

Industrial Insulation Systems

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OVERS CORNING
FIBERGLAS

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10-10-1993

Organized To Help Solve Design Problems
This manual has been organized by system rather than by product to aid engineers and other specifying factors in the choice of the proper insulation for a given application.
In general, the greatest benefit will be realized if the book is used as follows:

- A. Identify type of application by system:
Piping
Equipment
Vessels and tanks
Boilers and chimneys
- B. Determine Temperature Range
- C. Choose products from the Selection Guide Indexers
- D. Refer to PRODUCT DATA sheets for technical data.

DIVIDEND ENGINEERING

a service to aid in selecting optimum insulation thickness

introduction

Dividend Engineering is a new system for calculating optimum thickness of insulation which identifies performance and cost considerations.

basic reasons for insulation / The basic reasons for using insulation usually contain all or some of the following:

- Process Control
- Personnel Protection
- Condensation Prevention
- Heat (gain or loss) Saving

The first three factors are usually straight forward and present no problems. Heat Saving, however, due to economic variables is complex.

DE solves the economic dilemma / The purpose of Dividend Engineering is to provide a reliable tool for designers so that they can determine true economic thickness of insulation and its relation to return on investment and to equipment needed to produce heat or to refrigerate.

factors considered in DE / To determine true economic thickness these significant factors are included in a Dividend Engineering analysis.

1. Cost of insulation applied
2. Cost of heat energy
3. Cost of money
4. Depreciation
5. Depreciation-insulation
6. Conductivity (k) of insulation
7. Operating temperature
8. Size of pipe or surface area
9. Capital investment in heat-producing equipment
10. Hours of operation
11. Maintenance Costs.

how to get dividend engineering / Contact your local Fiberglas Branch Office to see how easily you can take advantage of the Dividend Engineering Service.

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OWENS CORNING
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INSULATION OF POWER & PROCESS PIPING SYSTEMS

selection guide

industry and unit process	temp. range	pipe insulation	data page
CHEMICAL Anhydrous Storage Refrigeration Other Low Temp Piping Fractionating Columns Resin Storage Tank Piping Steam Piping Hydrogen Furnace Piping	-50 to 100F -120 to 70F 140 to 300F 70 to 320F 250 to 350F 70 to 1200F	Heavy Density Sectional Heavy Density Sectional Glas-Klad Heavy Density Sectional Kaylo Kaylo-Klad	5.1 5.1 5.1 5.1 5.3 5.3
FOOD PROCESSING Refrigerant Piping Juice Processing Piping Lard Processing Refining Soybean Oil Steam Piping	-30 to 50F 20 to 30F 60 to 600F 200 to 600F 220 to 725F	Heavy Density Sectional Heavy Density Sectional Kaylo Kaylo-Klad	5.1 5.1 5.3 5.3
PAPER AND PULP Outside Alum Storage Drying Coated Paper Steam and Processing Lines	-20 to 110F 100 to 350F 220 to 750F	Heavy Density Sectional Heavy Density Sectional Glas-Klad Kaylo Kaylo-Klad	5.1 5.1 5.1 5.3 5.3

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continued

INSULATION OF POWER & PROCESS PIPING SYSTEMS

industry and unit process	temp. range	pipe insulation	data page
PETROLEUM Condensation of Gasoline from Natural Gas Ethylene Process Lines Distillation Tower Piping Fractionating Tower Piping Drying Column Piping in Fuel Catalyst Cracking Unit Piping	-20 to 5F 200 to 600F 450 to 750F 170 to 300F 600 to 1200F 1000 to 1500F	Heavy Density Sectional Glas-Klad Kaylo-Klad Kaylo 20	5.1 5.1 5.3 5.3
PLASTICS Raw Material Storage Tanks Production of Polyvinyl Resins Plastic Film Drying Steam Piping	-10F -20 to 25F 100 to 150F 600 to 1200F	Heavy Density Sectional Glas-Klad Kaylo Kaylo-Klad	5.1 5.1 5.3 5.3
ALCOHOLIC BEVERAGES Anhydrous Suction Lines Wine Cooling Rooms Mash Cooling System Brewery Steampipe Lines	0 to 80F 10F 80 to 350F 220 to 400F	Heavy Density Sectional Glas-Klad	5.1 5.1
GLASS CERAMIC Glass Tank Piping Steam Pipelines	200 to 700F 1200 to 1800F	Kaylo Kaylo 20	5.3 5.3
COKE BY-PRODUCTS Tar Process Piping	150 to 1800F	Heavy Density Sectional Kaylo Kaylo 20	5.1 5.3 5.3
STEAM POWER PLANT Condenser Cooling Water Service Steam Heating Piping Main Steam Piping	35 to 70F 220 to 300F 350 to 650F	Heavy Density Sectional Glas-Klad Kaylo-Klad Kaylo Kaylo-Klad	5.1 5.1 5.3 5.3 5.3

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INSULATION OF POWER & PROCESS EQUIPMENT

selection guide

industry and unit process	temp. range	products	data page
CHEMICAL Pumps	-30 to 100F	Type 705	6.1
Refrigeration Compressors	to 100F	I-S Board	6.3
Resin Pumps	to 300F	Metal Mesh Blanket	6.4
Hydrogen Furnaces	70 to 1200F	Kaylo Block	6.6
PETROLEUM Pumps	-30 to 100F	Type 705	6.1
Refrigeration Compressors	to 100F	Metal Mesh Blanket	6.4
PLASTICS Raw Material Pumps	-10F	Type 705	6.1
Cellulose Pumps	70 to 120F	I-S Board	6.3
Turbines, Furnaces	60 to 1200F	Metal Mesh Blanket	6.4
PHARMACEUTICALS Refrigeration Compressors	to 20F	Type 705	6.1
Furnaces	60 to 200F	I-S Boards	6.3
		Kaylo and Kaylo 20 Btl.	6.6
COSMETICS Pumps	-15 to 20F	Type 705	6.1

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continued INSULATION OF POWER & PROCESS EQUIPMENT

industry and unit process	temp. range	products	data page
ALCOHOLIC BEVERAGES Pumps	18 to 50F	Type 705	6.1
Refrigeration Compressors	to 100F		
Sillage Evaporators	80 to 250F	Type 705	6.1
FOOD PROCESSING Soybean Oil Pump	200 to 600F	Type 70A, 705 Metal Mesh Blanket	6.1 6.4
GLASS-CERAMICS Drying Ovens	to 650F	Type 70A, 705 Metal Mesh Blanket	6.1 6.4
Hot Water Pumps	150 to 200F		
RUBBER Drying Chambers	300F	Type 70A, 705	6.1
ROCK PRODUCTS Autoclaves & Kilns	300 to 350F	Type 70A, 705 I-S Board Metal Mesh Blanket	6.1 6.3 6.4
PAINT AND COATING Pigment Furnaces	1200 to 1600F	Kaylo 20 Block	6.6
COKE BY-PRODUCTS Process Equipment	150 to 1800F	Type 70A, 705 I-S Board Metal Mesh Blanket Kaylo and Kaylo 20 Btl.	6.1 6.3 6.4 6.6

