
ADDISON SMITH

Mechanical Contractor, Inc.

HPPG 89ki EXPANSION PROJECT

Mechanical Insulation Submittal Data

Spec 15250/15252

C & M Insulation Contractors Inc.

Submittal Data

HPPG Quality & Die Casting Expansion

Concealed Unlined Supply, Return, and Outside Air Duct: 1 inch 1 lb FSK blanket

Exposed Rectangular Unlined Supply, Return, Compressor, and Outside Air Ducts: 1 inch 6 lb board

Exposed Round Unlined Supply, Return, Compressor, and Outside Air Ducts: 1 ½ inch ¾ lb PSK Blanket

Chilled Water: 2 Inch Fiberglass with PVC 90's

Outdoor Cooling Water: 1 inch Fiberglass with .016 Aluminum Jacket

Condensate Drains ½ inch Fiberglass with PVC 90's

Industrial Water and Domestic Water: ½ inch Fiberglass with PVC 90's

Domestic Hot Water: 1 inch Fiberglass with PVC 90's

Horizontal Storm Water ½ inch Fiberglass with PVC 90's

MANSON INSULATION

KEEPING IT SIMPLE.™

ALLEY WRAP®

Glass Mineral Wool Blanket Insulation
Temperature Limit: UNFACED: 350°F (177°C) | FACED: 250°C (121°C)



ALLEY WRAP® glass mineral wool blanket insulation is a thermal and acoustical insulation product made from highly resilient, inorganic glass fibers bonded by a thermosetting resin. It is available unfaced or with a multi-purpose foil-scrim kraft (FSK) jacket and with a white metalized polypropylene scrim-kraft (PSK) jacket. Vapor retarders have a 2" (51mm) stapling flange on one edge, and the factory-applied facing assures uniform quality.

USES

Manson ALLEY WRAP® is used as an external insulation on commercial or residential heating or air conditioning ducts. It is suitable for the exterior of rectangular or round sheet metal ducts and spaces, or surfaces where temperature and condensation must be controlled.

AVAILABILITY

Manufactured dimensions are listed in the Manson Insulation product catalog.

PRODUCT FEATURES

Surface Burning Characteristics

- UL/ULC Classified FCH 25/50 (FSK, unfaced).
- Unfaced and FSK wrap have a Flame Spread 25 and Smoke Developed 50 when tested in accordance with ASTM E 84, CAN/ULC S102-M88, NFPA 255 and UL 723. PSK wrap has a Flame Spread 25 and Smoke Developed 50 when tested in accordance with ASTM E 84

Temperature Range (ASTM C 411)

- Faced, can be used on ducts operating up to 250°F (121°C).
- Unfaced, up to 350°F (177°C).

Water Vapor Permeance (ASTM E 96, Procedure A)

- FSK and white PSK facings have maximum water vapor permeance of .02 perms.

Water Vapor Sorption (ASTM C 1104)

- Less than 5% by weight when tested for 96 hours at 120°F (49°C) and 95% relative humidity.

Corrosiveness (ASTM C 665)

- Will not accelerate corrosion of a steel panel compared to sterile cotton.

Mold Growth (ASTM C 1338)

- No growth.

Puncture Resistance (TAPPI Test T803) (Beach Units)

- FSK and PSK: 25

SPECIFICATION COMPLIANCE

Canada

- CAN/ULC S102-M88
- CAN/CGSB 51.5m; Type II (FSK facing)
- CAN/CGSB 51. 11-92

USA

- ASTM C 553; Type I, II, III
- ASTM C 1136; Type II
- ASTM C 1290

GREENGARD Environmental Institute™

Gold Certified for superior indoor air quality (IAQ) performance.

