PLAINTIFF'S EXHIBIT
K-915

OWENS/CORNING FIBERGLAS TRADEMARK

Mechanical insulation systems



August 1970

INSULATION selection guide

PLUMBING PIPING & EQUIPMENT SYSTEMS

system	temp. range	products	page
PIPING		**PIPE INSULATIONS**	
Chilled Drinking Water Rainwater Leaders	35-50F	**Heavy Density** One-Piece Fiberglas 25 C-P	4-9 10-14 15-17
Drain Lines *(Bent Soft Copper Connections)*	35-50F	**O-C Flexible Tubing**	**36-37**
Domestic Cold Water Boiler Makeup Water	50-60F	**Heavy Density** One-Piece Fiberglas 25 C-P	**4-9** 10-14 15-17
Domestic Hot Water Tempered Water Booster Heater Water	to 180F	**Heavy Density** One-Piece Fiberglas 25 H-P	**4-9** 10-14 18-20
EQUIPMENT		**EQUIPMENT INSULATIONS**	
Hot Water Storage Tanks Heat Exchangers Hot Water Generators Booster Heaters	150-180F	**700 Series** Kaylo Block Fiberglas 25 H-E	**27-29** 34-35 25-26

Products shown in BOLD FACE type are recommended for use for the services shown based on performance and widespread acceptance. Other products are listed because of local conditions or product preference.

MECHANICAL PIPING SYSTEMS

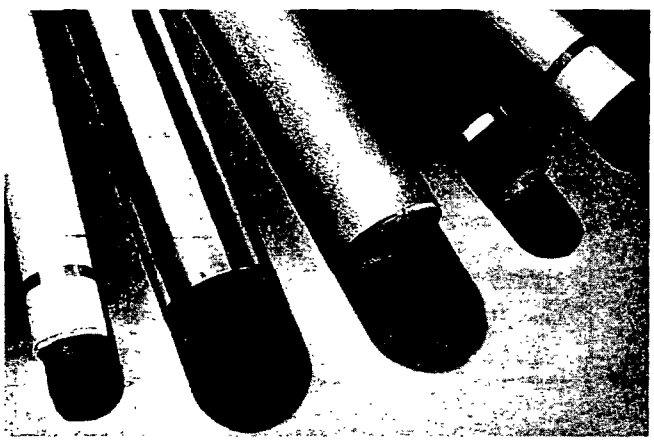
system	temp. range	products	page
PIPING		**PIPE INSULATIONS**	
Refrigerent Suction Chilled Water (Primary and Secondary) Cooling Tower Water (IPS)	−20 to 35F	**Heavy Density** One-Piece Fiberglas 25 C-P	**4-9** 10-14 15-17
Refrigerent Suction Chilled Water *(Bent Soft Copper Connections)*	0 to 70F	**O-C Flexible Tubing**	**36-37**
Dual—Temperature Make-Up Water	35 to 60F	**Heavy Density** One-Piece Fiberglas 25 C-P	**4-9** 10-14 15-17
Heating Hot Water Fuel Oil Piping High Temperature Hot Water Steam and Condensate	to 1200F	**Heavy Density (to 450F)** One-Piece (to 400F) Kaylo (to 1200 F) Fiberglas 25 H-P (to 450F)	**4-9** 10-14 21-22 18-20

MECHANICAL EQUIPMENT

temperature	products	page
Cold Equipment		
− 20F to 70F	**Type 705** Fiberglas 25 C-E	**27-29** 23-24
Hot Equipment		
70F to 1200F	**Type 704 (to 450F)** Fiberglas 25 H-E (to 450F) I-S Board (to 850F) Thermal Insulating Wool (TIW) (to 1000F) Kaylo Block (to 1200F)	**27-29** 25-26 30-31 32-33 34-35

Heavy Density Sectional Pipe Insulation

A multi-purpose rigid pipe insulation for all types of piping systems operating at temperatures from -120 F to 450 F



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 to permit selection of the correct insulation 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 ½" IPS to 33".

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 precise temperature control.

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 will not shrink or rot and will withstand thermal shock.

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 clean-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 valve and fitting covers.

inorganic—The special compounded glass fibers are completely inert. They will not corrode steel, copper or aluminum pipe and will not cause stress corrosion in 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 Self-Sealing Lap jacket further simplifies installation and assures a moisture vapor barrier seal at the joints.

*Trademark Registered Owens-Corning Fiberglas Corporation

Performance characteristics

moisture absorption:
0.2% by volume—96 hrs. at 120F and 95% RH

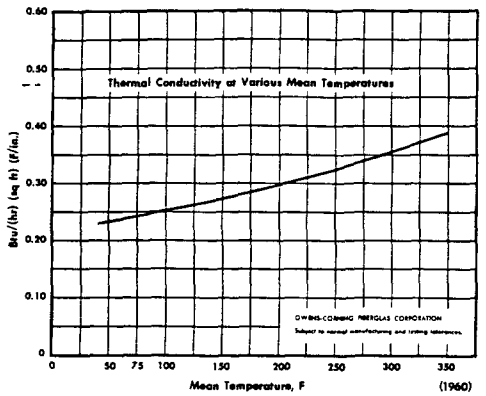
capillarity:
negligible (after 24 hours)

alkalinity:
ph 9

specific heat:
0.20 Btu/lb.F

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

thermal conductivity:



mean temperature	k
75F	0.240
40F	0.227

specification compliance:

HH-I-558a Insulation, Blocks, Boards, Blankets, Felts, Sleeving (Pipe and Tube Covering) and Pipe Fitting Covering, Thermal (Mineral Fiber, Industrial Type), **Form D, Type III, Class 12.**

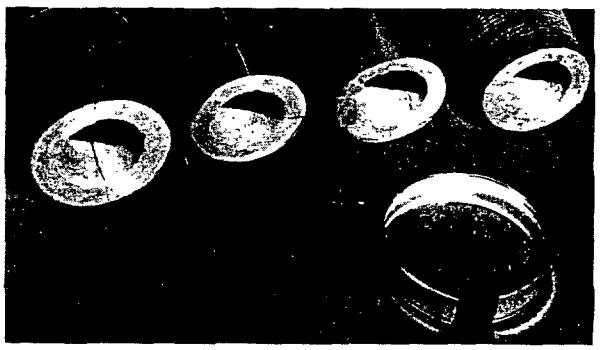
ASTM Specification C547-67



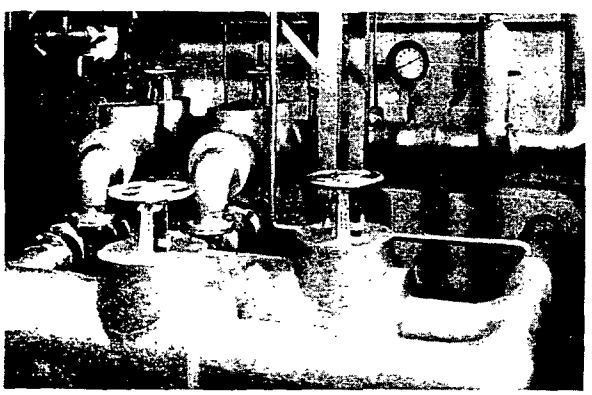
Fire Retardant Jacket, left. Fiberglas 25 Concealed with Self Sealing Lap and end joint sealing strip, right.



Standard Canvas Jacket, left. Pre-Sized Glass Cloth Cloth with end joint closure strip, right.



Glass Klad Metal Jacket, left to right: .016 Embossed Aluminum with snap-in locking joint; .010 Stainless Steel with snap-in locking joint; .010 Embossed Aluminum with overlapping jacket laps on end and longitudinal joints; End joint sealing butt strips for end joint closure.



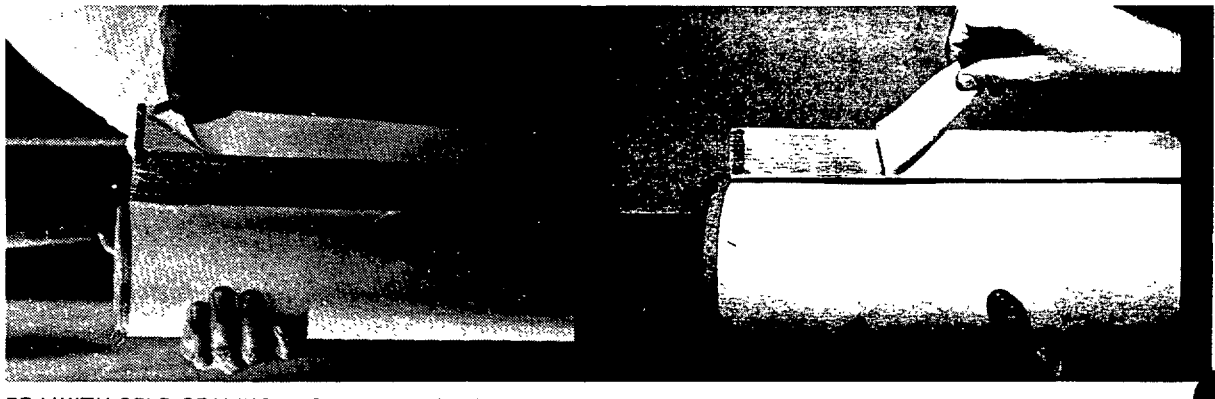
NEATER JOBS are possible with Fiberglas Heavy Density Pipe Insulation because of its inherent rigidity. It cuts cleaner with square neat edges.



ABUSE RESISTANT—Heavier density means less chance of damage from ladders or other mechanical abuse during installation or in service.

PIPE INSULATION SELECTION CHART—PLUMBING & MECHANICAL SYSTEMS

SERVICE REQUIREMENT	TEMPERATURE °F	JACKETS AVAILABLE (RECOMMENDED IN BOLD FACE TYPE)	
		CONCEALED	EXPOSED
HOT PIPING		**Fiberglas 25 Concealed Jacket—completely fire safe FRJ jacket with Self Sealing Lap. End joint butt strips furnished.**	**Fiberglas 25 H-P— pre-sized surface eliminates field priming. May be left as is or painted any color.**
Plumbing			
Domestic Hot Water	110-180	**Standard Canvas Jacket**—low cost—provides base for painting. Heavier 6 or 8 oz. weights available.	**Fiberglas 25 Concealed Jacket—completely fire safe FRJ jacket with Self Sealing Lap. End joint butt strips furnished.**
Tempered Water	110-130		
			Canvas; 6 oz. or 8 oz.—normally sized and painted.
Mechanical			
Heating Hot Water	150-210	**FRJ with Self Sealing Lap**—FRJ (Fire Retardant Jacket) is a laminate of white kraft and foil, reinforced with strong glass yarns, laminated with flame snuffing adhesive. Meets requirements of GSA 301-1, Type A. Jacket can be used on heated, and dual-temperature lines up to 450F. Butt joint strips to close end joints are furnished. Also available without the Self Sealing Lap feature.	**FRJ with Self Sealing Lap**—no further finish required. Neat, white attractive finish. Or, may be painted with water based paint.*
Steam and Condensate	210-450		
Fuel Oil Piping	210-450		
High Temperature Hot Water	250-450		**May be finished with field applied 6 oz. canvas, sizing & paint.*
COLD PIPING			
Plumbing		**Fiberglas 25 Concealed Jacket—completely fire safe FRJ jacket with Self Sealing Lap. End joint butt strips furnished.**	**Fiberglas 25 C-P**—a completely U.L. rated cold pipe insulation system. U.L. rating includes jacket, insulation; fittings and accessories.
Domestic Cold Water	50-65		
Chilled Drinking Water	35-65		
Rain Water Leaders	33-65		
		FRJ with Self Sealing Lap—provides a positive vapor seal for all cold and chilled water lines. FRJ (Fire Retardant Jacket) is a laminate of white kraft and foil reinforced with strong glass yarns. Meets requirements of GSA 301-1, Type A jackets. Laminated with flame snuffing adhesive. Excellent vapor barrier with low perm rating 0.02. Jacket can be used on heated, dual-temperature and refrigerant lines from —120F to 450F. Butt joint strips to close end joints are furnished. Also available without the Self Sealing Lap feature.	**FRJ with Self Sealing Lap—no further finish required. White appearance presents neat finished job.***
Mechanical			
Chilled Water—Primary and Secondary	35-55		
Dual-Temp	40-210		
Refrigerant Suction	−60 to +35		**May be finished with field applied 6 oz. canvas, sizing & paint.*



FRJ WITH SELF-SEALING LAP—installed by this unique method eliminates the need for stapling, bands and lap adhesives. The contact type adhesive offers a positive vapor seal at all joints and speeds application. It's as easy as 1, 2, 3: (1) start to peel the release paper off the vapor barrier, (2) apply to pipe and peel off the balance, (3) press

OUTDOORS

Glas Klad—factory applied .016 embossed aluminum or .010 stainless steel. Complete with integral longitudinal Pittsburgh seam and butt joint strips that lock out the weather. Butt joint strips are furnished, with weatherproof mastic protected with release paper. Also available with .010 embossed aluminum without Pittsburgh seam, having a two-inch overlap at the longitudinal seam and a 2″ overlap on end joint.

Glas Klad—factory applied .016 embossed aluminum or .010 stainless steel. Complete with integral longitudinal Pittsburgh seam and butt joint strips that lock out the weather. Butt joint strips are furnished with weatherproof mastic protected with release paper. Also available with .010 embossed aluminum without Pittsburgh seam, having a two-inch overlap at the longitudinal seam and a 2″ overlap on end joint.

Note:
All cold lines running outdoors require a weatherproofing jacket, in addition to the factory applied vapor barrier.

DESIGN CONSIDERATIONS

The wide temperature range of Fiberglas Heavy Density Pipe Insulation permits the specifier to select material from one manufacturer to answer all the mechanical and plumbing system insulation requirements, concealed, exposed, outdoors, hot or cold. A selection of jackets matched to end use and factory applied to the insulation assures maximum performance at the most economical cost.