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INSULATION OF VESSELS & TANKS

selection guide

industry and unit process	temp. range	products	data page
CHEMICAL			
Ammonia Storage	-50 to 100F	Type 704 SF, 705 SF	7.2
Fractionating Columns	140 to 300F	Type 704 SF, 705 SF	7.2
Petro-Chemical	70 to 250F	Kaylo Block	7.7
Resin Storage	70 to 120F		
Hydrogen Furnace	up to 1200F		
FOOD PROCESSING			
Juice Processing and Storage Tanks	20 to 30F	Type 704 SF, 705 SF	7.2
Processing Kettles	70 to 350F	Kaylo Block	7.7
PLASTICS			
Raw Material Storage Tanks	-10F	Type 704 SF, 705 SF	7.2
ALCOHOLIC BEVERAGES			
Storage Tanks	18F	Type 704 SF, 705 SF	7.2
PETROLEUM REFINING			
Fractionating Towers	up to 300F	Type 704 SF	7.2
Distillation Towers	450 to 195F	I-S Board	7.4
Drying Columns	600 to 1200F	I-S Board Kaylo Block	7.4 7.7
Catalyst Caking Unit	1000 to 1500F	Kaylo Block Kaylo 20 Block	7.7 7.7

continued

INSULATION OF VESSELS & TANKS

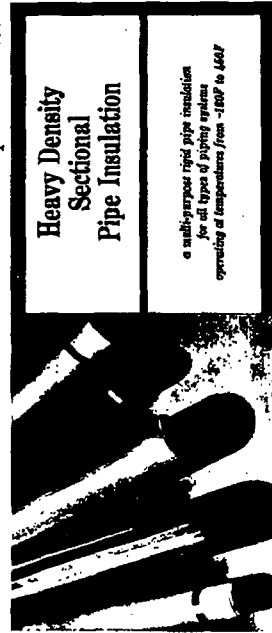
industry and unit process	temp. range	products	data page
PAINT AND COATINGS			
Jacketed Coking Kettles	300 to 500F	Type 703, 704 I-S Board	7.2 7.4
Varnished Kettles	650F	I-S Board Metal Mesh Blanket	7.4 7.5
PHARMACEUTICALS AND COSMETICS			
Reaction Kettle	80 to 300F	Type 703, 704	7.2
Furnaces	600 to 1800F	I-S Board Kaylo 20 Block	7.4 7.7
OILS AND FATS			
Storage Tanks	50 to 212F	Type 704SF, 705SF	7.2
Naphthalene Storage	200 to 600F		
Blending Kettles	200 to 600F	Type 703, 704	7.2
Fatty Acid Distillation	100 to 600F	I-S Board	7.4
Fat Splitting	300 to 600F		
Fatty Oil Refining	300 to 350F		
COKE BY-PRODUCTS			
Asphalt Storage Tanks	250 to 350F	Type 703, 704	7.2
Tar and Wax Melting Tanks	up to 500F	Type 703, 704 I-S Board	7.2 7.4
GLASS CERAMICS			
Lehrs	600 to 1200F	I-S Board Kaylo Block	7.4 7.7
Glass Tanks	1200 to 1800F	Kaylo 20 Block	7.7
POWER PLANT			
2nd, 3rd Stage Feed Water Heaters	220 to 450F	Type 703, 704	7.2

INSULATION OF BOILERS & CHIMNEYS

selection guide

systems	temp. range	products	product data
BOILERS			
Water Walls	up to 850F	I-S Band	8.1
Air Ducts	up to 700F	I-S Band	8.1
Breechings	up to 1000F	Kaylo	8.1
CHIMNEYS			
Steel Lined	200 to 400F	Type 70A, 70S	8.5
Exterior of Liner	450 to 850F	I-S Band	8.1
Concrete Lined			
Interior Face of Outside Column	200 to 450F	Type 70A, 70S	8.5
Corbel Type			
Between Concrete and Brick	250 to 450F	Type 70A, 70S	8.5
Between Concrete and Brick	450 to 850F	I-S Band	8.1

Pipe Insulation



Heavy Density Sectional Pipe Insulation

a multi-purpose rigid pipe insulation
for all types of piping systems
operating at temperatures from -180F to 440F

uses

Fiberglas Heavy Density Sectional Pipe Insulation has a broad range of uses for hot and cold piping. It is available with a variety of factory-applied jackets to provide for appearance, vapor barrier, fire safety or weatherproofing permitting the selection of the correct insulation thickness and finish for the service requirements from -120F to 450F. See page 2 for a complete selection guide.

description

Fiberglas Heavy Density Sectional Pipe Insulation is a precision molded pipe covering composed of Fiberglas wool resin-bonded and formed in two half cylinders up to 12" IPS. It is available in 3 ft long sections to fit all sizes of pipe and tubing from 1/2" IPS to 36".

benefits

superior thermal efficiency—Fiberglas Sectional Pipe Insulation because of its low k factor provides high efficiency with resultant cost savings. The closely knit glass fibers form millions of air pockets to retard the flow of heat for greater fuel savings and more profits throughout your plant.

resists compression—Heavy Density Fiberglas Pipe Insulation resists compression and mechanical damage because it is denser than other glass fiber pipe insulations. This means less chance of unsightly damage and puncture of the vapor barrier on cold lines.

dimensionally stable—Fiberglas withstands thermal shock and will not shrink or rot.

easy to fabricate—Fiberglas Heavy Density Pipe Insulation is easy to cut and fit in the field with

an ordinary knife. No special tools are required and the firm chem-cut sections knit tightly together forming an efficient thermal barrier at fittings and joints. The rigid, sectional form lends itself to accurate shop fabrication of miter and fitting covers.

inexpensive—The special compounded glass fibers are completely inert. They will not corrode steel, copper or aluminum pipe and will not cause stress corrosion cracking of stainless steel.

factory applied jackets—A wide variety of factory-applied jackets are available to provide vapor barrier protection, weather resistance, fire safety or damage resistance. These jackets speed application in the field. The new Self-Sealing Lap Jacket further simplifies installation and assures a durable vapor barrier seal at the joints.

performance characteristics

moisture absorption:
0.2% by volume—96 hrs. at 100% RH

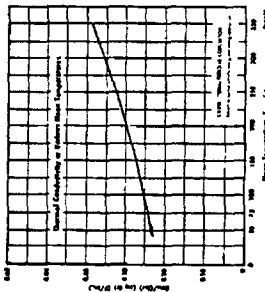
capillary:
negligible (after 24 hours)

stability:
JN 1

specific heat:
0.20 Btu/lb.°F

steam corrosion:
will not cause stress corrosion cracking of stainless steel

thermal conductivity:

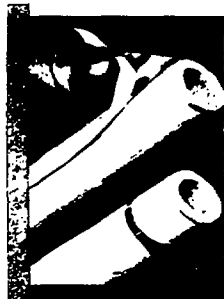


specification compliance:

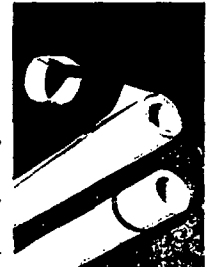
ANSI 501 Insulation Pipe Corrosion, Thermal and Insulating
Blanket, Thermal, Type Corrosion Type 1, Class 8 and 9,
Type 150 Insulation, Thermal, Mineral Wool, Blank or Baked
and Pipe Insulation (Unfilled Type) Type 15, Class 8 and 9,
Type 150 Insulation, Blocks, Boards, Blankets, Felt, Slitting
(Pipe and Tube Covering) and Pipe Fitting Covering, Thermal
(Unfilled Type), Insulation Type, Type D, Type III, Class 12,
ASTM Specification 28-51T



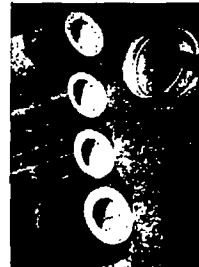
NEATED JOINTS are possible with **Exothermic Heavy Density** Pipe
Insulation because of its inherent rigidity. It can be fitted to
square, round, octagonal, hexagonal, and other shapes. It is
used on these fittings to
obtain desired insulating efficiency and an effective finish.



Fire Retardant Jacket, 1/2" FR with 3/4" Sealing
Lap and seal joint overlap strip.



Standard Glass Jacket, 1/2" Pre-Stress Glass Cloth
with end joint overlap strip.



Glass Fiber Jacket, 1/2" FR with 3/4" Sealing
Lap and seal joint overlap strip.



ADUCS 48 SUSITANI Heavy density means less
damage from laborers or other mechanical
abuse.

