured at $5.00 per Ton of 2,000 Lbs.—15,000 Btu. per lb. of Coal—Lakes, Boiler Room Expense, etc., Taken at $1.00 per Ton. Mahoney Trend Value of Coal Fired at $5.00 per Ton. Boiler Efficiency taken at 70 Per Cent. Air Temp. 80°F. Experimental Data Obtained at Mellon Institute.

420800

Heat Losses From Horizontal Bare Steel Pipes and Flat Surfaces

[redacted]

In Btu per Sq Ft of Pipe Surface per Hour per °F. Temperature Difference Between Pipe and Air

Pipe Size	Lineal Foot Factor*	Temperature Difference °F. Between Pipe Surface and Surrounding Air. Air at 80°F.																												
		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600
¼"	220	2 12	2 48	2 80	3 10	3 42	3 74	4 02	4 47	4 66	5 26	5 72	6 19	6 69	7 22	7 79	8 39	9 03	9 70	10 42	11 18	11 98	12 82	13 71	14 64	15 62	16 66	17 75	18 87	20 06	21 30	22 59	23 95
⅜"	275	2 08	2 43	2 74	3 04	3 35	3 63	4 [illegible]	4 40	4 79	5 21	5 65	6 12	6 61	7 15	7 71	8 31	8 95	9 62	10 34	11 09	11 89	12 74	13 62	14 56	15 60	16 57	17 68	18 78	19 97	21 21	22 51	23 86
1"	344	2 04	2 38	2 69	2 99	3 30	3 61	3 94	4 33	4 72	5 14	5 58	6 05	6 54	7 07	7 64	8 23	8 82	9 55	10 26	11 02	11 81	12 66	13 54	14 48	15 46	16 49	17 57	18 70	19 89	21 13	22 42	23 77
1¼"	433	2 00	2 34	2 64	2 93	3 24	3 55	3 88	4 27	4 66	5 07	5 51	5 97	6 47	7 00	7 56	8 16	8 79	9 47	10 18	10 94	11 73	12 58	13 46	14 39	15 38	16 41	17 49	18 62	19 80	21 04	22 34	23 69
1½"	497	1 98	2 31	2 61	2 90	3 20	3 52	3 84	4 23	4 62	5 01	5 47	5 93	6 43	6 96	7 52	8 12	8 75	9 43	10 14	10 89	11 69	12 53	13 42	14 35	15 33	16 36	17 44	18 57	19 76	20 99	22 29	23 64
2"	622	1 95	2 27	2 56	2 85	3 15	3 46	3 78	4 17	4 56	4 92	5 41	5 87	6 37	6 89	7 45	8 05	8 68	9 36	10 07	10 82	11 62	12 46	13 35	14 28	15 26	16 29	17 37	18 50	19 68	20 92	22 21	23 56
2½"	753	1 92	2 23	2 52	2 81	3 11	3 42	3 74	4 12	4 51	4 92	5 36	5 82	6 31	6 84	7 40	7 99	8 63	9 30	10 01	10 77	11 56	12 40	13 29	14 22	15 20	16 23	17 30	18 44	19 62	20 86	22 15	23 50
3"	946	1 89	2 20	2 49	2 77	3 07	3 37	3 69	4 08	4 46	4 87	5 31	5 77	6 26	6 79	7 35	7 94	8 57	9 25	9 96	10 71	11 50	12 34	13 23	14 16	15 14	16 17	17 25	18 38	19 56	20 80	22 09	23 44
3½"	1 047	1 87	2 18	2 46	2 74	3 04	3 34	3 66	4 05	4 41	4 84	5 27	5 73	6 23	6 75	7 31	7 91	8 54	9 21	9 92	10 67	11 47	12 31	13 19	14 12	15 08	16 11	17 21	18 34	19 52	20 76	22 05	23 40
4"	1 178	1 85	2 16	2 44	2 72	3 01	3 32	3 64	4 02	4 40	4 81	5 25	5 71	6 20	6 72	7 28	7 87	8 51	9 18	9 89	10 64	11 44	12 27	13 16	14 09	15 07	16 09	17 17	18 30	19 49	20 72	22 02	23 37
4½"	1 309	1 84	2 14	2 42	2 70	2 99	3 30	3 61	4 00	4 38	4 79	5 22	5 68	6 17	6 69	7 25	7 85	8 48	9 15	9 86	10 61	11 41	12 25	13 13	14 06	15 04	16 07	17 14	18 27	19 46	20 69	21 99	23 34