Self Sealing Lap on FRJ (Fire Retardant Jacket) assures a positive vapor seal and serves to hold the insulation on the pipe. This technological advance employs a unique chemical bonding agent that instantly seals and holds the joint lap tightly in place. The bond also becomes stronger with age. Butt joint strips of the same material are used on the end joints. The use of staples, bands and messy adhesives are eliminated and the attendant problems of fishmouths and other application defects. In addition FRJ with Self Sealing Lap is fire retardant, presents a neat white appearance and is glass fiber reinforced to resist damage.

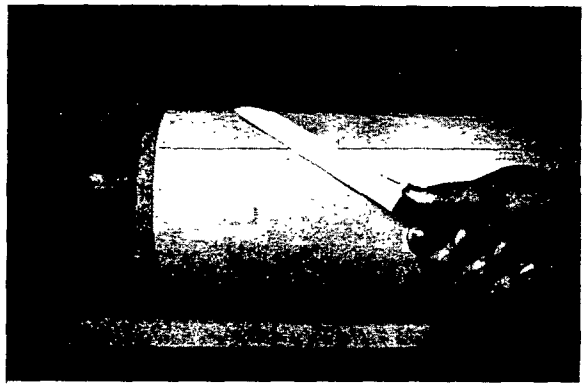
Fiberglas 25 Jacket factory-applied to Fiberglas Heavy Density Pipe Insulation is a completely fire-safe insulation for hot or cold lines. No lagging is required before painting. The jacket is tough, resists damage and will not mildew or rot. Available in C-P or H-P for exposed applications and Fiberglas 25 Concealed for concealed systems.

Fittings for cold lines are insulated with mitered segments, or pre-molded Fiberglas fittings which is subsequently wrapped with glass fabric and coated with vapor barrier mastic. For hot lines the fitting is made smooth with insulating cement, canvased and sized.

Fiberglas will not burn, rot or shrink. With the addition of FRJ or Fiberglas 25 Jacket, the insulation is completely fire-safe.

The exceptional low k factor means maximum economy and performance for all piping systems, concealed, exposed or outdoors.

Caution: Owens-Corning Fiberglas Insulations are to be applied only with approved adhesives, mastics and mechanical fastening devices as published in Accessory Materials List, Pub. No. 4-IN-3430. Owens-Corning Fiberglas accepts no responsibility or liability for the performance of materials other than those listed in this list unless approved in writing by O-CF Testing Laboratories.



the lap in place at the center and, pressing hard, work out toward either end. Rub with the blunt edge of a knife. End joints are sealed with a 3" wide butt strip of the same Self-Sealing vapor barrier material. This feature also available on Fiberglas 25 C-P and Fiberglas 25 Concealed.

recommended thickness

Selection of insulation thicknesses for any specific application should take into consideration the following important criteria. 1. Cost of insulation applied. 2. Cost of heat energy. 3. Cost of capital. 4. Cost of depreciation-plant and insulation. 5. Capital investment in heat production equipment. 6. Temperature differential. 7. Size of the pipe or surface. 8. Conductivity of insulation.

cold piping—Proper thickness (see overleaf for tables) is required for efficient operation and to prevent condensation on the insulation surface. Specifically:

1. Designed thickness should be specified to result in a surface temperature above the Dew-Point temperature of the surrounding air. Generally this is equal to or greater than the "economical thickness" despite the relatively higher cost of cold Btu's.

2. Insulation thickness should be based on ambient air conditions and corresponding permissible temperature differences.

Ambient Air Condition	Permissible temp. drop (between ambient air and insulation surface)
90 F at 90% R.H.	3 F
90 F at 80% R.H.	7 F

3. Piping operating down to freezing temperatures or at fluctuating hot and cold temperatures should be insulated for maximum performance during the coolest part of the cold cycle.

recommened thickness

heated piping to 450F (80F ambient air)

Pipe Temp.	200			300			400			450		
Temp. Diff.	120			220			320			370		
IPS	RT	HL	ST	RT	HL	ST	RT	HL	ST	RT	HL	ST
½	1	13	91	1	24	101	1½	32	100	1½	39	105
¾	1	15	94	1	29	106	1½	42	104	1½	45	120
1	1	16	92	1	30	102	1½	42	104	1½	49	108
1¼	1	20	95	1½	27	95	1½	45	104	2	51	104
1½	1	21	93	1½	31	96	1½	50	107	2	57	107
2	1	24	94	1½	36	97	1½	58	107	2	60	103
2½	1½	24	91	2	36	95	2	60	104	2	72	108
3	1½	25	90	2	39	94	2½	56	97	2½	69	98
3½	1½	31	92	2	47	96	2½	58	96	2½	71	99
4	1½	30	90	2	47	94	2½	64	97	2½	80	100
4½	1½	34	92	2	58	97	2½	58	96	2½	84	102
5	1½	38	91	2	58	95	2½	80	100	3	70	98
6	1½	29	88	2	56	94	2½	95	101	3	95	99
7	1½	44	91	2	74	95	2½	100	98	3	100	99
8	1½	50	93	2	76	95	2½	104	100	3	112	99
9	1½	58	91	2	80	96	2½	118	99	3	114	100
10	2	48	88	2½	76	93	3	111	97	3	135	101
12	2	56	89	2½	88	93	3	127	98	3½	138	98
14	2	63	89	2½	99	94	3	142	98	3½	153	99

HL—heat loss . . . Btu/hr/lineal foot **ST**—surface temperature (F)
RT—recommended thickness **HG**—heat gain

recommended thickness

cold piping & dual-temperature (minus 60 to 200F)

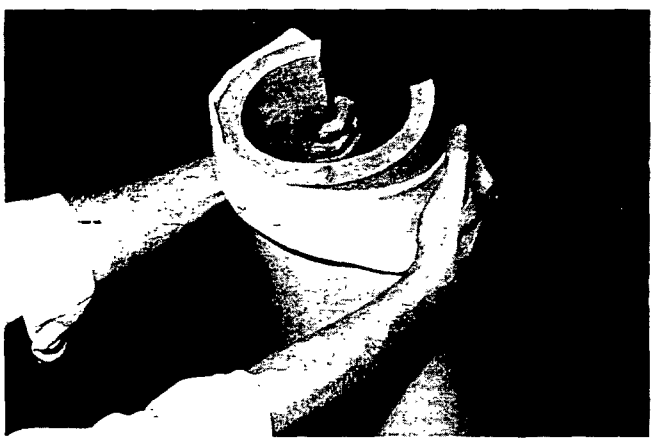
(90F ambient air)

	90% relative humidity										80% relative humidity									
pipe surface temperature	40 F		35 F		0 F		—30 F		—60 F		40 F		35 F		0 F		—30 F		—60 F	
condition	chilled water		ice water		brine		special brine		refrig-erants		chilled water		ice water		brine		special brine		refrig-erants	
pipe sizes	RT*	HG	RT*	HG	RT	HG	RT	HG	RT	HG	RT	HG	RT	HG	RT	HG	RT	HG	RT	HG
½	1½	3.8	1½	5	2½	6	3	7	3½	7	¾	5.4	¾	6	1	8	1½	9	1½	11
¾	1½	4.3	1½	5	2½	6	3	7	3½	8	¾	6.2	¾	7	1½	8	1½	10	2	10
1	1½	4.7	1½	6	2½	6	3	8	3½	9	¾	7.1	¾	8	1½	8	1½	11	2	11
1¼	1½	5.3	2	6	2½	7	3	9	3½	11	¾	8.4	1	9	1½	9	1½	12	2	14
1½	1½	6.0	2	7	3	8	3½	8	3½	10	¾	9.4	1	9	1½	10	2	12	2	15
2	1½	5.8	2	7	3	8	3½	10	4	11	¾	11.0	1	10	1½	12	2	13	2	16
2½	2	7.2	2	8	3	10	3½	11	4	12	¾	12.6	1	12	1½	15	2	16	2½	17
3	2	7.5	2	9	3	10	4	11	4½	13	1	12	1	14	1½	16	2	17	2½	18
4	2	9.1	2	10	3	12	4	13	4½	15	1	14	1	16	1½	18	2	20	2½	21
5	2	10.6	2½	11	3½	13	4	15	4½	17	1	18	1	20	1½	23	2	24	2½	25
6	2	12.4	2½	12	3½	14	4½	16	5	18	1	21	1	24	2	21	2	27	2½	28
7	2	13.8	2½	14	3½	15	4½	17	5	19	1	24	1	28	2	23	2	30	2½	31
8	2	15	2½	15	3½	17	4½	18	5	21	1	25	1	29	2	26	2	33	2½	34
9	2	16	2½	16	4	17	4½	20	5½	22	1	27	1½	24	2	27	2	35	2½	37
10	2	17	2½	17	4	18	4½	22	5½	24	1	32	1½	26	2	30	2	39	3	41
11	2½	16	2½	19	4	20	4½	23	5½	25	1	32	1½	29	2	31	2	41	3	38
12	2½	17	2½	21	4	21	5	24	5½	26	1	34	1½	32	2	36	2½	39	3	41
14	2½	19	2½	23	4	23	5	28	6	27	1	41	1½	35	2	41	2½	44	3	46
16	2½	21	2½	25	4	25	5	28	6	29	1	44	1½	39	2	45	2½	49	3	50
18	2½	24	2½	28	4	29	5	31	6	32	1	52	1½	43	2	50	2½	54	3	56
20	2½	26	2½	31	4	31	5	33	6	35	1	57	1½	48	2	55	2½	60	3	62
24	2½	30	3	32	4½	33	5½	37	6	41	1	70	1½	55	2	64	2½	70	3	73
30	2½	37	3	32	4½	40	5½	43	6½	48	1	82	1½	70	2	79	2½	83	3	88
33	2½	40	3	45	4½	47	5½	51	6½	54	1	91	1½	77	2	88	2½	92	3	98
copper tubing ½	1½	3.5	1½	3.8							¾	4.0	¾	4.3						
⅝	1½	3.2	1½	3.5							¾	4.4	¾	4.9						
¾	1½	3.5	1½	3.8							¾	4.8	¾	5.3						
⅞	1½	3.9	1½	4.2							¾	5.2	¾	5.8						
1⅛	1½	4.5	1½	5.0							¾	6.3	¾	6.9						
1⅜	1½	4.9	1½	5.4							¾	7.2	¾	7.8						
1⅜	1½	5.6	1½	6.1							¾	8.0	¾	8.8						
2⅛	1½	6.0	2	5.8							¾	9.8	1	8.0						
2⅝	2	6.3	2	6.8							¾	11.5	1	11.1						
3⅛	2	6.6	2	7.6							¾	13.3	1	10.6						
3⅝	2	7.8	2	8.5							1	12.8	1	14.0						
4⅛	2	7.9	2½	8.6							1	11.7	1	10.9						
5⅛	2	9.2	2½	9.6							1	13.9	1	15.2						
6	2	12.7	2½	11.3							1	16.1	1	17.6						

*Minimum thickness available above 12" IPS is 1", above 24" IPS is 1½".

One-Piece Pipe Insulations

A versatile, efficient quick applying insulation for hot and cold piping from—30F to 450 F.



uses

Fiberglas* One-Piece Pipe Insulation is adaptable to all types of piping systems operating at temperatures from —30F to 450F. It is available with a variety of factory-applied jackets for appearance, vapor barrier, fireproofing or waterproofing to permit selection of the right combination of insulation and jacket for the service condition requirement.

description

Fiberglas One-Piece Pipe Insulation is a resilient lightweight pipe insulation molded from fine glass fibers in cylindrical form. A single longitudinal seam, which is opened to apply to the pipe, springs closed when in place. It is available with a variety of factory-applied jackets for appearance and function.

benefits

economical application—One-piece unit is applied quickly, easily, even in the larger sizes. **easy fabrication**—Only a knife is needed for fabrication of the most intricate fittings.

efficient—Because of its very low k factor, it is possible to reduce the thickness of insulation to provide thermal efficiency equivalent to other non-fibrous materials with savings in material costs. Conversely, the same thickness of One-piece provides better thermal efficiency, which results in savings in operating expense due to reduction in heat loss.

permanent — Completely U.L. rated — Inorganic glass fiber construction will not shrink, rot or cause metal corrosion.

multi-purpose—The variety of applications means less inventory. A selection of factory-applied jackets are available for surface finish, vapor barrier, weather protection. fire proofing or damage resistance. The Self-Sealing lap jacket speeds application in the field and assures a positive vapor barrier.

damage resistant—The resilient glass fibers spring back when bumped, and One-Piece will not break if accidentally dropped during installation.

*Trademark Registered Owens-Corning Fiberglas Corporation

Performance characteristics

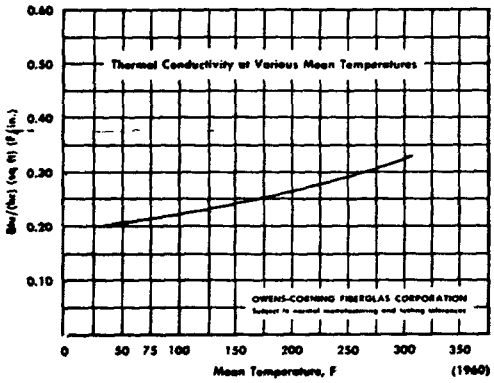
moisture absorption: 0.2% by volume 96 hrs. at 120F and 95% RH

specific heat: 0.20 Btu/lb. F.

shrinkage: None

alkalinity: ph9

thermal conductivity: Unusually low thermal conductivity shown on chart



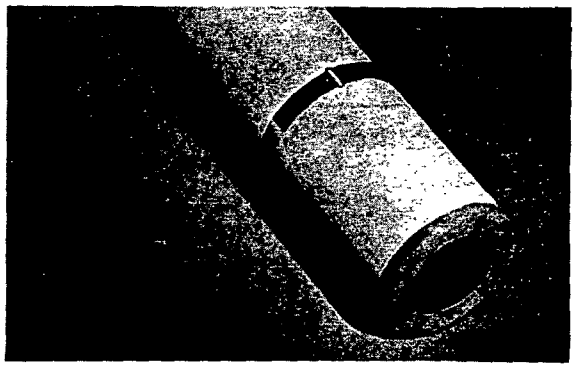
mean temperature	k
75F	0.23
40F	0.21

specification compliance:

HH-I-558a Form D, Type III, Class 12

HH-I-562 Type II

MIL-I-22344B (Ships)



1. Standard Canvas.



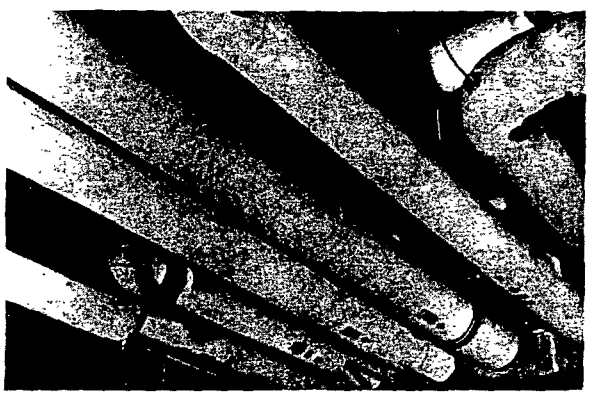
2. FRJ.
3. FRJ with Self-Sealing Lap.