SERVICE	INDOOR PIPING	OUTDOOR PIPING
COLD LINES—Down to -120°F Typical Applications: Chemical Acetic Acid, Propyl, 20 to 100 Ammonia, 20 to 100 Carbon Dioxide, 20 to 100 Ethylene Glycol, 20 to 100 Freon, 20 to 100 Hydrochloric Acid, 20 to 100 Hydrofluoric Acid, 20 to 100 Nitric Acid, 20 to 100 Sulfuric Acid, 20 to 100 Water, 20 to 100 Hot Lines—Up to 400°F Typical Applications: Chemical Acetic Acid, Propyl, 20 to 100 Ammonia, 20 to 100 Carbon Dioxide, 20 to 100 Ethylene Glycol, 20 to 100 Freon, 20 to 100 Hydrochloric Acid, 20 to 100 Hydrofluoric Acid, 20 to 100 Nitric Acid, 20 to 100 Sulfuric Acid, 20 to 100 Water, 20 to 100	FR WITH SELF-HEALING LAP—provides a positive joint seal for all cold and hot lines. Seals all sizes of pipe, 1/2" to 48" diameter. Seals all types of pipe, 1/2" to 48" diameter. Seals all types of pipe, 1/2" to 48" diameter. Seals all types of pipe, 1/2" to 48" diameter. Seals all types of pipe, 1/2" to 48" diameter. Seals all types of pipe, 1/2" to 48" diameter. Seals all types of pipe, 1/2" to 48" diameter. Seals all types of pipe, 1/2" to 48" diameter. Seals all types of pipe, 1/2" to 48" diameter.	All standard cold lines requiring insulation should be protected from the weather by covering the insulation with a weather-resistant material. The material should be applied in a manner which will protect the insulation from weather and provide a finished appearance.

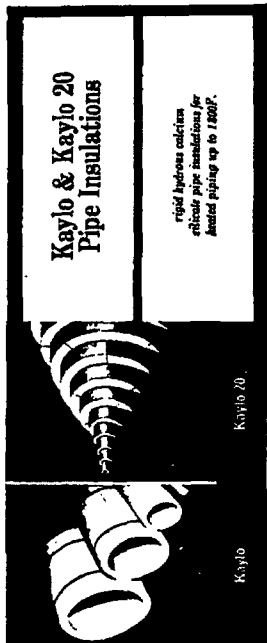


FR WITH SELF-HEALING LAP—insulated by the
insulation material, eliminates the need for
sealing, bonding and lap joints. The contact
between the insulation and the pipe is
positive, and the material is applied in a
manner which will protect the insulation from
weather and provide a finished appearance.

power & process piping systems

Pipe Insulation

OWENS CORNING
FIBERGLAS



Kaylo & Kaylo 20
Pipe Insulations

rigid hydrous calcium
silicate pipe insulations for
ambient piping up to 1800°.

Kaylo Kaylo 20

description

uses

Kaylo® & Kaylo 20® pipe insulations are rigid hydrous calcium silicate heat insulations for use on all heated piping up to 1800° — indoors and out. These products are precision molded in sections or segments from a chemical reacted material. A small amount of asbestos fiber is added to improve mechanical strength. Kaylo is gray. Kaylo 20 has a slight pinkish color to distinguish it from Kaylo.

Standard Kaylo is recommended for use on heated piping operating up to 1200° and Kaylo 20 extends the temperature range to 1800°. These thoroughly field-tested insulations have the physical properties most desirable for efficient, durable work for indoor and outdoor, power and process piping. A variety of jackets are available for surface finish and weatherproofing.

benefits

unaffected by moisture — Kaylo can be completely wetted in water without appreciable loss of strength and regains its strength and thermal value after drying out.

clean, neat installation — Kaylo cuts cleanly leaving a sharp square edge for neat appearance on fittings. Rigor manufacturing techniques assure uniform, smooth, unbroken joints.

variety of jackets — A variety of factory-applied jackets allows a selection of product for indoor finished appearance or for weatherproofing insulation on outdoor lines.

nestling sizes — Kaylo and Kaylo 20 Pipe Insulations are manufactured to Simplified Dimensional Standards to permit nesting sizes for double layer applications.

better operating costs — Kaylo insulations have excellent thermal efficiency. This line is tested at 30° and 200° Fahrenheit and has been operating for better temperature control for process operations.

regressed — Kaylo Pipe Insulations are strong and rigid to resist mechanical abuse in shipping, handling and in service.

versatile — Kaylo's extended temperature range covers a broad number of uses with one material. All heated piping requirements to 1200° and in sizes from 1/2" to 36" IPS can be met with Kaylo and Kaylo 20.

will not cause stress corrosion cracking — Kaylo will not cause stress corrosion cracking of stainless steel because Kaylo contains no sulfur, and has less than 20 ppm soluble chlorides.

*A.S.T.M. D-607 COMP.

recommended thickness
utility piping to 450° (80° ambient air)

Pipe Temp. Temp. Diff. °F	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	4 1/2"	5"	6"	7"	8"	9"	10"	11"	12"	14"	16"	18"	20"	24"	30"
RT	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
HL	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
ST	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
RT	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
HL	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
ST	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
RT	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
HL	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
ST	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
RT	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
HL	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
ST	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2

process piping to 450° (80° ambient air)

Pipe Temp. Temp. Diff. °F	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	4 1/2"	5"	6"	7"	8"	9"	10"	11"	12"	14"	16"	18"	20"	24"	30"
RT	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
HL	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
ST	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
RT	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
HL	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
ST	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
RT	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
HL	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
ST	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
RT	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
HL	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
ST	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2

472017

economic thickness—kaylo 20 pipe insulation—power & utility piping (44F ambient air)

Temp. Pipe Size	1300			1400			1500			1600			1700			1800		
	ET	HL	ST	ET	HL	ST	ET	HL	ST	ET	HL	ST	ET	HL	ST	ET	HL	ST
1/4	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2
1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2
3/4	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2
1	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2	2 1/4	2 1/4	1 1/2
1 1/4	3	3	2 1/4	3	3	2 1/4	3	3	2 1/4	3	3	2 1/4	3	3	2 1/4	3	3	2 1/4
1 1/2	3	3	2 1/4	3	3	2 1/4	3	3	2 1/4	3	3	2 1/4	3	3	2 1/4	3	3	2 1/4
2	3	3	2 1/4	3	3	2 1/4	3	3	2 1/4	3	3	2 1/4	3	3	2 1/4	3	3	2 1/4
2 1/2	3	3	2 1/4	3	3	2 1/4	3	3	2 1/4	3	3	2 1/4	3	3	2 1/4	3	3	2 1/4
3	3 1/4	3 1/4	2 1/4	3 1/4	3 1/4	2 1/4	3 1/4	3 1/4	2 1/4	3 1/4	3 1/4	2 1/4	3 1/4	3 1/4	2 1/4	3 1/4	3 1/4	2 1/4
3 1/2	4	4	3 1/4	4	4	3 1/4	4	4	3 1/4	4	4	3 1/4	4	4	3 1/4	4	4	3 1/4
4	4	4	3 1/4	4	4	3 1/4	4	4	3 1/4	4	4	3 1/4	4	4	3 1/4	4	4	3 1/4
4 1/2	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4
5	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4
6	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4
7	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4
8	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4
9	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4
10	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4
11	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4
12	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4
14	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4
16	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4
18	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4
20	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4
24	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4
30	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4
36	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4	4 1/2	4 1/2	3 1/4

ET—economic thickness

HL—heat loss, ... Btu/hr/linear foot

ST—surface temperature

472021

OVERSIGHT CORP.

FIBERGLAS

power & process equipment 6.1
chemical & petrochemical 6.2
refrigeration & chillers 6.5

Equipment Insulation

**Industrial Insulation
700 Series**

a highly versatile group of Fiberglas
insulating boards designed to insulate
ductwork and equipment operating
at temperatures up to 450°F

uses

description

The 700 Series boards have been designed primarily to insulate heating and air conditioning ducts, ovens, tanks, boilers, hot water generators and other hot equipment.