5"	1 456	1 83	2 13	2 40	2 68	2 97	3 28	3 59	3 97	4 35	4 76	5 20	5 65	6 15	6 68	7 23	7 82	8 45	9 12	9 83	10 58	11 38	12 22	13 10	14 03	15 01	16 04	17 11	18 24	19 43	20 66	21 96	23 31
6"	1 734	1 80	2 10	2 37	2 65	2 94	3 24	3 55	3 94	4 32	4 72	5 16	5 61	6 10	6 63	7 19	7 78	8 41	9 08	9 79	10 54	11 34	12 17	13 06	13 99	14 96	15 99	17 07	18 20	19 38	20 62	21 91	23 26
7"	1 996	1 79	2 08	2 35	2 63	2 91	3 21	3 53	3 91	4 29	4 69	5 13	5 58	6 07	6 60	7 15	7 75	8 38	9 05	9 76	10 51	11 30	12 14	13 02	13 95	14 93	15 95	17 03	18 16	19 34	20 58	21 87	23 22
8"	2 258	1 77	2 06	2 33	2 60	2 89	3 19	3 50	3 88	4 26	4 67	5 10	5 56	6 05	6 57	7 12	7 72	8 35	9 02	9 73	10 48	11 27	12 11	12 99	13 92	14 90	15 92	17 00	18 13	19 31	20 55	21 84	23 19
9"	2 520	1 76	2 03	2 31	2 59	2 87	3 17	3 48	3 86	4 24	4 65	5 08	5 53	6 02	6 54	7 10	7 69	8 32	8 99	9 70	10 45	11 24	12 08	12 96	13 89	14 87	15 90	16 97	18 10	19 28	20 52	21 81	23 16
10"	2 814	1 75	2 01	2 30	2 57	2 85	3 15	3 46	3 84	4 22	4 62	5 05	5 51	6 00	6 52	7 08	7 67	8 30	8 97	9 68	10 43	11 22	12 06	12 94	13 87	14 84	15 87	16 95	18 08	19 26	20 49	21 79	23 13
12"	3 346	1 75	2 01	2 27	2 54	2 81	3 12	3 43	3 81	4 19	4 59	5 02	5 48	5 96	6 48	7 04	7 63	8 26	8 93	9 64	10 39	11 18	12 02	12 90	13 83	14 80	15 83	16 91	18 04	19 22	20 46	21 74	23 09
14"	3 865	1 72	2 00	2 26	2 53	2 81	3 11	3 41	3 79	4 17	4 57	5 00	5 46	5 94	6 47	7 02	7 61	8 24	8 91	9 62	10 37	11 16	12 00	12 88	13 81	14 78	15 81	16 89	18 01	19 20	20 43	21 72	23 07
16"	4 389	1 70	1 98	2 24	2 51	2 79	3 09	3 39	3 77	4 14	4 55	4 98	5 43	5 92	6 44	6 99	7 58	8 21	8 88	9 59	10 34	11 13	11 97	12 85	13 78	14 75	15 78	16 86	17 98	19 17	20 40	21 69	23 04
18"	4 917	1 69	1 96	2 22	2 49	2 77	3 07	3 37	3 75	4 12	4 53	4 96	5 41	5 90	6 42	6 97	7 56	8 19	8 86	9 57	10 32	11 11	11 94	12 83	13 75	14 73	15 75	16 83	17 96	19 14	20 38	21 67	23 01
20"	5 216	1 68	1 95	2 21	2 47	2 75	3 05	3 36	3 73	4 11	4 51	4 94	5 39	5 88	6 40	6 95	7 54	8 17	8 84	9 55	10 29	11 09	11 92	12 80	13 73	14 71	15 73	16 81	17 94	19 12	20 35	21 64	22 99
24"	6 283	1 66	1 93	2 19	2 45	2 73	3 02	3 33	3 70	4 07	4 48	4 90	5 36	5 84	6 36	6 92	7 51	8 14	8 80	9 51	10 26	11 05	11 89	12 77	13 69	14 67	15 70	16 77	17 90	19 08	20 31	21 61	22 95
Vertical Surface		1 84	2 14	2 42	2 70	3 00	3 30	3 62	4 00	4 38	4 79	5 22	5 68	6 17	6 70	7 26	7 85	8 48	9 15	9 86	10 62	11 41	12 25	13 13	14 06	15 04	16 07	17 15	18 28	19 46	20 70	21 99	23 34
Horizontal Surface Facing Upward		2 01	2 37	2 67	2 97	3 28	3 59	3 92	4 31	4 70	5 12	5 56	6 02	6 52	7 05	7 61	8 21	8 85	9 52	10 24	10 99	11 79	12 63	13 52	14 45	15 43	16 46	17 54	18 67	19 86	21 10	22 39	23 74
Horizontal Surface Facing Downward		1 67	1 96	2 21	2 46	2 68	2 93	3 23	3 60	3 97	4 37	4 [illegible]	5 25	5 71	6 25	6 80	7 39	8 02	8 69	9 39	10 14	10 93	11 76	12 64	13 57	14 53	15 57	16 67	17 77	18 93	20 19	21 48	22 82