4. Fiberglas 25 Concealed



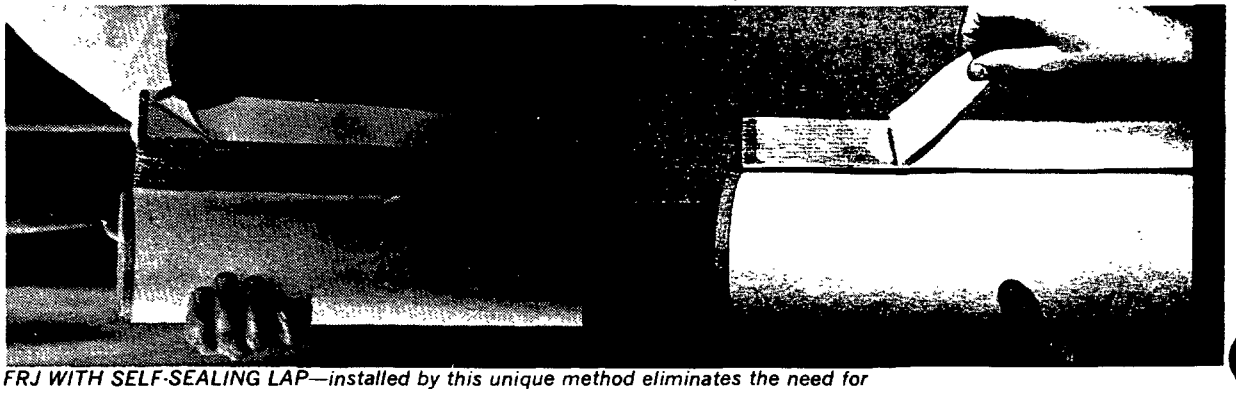
Neat Finished Appearance on this well insulated chilled water system is one of the reasons why One-Piece Pipe Insulation is used widely in equipment rooms.



Self Sealing Lag vapor barrier jacket combines a positive vapor seal, with an attractive fire safe finished appearance for cold water service and dual-temperature lines.

PIPE INSULATION SELECTION CHART—PLUMBING & MECHANICAL SYSTEMS

SERVICE REQUIREMENT	TEMPERATURE °F	JACKETS AVAILABLE (RECOMMENDED IN BOLD FACE TYPE)	
		CONCEALED	EXPOSED
HOT PIPING			
Plumbing			
Domestic Hot Water	110-180	**Fiberglas 25 Concealed Jacket—completely fire safe FRJ jacket with Self Sealing Lap. End joint butt strips furnished.**	
Tempered Water	110-130		
		Standard Canvas Jacket—low cost—provides base for painting. Heavier 6 or 8 oz. weights available.	**Fiberglas 25 H-P**—a completely U.L. rated hot pipe insulation system. U.L. rating includes jacket, insulation, fittings and accessories. **Available on Fiberglas Heavy Density Pipe Insulation only. See data sheet 1-IN-3853.**
Mechanical			
Heating Hot Water	150-210	**FRJ with Self Sealing Lap**—FRJ (Fire Retardant Jacket) is a laminate of white kraft and foil, reinforced with strong glass yarns, laminated with flame snuffing adhesive. Meets requirements of GSA 301-1, Type A. Jacket can be used on heated, and dual-temperature lines up to 450F. Butt joint strips to close end joints are furnished. Also available without the Self Sealing Lap feature.	**Fiberglas 25 Concealed Jacket—completely fire safe FRJ jacket with Self Sealing Lap. End joint butt strips furnished.**
Steam and Condensate	210-450		
Fuel Oil Piping	210-450		
High Temperature Hot Water	250-450		
COLD PIPING			
Plumbing			
Domestic Cold Water	50-65	**Fiberglas 25 Concealed Jacket—completely fire safe FRJ jacket with Self Sealing Lap. End joint butt strips furnished.**	
Chilled Drinking Water	35-65		
Rain Water Leaders	33-65		
Mechanical		**FRJ with Self Sealing Lap—provides a positive vapor seal for all cold and chilled water lines. FRJ (Fire Retardant Jacket) is a laminate of white kraft and foil reinforced with strong glass yarns. Meets requirements of GSA 301-1, Type A jackets. Laminated with flame snuffing adhesive. Excellent vapor barrier with low perm rating 0.02. Jacket can be used on heated, dual-temperature and refrigerant lines from —30F to 450F. Butt joint strips to close end joints are furnished. Also available without the Self Sealing Lap feature.**	**Fiberglas 25 C-P**—a completely U.L. rated cold pipe insulation system. U.L. rating includes jacket, insulation, fittings and accessories. **Available in Fiberglas Heavy Density Pipe Insulation only. See data sheet 1-IN-4376.**
Chilled Water—Primary and Secondary	35-55		
Dual-Temp	40-210		
Refrigerant Suction	—30 to —35		



FRJ WITH SELF-SEALING LAP—installed by this unique method eliminates the need for stapling, bands and lap adhesives. The contact type adhesive offers a positive vapor seal at all joints and speeds application. It's as easy as 1, 2, 3: (1) start to peel the release paper off the vapor barrier, (2) apply to pipe and peel off the balance, (3) press the lap in

OUTDOORS

A suitable weatherproof jacket applied over no wrap or factory jacket.

DESIGN CONSIDERATIONS

The wide temperature range of Fiberglas One-Piece Pipe Insulation permits the specifier to select material from one manufacturer to answer all the mechanical and plumbing system insulation requirements, concealed, exposed, outdoors, hot or cold. A selection of jackets matched to end use and factory applied to the insulation assures maximum performance at the most economical cost.

Self Sealing Lap on FRJ (Fire Retardant Jacket) assures a positive vapor seal and serves to hold the insulation on the pipe. This technological advance employs a unique chemical bonding agent that instantly seals and holds the joint lap tightly in place. The bond also becomes stronger with age. Butt joint strips of the same material are used on the end joints. The use of staples, bands and messy adhesives are eliminated and the attendant problems of fishmouths and other application defects. In addition FRJ with Self Sealing Lap is fire retardant; presents a neat white appearance and is glass fiber reinforced to resist damage.

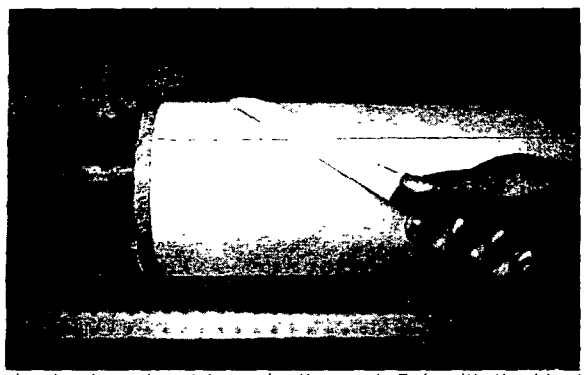
Fiberglas 25 Jacket factory-applied to Fiberglas Heavy Density Pipe Insulation is a completely fire-safe insulation for hot or cold lines. No lagging is required before painting. The jacket is tough, resists damage and will not mildew or rot. Available in C-P or H-P for exposed applications and Fiberglas 25 Concealed for concealed systems.

Fittings for cold lines are insulated with mitered segments, or pre-molded Fiberglas fittings which is subsequently wrapped with glass fabric and coated with vapor barrier mastic. For hot lines the fitting is made smooth with insulating cement, canvased and sized.

Fiberglas will not burn, rot or shrink. With the addition of FRJ or Fiberglas 25 Jacket, the insulation is completely fire-safe.

The exceptional low k factor means maximum economy and performance for all piping systems, concealed, exposed or outdoors.

Caution: Owens-Corning Fiberglas Insulations are to be applied only with approved adhesives, mastics and mechanical fastening devices as published in Accessory Materials List, Pub. No. 4-IN-3430. Owens-Corning Fiberglas accepts no responsibility or liability for the performance of materials other than those listed in this list unless approved in writing by O-CF Testing Laboratories.



place at the center and, pressing hard, work out toward either end. Rub with the blunt edge of a knife. End joints are sealed with a 3" wide butt strip of the same Self-Sealing vapor barrier material.

economic thickness

heated piping to 450F (80F ambient still air)

pipe temp. / temp. diff. / IPS	200 / 120			300 / 220			400 / 320		
	ET	HL	ST	ET	HL	ST	ET	HL	ST
½	1	13	91	1	24	101	1½	32	100
¾	1	15	94	1	29	106	1½	42	104
1	1	16	92	1	30	102	1½	42	104
1¼	1	20	95	1½	27	95	1½	45	104
1½	1	21	93	1½	31	96	1½	50	107
2	1	24	94	1½	36	97	1½	58	107
2½	1½	24	91	2	36	95	2	60	104
3	1½	25	90	2	39	94			
3½	1½	31	92	2	47	96			
4	1½	30	90	2	47	94			
4½	1½	34	92	2	58	97			
5	1½	38	91	2	58	95			
6	1½	29	88	2	56	94			
7	1½	44	91	2	74	95			
8	1½	50	93	2	76	95			
9	1½	58	91	2	80	96			
10	2	48	88						
12	2	56	89						
14	2	63	89						

Specify Fiberglas Heavy Density Pipe Insulation for thickness above 2".

ET-economic thickness (inches) **HL**-heat loss . . . BTU/hr/lineal foot **ST**-surface temperature (F)

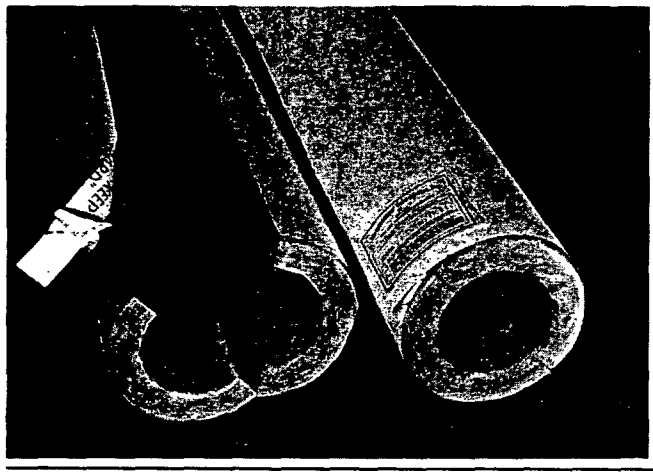
cold and dual-temperature lines (90 F at 80% R.H.)

pipe surface temperature	50 F or above		49 F to 35 F		34 F to 0 F		0 F to −30 F	
pipe size	RT	HG	RT	HG	RT	HG	RT	HG
½	½	4	¾	5	1	8	1½	8
¾	½	5	¾	6	1	9	1½	10
1	½	6	¾	7	1½	8	1½	11
1¼	½	7	¾	8	1½	9	1½	12
1½	½	8	¾	9	1½	10	1½	13
2	½	10	¾	11	1½	12	1½	15
2½	½	12	¾	13	1½	15	2	15
3	¾	11	¾	15	1½	16	2	17
3½	¾	12	1	12	1½	18	2	19
4	¾	13	1	14	1½	18	2	20
4½	¾	14	1	15	1½	22	2	23
5	¾	15	1	19	1½	23	2	23
6	¾	17	1	22	1½	25	2	26
7	1	18	1	25	1½	28	2	29
8	1	20	1	27	1½	31	2	32
9	1	22	1	29	1½	34	2	35
10	1	25	1	32	1½	36	2	38
11	1	25	1	34	1½	39	2	41
12	1	26	1	35	1½	43	2	44

RT-recommended thickness (inches) **HG**-heat gain

Fiberglas 25 C-P Pipe Insulation System

A U.L. rated noncombustible pipe insulation system for cold service piping operating at temperatures down to 35° F.



uses

Recommend for use on all cold or dual-service piping operating from 35°F. to 450°F. where rated non-combustible fire safety is desired—such as, commercial and institutional buildings, schools, hospitals, and places of public assembly. Also recommended for processing lines where fire safety is a paramount criterion. Fiberglas 25*C-P Pipe Insulation System is composed

description

of Fiberglas Heavy Density Sectional Pipe Insulation jacketed with a vapor barrier laminate of aluminum foil and pre-sized glass cloth. The jacket has a pressure sealing lap adhesive (on sizes up to 12" IPS x 2") to eliminate the use of staples, adhesives, or bands. The fittings are also non-combustible.

benefits

fire safety—a complete insulation system with a UL rating including pipe fittings, vapor barrier and mastic when installed in accordance with recommended procedures.

ready for painting—factory pre-sized glass cloth jacket and matching tape and mastic system do not require field sizing. If desired, painting may be omitted. If painting is required see "Application recommendations."

damage resistant—the extra heavy density pipe insulation and extra tough woven glass cloth jacket resists damage on exposed lines.

lower operating cost—the exceptional thermal efficiency of Fiberglas Heavy Density pipe insulation contributes to lower operating cost of cooling equipment and piping.

no condensation drippage—the foil vapor barrier and pressure sensitive lap when applied as per instruction, assure a positive vapor seal. Fittings also provide a vapor seal.

installation savings—Fiberglas 25 C-P pipe insulation system meets all existing standards for fire safety and its uses may result in lower insurance costs.