Type 700 — a low cost flexible material suitable for insulating factory-fabricated metal panels and for packing into irregular spaces

Type 701 — A lightweight resilient insulation, in board form, used on vessels having irregular surfaces where the exterior finish is supported by welded studs, pins or other mechanical attachments

Type 702 — More rigid than 701 and is recommended for use on equipment and ductwork subject to minimum maintenance and construction abuse

Type 703 — A semi-rigid board recommended for use on equipment, vessels and air conditioning ductwork.

Fiberglas® 700 Series Industrial Insulations are made of inorganic glass fibers pre-formed into semi-rigid to rigid rectangular boards of varying densities. The series consist of Types 700, 701, 702, 703, 704 and 705. Each board has a smooth, finished surface on both sides which makes it suitable for the application of a factory-applied vapor-barrier to prevent condensation on cold surfaces and to provide a neat finished appearance. Full finished facings are available.

Type 704 — A rigid board recommended for use on heating and air conditioning ductwork in exposed areas where sharp, true corners and smooth surfaces are desired.

Type 705 — A rigid board with very high strength characteristics for use on chills, hot and cold equipment, heating and air conditioning ductwork where greater abuse resistance and good appearance is required.

benefits

lower operating costs — the exceptional thermal efficiency of Fiberglas 700 Series Insulations lowers operating costs.

and-as tailored — a variety of densities and facings offers a selection of products to meet specific performance and economic requirements.

continuous in-place performance — 700 Series resists

damage maintains structural integrity and efficiency. Thickness stays uniform.
neat, finished appearance — the boardlike characteristics of the boards make 700, 701 and 705 products perfect for use on equipment where a finished appearance is desired. Fiberglass is available in a variety of finished boards and the minimum for 700, 701 and 705 have UL Flame Spread ratings of less than 25.

— F. M. Ray, OGC Corp.

472022

performance characteristics

sound absorption coefficients (2" thick #6 mounting)

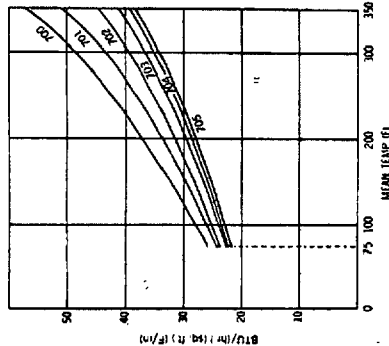
TYPE	125	250	500	1000	2000	4000	NRC
701	.34	.70	.96	.97	.86	.83	.87
702	.28	.77	.96	.98	.87	.87	.89
703	.32	.74	.97	.98	.87	.86	.89
704	.27	.79	.98	.99	.88	.86	.91
705	.48	.82	.97	.99	.90	.86	.92

size and density

Type	Density (lb/ft ³)	Thickness (in.)	Compressive Strength (psi at 72° F)	Flexural Strength (psi)	Thermal Expansion (1/16 in./in.)
700	1.08	1'-4"	31	0.242	0.250
701	1.58	1'-4"	4.51	24" ± 48"	0.242
702	2.25	1'-3"	9.51		0.235
703	3.00	1'-2"	100		0.230
704	4.20	1'-2"	200		0.230
705	6.00	1'-2"	350		0.220

*For special application, boards up to 48" x 96" are available. (Major compressive packaging.)

thermal conductivity



moisture absorption
less than 0.2% by volume
bacteria and fungus resistance
does not breed ear gramite
odor
adhesive
humidity and temperature effect
cycling conditions will not cause spalling or crumbling
corrosion
does not accelerate corrosion of copper, steel or aluminum.

472023

feckings

Type 701, 704 and 705 are also available with the following factory applied vapor barrier facings:

F1 — 205 aluminum foil (UL Rated)

F2E — Felt-reinforced felt

F3 — Duplex laminated felt

fire hazard classification

	(Type 701, 704, 705)	(Type 702, 703, 704, 705)	(Type 701, 704, 705)
Items tested	10, 20	15	15, 20
Test conducted	10, 20	15	15, 20
Results developed	0-20	0	0
(compared to untreated steel on 100)			

application recommendations

Type 701, 704, 705 — Unfaced and faced flexible insulations are used in walls, ceilings, floors, and other areas where the system is supported by resilient chair or stiffeners and set by the insulation fast. The products are self-supporting but are generally secured with mechanical fasteners.

Type 702, 703, 704 — These board insulations are normally installed on wooden joists or other structural members. They are set in grooves and backed by other insulating material. Unfaced boards are normally finished with reinforced insulating cement. Faced boards are normally finished with a decorative surface. They provide a continuous vapor barrier, may be left unfinished or may be painted.