Values are for Flat Surfaces four square feet or more in area.

*To secure losses per lineal foot, multiply sq ft losses in table by this factor. The losses per sq ft of pipe surface for pipes larger than 24" can be considered the same as the losses for the 24" pipe.

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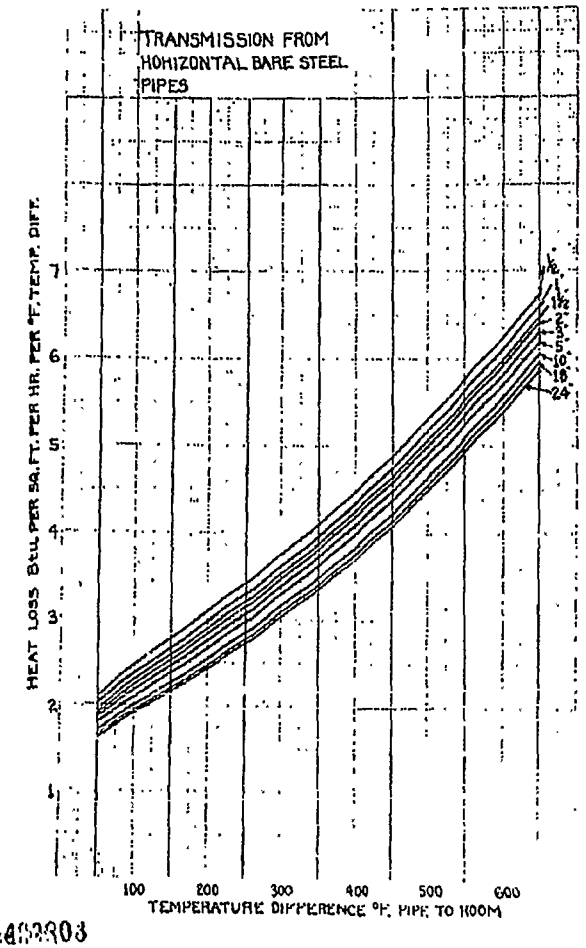
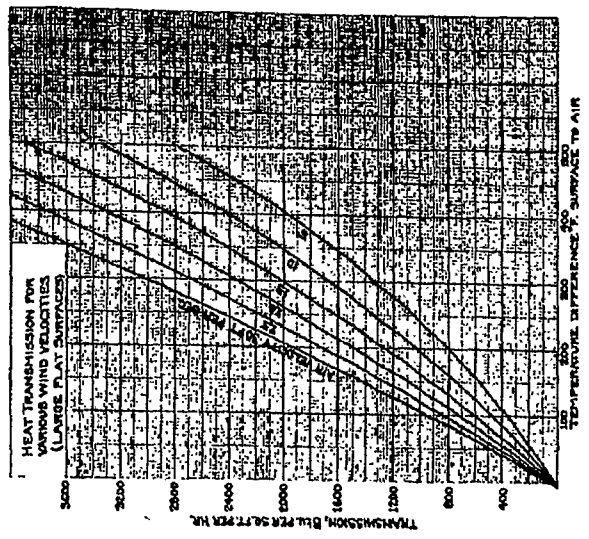
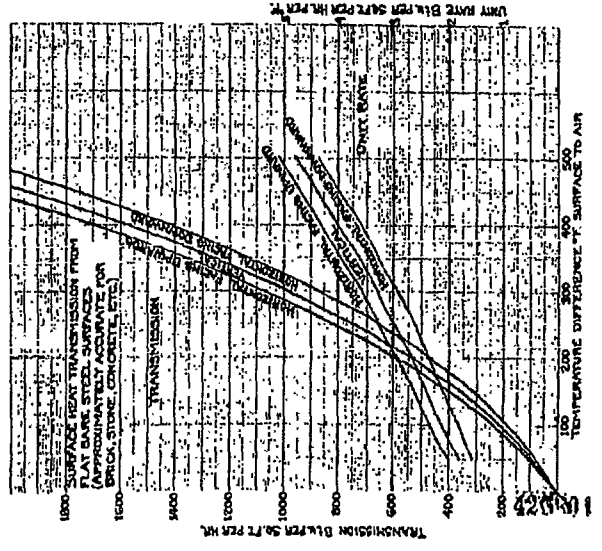
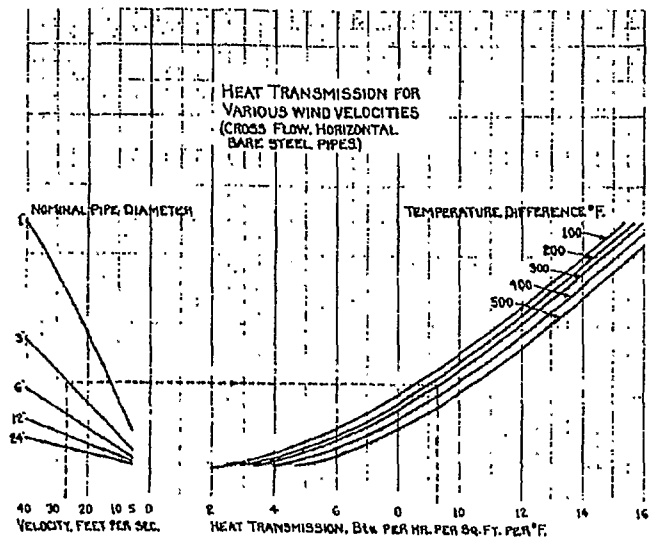
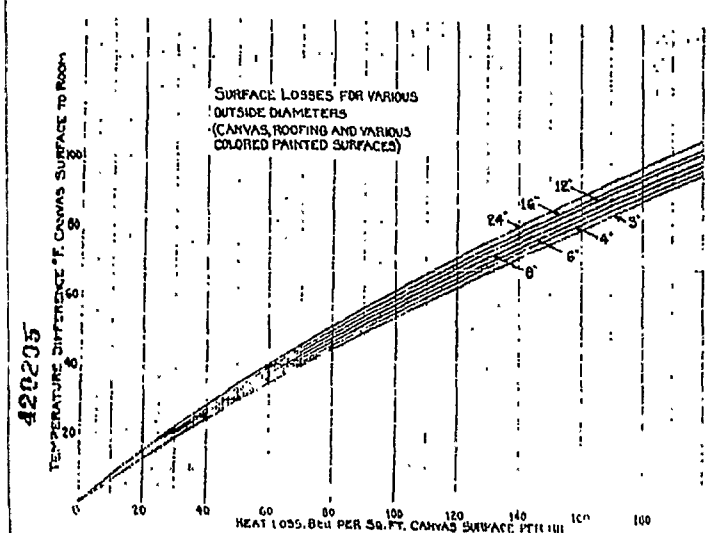
420802