*Fiberglas (Reg. U.S. Pat. Off.) and "25" are trademarks of Owens-Corning Fiberglas Corporation.

Performance characteristics

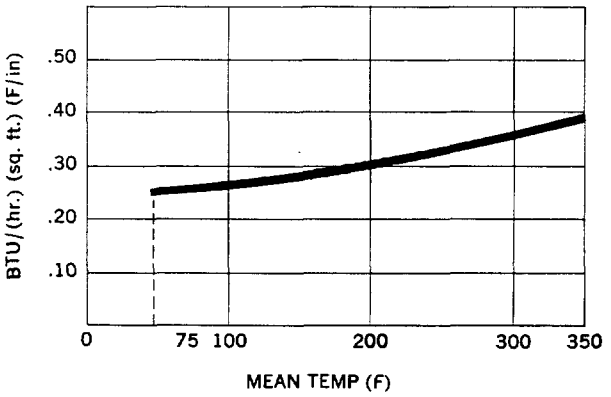
Insulation

moisture absorption: 0.2% by volume 96 hrs. at 120F and 95% RH
specific heat: 0.20 Btu/lb. F
shrinkage: none
alkalinity: ph 9
capillarity: negligible after 24 hrs.
dimensional stability — will not warp, shrink, rot or decompose.
vermin and rodent resistant—provides no sustenance.
temperature limitation—recommended for chilled or dual-temperature piping from 35°F. to 450°F.

Jacket

vapor transmission rate: .05 perms
burst strength: 300 psi

thermal conductivity



fire hazard classification

Maximum Fire Hazard Classifications for building materials and insulations as noncombustible have been established as follows:

	Acceptable
Flame Spread	25
Fuel Contributed	50
Smoke Developed	50

Fiberglas 25 C-P Pipe Insulation Systems, including fittings, is considerably below the maximum allowable. This is your assurance that you can specify and use Fiberglas 25 C-P Pipe Insulation System without the danger of contributing to the spread of fire or that combustion will liberate excessive smoke. The system has been designed to meet the stringent fire safety requirements of the GSA and Corps of Engineers.

Underwriters Laboratories
(Pipe & Equipment Coverings R5583 40 U 8.15)

	**Fiberglas 25 C-P Pipe Insulation System
Flame Spread	20
Fuel Contributed	5
Smoke Developed	40

Note. This rating is for the pipe insulation **plus an unlimited number of fittings in a piping system if materials and application conform to those recommended.

application recommendations

The self sealing lap feature on Fiberglas 25 C-P Pipe Insulation sections makes installation on straight runs of pipe a simple procedure. The only precaution needed is to keep all contact adhesive surfaces clean and to rub hard all longitudinal and circumferential seams. The end joints are sealed with a factory furnished joint sealing strip with pressure sealing adhesive.

Fittings are fabricated from mitered segments of Fiberglas Heavy Density pipe insulation or commercially available molded insulation fitting covers.

Fitting insulation is coated with a skim coat of insulating cement to smooth out the insulation. After cement is dry, O-C F Fitting Mastic, Type C, is then applied over Fiberglas Reinforcing Cloth and coated with another coating of O-C F Fitting Mastic, Type C.

If painting is required, no sizing is necessary; but, to maintain the noncombustible rating of the system, only Glidden acrylic latex paint (No. 5370) is approved for use.

specification compliance

HH-I-558a, Form D, Type III, Class 12

Recommended Thickness

Selection of insulation thicknesses for any specific application should take into consideration the following important criteria. 1. Cost of insulation applied. 2. Cost of heat energy. 3. Cost of capital. 4. Cost of depreciation-plant and insulation. 5. Capital investment in heat production equipment. 6. Temperature differential. 7. Size of the pipe or surface. 8. Conductivity of insulation.

for cold piping, proper thickness is required for efficient operation and to prevent condensation on the insulation surface.

Specifically:

1. Designed thickness should be specified to result in a surface temperature above the Dew-Point temperature of the surrounding air. Generally this is equal to or greater than the "economical thickness" despite the relatively higher cost of cold Btu's.

2. Insulation thickness should be based on ambient air conditions and corresponding permissible temperature differences.

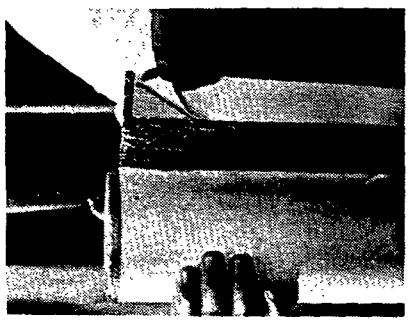
Ambient Air Condition	Permissible temp. drop (between ambient air and insulation surface
90 F at 90% R.H.	3F
90 F at 80% R.H.	7F

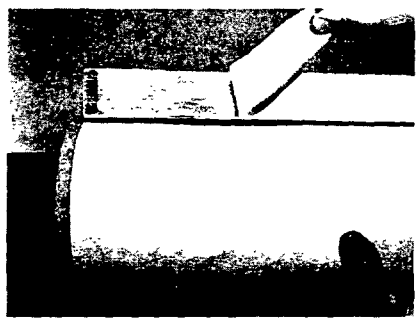
3. Piping operating down to freezing temperature or cycling hot and cold temperatures should be insulated for maximum performance during the coolest part of the cold cycle.

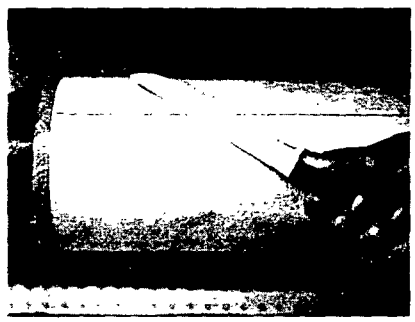
Recommended Thickness—Ambient Still Air At 90F

Pipe Suface Temperature 35 F	PIPE SIZES												copper tubing nominal size						
Condition Ice Water	½	1	1½	2½	4	6	8	10	12	16	20	30	⅜	⅝	1	1½	2½	3½	5
90% RELATIVE HUMIDITY	¾	1¼	2	3	5	7	9	11	14	18	24	33	½	¾	1¼	2	3	4	6
Recommended Thickness (in.)	1½	1½	2	2	2	2½	2½	2½	2½	2½	2½	3	1½	1½	1½	1½	2	2	2½
	1½	2	2	2	2½	2½	2½	2½	2½	2½	3	3	1½	1½	1½	2	2	2½	2½
Heat Gain (Btu/lf/hr.)	5	6	7	8	10	12	15	17	21	25	31	32	3.8	3.8	5.0	6.1	6.8	8.5	9.6
	5	6	7	9	11	14	16	19	23	28	32	45	3.5	4.2	5.4	5.8	7.6	8.6	11.3
80% RELATIVE HUMIDITY																			
Recommended Thickness (in.)	¾	¾	1	1	1	1	1	1½	1½	1½	1½	1½	¾	¾	¾	¾	1	1	1
	¾	1	1	1	1	1	1½	1½	1½	1½	1½	1½	¾	¾	¾	1	1	1	1
Heat Gain (Btu/lf/hr.)	6	8	9	12	16	24	29	26	32	39	48	70	4.3	5.3	6.9	8.8	11.1	14.0	15.2
	7	9	10	14	20	28	24	29	35	43	55	77	4.9	5.8	7.8	8.0	10.6	10.9	17.6

*Minimum thickness available above 12" IPS is 1", above 24" IPS is 1½"



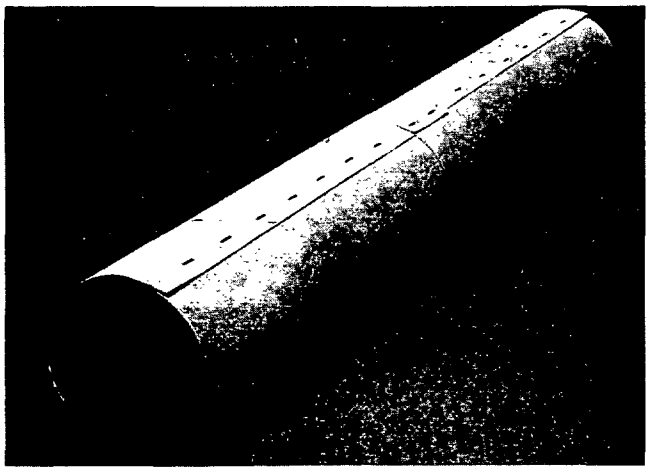




Fiberglas 25 C-P Pipe Insulations installed by this unique method eliminates the need for stapling, bands and lap adhesives. The contact type adhesive offers a positive vapor seal at all joints and speeds application. It's as easy as 1,2,3: (1) start to peel the release paper off the vapor barrier, (2) apply to pipe and peel off the balance. (3) place the lap in place at the center and, pressing hard, work out toward either end. Rub with the blunt edge of a knife. End joints are sealed with a 3" wide butt strip of the same Self-Sealing vapor barried material.

Fiberglas 25 H-P Pipe Insulation System

A noncombustible pipe insulation system for hot service piping operating at temperatures up to 450° F.



uses

Recommended for use on all heated piping operating at temperatures up to 450°F. where a complete noncombustible insulation system is desired, for commercial and institutional buildings, schools, hospitals and places of public assembly. Also recommended for processing lines where fire safety is a paramount criterion.

description

Fiberglas 25* H-P Pipe Insulation System is composed of Fiberglas Heavy Density Sectional Pipe Insulation jacketed with a white pre-sized glass cloth jacket. Longitudinal jacket flaps are secured with flare-door staples. End joints are closed with a glass cloth tape stapled firmly in place.

benefits

fire safety—a complete insulation system with a UL rating including pipe fittings, and mastic when installed in accordance with recommended procedures.

ready for painting—factory pre-sized glass cloth jacket and matching tape and mastic system do not require field sizing. If desired, painting may be omitted. "See Application Recommendations."

damage resistant—the extra heavy density pipe insulation and extra tough woven glass cloth jacket resists damage on exposed lines.

lower operating cost—the exceptional thermal efficiency of Fiberglas Heavy Density pipe insulation contributes to lower operating cost of heating equipment and piping.

*Trademark Registered Owens-Corning Fiberglas Corporation

Performance characteristics

Insulation

dimensional stability:
will not warp, shrink, rot or decompose

specific heat:
0.20 Btu/lb F.

vermin and rodent resistance:
provides no sustenance

temperature limitation:
heated lines to 450F

alkalinity:
ph 9

stress corrossion:
will not cause stress corrossion cracking of stainless steel

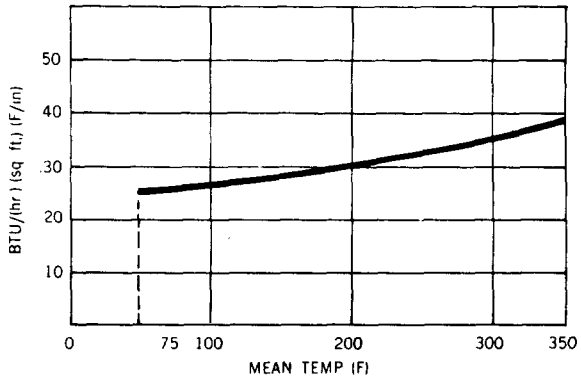
Jacket

permanence:
mildew resistant. Will not rot or shrink. Vermin and rodent proof.

burst strength:
exceptional glass-cloth strength exceeds that of canvas

Pre-sized **Glass-Cloth**	8 oz **Canvas**
300 psi	211 psi

thermal conductivity



fire hazard classification

Maximum Fire Hazard Classification for building materials and insulations as noncombustible has been established as follows:

	Acceptable
Flame Spread	25
Fuel Contributed	50
Smoke Developed	50

Fiberglas 25 H-P Insulation System, including fittings, is below the maximum allowable. This is your assurance that you can specify and use Fiberglas 25 H-P Pipe Insulation System without the danger of contributing to the spread of fire or that combustion will liberate excessive smoke. The system has been designed to meet the stringent fire safety requirements of the GSA and Corps of Engineers.

Underwriters Laboratories
(Pipe & Equipment Coverings R5583 40 U 8.15)

	Fiberglas 25 H-P Pipe Insulation System	
Flame Spread	20*	25**
Fuel Contributed	15	10
Smoke Developed	20	35

*Note: This rating is for the pipe insulation **plus** an unlimited number of fittings in a piping system when O-CF Fitting Mastic, Type H, is used.

Note: This rating is for the pipe insulation **plus fittings when the system is limited to 25% of fittings and BF 30-36 is used.

finish

The factory pre-sized white finish eliminates the necessity of sizing the jacket before painting and the neat white surface may be left unpainted if desired. Fitting finish is also compatible with the insulation jacket. If painting is required, Glidden acrylic latex paint (No. 5370) is approved for use.

application recommendations

Fiberglas 25 H-P Insulation System is installed on the pipe by stapling the longitudinal jacket flap securely with flare-door staples on 2" centers. End joints are closed by wrapping with factory-furnished pre-sized glass cloth tape stapled in place.

Fittings are insulated with Fiberglas molded or segmental Insulation and wrapped with Fiberglas Reinforcing Cloth, Type H. The wrapping is subsequently coated with O-C-F Fitting Mastic, Type H or Benjamin Foster 30-36.

federal specification compliance

Fiberglas 25 H-P Pipe Insulation System meets the requirements of Federal Specifications. HH-I-558a Form D; Type III, Class 12.
ASTM C547-67

recommend thickness

selection of an insulation thickness for any specific application should take into consideration the following important criteria: 1. Cost of insulation applied. 2. Cost of heat energy. 3. Cost of capital. 4. Cost of depreciation-plant and insulation. 5. Capital investment in heat production equipment. 6. Temperature differential. 7. Size of the pipe surface. 8. Conductivity of insulation.

The thicknesses shown in the table, below, are based on the optimum balance of these consideration for selecting an insulation thickness for performance and economy.