recommended thickness — tested equipment

(per ambient air)	Type 701	Type 702	Type 703	Type 704	Type 705
Temp.	RT	RT	RT	RT	RT
100	11	11	11	11	11
150	11	11	11	11	11
200	11	11	11	11	11
250	11	11	11	11	11
300	11	11	11	11	11
350	11	11	11	11	11
400	11	11	11	11	11
450	11	11	11	11	11
500	11	11	11	11	11
550	11	11	11	11	11
600	11	11	11	11	11
650	11	11	11	11	11
700	11	11	11	11	11
750	11	11	11	11	11
800	11	11	11	11	11
850	11	11	11	11	11
900	11	11	11	11	11
950	11	11	11	11	11
1000	11	11	11	11	11
1050	11	11	11	11	11
1100	11	11	11	11	11
1150	11	11	11	11	11
1200	11	11	11	11	11
1250	11	11	11	11	11
1300	11	11	11	11	11
1350	11	11	11	11	11
1400	11	11	11	11	11
1450	11	11	11	11	11
1500	11	11	11	11	11
1550	11	11	11	11	11
1600	11	11	11	11	11
1650	11	11	11	11	11
1700	11	11	11	11	11
1750	11	11	11	11	11
1800	11	11	11	11	11
1850	11	11	11	11	11
1900	11	11	11	11	11
1950	11	11	11	11	11
2000	11	11	11	11	11
2050	11	11	11	11	11
2100	11	11	11	11	11
2150	11	11	11	11	11
2200	11	11	11	11	11
2250	11	11	11	11	11
2300	11	11	11	11	11
2350	11	11	11	11	11
2400	11	11	11	11	11
2450	11	11	11	11	11
2500	11	11	11	11	11
2550	11	11	11	11	11
2600	11	11	11	11	11
2650	11	11	11	11	11
2700	11	11	11	11	11
2750	11	11	11	11	11
2800	11	11	11	11	11
2850	11	11	11	11	11
2900	11	11	11	11	11
2950	11	11	11	11	11
3000	11	11	11	11	11
3050	11	11	11	11	11
3100	11	11	11	11	11
3150	11	11	11	11	11
3200	11	11	11	11	11
3250	11	11	11	11	11
3300	11	11	11	11	11
3350	11	11	11	11	11
3400	11	11	11	11	11
3450	11	11	11	11	11
3500	11	11	11	11	11
3550	11	11	11	11	11
3600	11	11	11	11	11
3650	11	11	11	11	11
3700	11	11	11	11	11
3750	11	11	11	11	11
3800	11	11	11	11	11
3850	11	11	11	11	11
3900	11	11	11	11	11
3950	11	11	11	11	11
4000	11	11	11	11	11
4050	11	11	11	11	11
4100	11	11	11	11	11
4150	11	11	11	11	11
4200	11	11	11	11	11
4250	11	11	11	11	11
4300	11	11	11	11	11
4350	11	11	11	11	11
4400	11	11	11	11	11
4450	11	11	11	11	11
4500	11	11	11	11	11
4550	11	11	11	11	11
4600	11	11	11	11	11
4650	11	11	11	11	11
4700	11	11	11	11	11
4750	11	11	11	11	11
4800	11	11	11	11	11
4850	11	11	11	11	11
4900	11	11	11	11	11
4950	11	11	11	11	11
5000	11	11	11	11	11
5050	11	11	11	11	11
5100	11	11	11	11	11
5150	11	11	11	11	11
5200	11	11	11	11	11
5250	11	11	11	11	11
5300	11	11	11	11	11
5350	11	11	11	11	11
5400	11	11	11	11	11
5450	11	11	11	11	11
5500	11	11	11	11	11
5550	11	11	11	11	11
5600	11	11	11	11	11
5650	11	11	11	11	11
5700	11	11	11	11	11
5750	11	11	11	11	11
5800	11	11	11	11	11
5850	11	11	11	11	11
5900	11	11	11	11	11
5950	11	11	11	11	11
6000	11	11	11	11	11
6050	11	11	11	11	11
6100	11	11	11	11	11
6150	11	11	11	11	11
6200	11	11	11	11	11
6250	11	11	11	11	11
6300	11	11	11	11	11
6350	11	11	11	11	11
6400	11	11	11	11	11
6450	11	11	11	11	11
6500	11	11	11	11	11
6550	11	11	11	11	11
6600	11	11	11	11	11
6650	11	11	11	11	11
6700	11	11	11	11	11
6750	11	11	11	11	11
6800	11	11	11	11	11
6850	11	11	11	11	11
6900	11	11	11	11	11
6950	11	11	11	11	11
7000	11	11	11	11	11
7050	11	11	11	11	11
7100	11	11	11	11	11
7150	11	11	11	11	11
7200	11	11	11	11	11
7250	11	11	11	11	11
7300	11	11	11	11	11
7350	11	11	11	11	11
7400	11	11	11	11	11
7450	11	11	11	11	11
7500	11	11	11	11	11
7550	11	11	11	11	11
7600	11	11	11	11	11
7650	11	11	11	11	11
7700	11	11	11	11	11
7750	11	11	11	11	11
7800	11	11	11	11	11
7850	11	11	11	11	11
7900	11	11	11	11	11
7950	11	11	11	11	11
8000	11	11	11	11	11
8050	11	11	11	11	11
8100	11	11	11	11	11
8150	11	11	11	11	11
8200	11	11	11	11	11
8250	11	11	11	11	11
8300	11	11	11	11	11
8350	11	11	11	11	11
8400	11	11	11	11	11
8450	11	11	11	11	11
8500	11	11	11	11	11
8550	11	11	11	11	11
8600	11	11	11	11	11
8650	11	11	11	11	11
8700	11	11	11	11	11
8750	11	11	11	11	11
8800	11	11	11	11	11
8850	11	11	11	11	11
8900	11	11	11	11	11
8950	11	11	11	11	11
9000	11	11	11	11	11
9050	11	11	11	11	11
9100	11	11	11	11	11
9150	11	11	11	11	11
9200	11	11	11	11	11
9250	11	11	11	11	11
9300	11	11	11	11	11
9350	11	11	11	11	11
9400	11	11	11	11	11
9450	11	11	11	11	11
9500	11	11	11	11	11
9550	11	11	11	11	11
9600	11	11	11	11	11
9650	11	11	11	11	11
9700	11	11	11	11	11
9750	11	11	11	11	11
9800	11	11	11	11	11
9850	11	11	11	11	11
9900	11	11	11	11	11
9950	11	11	11	11	11
10000	11	11	11	11	11

RT — recommended economic thickness, inches.

11 — best less (RT/100° F).

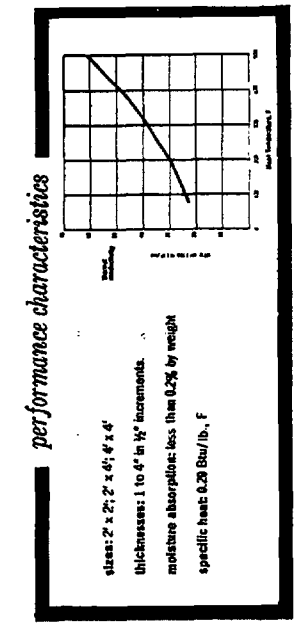
OWENS CORNING
FIBERGLAS

plant & process equipment 6.3
resists & repels 7.5
resists & withstands 8.1

Equipment Insulation

Intermediate Service Board

a lightweight, highly efficient, semi-rigid
insulation for service temperatures up to 850°F



heat transfer data

operating temperature (ambient still air 80°F)

Thickness in.	450 F		500 F		550 F		600 F		650 F		700 F		750 F		800 F	
	heat loss	surf temp	heat loss	surf temp	heat loss	surf temp	heat loss	surf temp	heat loss	surf temp	heat loss	surf temp	heat loss	surf temp	heat loss	surf temp
2.0	0.17	275	0.22	275	0.28	275	0.35	275	0.42	275	0.50	275	0.58	275	0.66	275
2.5	0.14	275	0.18	275	0.23	275	0.29	275	0.36	275	0.43	275	0.51	275	0.59	275
3.0	0.11	275	0.15	275	0.20	275	0.26	275	0.33	275	0.40	275	0.48	275	0.56	275
3.5	0.09	275	0.12	275	0.16	275	0.21	275	0.28	275	0.35	275	0.42	275	0.50	275
4.0	0.08	275	0.10	275	0.14	275	0.19	275	0.25	275	0.32	275	0.39	275	0.47	275
4.5	0.07	275	0.09	275	0.13	275	0.18	275	0.24	275	0.31	275	0.38	275	0.46	275
5.0	0.06	275	0.08	275	0.12	275	0.17	275	0.23	275	0.30	275	0.37	275	0.45	275
5.5	0.05	275	0.07	275	0.11	275	0.16	275	0.22	275	0.29	275	0.36	275	0.44	275
6.0	0.04	275	0.06	275	0.10	275	0.15	275	0.21	275	0.28	275	0.35	275	0.43	275
6.5	0.04	275	0.05	275	0.09	275	0.14	275	0.20	275	0.27	275	0.34	275	0.42	275
7.0	0.03	275	0.05	275	0.08	275	0.13	275	0.19	275	0.26	275	0.33	275	0.41	275
7.5	0.03	275	0.04	275	0.07	275	0.12	275	0.18	275	0.25	275	0.32	275	0.40	275

limitations

I-S Board must be applied flush against the hot surface with an exterior finish of sheet metal mesh (with or without cement coating) whenever it is exposed to temperatures in excess of 350°F. There will be no rapid decomposition of the product after insulating a 1200°F pipe into the insulation for 20 minutes with the hot surface at 850°F when the product is applied as noted above.

application recommendations

Fiberglas Intermediate Service Insulation is installed on flat and curved surfaces by attaching with welded joints or studs and covering surfaces with sheet metal mesh and mastic. Cement, cemented and painted. Pins with spaced washers or studs and nuts are installed on a maximum spacing of 18" and not further than 6" from the edge of the insulation. The insulation is normally installed over the pipe or flange and the end of the sheet metal mesh is secured to the same fasteners. Joints of the sheet metal mesh are offset from the joints of the insulation. Double layer application is recommended for temperatures over 600°F.

specification compliance

MIL-43038 (except for testing temperatures)
MIL-43039 (Type II, Class D)
MIL-43040 (Int. amend. 47) Type I, Class 2
MIL-43041 (Int. amend. 47) Type I, Class 2
Felt, Slowing Pipe and Tube Coasting and
Pipe Fitting Coasting, Thermal (Aluminum, Steel,
Industrial Type) Form D, Type II, Class 12.

Fiberglas I-S Board insulation is designed for use on boilers, breechings, ducts, chimney liners, and other heated equipment operating at temperatures up to 850°F. It is designed for use in applications where an outside facing of steel sheet or metal mesh (with or without finishing cement) is provided.

benefits

I-S Board insulation means easier handling, and the larger size pieces, up to 4' x 4', speed installation and reduce the number of joints to leak heat. Larger sizes are possible because of unusual structural integrity. The insulation will not crumble or break, cures only for good tight joints, conforms readily to irregularities and curved surfaces and returns to full bulkiness if compressed.