TRANSMISSION FROM
HORIZONTAL BARE STEEL
PIPES
HEAT LOSS Btu. PER SQ. FT. PER HR. PER °F. TEMP. DIFF.
TEMPERATURE DIFFERENCE °F. PIPE TO ROOM
100
200
300
400
500
600
1
2
3
4
5
6
7
1½
2
3
5
10
18
24


HEAT TRANSMISSION FOR
VARIOUS WIND VELOCITIES
(LARGE FLAT SURFACES)
TRANSMISSION, Btu. PER SQ. FT. PER HR.
TEMPERATURE DIFFERENCE °F. SURFACE TO AIR
3000
2800
2400
2000
1600
1200
800
400
100
200
300
400
500


SURFACE HEAT TRANSMISSION FROM
FLAT BARE STEEL SURFACES
(APPROXIMATELY ACCURATE FOR
BRICK, STONE, CONCRETE, ETC.)
TRANSMISSION
UNIT RATE
TRANSMISSION Btu. PER SQ. FT. PER HR.
TEMPERATURE DIFFERENCE °F. SURFACE TO AIR
1800
1600
1400
1200
1000
800
600
400
200
100
200
300
400
500





420205

PHILIP Carey

INSULATION SEAL

UP TO 200° F.

A vapor barrier cut-back for protecting insulation

Insulation Seal is a ready mixed asbestos fibrated bituminous mastic. It is especially compounded for cold application over most types of insulating materials. It protects the insulation against damage and loss of efficiency by the penetration of water and water vapor. Insulation Seal is made in spray (No. 830) consistency or trowel (No. 830) consistency.

Insulation Seal can be used on pipes, curved and flat surfaces of all kinds. It will hold its bond on horizontal, vertical, sloped or inverted surfaces. Insulation Seal is designed for application over insulation such as Carey temp, Calcium Silicate, asbestos cement, rock wool base cements, cellular glass, fibre-glass, mineral wool blankets. It remains flexible and will withstand moderate expansion and contraction without cracking on interior or exterior surfaces.

Insulation Seal is specially recommended for (1) systems operating at temperatures below dew point, (2) dual temperature systems, and (3) systems subject to long shutdown periods.

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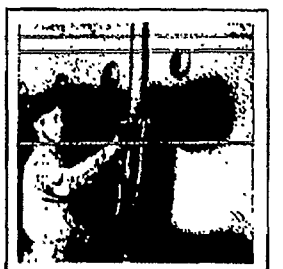
PACKAGING

Insulation Seal is packaged in 54-gal. drums, 5-gal. pails, 1-gal. cans.



Spray application of Insulation Seal on outside breeching duct

PHYSICAL PROPERTIES

Moisture Vapor Penetration:
0.0005 oz. of water per sq. ft. per 24 hours
Shrinkage: Lineal—None
Shrinkage: Thickness—
Approx. 15% in drying (due to loss of solvents)
Coverage:
1 gal. covers approx. 13 sq. ft. in a finished ⅛" thickness
Film Thickness and Coverage:

8Ths	16ths	32nds	64ths	Approximate Square Feet per Gallon	Approximate Gallons per 100 Sq. Ft.
			1	163.00	0.07
		1	2	54.2	1.95
			3	33.4	2.92
	1	2	4	25.6	3.90
			5	20.5	4.87
		3	6	17.1	5.84
			7	14.7	6.81
1	2	4	8	12.8	7.71
			9	11.4	8.78
		5	10	10.3	9.54
			11	9.34	10.70
	3	6	12	8.54	11.70
			13	7.87	12.7
		7	14	7.35	13.6
			15	6.85	14.6
2	4	8	16	6.41	15.6
			17	6.02	16.6
		9	18	5.68	17.6
			19	5.38	18.5
	5	10	20	5.13	19.5
			21	4.88	20.5
		11	22	4.65	21.5
			23	4.41	22.6
3	6	12	24	4.27	23.4
			25	4.10	24.4
		13	26	3.94	25.4
			27	3.80	26.3
	7	14	28	3.56	27.3
			29	3.53	28.3
		15	30	3.42	29.3
			31	3.31	30.2
4	8	16	32	3.20	31.2

Note: Shrinkage of approx. 15% can be estimated to obtain dry film thickness.