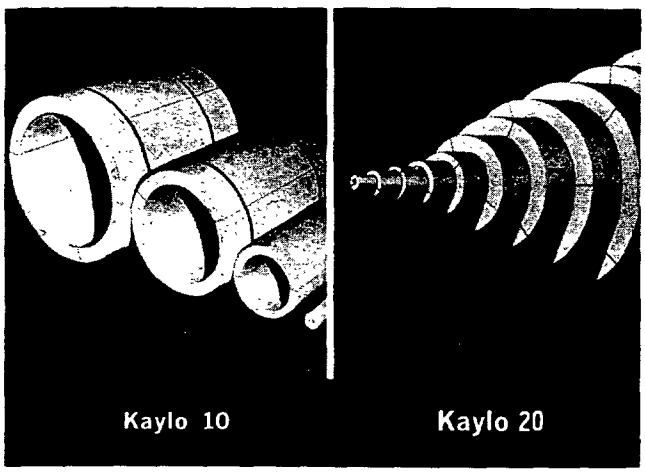
recommended thickness-heated piping to 450F (80F Ambient still air.)

Pipe Temp.		200			300			400			450	
Temp. Diff.		120			220			320			370	
IPS	RT	HL	ST	RT	HL	ST	RT	HL	ST	RT	HL	ST
½	½	19	105	½	34	125	1	39	115	1	47	123
¾	½	22	107	1	29	106	1	46	122	1	56	131
1	½	25	107	1	30	102	1	48	117	1	60	129
1¼	1	20	95	1	37	108	1	62	125	1	75	135
1½	1	21	93	1	39	106	1	63	121	1½	62	112
2	1	24	94	1	45	106	1	73	122	1½	70	113
2½	1	28	94	1½	50	101	1½	74	113	1½	88	121
3	1	32	94	1½	50	101	1½	76	110	1½	93	116
3½	1	30	95	1½	56	103	1½	94	111	1½	114	118
4	1	39	95	1½	57	101	1½	94	112	1½	114	118
4½	1	38	95	1½	72	104	1½	118	115	1½	148	121
5	1	50	95	1½	70	100	1½	114	115	1½	140	121
6	1	57	97	1½	85	101	1½	128	115	2	125	110
7	1	62	96	1½	90	100	1½	142	110	2	136	108
8	1	68	96	1½	100	101	2	125	107	2	154	111
9	1	80	97	1½	110	101	2	138	106	2	174	111
10	1½	59	91	1½	110	101	2	146	106	2	180	111
11	1½	64	91	1½	120	101	2	168	106	2	194	111
12	1½	80	96	1½	149	107	2	171	106	2	209	112
14	1½	92	92	1½	171	110	2	190	108	2½	199	107
16	1½	93	92	2	133	97	2½	181	103	2½	223	108
18	1½	101	92	2	148	97	2½	204	103	2½	248	108
20	1½	110	92	2	162	97	2½	222	103	2½	271	108
24	1½	131	93	2	194	98	2½	266	104	2½	320	109
30	2	132	92	2	257	98	2½	323	103	2½	361	105

RT—recommended thickness HL—heat loss, Btu/hr/lineal foot ST—surface temperature (F) HG—heat gain

Kaylo 10 & Kaylo 20 Pipe Insulations

Rigid hydrous calcium silicate pipe insulations for heated piping up to 1800 F.



uses

Kaylo 10 is recommended for use on heated piping operating up to 1200F and Kaylo 20 extends the temperature range to 1800F. 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.

description

Kaylo 10* & Kaylo 20* pipe insulations are rigid hydrous calcium silicate heat insulations for use on all heated piping up to 1800F—indoors and out. These products are precision molded in sections or segments from a chemically reacted material. A small amount of asbestos fiber is added to improve mechanical strength. Kaylo 10 is white. Kaylo 20 has a slight pinkish color to distinguish it from Kaylo 10.

benefits

lower operating costs — Kaylo Insulations have exceptional thermal efficiency. The low k factor of .40 at 200 mean temperature means lower operating cost, better temperature control for process operations.

rugged — 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 1800F and in sizes from ½" to 30" IPS can be met with Kaylo and Kaylo 20.

will not cause stress corrosion cracking — Kaylo 10 will not cause stress corrosion cracking of stainless steel because it contains an inhibitor, and has less than 75 ppm soluble chlorides.

unaffected by moisture — Kaylo can be completely saturated 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 neater appearance on fittings. Rigid manufacturing tolerances 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.

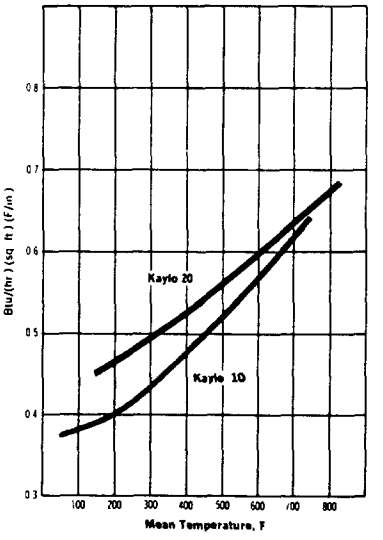
nesting sizes — Kaylo Pipe Insulations are manufactured to Simplified Dimensional Standards to permit nesting sizes for double layer applications.

†Kaylo is a registered trademark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corp.

Performance characteristics

	Kaylo 10	Kaylo 20
density (approx.)	11 lb. pcf.	12 lb. pcf.
modulus of rupture (ASTM C-446)	75 lbs./sq. in.	70 lbs./sq. in.
compression strength (ASTM C-165) at 5% deformation	115 psi	110 psi
resistance to abrasion (Conventional tumbling test-loss in weight before heating) (ASTM C-421)	after 10 minutes, 20% max.	
	after 20 minutes, 45% max.	
corrosion resistance	does not cause or accelerate corrosion of steel, aluminum, or stainless steel	
dimensional stability linear shrinkage after heating for 24 hours in a muffle (ASTM C-356)		
hardness (ASTM C-569)	.75	.70
% **length loss**	1.4 (at 1200F)	2.0 (at 1800F)

thermal conductivity



sizes

thickness — Kaylo Pipe Insulation is available in single or double layer thicknesses from 1" to 3" depending upon pipe size. Kaylo Tube Insulation is available in single layer thicknesses of 1" and 1½".

pipe sizes — Kaylo Pipe Insulation is available to fit nominal pipe sizes from ½" to 39" in diameter. Kaylo Tube Insulation will fit nominal copper tubing sizes from ⅜" to 3" in diameter.

forms — Kaylo Pipe Insulation is available in sectional or multisegmental form depending upon pipe size. All insulation is furnished in 3 ft. sections.

jackets

canvas — Standard canvas & 8 oz. canvas jacket are available for all types, sizes and thicknesses of Kaylo Pipe and Tube Insulation at an additional charge. These jackets are factory applied on Sectional Pipe and Tube Insulation. On Multisegmental forms, they are furnished but not adhered. Bands are available for use with this product at slight additional charge and will be furnished on request.

Kaylo Klad — Kaylo is also available with an embossed aluminum jacket .016" thick or .010" thick stainless steel jacket. These jackets provide greater resistance to mechanical damage and present a neat finished appearance to pipe lines. The longitudinal seam has a self-locking joint. Butt sealing strips with integral mastic and protective asbestos cover are furnished for sealing end joints.

specification compliance

HH-I-523c — Insulation Block and Pipe Covering Thermal (Calcium Silicate for Temperatures up to 1200F). Type II, Class A through F.

MIL-I-2781D (Int. Amend. 1) — Insulation Pipe Covering, Thermal: Grade I, Class b; Grade II, Class d; Grade III, Class e, Type I and II.

MIL-I-24244 (Ships)* — Insulation Materials, Thermal, with Special Corrosion and Chloride Requirements, Type 1A, 1C, 1D, 1E.

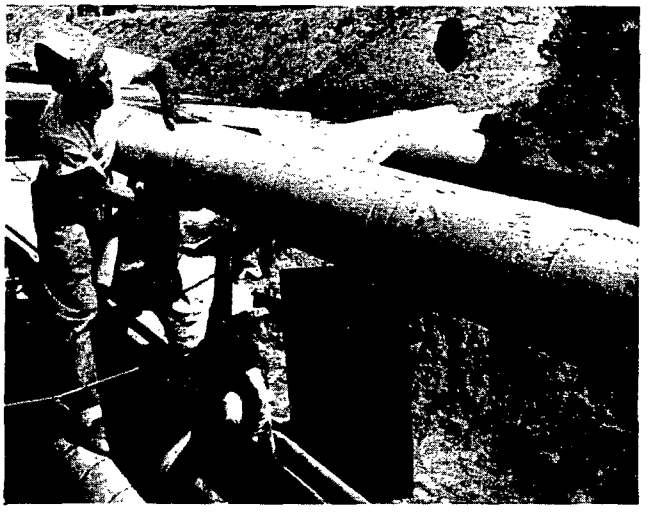
ASTM C533-67 *Kaylo 10 only

application recommendations

outdoor lines — Kaylo Pipe Insulations are mechanically fastened by wiring in place using 16 gauge wire on 9" centers and subsequently covered with a weatherproof jacket of metal or 45 lb. roofing felt. See Application Specifications for complete details.

indoor lines — Kaylo for indoor piping work is furnished with a factory-applied canvas jacket and held in place with bands or wire. The jacket has overlapping joint flaps that are smoothly pasted in place. Canvas should be sized to provide a base for painting.

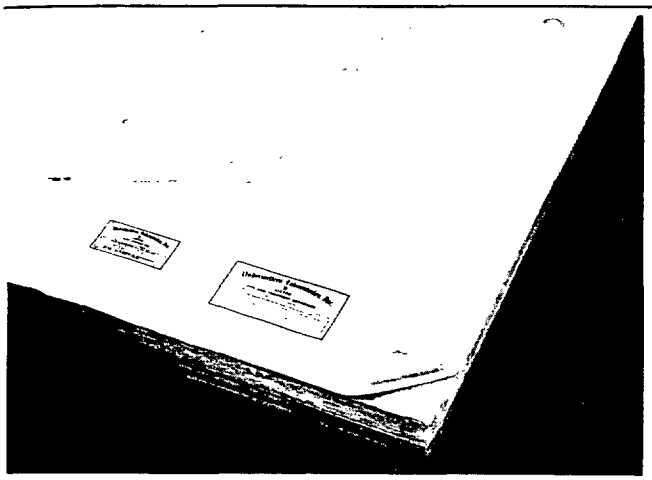
fittings — Fitting are insulated with mitered segments of Kaylo wired in place and finished with a ¼" layer of insulating cement. Flanges and valves are insulated with oversized pipe insulation. They are finished off with canvas pasted in place for indoor lines or reinforced waterproof mastic for outdoor lines.



For tables on economic thickness refer to Owens-Corning Fiberglas Corporation Pub. No. 1-IN-4350-B (page 5.3 in Mechanical Insulation Systems manual. Pub. No. 14-IN-2600-A)

Fiberglas 25 C-E Equipment Insulation System

A noncombustible rigid board insulation and vapor barrier system for cold and dual-temperature service ducts and equipment operating at temperatures down to 35 F.



uses

Recommended for use on all cold or dual-temperature service rectangular ducts and cooling equipment where the ultimate in noncombustibility is desired. Boards are impaled over welded pins and held in place with white fastener caps vapor sealed with mastic.

description

A Fiberglas 25* C-E Equipment Insulation System for cold temperature service consists of a rigid board of glass fibers faced with a noncombustible vapor barrier facing. The facing is a laminate of vapor tight aluminum foil and pre-sized glass cloth. Joints are sealed with a noncombustible vapor barrier pressure sensitive adhesive tape to form a complete vapor tight system.

benefits

fire safety—the only complete insulation system with UL rating on board, vapor barrier, joint tape, mastic and fastening device.

ready for painting—the pre-sized glass cloth facing, matching tape and fastener caps, do not require field sizing. They may be left unpainted if desired.

damage resistant—the tough finely woven glass cloth facing resists damage and the semi-rigid insulation board is resilient thereby absorbing impact and resisting damage.

lower operating cost—the uniform, factory controlled board thickness assures constant thermal efficiency performance.

no condensation drippage—the factory-applied glass cloth and foil vapor barrier and the taping system make the system vapor tight to resist vapor penetration.

*Fiberglas (Reg. U.S. Pat. Off.) and "25" are trademarks of Owens-Corning Fiberglas Corporation.

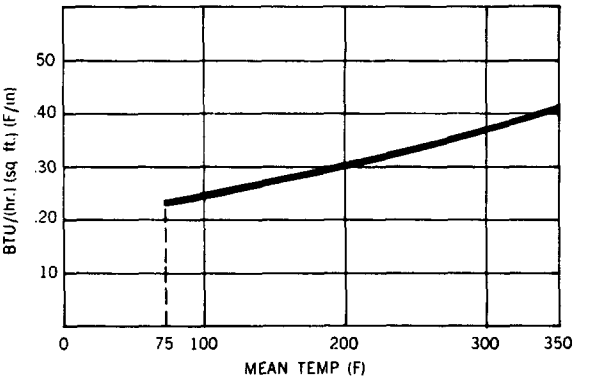
Performance characteristics

dimensional stability:
will not warp, shrink, rot or decompose
vermin and rodent resistant:
provides no sustenance
flame hazard classification:

Flame Spread	20
Flame Contributed	10
Smoke Developed	35

temperature limitations:
recommended for heated surfaces when temperatures do not exceed 450°F. or fall below 35°F.
vapor transmission rate:
.05 perms

thermal conductivity



sizes

Width 24", Length 48", Thickness 1", 1½", 2".

fire hazard classification

Maximum Fire Hazard Classification for buidling materials and insulation as noncombustible has been established as follows:

	Acceptable
Flame Spread	25
Fuel Contributed	50
Smoke Developed	50

Fiberglas 25 C-E Insulation System, including joint sealing treatment, is considerably below the maximum allowable. This is your assurance that you can specify and use this system without the danger of contributing to the spread of fire or that combustion will liberate excessive quantities of smoke. The system has been designed to meet the stringent fire safety requirements of GSA and Corps of Engineers.