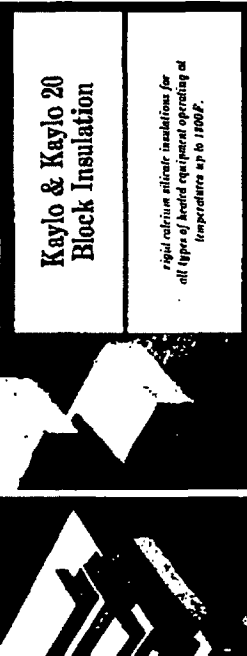
conforms in-place, performance-fiberglass Intermediate Service Board will not slump or deteriorate in severe service conditions. The insulation easily passed the rugged Navy Test MIL-15475B, Paragraph 5.3 which requires vibration at 17 cps through an arc of 0.15" for 100 hours at 150°F, without falling.

lower cost installation—the lightweight feature of I-S Board had superior heat flow characteristics over an 18 month period of continuous service.

lower cost installation—the lightweight feature of I-S Board had superior heat flow characteristics over an 18 month period of continuous service.

new & process equipment 6.0
new & tanks 7.7
boilers & chimneys 8.3

Equipment Insulation



Kaylo & Kaylo 20 Block Insulation

rigid calcium silicate insulation for all types of heated equipment operating at temperatures up to 1800°F.

description

Kaylo and Kaylo 20 Block Insulations are rigid, inorganic, calcium silicate heat insulations reinforced with asbestos fibers. They are strong, efficient and are highly resistant to abrasion and moisture damage. Kaylo 20 has a slightly pink color to distinguish it from Kaylo.

Kaylo Block is for use on indoor or outdoor equipment operating at temperatures up to 1200°F. Kaylo Block is ideally suited for use on stainless steel vessels and equipment as it inhibits stress corrosion cracking. Typical applications are for boilers, breeching, tanks, vessels.

Kaylo 20 with its high temperature limit of 1800°F extends its use to include refractory wall backing for furnaces and boilers and fireproofing of equipment and vessel skirts.

benefits

high thermal efficiency—both Kaylo and Kaylo 20 offer excellent thermal efficiency coupled with high strength. A low k of .37 for Kaylo and .57 for Kaylo 20 at 200° mean temperature proves that Kaylo will provide significant savings in operating costs over the life of the equipment.

resistant to abuse—resists mechanical damage because of hard, tough, reinforced structure.

strong—less breakage in shipment and handling. High temperatures have little effect on strength characteristics.

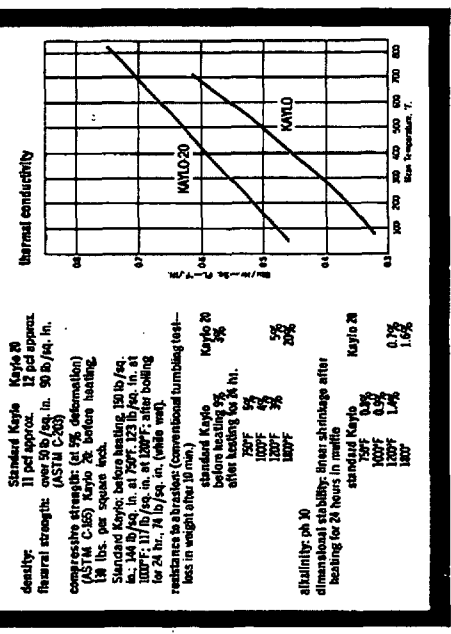
will not cause stress corrosion cracking—Kaylo will not cause stress corrosion cracking of stainless steel because Kaylo contains less than 200 ppm soluble chlorides as well as an inhibitor which prevents trace quantities of chlorides from the atmosphere or other sources from causing cracking and possible failure of piping and equipment.

resistant to moisture damage—unlike many other insulations, Kaylo is not affected appreciably from moisture damage. It regains thermal efficiency and strength after drying out. Outdoor installations must be weatherproofed, however, for long continuous service.

dimensionally stable—Kaylo does not shrink appreciably in service, even at elevated temperatures. This means less heat leakage at the joints. And Kaylo will not warp or crack in service.

fabricates easily—ordinary insulating tools are all that is required to fabricate Kaylo. It cuts with a clean true edge for tighter fit at the joints. Fit-tugs are easier, faster.

performance characteristics



key:
KT—recommended thickness (inches)
HT—heat loss ... Btu/hr./sq. ft.
ST—surface temperature
economic thicknesses
Selection of insulation thicknesses for any specific application should take into consideration the following important criteria: 1. Cost of material applied. 2. Cost of heat energy. 3. Cost of capital. 4. Cost of replacement—plant and labor.—National Insulation Manufacturers Association.

Kaylo Block to 1200°F—ambient temperature 80°F

Operating Temp. °F	Commercial			Process		
	KT	HT	ST	KT	HT	ST
200	3	3	103	3	3	103
300	3	3	103	3	3	103
400	3	3	103	3	3	103
500	3	3	103	3	3	103
600	3	3	103	3	3	103
700	3	3	103	3	3	103
800	3	3	103	3	3	103
900	3	3	103	3	3	103
1000	3	3	103	3	3	103
1100	3	3	103	3	3	103
1200	3	3	103	3	3	103

Kaylo 20 Block to 1800°F—ambient temperature 80°F

Operating Temp. °F	Commercial			Process		
	KT	HT	ST	KT	HT	ST
200	3	3	103	3	3	103
300	3	3	103	3	3	103
400	3	3	103	3	3	103
500	3	3	103	3	3	103
600	3	3	103	3	3	103
700	3	3	103	3	3	103
800	3	3	103	3	3	103
900	3	3	103	3	3	103
1000	3	3	103	3	3	103
1100	3	3	103	3	3	103
1200	3	3	103	3	3	103
1300	3	3	103	3	3	103
1400	3	3	103	3	3	103
1500	3	3	103	3	3	103
1600	3	3	103	3	3	103
1700	3	3	103	3	3	103
1800	3	3	103	3	3	103

specification compliance
ASTM C-203 Insulation Block, Type 1.
ASTM C-165 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-174 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-175 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-176 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-177 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-178 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-179 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-180 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-181 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-182 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-183 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-184 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-185 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-186 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-187 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-188 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-189 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-190 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-191 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-192 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-193 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-194 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-195 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-196 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-197 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-198 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-199 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-200 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-201 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-202 Insulation Block, Thermal Class 1, 2, 3, 4, 5.
ASTM C-203 Insulation Block, Thermal Class 1, 2, 3, 4, 5.

Total Performance Ratings

for Insulations operating
at temperatures from -80 to 450° F

A FIBERGLAS SERVICE

Owens-Corning Fiberglas® is continuously evaluating insulation performance as a means of upgrading the Fiberglas line of insulations and to make specifiers aware of the performance of other products on the market.

This comparison establishes Design Criteria for Insulations in commercial buildings and power and process applications and equates the performance of five insulations to that criteria. These insulations are used for hot and cold or dual service piping, equipment and duct-work operating at temperatures from -20 to 450 F.

All conclusions are based on data taken from published literature or OCF Laboratory test results.

This comparison is part of a continuing service Owens-Corning is providing for specifiers to simplify the selection of the correct insulation for the service required.

DESIGN CRITERIA

The design criteria were established by a study of the factors mechanical engineers consider the most important performance requirements for insulations in commercial and power and process applications.

RATING SYSTEM AND PERFORMANCE DATA

The ratings of the insulations compared (such as: stable, unstable, acceptable, unacceptable) have been assigned after a careful analysis of comparative test results. Performance data were taken from published literature.