LIMITATIONS

Insulation Seal should not be applied to surfaces subject to temperatures in excess of 200° F.

FIRE RESISTANT INSULATION SEAL

UP TO 200° F.

A fire resistant vapor barrier asphalt rubber mastic.

Fire Resistant Insulation Seal is a ready mixed asbestos fibered rubber and polychlorinated resinous bituminous mastic containing a chlorinated hydrocarbon solvent which is non-flammable. It is especially compounded for cold application over most types of insulating materials, one exception being polystyrene foam. It protects the insulation against damage and loss of efficiency by the penetration of water and water vapor and may be applied in the presence of open flame without fear of fire or explosion. Fire Resistant Insulation Seal is made in brush (No. 120) consistency or bowel (No. 170) consistency.

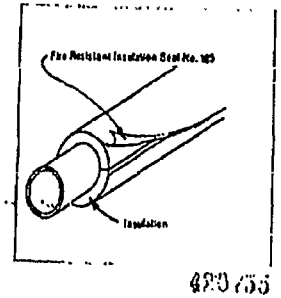
Fire Resistant Insulation Seal can be used on pipes, curved and flat surfaces of all kinds. It will hold its bond on horizontal, vertical, sloped or inverted surfaces. Fire Resistant Insulation Seal is designed for application over insulation such as Careytemp, calcium silicate, asbestos cement, rock wool base cements, cellular glass, fiberglass, mineral wool blankets. It remains flexible and will withstand moderate expansion and contraction without cracking on interior or exterior surfaces.

Fire Resistant Insulation Seal No. 125 is ideally suited for use as a vapor barrier cement for sealing laps of insulation jacketing on ductwork or piping. The fire laws and building codes in many metropolitan areas specify the use of a fire resistant cement of this type.

Fire Resistant Insulation Seal is specially recommended for (1) systems operating at temperatures below dew point, (2) dual temperature systems, and (3) systems subject to long shutdown periods.

PACKAGING

Fire Resistant Insulation Seal is packaged in 54-gal. drums, 5-gal. pails, 1-gal. cans.



420756

PHILIP Carey

PHYSICAL PROPERTIES

Color: Black only

Moisture Vapor Penetration:
0.0001 oz. of water per sq. ft. per 24 hours

Shrinkage: Linear—None

Shrinkage: Thickness—
10% to 12% in drying (due to loss of solvents)

Coverage:
1 gal. covers approx. 12 sq. ft. to a finished ⅛" thickness

Film Thickness and Coverage:

Wet Thickness	Dry Thickness	Approximate Square Feet per Gallon	Approximate Gallons per 100 Sq. Ft.
	1	160.00	0.97
	2	81.3	1.05
	3	53.4	0.92
1	4	25.8	3.88
	5	20.5	4.87
	6	17.1	5.84
	7	14.7	6.81
2	8	12.8	7.79
	9	11.4	8.76
	10	10.3	9.74
	11	9.34	10.70
3	12	8.54	11.70
	13	7.82	12.7
	14	7.25	13.8
	15	6.83	14.8
4	16	6.41	15.6
	17	6.02	16.6
	18	5.68	17.8
	19	5.40	18.5
5	20	5.13	19.5
	21	4.88	20.5
	22	4.65	21.5
	23	4.41	22.4
6	24	4.27	23.4
	25	4.10	24.4
	26	3.94	25.4
	27	3.80	26.3
7	28	3.66	27.3
	29	3.53	28.3
	30	3.42	29.2
	31	3.31	30.2
8	32	3.20	31.2

Note: Shrinkage of 25% can be estimated to obtain dry film thickness.

LIMITATIONS

Fire Resistant Insulation Seal should not be applied to surfaces subject to temperatures in excess of 200° F.

PHILIP Carey

THERMOTEX-B

A breathing-type weather resistant coating

Thermotex-B is a combination of asbestos fibers, emulsified asphalt and mineral stabilizers. It forms a cold plastic water-resistant coating, which is applied by trowel or spray in one or more coats.