Underwriters Laboratories
(Pipe & Equipment Coverings R5583 40 U 8.15)

	**Fiberglas 25 C-E Insulation Systems
Flame Spread	20
Fuel Contributed	10
Smoke Developed	35

**NOTE: This rating is for the composite product and includes the use of O-CF Type C Joint Sealing Tape for sealing joints.

specification compliance

Meets the stringent fire safety requirements of GSA and Corps of Engineers HH-I-558a, Form A, Class 1 & 2.

Meets NFPA 90 A Fire Hazard Classification.

application recommendations

The Fiberglas 25 C-E Insulation System is installed by impaling the insulation boards on welded pins spaced 3" in from each corner of the board with intermediate pins of no greater than 21" centers.

After boards are impaled, the welded pins are cut to extend ⅛" beyond the face of the board. A self-locking cap is pushed onto the pin after coating with OC Fitting Mastic (Type C) to provide a vapor seal.

All insulation edges and butt joints are to be sealed with O-CF Type C Joint Sealing Tape.Tape is a pressure sealing type requiring no separate adhesive. Pressurize tape by rubbing hard with a nylon sealing tool.

Ductwork els and other sharp radius bends require prescoring of the insulation board to conform to the curved surface.

If painting is required, no sizing is necessary; but, to maintain the noncombustibility of the system, only Glidden acrylic latex paint (No. 5370) is to be used.

thickness to prevent condensation

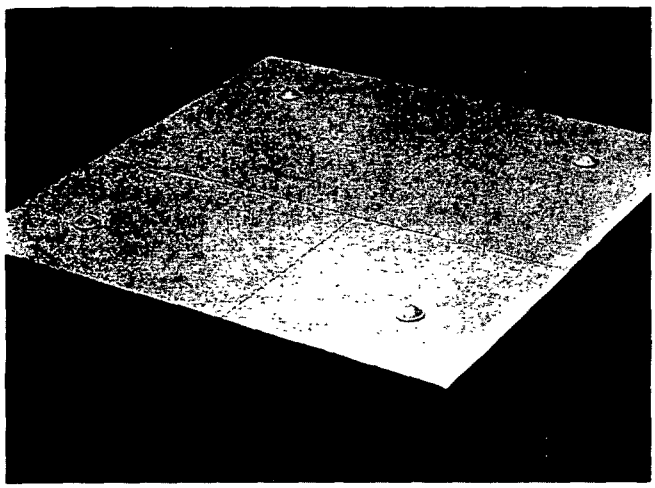
cold ducts and equipment

The following chart indicates the recommended thickness for installation on cold air ducts at various temperature differences (duct to air). Also shown are values for heat gain and approximate maximum relative humidity allowable.

Temperature Differences	Recommended Thickness (inches)	Heat Gain Btu/ft²-hr	Permissible Relative Humidity
20	¾	5.1	90%
25	¾	6.4	87%
30	1	6.1	89%
35	1	7.1	88%
40	1½	5.7	90%
45	1½	6.3	89%
50	2	5.4	90%

Fiberglas 25 H-E Equipment Insulation System

A non-combustible rigid board insulation system for hot service ducts and equipment operating at temperatures up to 450° F.



uses

Recommended for use on all hot mechanical equipment and ductwork operating up to 450°F, where the ultimate in noncombustibility is desired.

description

A Fiberglas 25* H-E Equipment Insulation System for heated surface service consists of a rigid insulation board of glass fibers faced with a noncombustible pre-sized Fiberglas cloth. Other components of the system include a noncombustible pressure sealing joint tape and pre-finished metal fastener caps attached to welded pin anchors.

benefits

fire safety—a complete insulation system with UL rating on board, facing, joint tape, fastening device.

ready for painting—the pre-sized white glass cloth facing, matching tape and fastener caps do not require field sizing prior to painting. If painting is required, use recommended paint.

damage resistant—the tough finely woven glass cloth facing resists damage and the rigid insulation board absorbs most impact blows without damage.

lower operating cost—the uniform, factory controlled board thickness assures constant thermal efficiency performance.

*Fiberglas (Reg. U.S. Pat. Off.) and "25" are trademarks of Owens-Corning Fiberglas Corporation.

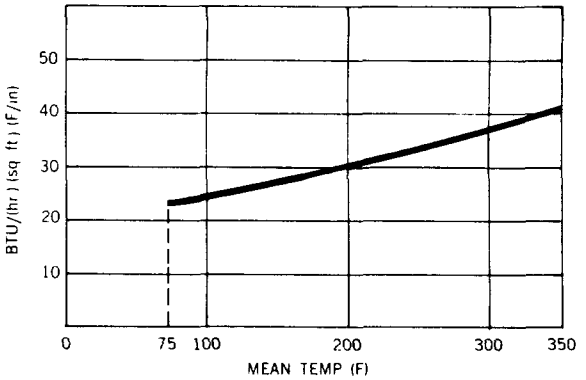
Performance characteristics

dimensional stability:
will not warp, shrink, rot or decompose
vermin and rodent resistant:
provides no sustenance
flame hazard classification:

Flame Spread	25
Flame Contributed	10
Smoke Developed	50

temperature limitations:
recommended for heated surfaces when temperatures do not exceed 450°F.
jacket burst strength:
300 psi

thermal conductivity:



sizes

Width 24", Length 48", Thickness 1", 1½", 2".

fire hazard classification

Maximum Fire Hazard classification for building materials and insulation as noncombustible has been established as follows:

	Acceptable
Flame Spread	25
Fuel Contributed	50
Smoke Developed	50

Fiberglas 25 H-E Insulation System, including fittings, performs below the maximum allowable. This is your assurance that you can specify and use this system without the danger of contributing to the spread of fire or that combustion will liberate excessive smoke. The system has been designed to meet the stringent fire safety requirements of GSA and Corps of Engineers.

Underwriters Laboratories
(Pipe & Equipment Coverings R5583 40 U 8.15)

	*Fiberglas 25 H-E Insulation System
Flame Spread	25
Fuel Contributed	10
Smoke Developed	50

*Note: This rating is for the composite product and includes the use of O-CF Type H Joint Sealing Tape if materials and application conform to those recommended.

specification compliance

meets the stringent fire safety requirements of GSA and Corps of Engineers HH-I-558a, Form A, Class 1 & 2.
ASTM C392-63
Meets NFPA 90A fire hazard requirements.

application recommendations

Fiberglas 25 H-E Equipment Insulation System is installed by impaling the insulation boards on welded pins spaced 3" in from each corner of the board with intermediate pins on no greater than 21" centers.

After boards are impaled, the welded pins are cut to extend ⅛" beyond the face of the board and a self-locking cap is pushed onto the pin.

All insulation raw edges and butt joints are to be sealed with O-CF Joint Sealing Tape, Type H. Tape is a pressure-sealing type requiring no separate adhesive. Pressurize tape by rubbing hard with a plastic sealing tool.

Ductwork els and other sharp radius bends require prescoring of the insulation board to conform to the curved surface.

If painting is required, no sizing is necessary; but to maintain the noncombustibility of the system, only Glidden acrylic latex paint (No. 5370) is approved for use.

recommended thickness—heated equipment

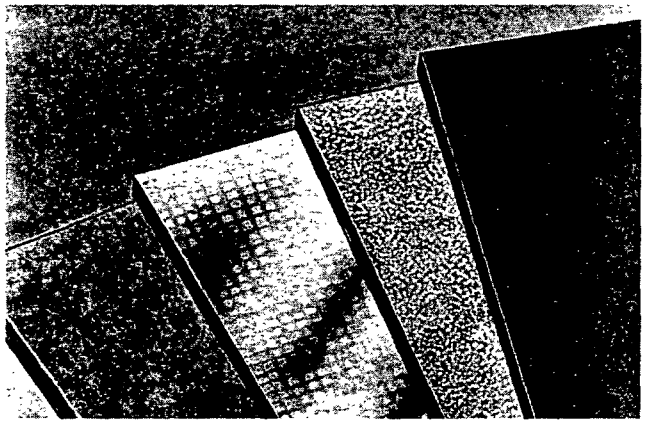
(80F ambient still air)

Operating temp.	RT	HL	ST
150F	1	15	89
250F	1½	29	98
350F	2	39	104
450F	2	61	117

RT — recommended economic thickness, inches.
HL — heat loss (Btu/ft²-hr.).
ST — surface temperature (F).

Industrial Insulation 700 Series

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



uses

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 minmum maintenance and construction abuse

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

description

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 consists of Type 700, 701, 702, 703, 704 and 705. Each type has specific thermal and physical characteristics which makes it suitable for the uses described. Type 703, 704 and 705 are available with a variety of factory-applied vapor-barrier facings to prevent condensation on cold surfaces and to provide a neat finished appearance. Fire Retardant 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 chillers, 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.

end-use 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 heavier density 703, 704 and 705 products provide neat square corners. The factory-applied facings present an attractive finished appearance.

fire safe — Fiberglas is inherently fire safe. The unfaced boards and the Aluminum Foil Faced 703, 704 and 705 have UL Flame Spread ratings of less than 25.

*Trademark Registered Owens-Corning Fiberglas Corporation

Performance characteristics

sound absorption coefficients (2" thick #6 mounting)

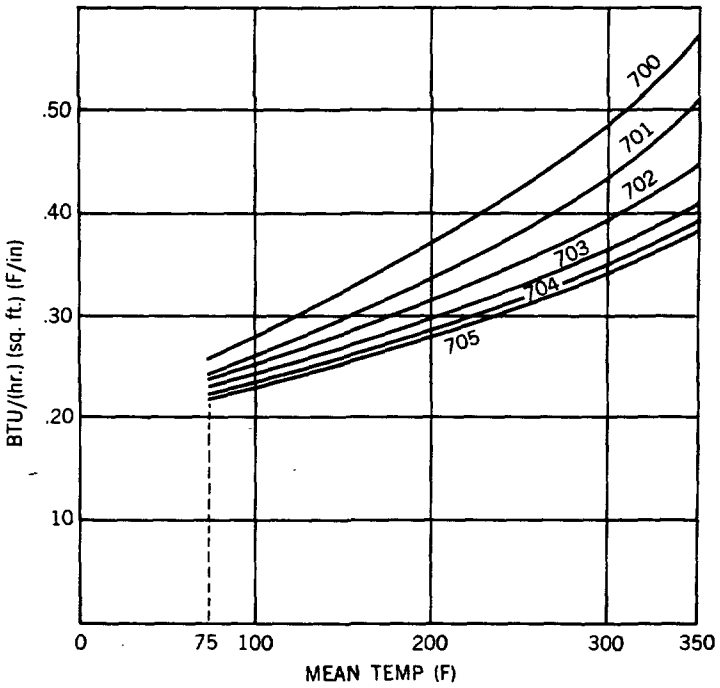
TYPE	125	250	500	1000	2000	4000	NRC
701	.34	.70	.96	.97	.86	.83	.87
702	.28	.77	.96	.98	.87	.87	.89
703	.32	.74	.97	.98	.87	.85	.89
704	.27	.79	.98	.99	.88	.86	.91
705	.48	.82	.97	.99	.90	.86	.92

size and density

Type	Density (pcf)	Thickness (in ½" increments)	Compressive Strength (psf at 10% deformation)	Standard Size	Therm. Cond. @ 75F Mean Temp.
700	1.08	1"—4"	3†		0.260
701	1.58	1"—4"	4.5†		0.242
702	2.25	1"—3"	9.5†	24" x 48"*	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 applications, boards up to 48" x 96" are available. †After compression packaged.

thermal conductivity



moisture absorption ..... less than 0.2% by volume

bacteria and fungus resistance ..... does not breed nor promote

odor ..... odorless

humidity and temperature effect ..... cycling conditions will not cause spalling or crumbling

corrosion ..... does not accelerate corrosion of copper, steel or aluminum.

facings

Type 703, 704 and 705 are also available with the following factory applied vapor barrier facings:

FF — .0025 aluminum foil (UL Rated)
FRK — Foil-reinforced kraft
SF — Duplex Laminated kraft
COATED — either clear or black

fire hazard classification

	unfaced (700, 701, 702)	unfaced (703, 704, 705)	foil-faced (703, 704, 705)
flame spread	10-20	15	15-20
fuel contributed	10-15	15	20-35
smoke developed	0-20	0	0

(compared to untreated Red Oak as 100)

application recommendations

Type 700, 701, 702 — Lightweight unfaced flexible insulations in board form for use on vessels having irregular surfaces where the exterior is supported by welded studs or stiffeners and not by the insulation itself. The products are self-supporting but are generally secured with mechanical fasteners and protected by sheet metal.

Type 703, 704, 705 — These board insulations are normally impaled on welded pins on flat surfaces. They are cut in segments and banded in place on irregular surfaces. Unfaced boards are normally finished with reinforced insulating cement or weatherproof mastic. Faced boards, with joints taped to provide a continuous vapor barrier, may be left unfinished or may be canvas jacketed.

recommended thickness — heated equipment

(80F ambient air)

Surface	Type 701			Type 703			Type 704		
Temp.	RT	HL	ST	RT	HL	ST	RT	HL	ST
150	1½	11	87	1½	10	86	1½	10	86
250	2	24	95	2	21	93	2	20	92
350	3	29	98	2½	31	99	2½	30	98
450	3½	40	105	3	40	105	3	39	104

RT — recommended economic thickness, inches.
HL — heat loss (Btu/ft²-hr.).
ST — surface temperature (F).

thickness to prevent condensation

cold ducts and equipment

The following chart indicates the recommended thickness of Type 703, 704, 705 Faced Duct Insulation for installation on cold air ducts at various temperature differences (duct to air). Also shown are values for heat gain and approximate maximum relative humidity allowable.