INSULATIONS COMPARED

Insulations evaluated by this study are Fiberglas Heavy Density and Fiberglas Light Density, polystyrene and polyurethane (with and without fire retardant additives), and cellular glass.

*U.S. PAT. OFFICE

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PERFORMANCE COMPARISON-INSULATION

EFFECT OF TEMPERATURE AND AGE ON IN-PLACE THERMAL PERFORMANCE

The charts shown in Figures 1, 2 and 3 indicate the effect of temperature and aging on the thermal conductivity of insulation. Note that the polyurethane thermal conductivity ("k" factor) change with temperature and age. Figure 1 shows a section of the insulation with temperature and age. Figure 2 shows a section of the insulation with temperature and age. Figure 3 shows a section of the insulation with temperature and age.

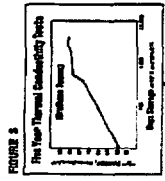
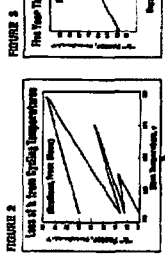
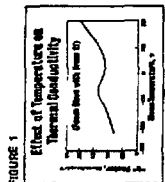
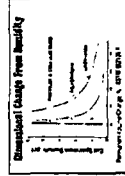
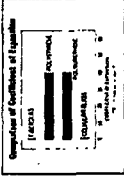


Figure 3 represents the results of the year tests on the "k" factor of polyurethane foams showing a gradual but marked increase in room temperature. Figure 3 derived from O-CF Product Testing Laboratories Test Report T.R. 2548.



DIMENSIONAL CHANGES DUE TO TEMPERATURE AND HUMIDITY

The stability of organic foams when subjected to temperature differences or humidity conditions is shown by these charts. The coefficient of expansion, Figure 6, has been developed from the Journal of Cellular Plastics, July 1965 and from O-CF Product Testing Laboratories Test Report T.R. 3001, March 4, 1968, containing data derived from manufacturers' literature.

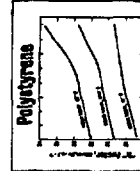
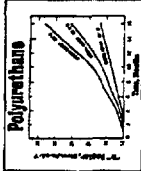
Curves for polyurethane and for polyurethane, Figure 7, were obtained from the Journal of Cellular Plastics, July 1965. The significance of dimensional change means that if the insulation warps or grows, joints open up, leading to a strengthening of the cold service or heat loss on heated lines.

FOR SERVICE FROM: -20 to 450°F.

EFFECT OF HUMIDITY ON IN-PLACE THERMAL PERFORMANCE

It has been proven conclusively that closed-cell organic foams for insulation require a vapor barrier to prevent the penetration of moisture into the cell structure due to vapor pressure.

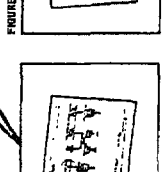
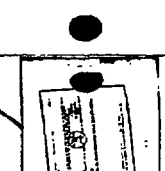
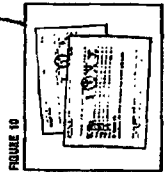
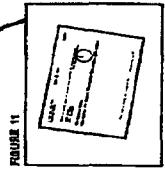
Figures 4 and 5 published in the Journal of Cellular Plastics, January 1965, show what happened to the thermal efficiency of samples exposed to a moist environment for 18 months. Fourteen organic insulations are now recommended for use in cold storage applications. The vapor barrier is also being recommended for cellular glass insulation.



FIRE SAFETY

As acceptable maximum rating for building materials to comply with building codes is a twenty-five spread... 50 not contributed... and a 50 units developed. These ratings are achieved as a package case... of the building materials... red oak as 100. The Corps of Engineers, Veterans Administration and Air Force have clearly spelled out in their specification that insulations and their vapor barriers must not exceed these maximum figures. Ratings of the insulations compared are published on U.L. cards reproduced in Figures 8, 9, 10 and 11 at the left.

TOTAL		PERFORMANCE RATINGS	
DESIGN CRITERIA -20 TO 450 F.	HEAVY DENSITY FIBERGLAS	POLYURETHANE	POLYURETHANE
1. LOW THERMAL CONDUCTIVITY	2.25	23-30	30
2. EXCELLENT VAPOR BARRIER	.02	WITHOUT V.B. 1.5	WITHOUT V.B. 2.0
3. DIMENSIONAL STABILITY	STABLE	UNSTABLE	STABLE
4. FIRE SAFE	ACCEPTABLE U.L. RATING	UNACCEPTABLE	ACCEPTABLE
5. PERMANENCE TROUBLE-FREE	DAMAGE RESISTANT	POOR	POOR



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DISTRIBUTOR/CONTRACTORS OF OWENS-CORNING FIBERGLAS INDUSTRIAL INSULATION PRODUCTS