Thermotex-B has excellent elasticity—minimizes surface cracking from temperature changes. It is shipped ready-to-use—eliminates on-the-job mixing. It dries quickly, requires no painting. Thermotex-B is recommended for use up to 200° F. It has a volumetric shrinkage of 30%.

Thermotex-B is recommended as a durable, water-resistant coating for insulation on hot equipment, ducts, vessels, housings, tanks, towers, heat exchangers and fittings that are subjected to weather conditions. It is especially suited for oil and chemical plant use because it resists acid and alkaline conditions and can be installed over insulation that is not completely dry. Thermotex-B is a breathing type coating. After application over most insulation, Thermotex-B allows the trapped water vapor to escape, while remaining impervious to surface water.

The following are a few advantages of an emulsion such as Thermotex-B over cut-back materials.

1. Will not blister.
2. Will not run or sag as easily as cut-backs.
3. No odor.
4. Will not alligator upon weathering.
5. Can be applied over a moist surface.

PACKAGING

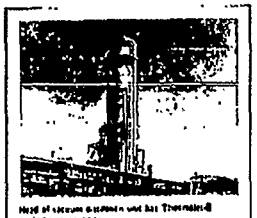
Thermotex-B is furnished in 43-lb. pails, 270-lb. drums, 475-lb. drums. Plastic liner protects Thermotex-B from electro-chemical reaction in drum to assure proper consistency. After drum is open, liner can be re-tied to preserve unused Thermotex-B.

PHYSICAL PROPERTIES

Coverage: 100 lbs. covers approximately 55 sq. ft., full ⅛" thick wet or ⅛" thick dry.

LIMITATIONS

Thermotex-B is not recommended for equipment operations at temperatures lower than ambient. When the insulated



Head of vacuum evaporator unit has Thermotex-B applied over insulation

THERMOTEX-B, NO. 51 AND NO. 228 EMULSIONS

UP TO 200° F.

surface temperature is lower than the dew point of the surrounding air, water vapor will form on the surface. This condensation is likely to penetrate the insulation and cause rusting and deterioration. A cut-back type of weather-resistant material should be used on all equipment operating below the dew point of the surrounding air.

Heating: Thermotex-B should be protected against freezing during storage and during application.

NO. 51 EMULSION

No. 51 Emulsion is an odorless, clay type emulsified product composed of asphalt, water and bentonite clay. It has a trowling consistency. It may be thinned if necessary by adding a small amount of coal tar water, stirring rapidly. No. 51 Emulsion is recommended for temperatures up to 200° F.

No. 51 Emulsion may be used as a prime and bond coat for insulation and cold storage vault and other low temperature insulated construction. It may also be used as a bond coat for cementing layers of vapor barrier and aluminum foil to walls and ceilings. Blends well with Asbestos Fibre and sand to make "on-the-job" finished coats. No. 51 Emulsion can be used to make asphalt mortar by mixing six parts of No. 51 Emulsion, one part of Portland Cement and one part water.

PACKAGING

55-gal. (nominal) drums, 5-gal. pails.

PHYSICAL PROPERTIES

Coverage: For bonding insulation—1 gal. per 20-25 sq. ft.; for priming—1 gal. per 100 sq. ft.; for bonding vapor barrier sheets—1 gal. per 80 sq. ft.

LIMITATIONS

Must be stored at temperatures above freezing.

NO. 228 FIBRATED EMULSION

No. 228 Fibrated Emulsion is an odorless compound of bentonite clay type emulsified asphalt and asbestos fibre similar to Thermotex-B, with a trowling consistency. No. 228 is recommended for temperatures up to 200° F.

No. 228 Emulsion can be used as a weather resistant coating to protect insulation exposed to weather, chemical fumes and liquids, applied to wire mesh stretched over insulation; on insulating air conditioning ducts as a coating or for "sanding the seams" on rigid duct insulation; as a protective damp-resistant coating on foundation walls and pervious insulation; as a marine finish coat in cold storage vault construction.

PACKAGING

55-gal. (nominal) drums, 5-gal. pails.

420756

PHYSICAL PROPERTIES

Coverage: 1 gal. per 8 sq. ft. produces a dry thickness of ⅛".