Temperature Differences	Recommended Thickness (inches)	Heat Gain Btu/ft²-hr	Permissible Relative Humidity
20	¾	5.1	90%
25	¾	6.4	87%
30	1	6.1	89%
35	1	7.1	88%
40	1½	5.7	90%
45	1½	6.3	89%
50	2	5.4	90%

specification compliance

HH-I-542, Type I	700
HH-I-542, Type II	701, 702, 703
HH-I-558a, Form A, Class 1.	702, 703**, 704, 705
HH-I-558a, Form A, Class 2.	703**, 704, 705
HH-I-558a, Form B, Type 1, Class 7.	700, 701, 702
HH-I-562, Type I, Class 2.	703**, 704, 705
HH-I-563, Type II, Class D. (500F***)	701, 702, 703
HH-I-564, Form I & II, Class A.	703**, 704, 705
Navy Bureau of Yards and Docks, 16Yf	703**, 704, 705
Corps of Engineers, C.E.—301.08, .11 thru .17	703**, 704, 705

**Type 703 G is specially produced for contracts where certification of compliance to the above Federal Specification is required. Available plain or faced for use on hot or cold equipment and for air conditioning ductwork.
***Waiver required on upper temperature limit.

limitations

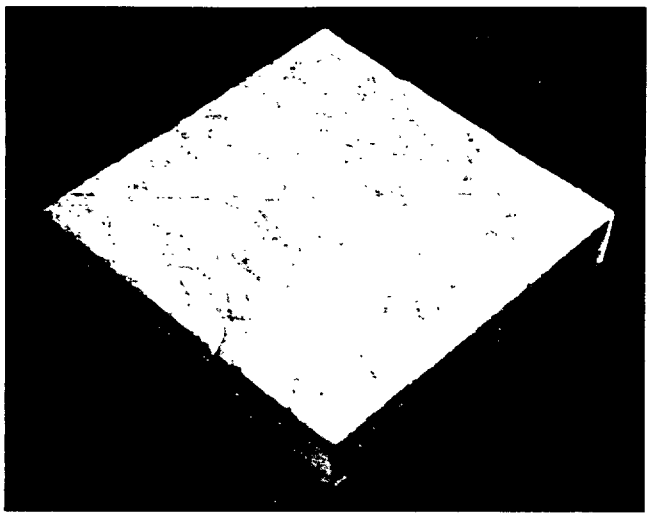
Industrial insulation 700 series, plain, should not be used on surfaces operating at temperatures above 450F. Types 703, 704, 705 faced products should not be used on surfaces operating at temperatures greater than 250F except that FF may be used at a maximum thickness of 2½ inches up to 450F.

caution

Owens-Corning Fiberglas Insulations are to be applied only with approved adhesives, mastics and mechanical fastening devices as published in Accessory Materials List, Pub. No. 4-IN-3430. Owens-Corning Fiberglas accepts no responsibility or liability for the performance of materials other than those listed unless approved in writing by O-CF Testing Laboratories.

Intermediate Service Board

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



uses

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.

description

Intermediate Service Insulation (I-S) is a lightweight insulation composed of Fiberglas fibers bonded together in semi-rigid, boardlike form with a special high temperature binder.

benefits

Lowers operating costs—Fiberglas Intermediate Service Board is an extremely efficient thermal insulation. A low k factor of .30 at 200 F mean temperature means lower fuel costs due to less heat loss—more comfortable working conditions in equipment rooms. This superior thermal efficiency is attained because of finer fiber construction and the complete absence of shot or unfiberized material. Heat flow tests on a 600 F power plant duct insulated partially with I-S insulation and with a 8 pcf mineral wool insulation showed that 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 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; cuts cleanly for good tight joints; conforms readily to irregularities and curved surfaces and returns to full thickness if compressed.

Continuous in-place performance—Fiberglas Intermediate Service Board will not slump or deteriorate in severe service conditions. The insulation easily passed the rugged Navy Test Mil-I-15475C (Ships), Paragraph 4.5.3 which requires vibration at 12 cps through an arc of .015″ for 100 hours at 750F, without setting.

*Trademark Registered Owens-Corning Fiberglas Corporation

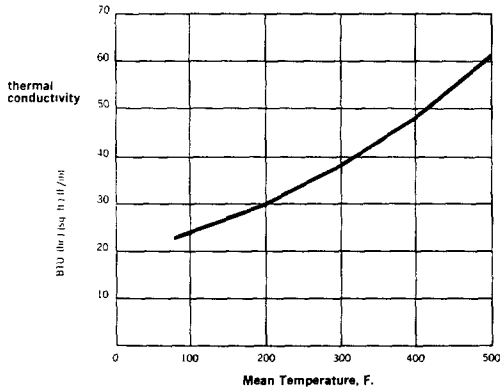
Performance characteristics

sizes: 2′ x 2′; 2′ x 4′; 4′ x 4′

thicknesses: 1 to 4″ in ½″ increments.

moisture absorption: less than 0.2% by weight

specific heat: 0.20 Btu/lb., F



heat transfer data

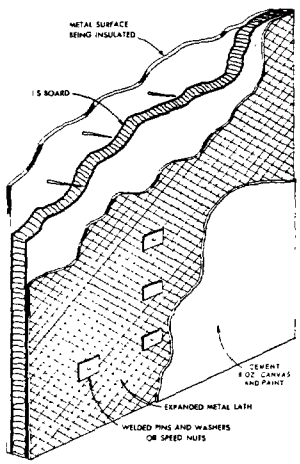
thickness in inches	operating temperature (ambient still air 80 F)																	
	450 F		500 F		550 F		600 F		650 F		700 F		750 F		800 F		850 F	
	heat loss	surf temp	heat loss	surf temp	heat loss	surf temp	heat loss	surf temp	heat loss	surf temp	heat loss	surf temp	heat loss	surf temp	heat loss	surf temp	heat loss	surf temp
2.0	61	117	73	125	88	133	103	143	121	154	140							
2.5	49	110	59	116	71	123	84	131	98	140	113	149	131	160	149			
3.0	41	105	50	110	59	116	70	123	82	130	95	138	110	147	125	156	143	
3.5	36	102	43	106	51	111	60	117	71	123	82	130	94	138	108	146	123	155
4.0	31	99	38	103	45	107	53	112	62	118	72	124	83	130	95	138	108	146
4.5	28	97	34	101	40	104	47	109	55	114	64	119	74	125	84	131	96	138
5.0	25	95	30	99	36	102	43	106	50	110	58	115	66	121	76	126	85	133
5.5	23	94	28	97	33	100	39	104	45	108	53	112	61	117	69	122	79	128
6.0	21	93	25	96	30	98	36	102	42	105	48	109	56	114	63	119	72	124

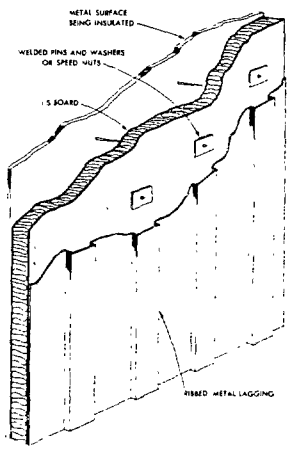
limitations

I-S Board must be applied flush against the hot surface with an exterior finish of sheet metal mesh (with or without a cement coating) whenever it is exposed to temperatures in excess of 350 F. There will be no rapid decomposition of the product after inserting a 1300F probe into the insulation for 20 minutes with the hot surface at 850F 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 pins or studs and finishing with sheet metal; or metal mesh and insulating cement, canvassed and painted. Pins with speed washers, or studs and nuts are installed on a maximum spacing of 18″ and not farther than 6″ from the edge of the insulation. The insulation is normally impaled over the pins or studs and the enclosing sheet metal or metal mesh is secured to the same fasteners. Joints of the sheet metal finish are offset from the joints of the insulation. Double-layer application is recommended for temperature over 600 F.





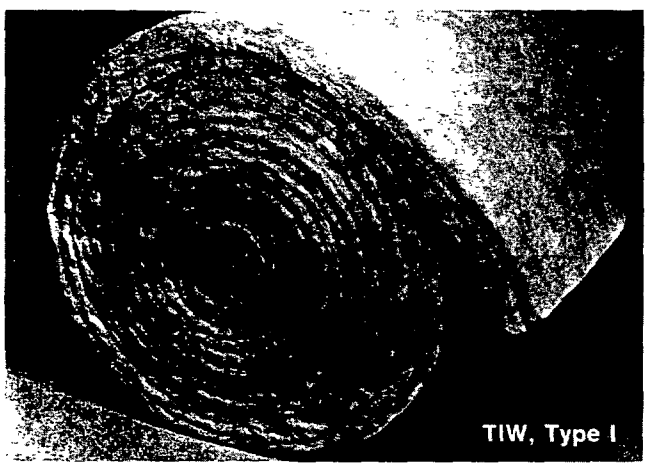
federal specification compliance

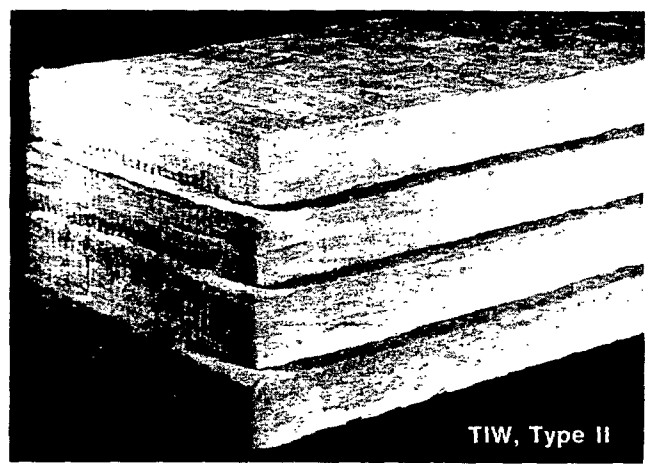
MIL-I-15475C (Ships) (except for fusing temperature)

HH-I-558a Insulation, Blocks, Boards, Blankets, Felts, Sleeving (Pipe and Tube Covering) and Pipe Fitting Covering, Thermal (Mineral Fiber, Industrial Type), Form A, Class 3 (waiver needed on compression strength).

Thermal Insulating Wool (TIW) Types I & II

Resilient, lightweight, inorganic insulation for applications up to 1000 F.


TIW, Type I


TIW, Type II

uses

TIW, Type I is used in applications requiring a lightweight insulation such as in panel systems, flexible wrap, industrial ovens, or surfaces having irregularities. It's low compressive strength does not make it suitable for use as a base wool for metal mesh blankets.

TIW, Type II is especially suitable for use in metal mesh blankets, and for use on boilers, vessels and many other types of industrial equipment operating at temperatures up to 1000 F. It may also be used in panel systems for precipitators ducts and breechings where more compressive strength than Type I is needed.

description

TIW, Type I and II are off-white to light tan, non-combustible wool with long, resilient, inorganic glass fibers bonded with a thermosetting resin. TIW, Type I is available in batts or rolls, while TIW, Type II comes in batts only.

benefits

Lowers Operating Costs — the low K factor of Fiberglas* Thermal Insulating Wool can substantially lower fuel costs by reducing heat loss, and helps develop more comfortable working conditions in equipment rooms.

Lowers Installation Costs — larger blankets cover greater areas reducing installation cost. No tedious block-by-block hand lay-up. No drilling for studs. Type II blankets are easily impaled over welded studs or pins with speed washers or may be held in place with wire ties, metal lath or lagging.

Dimensionally Stable — will not shrink, rot or slump.

Non-Corrosive — inorganic fibers of Fiberglas TIW Type I and II, will not cause or accelerate corrosion of any metal. It cannot cause stress corrosion cracking of stainless steel.

Moisture Resistance — Fiberglas TIW Type I and II do not absorb moisture. If the insulation becomes wet, it dries out rapidly when exposed to dry air, and without any residual loss of integrity or thermal efficiency.

Fire Safe — glass fibers will not burn or support combustion.

*Trademark Registered Owens-Corning Fiberglas Corporation

Performance characteristics

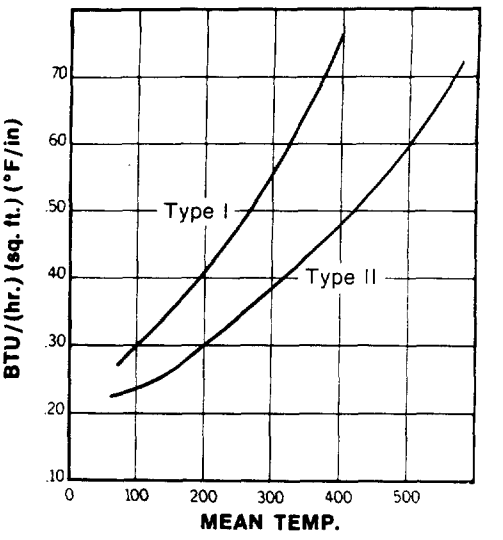
	Type I	Type II
Moisture absorption % by volume	0.1% or less	0.2% or less
Temperature limit	1000 F	1000 F
Bacteria and fungus resistance	Does not breed or promote	
Odor	Essentially odorless	

Specification compliance:

TIW, Type I — HH-1-558a Form B — Blankets and Felts, Flexible Type I, Class 8

TIW, Type II — HH-I-558a Form B — Blankets and Felts, Flexible Type I, Class 8
Mil-1-2818 B — Insulation Blanket, Thermal Fibrous Material (Requires waiver on ignition loss)

Thermal Conductivity



Sizes

TIW, Type I

Standard Roll Sizes
Width — 24″ or 36″
Thickness 1″ 2″ 3″ 4″
Lengths 76′ 76′ 52′ 38′
Note: MTO thicknesses are available in ¼″ increments
MTO widths are available 12″, 18″, 24″ and 72″

TIW, Type II

Standard Batt Size
24″ x 48″
24″ x 96″
Made-to-Order
Width — 10″ (min) to 38″
Length — 10″ (min) to 117″
Thickness — 1″-3″ (½″ increments)

Recommended Thicknesses

Recommended thickness, heat loss, efficiency and surface temperature data are provided for the various Commercial, Power and Process Industries so that the design engineer can better select the thickness required for his specific job conditions. On outdoor work increase recommended thickness at least ½ inch to compensate for wind conditions.