ALABAMA BIRMINGHAM Birmingham Insulation Co., Inc. 201 - 478-4017	FLORIDA (Cont.) Gainesville Gainesville Insulation Co., Inc. 201 - 478-4017	LOUISIANA (Cont.) New Orleans New Orleans Insulation Co., Inc. 201 - 478-4017	TEXAS Dallas Dallas Insulation Co., Inc. 201 - 478-4017
ALASKA JUNEAU JunEAU Insulation Co., Inc. 201 - 478-4017	GEORGIA Atlanta Atlanta Insulation Co., Inc. 201 - 478-4017	MASSACHUSETTS Boston Boston Insulation Co., Inc. 201 - 478-4017	UTAH Salt Lake City Salt Lake City Insulation Co., Inc. 201 - 478-4017
ARIZONA Phoenix Phoenix Insulation Co., Inc. 201 - 478-4017	IDAHO Boise Boise Insulation Co., Inc. 201 - 478-4017	MICHIGAN Detroit Detroit Insulation Co., Inc. 201 - 478-4017	VERMONT Rutland Rutland Insulation Co., Inc. 201 - 478-4017
ARKANSAS Fayetteville Fayetteville Insulation Co., Inc. 201 - 478-4017	ILLINOIS Chicago Chicago Insulation Co., Inc. 201 - 478-4017	MINNESOTA Minneapolis Minneapolis Insulation Co., Inc. 201 - 478-4017	WASHINGTON Seattle Seattle Insulation Co., Inc. 201 - 478-4017
CALIFORNIA San Francisco San Francisco Insulation Co., Inc. 201 - 478-4017	INDIANA Indianapolis Indianapolis Insulation Co., Inc. 201 - 478-4017	MISSISSIPPI Jackson Jackson Insulation Co., Inc. 201 - 478-4017	WEST VIRGINIA Martinsburg Martinsburg Insulation Co., Inc. 201 - 478-4017
COLORADO Denver Denver Insulation Co., Inc. 201 - 478-4017	IOWA Des Moines Des Moines Insulation Co., Inc. 201 - 478-4017	NEBRASKA Omaha Omaha Insulation Co., Inc. 201 - 478-4017	NEW HAMPSHIRE Manchester Manchester Insulation Co., Inc. 201 - 478-4017
CONNECTICUT Hartford Hartford Insulation Co., Inc. 201 - 478-4017	KANSAS Topeka Topeka Insulation Co., Inc. 201 - 478-4017	NEVADA Las Vegas Las Vegas Insulation Co., Inc. 201 - 478-4017	NEW JERSEY Newark Newark Insulation Co., Inc. 201 - 478-4017
DELAWARE Wilmington Wilmington Insulation Co., Inc. 201 - 478-4017	KENTUCKY Louisville Louisville Insulation Co., Inc. 201 - 478-4017	NEW MEXICO Albuquerque Albuquerque Insulation Co., Inc. 201 - 478-4017	NEW YORK New York New York Insulation Co., Inc. 201 - 478-4017
DISTRICT OF COLUMBIA Washington Washington Insulation Co., Inc. 201 - 478-4017	LOUISIANA Baton Rouge Baton Rouge Insulation Co., Inc. 201 - 478-4017	OHIO Columbus Columbus Insulation Co., Inc. 201 - 478-4017	PENNSYLVANIA Philadelphia Philadelphia Insulation Co., Inc. 201 - 478-4017
FLORIDA Tampa Tampa Insulation Co., Inc. 201 - 478-4017	MAINE Portland Portland Insulation Co., Inc. 201 - 478-4017	OKLAHOMA Oklahoma City Oklahoma City Insulation Co., Inc. 201 - 478-4017	RHODE ISLAND Providence Providence Insulation Co., Inc. 201 - 478-4017
GA Atlanta Atlanta Insulation Co., Inc. 201 - 478-4017	MARYLAND Baltimore Baltimore Insulation Co., Inc. 201 - 478-4017	SCOTLAND Aberdeen Aberdeen Insulation Co., Inc. 201 - 478-4017	SOUTH CAROLINA Charleston Charleston Insulation Co., Inc. 201 - 478-4017
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KY Louisville Louisville Insulation Co., Inc. 201 - 478-4017	NEVADA Las Vegas Las Vegas Insulation Co., Inc. 201 - 478-4017	NEW JERSEY Newark Newark Insulation Co., Inc. 201 - 478-4017	NEW YORK New York New York Insulation Co., Inc. 201 - 478-4017
LA Baton Rouge Baton Rouge Insulation Co., Inc. 201 - 478-4017	NEW MEXICO Albuquerque Albuquerque Insulation Co., Inc. 201 - 478-4017	NEW YORK New York New York Insulation Co., Inc. 201 - 478-4017	PENNSYLVANIA Philadelphia Philadelphia Insulation Co., Inc. 201 - 478-4017
ME Portland Portland Insulation Co., Inc. 201 - 478-4017	MARYLAND Baltimore Baltimore Insulation Co., Inc. 201 - 478-4017	OHIO Columbus Columbus Insulation Co., Inc. 201 - 478-4017	RHODE ISLAND Providence Providence Insulation Co., Inc. 201 - 478-4017
MA Boston Boston Insulation Co., Inc. 201 - 478-4017	MASSACHUSETTS Boston Boston Insulation Co., Inc. 201 - 478-4017	OKLAHOMA Oklahoma City Oklahoma City Insulation Co., Inc. 201 - 478-4017	SOUTH CAROLINA Charleston Charleston Insulation Co., Inc. 201 - 478-4017
MD Baltimore Baltimore Insulation Co., Inc. 201 - 478-4017	MICHIGAN Detroit Detroit Insulation Co., Inc. 201 - 478-4017	SCOTLAND Aberdeen Aberdeen Insulation Co., Inc. 201 - 478-4017	TENNESSEE Nashville Nashville Insulation Co., Inc. 201 - 478-4017
MI Detroit Detroit Insulation Co., Inc. 201 - 478-4017	MINNESOTA Minneapolis Minneapolis Insulation Co., Inc. 201 - 478-4017	SOUTH DAKOTA Sioux Falls Sioux Falls Insulation Co., Inc. 201 - 478-4017	Texas Dallas Dallas Insulation Co., Inc. 201 - 478-4017
MO St. Louis St. Louis Insulation Co., Inc. 201 - 478-4017	MISSISSIPPI Jackson Jackson Insulation Co., Inc. 201 - 478-4017	TEXAS Dallas Dallas Insulation Co., Inc. 201 - 478-4017	UTAH Salt Lake City Salt Lake City Insulation Co., Inc. 201 - 478-4017
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NH Manchester Manchester Insulation Co., Inc. 201 - 478-4017	NEW HAMPSHIRE Manchester Manchester Insulation Co., Inc. 201 - 478-4017	WEST VIRGINIA Martinsburg Martinsburg Insulation Co., Inc. 201 - 478-4017	WISCONSIN Milwaukee Milwaukee Insulation Co., Inc. 201 - 478-4017
NJ Newark Newark Insulation Co., Inc. 201 - 478-4017	NEW JERSEY Newark Newark Insulation Co., Inc. 201 - 478-4017	WYOMING Cheyenne Cheyenne Insulation Co., Inc. 201 - 478-4017	
NY New York New York Insulation Co., Inc. 201 - 478-4017	NEW YORK New York New York Insulation Co., Inc. 201 - 478-4017		

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Branch and Resident Offices

Alton, Ohio	816-9546	Newark, New Jersey	484-2800
Albany, New York	489-3508	New Orleans, Louisiana	897-7237
Albuquerque, New Mexico	243-4583	New York, New York	759-3810
Anchorage, Alaska	273-4425	Norfolk, Virginia	853-9162
Atlanta, Georgia	355-4821	Oakland, California	834-0262
Baltimore, Md.	727-0234	Oklahoma City, Oklahoma	578-4448
Baltimore, Pennsylvania	845-0427	Omaha, Nebraska	339-2826
Birmingham, Alabama	252-8496	Orlando, Florida	425-3481
Birmingham, Alabama	252-4184	Peoria, Illinois	682-9622
Boston, Massachusetts	342-9311	Philadelphia, Pennsylvania	488-8450
Buffalo, New York	335-2540	Phoenix, Arizona	258-1588
Charlotte, North Carolina	853-4123	Pittsburgh, Pennsylvania	363-7766
Charlotte, West Virginia	343-7094	Portland, Maine	774-4143
Chattanooga, Tennessee	372-5777	Portland, Oregon	226-3505
Cincinnati, Ohio	583-0100	Providence, Rhode Island	434-7435
Cleveland, Ohio	281-1173	Raleigh, North Carolina	832-7716
Columbus, South Carolina	884-9440	Richmond, Virginia	355-3703
Columbus, Ohio	252-1384	Rochester, New York	288-2200
Columbus, Ohio	486-9418	Rock Island, Illinois	788-1190
Dallas, Texas	521-7731	Sacramento, California	922-1241
Dallas, Texas	293-3155	St. Louis, Missouri	725-1061
Dallas, Texas	777-4894	Salt Lake City, Utah	487-1261
Denver, Colorado	288-4273	San Antonio, Texas	342-9531
Des Moines, Iowa	547-8000	Santa Barbara, California	495-9800
Detroit, Michigan	533-8208	San Bernardino, California	794-0271
El Paso, Texas	345-4114	San Diego, California	374-7711
El Paso, Texas	425-5124	San Francisco, California	873-7950
Ennisville, Indiana	233-4262	San Jose, California	297-9520
Fargo, North Dakota	787-4573	Seattle, Washington	728-4250
Farmington, Connecticut	743-5241	South Bend, Indiana	335-2415
Fort Wayne, Indiana	233-4871	Spokane, Washington	914-4532
Franklin, California	452-4788	Syracuse, New York	463-4541
Grand Rapids, Michigan	299-3911	Tampa, Florida	267-3171
Greensboro, North Carolina	239-4279	Tallahassee, Florida	248-4741
Greenville, South Carolina	761-0430	Tulsa, Oklahoma	627-1220
Harrisburg, Pennsylvania	524-9827	Washington, D.C. (Gov't)	295-3256
Hartford, Connecticut	573-4322	Washington, D.C. (Gen'l)	387-0930
Hawthorne, New Jersey	869-3531	Wichita, Kansas	264-2522
Houston, Texas	523-2340		
Idaho Falls, Idaho	898-1140		
Indianapolis, Indiana	948-3464		
Jacksonville, Florida	387-2543		
Kansas City, Missouri	753-7725		
Kearney, Nebraska	584-3421		
Kearney, Nebraska	372-0930		
Leavenworth, Kansas	664-2133		
Little Rock, Arkansas	685-4381		
Los Angeles, California	634-8384		
Louisville, Kentucky	795-1784		
Los Angeles, California	327-4116		
Los Angeles, California	624-2689		
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Los Angeles, California	545-3991		
Los Angeles, California	471-5963		
Los Angeles, California	254-9210		

OWENS-CORNING FIBERGLAS CORPORATION

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