TIW, Type I

Operating Temperature	(Ambient Air 80F) RT	HL	ST
500	4	55	114
600	5	64	119
700	6	75	126
800	7	90	135
900	8	106	145
1000	8.5	131	160

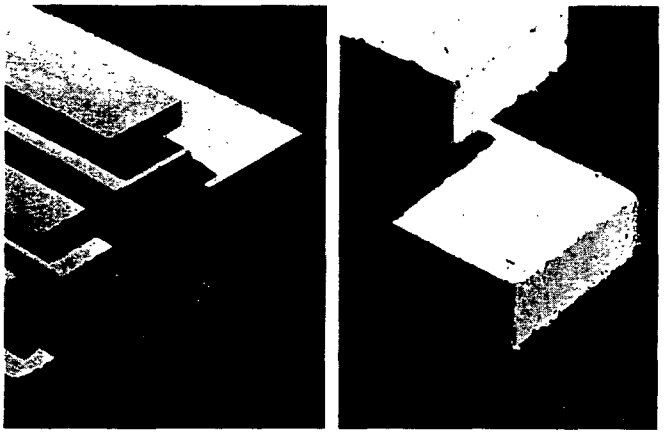
RT — recommended thickness (inches)
HL — heat loss (Btu/hr/sq. ft.)
ST — surface temperature (degrees F)

TIW, Type II

Operating Temperature	(Ambient Air 80F) COMMERCIAL			POWER			PROCESS		
	RT	HL	ST	RT	HL	ST	RT	HL	ST
200	.75	35	102	1.5	21	91	1.0	26	93
300	1.5	38	103	2.0	30	95	1.5	37	99
400	2.5	38	103	2.5	39	100	2.0	47	104
500				3.0	47	104	2.5	58	109
600				3.5	56	108	3.0	68	114
700				4.0	64	112	3.5	79	120
800				5.0	74	117	4.0	90	125
900				5.5	83	122	4.5	101	131
1000				6.0	94	127	5.0	114	137

Kaylo 10 & Kaylo 20 Block Insulation

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



uses

Kaylo 10* Block is for use on indoor or outdoor equipment operating at temperatures up to 1200F. Kaylo block is ideally suited for use on stainless steel vessels and equipment as it helps inhibit stress corrosion cracking. Typical applications are for boilers, breeching, tanks, vessels. Kaylo 10 Block is white in color.

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

description

Kaylo 10 and Kaylo 20 Block Insulations are rigid hydrous 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 10.

benefits

high thermal efficiency—both Kaylo 10 and Kaylo 20 offer excellent thermal efficiency coupled with high strength. A low k of .40 for Kaylo 10 and .52 for Kaylo 20 at 200F 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 10 will not cause stress corrosion cracking of stainless steel because Kaylo 10 contains less than 75 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.

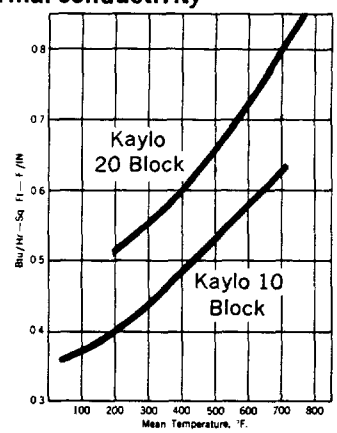
fabricates easily—ordinary insulators tools are all that is required to fabricate Kaylo. It cuts with a clean true edge for tighter fit at the joints. Fittings are neater, faster.

*Trademark Registered Owens-Corning Fiberglas Corporation

Performance characteristics

	KAYLO 10	KAYLO 20
density:	11 pcf approx.	12 pcf. approx.
flexural strength: (ASTM C-203)	60 psi average	65 lb./sq. in.
compressive strength: (ASTM C-165) at 5% deformation	115 psi	110 psi
resistance to abrasion: (ASTM C-421)	after 10 minutes, 20% max. after 20 minutes, 45% max.	
dimensional stability: (ASTM C-356)	linear shrinkage after heating for 24 hours in muffle at 1200F.—1.4% (Kaylo 10) for 24 hours in muffle at 1800F.—2.0% (Kaylo 20)	
hardness: (ASTM C-569	.60	.70

thermal conductivity



economic thickness*

Selection of insulation thicknesses for any specific application should take into consideration the following important criteria. 1. Cost of insulation applied. 2. Cost of heat energy. 3. Cost of capital. 4. Cost of depreciation—plant and insulation. 5. Capital investment in heat production equipment. 6. Temperature differential. 7. Size of the pipe or surface. 8. Conductivity of insulation.

**From "How to Determine Economic Thickness of Insulation"— National Insulation Manufacturers Association.*

economic thickness— Kaylo 10 block to 1200 F—ambient still air 80 F

ET—economic thickness HL—heat loss
ST—surface temperature Btu/hr/lin/foot

THICK	200 F		300 F		400 F		500 F		600 F		700 F		800 F		900 F		1000 F		1100 F		1200 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.	HEAT LOSS	SURF. TEMP.	HEAT LOSS	SURF. TEMP.	HEAT LOSS	SURF. TEMP.
1.000	38	103	72	124	109	147																
1.500	27	96	51	111	78	127	107	145														
2.000	21	93	40	104	60	117	83	130	107	145												
2.500	17	90	33	100	49	110	68	121	87	133	109	146										
3.000	14	89	28	97	42	105	57	115	74	125	92	136	112	148								
3.500	13	88	24	95	36	102	49	110	64	119	80	129	97	139	116	150						
4.000	11	87	21	93	32	99	44	107	56	114	70	123	85	132	102	142	120	153				
4.500	10	86	19	91	28	97	39	104	50	111	63	118	76	127	91	136	107	145	125	156		
5.000	9	85	17	90	26	96	35	101	46	108	57	115	69	122	82	130	97	139	113	149	130	159
5.500	8	85	16	89	23	94	32	100	42	105	52	112	63	118	75	126	88	134	103	143	118	152
6.000	7	85	14	89	22	93	30	98	38	103	48	109	58	115	69	122	81	130	94	138	109	146

*calculated

Kaylo 20 Block to 1800 F—ambient still air 80 F

Operating Temp. F	Power ET	Power HL	Power ST	Process ET	Process HL	Process ST
1300	7½	111	136	6	135	148
1400	8	117	139	6½	143	152
1500	8	123	142	7	151	155
1600	8½	129	145	7	158	159
1700	9	135	148	7½	165	163
1800	9½	141	151	7½	172	166

specification compliance

HH-1-523c Insulation Block, Pipe Covering, Thermal, (Calcium Silicate for temperatures up to 1200°F). Type 1.

MIL-1-2819E Insulation Block, Thermal. Class 1, 2, and 3. ASTM C533-67.

MIL-1-24244 (ships) Insulating Materials, Thermal, with Special Corrosion and Chloride Requirements (Kaylo 10 only), Type 3A, 3B.

sizes

thickness—1", 1½", 2", 2½", 3", 3½" and 4"
width—3", 6", 12" and 18"
length—18" to 36"
form—Block

beveled lags

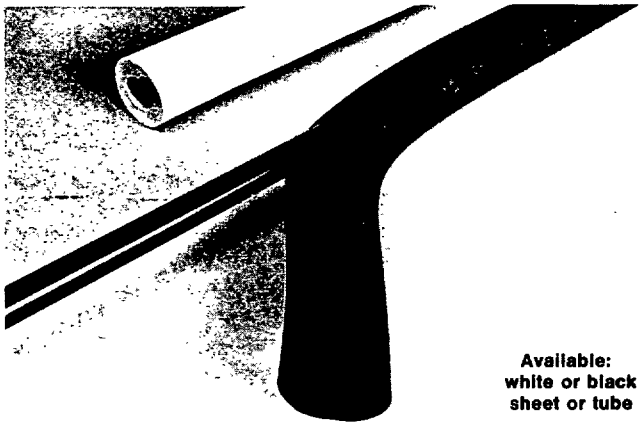
For pipe sizes greater than those for which Kaylo 10 and Kaylo 20 Pipe Insulation sizes are available, Kaylo 10 and Kaylo 20 beveled lags may be used to insulate piping. Lags beveled to fit pipes from 18" to 72" in diameter are available in thickness of 1½," 2", 2½", 3". Lags are 36" long and 3" wide.

application recommendations

Kaylo 10 & 20 Block Insulations are held in place by mechanically fastening with bands, welded rods or studs. The insulation may be finished with a trowel coat of insulating cement, canvassed and painted. Outdoor installations require weatherproofing with mastic or metal jacketing.

O-C Flexible Tubing and Sheet Insulation "Standard"

A flexible foamed plastic insulation for hot or cold copper tubing and iron pipe operating at temperatures from -50° to 220° F.



Available: white or black sheet or tube

uses

O-C Flexible Tubing is recommended for use on cooling and heating water lines, chilled drinking water and refrigerent suction lines. The flexible feature of this resilient insulation allows it to conform to gradual bends. Available unslit to slide over tubing or pipes before they are installed, or, slit to apply over piping already in place.

description

O-C Flexible Tubing Insulation is made from an expanded elastomeric plastic blend. Millions of tiny cells, each filled with an inert gas, make this product an extremely efficient insulator. It is resilient and soft, returning to full thickness after being compressed. The inside surface is powdered to make it easy to slip over the pipe or tubing.

benefits

Efficient—a low thermal conductivity of 0.26 at 70° mean temperature assures minimum heat loss or gain—maximum performance of equipment.

Built-In Vapor Barrier—the closed cell structure eliminates the need for a separate vapor barrier and protects against moisture condensation on cold lines.

Uniform Thickness—strict quality control assures constant diameters and thicknesses, providing a snug fit on the pipe, and smooth butt joints.

Fast Application—available in two forms, slit and unslit. Means faster application. No banding required. The unslit material slips over gradual bends with ease.

Broad Uses—temperature range from —50° to 220°F makes possible insulation of most lines commonly used in commercial heating and air conditioning.

Flexible and Resilient—designed for exceptional ease of handling. It is so flexible it can be tied in knots—so resilient it springs back to original shape when untied. Resists mechanical abuse. Softer for winter flexibility and ease of application.

Performance characteristics

density, lbs./cu.ft. (avg.).....6.0

thermal conductivity (Btu-in/sq.ft.-hr°F)

70°F mean temperature.....0.27

90°F mean temperature.....0.28

water absorption, % by volume (ASTM D1056).....0.5

water vapor transmission, perm-in.....less than 0.05

maximum temperature limit continuous use F.....—50° to 220°

fire rating per ASTM D-635...Self extinguishing

ozone resistance.....Good

odor.....Extremely low level

Recommended Thicknesses

	DESIGN CONDITIONS*	PIPE SIZE	O-C Flexible Tubing Thickness for Line Temperature		
			50 F	32 F	0 F
MILD	(Prevention of condensation on indoor piping under a maximum severity of 80 F and 50% R.H. Typical of these conditions: most air conditioned spaces and arid climates.)	3/8" thru 2" IPS	Nom. 3/8"	Nom. 3/8"	Nom. 1/2"
		Over 2" IPS thru 4" IPS	Nom. 1/2"	Nom. 1/2"	Nom. 1/2"
NORMAL	(Prevention of condensation on indoor piping under a maximum severity of 85 F and 70% R.H. Research and field experience suggest indoor conditions anywhere in the U.S. seldom exceed this degree of severity.)	3/8" ID thru 2" IPS	Nom. 3/8"	Nom. 1/2"	Nom. 3/4"
		Over 2" IPS thru 4" IPS	Nom. 1/2"	Nom. 1/2"	Nom. 3/4"
SEVERE	(Prevention of condensation on indoor piping under a maximum severity of 90 F and 80% R.H. Typical of these conditions: indoor areas where excessive moisture is introduced, or poorly ventilated confined areas where the temperature may be depressed below ambient.)	3/8" ID thru 4" IPS	Nom. 3/4"	Nom. 3/4"	Available on Request

* Consideration for condensation only. Heat gain of coolant not considered because O-C Flexible Tubing Insulation is used primarily on short run-outs.

flexible tubing sizes

Iron pipe sizes (IPS) 1/4" to 6"
copper tubing (CT) 3/8" O.D.—4 1/8" O.D.
Wall thickness—inches (nominal) 3/16", 3/8", 1/2", 3/4"
Inside Diameters—inches 3/8" to 6"
Length of Sections
Standard Carton — 6 Feet
Made to order — 100' to 700' depending on size

flexible sheet sizes

Standard size—24" x 72" and 30" x 72" (depending on thickness)
Sheet thickness—1/8"", 3/16", 1/4", 3/8", 1/2", 3/4", 1"
continuous rolls—1/8" x 30" x 150', 3/8" x 30" x 74'
3/16" x 30" x 150', 1/2" x 30" x 54'
1/4" x 30" x 120', 1/2" x 24" x 55'
1/2" x 24" x 40'

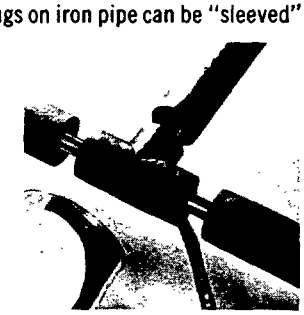
specification compliance

HH-I-573b
MIL-P-15280-E
(GSA-F55)

application

Insulation can be slipped over pipe or tubing before installation or snapped over piping already connected. All joints are sealed with O-C 500 adhesive. Paint both edges of slit as porous surfaces of tubing require it for firm bond. This tenacious adhesive forms a strong resilient bond which grows stronger with age. It is water and oil resistant.

Flexible tubing insulation can be slipped right over copper tube fittings. Cast bronze fittings or fittings on iron pipe can be "sleeved" with a larger diameter of insulation nested over the covering on the pipe and adhered with O-C 500 adhesive. O-C Flexible Tubing Insulation should be protected from the weather on lines running outdoors with: Benjamin Foster's BF 57-68; Insul-coustic VIAC 550 or Aklyd-Chlorinated Rubber Paint or Inmont 762 protective coating.



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