California Title 24 (installed at 25% compression)
HH-I-558C; Form B, Type I, Class 7
NFPA 90A and 90B
NRC Reg. Guide 1.36

City of New York MEA 323-83-M

CONTRACTOR:

JOB NAME:

DATE:

MANSON
INSULATION
KEEPING IT SIMPLE.™

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ALLEY WRAP®

Glass Mineral Wool Blanket Insulation

Temperature Limit: UNFACED: 350°F (177°C) |

FACED: 250°C (121°C)



ACOUSTICAL PERFORMANCE	INSERTION LOSS										
	(Reduction of Sound Transmitted Through Duct Wrap) (Sound and Vibration Design and Analysis, National Environmental Balancing Bureau, 1944)										
	DUCT WRAP				INSERTION LOSS, dB						
	DUCT DIMENSIONS	SHEET METAL	NOMINAL THICKNESS	NOMINAL DENSITY	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	400Hz
12" X 12" (305mm x 305mm)	24 GA	1.5" (38mm)	0.75PCF (12kg/m³)	0.6	0.6	0.6	0.7	7.4	14.2	20.9	
24" X 12" (610mm x 305mm)	24 GA	1.5" (38mm)	0.75PCF (12kg/m³)	0.6	0.6	0.6	0.7	7.4	14.2	20.9	
48" X 12" (1219mm x 305mm)	22 GA	1.5" (38mm)	0.75PCF (12kg/m³)	0.6	0.5	0.5	0.6	7.4	14.1	20.9	
24" X 24" (610mm x 610mm)	22 GA	1.5" (38mm)	0.75PCF (12kg/m³)	0.6	0.5	0.5	0.6	7.4	14.1	20.9	
24" X 12" (610mm x 305mm)	26 GA	1.5" (38mm)	0.75PCF (12kg/m³)	0.8	0.8	0.8	0.8	7.5	14.2	21.0	
24" X 8" (610mm x 203mm)	26 GA	2" (51mm)	0.75PCF (12kg/m³)	1.0	1.0	1.0	3.6	10.4	17.1	23.9	

ACOUSTICAL PERFORMANCE (ASTM C177)	THERMAL EFFICIENCY						
	MEAN TEMPERATURE	0.75 PCF (12Kg/m³)		1.0 PCF (16Kg/m³)		1.5 PCF (24Kg/m³)	
		k	k (SI)	k	k (SI)	k	k (SI)
12" X 12" (305mm x 305mm)	24 GA	1.5" (38mm)	0.75PCF (12kg/m³)	0.6	0.6	0.6	
24" X 12" (610mm x 305mm)	24 GA	1.5" (38mm)	0.75PCF (12kg/m³)	0.6	0.6	0.6	
48" X 12" (1219mm x 305mm)	22 GA	1.5" (38mm)	0.75PCF (12kg/m³)	0.6	0.5	0.5	
24" X 24" (610mm x 610mm)	22 GA	1.5" (38mm)	0.75PCF (12kg/m³)	0.6	0.5	0.5	
24" X 12" (610mm x 305mm)	26 GA	1.5" (38mm)	0.75PCF (12kg/m³)	0.8	0.8	0.8	
24" X 8" (610mm x 203mm)	26 GA	2" (51mm)	0.75PCF (12kg/m³)	1.0	1.0	1.0	

FSK FOILED FACED	DENSITY	THICKNESS	WIDTH	LENGTH	R-VALUE	R-VALUE (INSTALLED)
	0.75PCF (12kg/m³)	1 1/2"	48"	100'	R 5.1	R 4.2
		2"		75'	R 6.8	R 5.6
		2 3/16"		75'	R 7.4	R 6.0
		2 1/2"		75'	R 8.5	R 7.0
		3"		50'	R 10.2	R 8.4
	1.0PCF (16kg/m³)	1 1/2"		100'	R 5.6	R 4.5
		2"		75'	R 7.4	R 6.0
	1.5PCF (24kg/m³)	1 1/2"		75'	R 6.1	R 4.8
		2"		50'	R 8.2	R 6.4

GLASS MINERAL WOOL AND MOLD

Glass mineral wool insulation will not sustain mold growth. However, mold can grow on almost any material when it becomes wet and contaminated with organic materials.

Carefully inspect any insulation that has been exposed to water. If it shows any sign of mold, it must be discarded. If the material is wet but shows no evidence of mold, it should be dried rapidly and thoroughly. If it shows signs of facing degradation from wetting, it should be replaced.

Air handling insulation used in the air stream must be discarded if exposed to water.

Application & Specification Guidelines

Storage

- Protect stored insulation from water damage, construction damage and other abuse.
- If stored outside, proper protection from weather conditions should be provided.

Preparation

- Install Manson Insulation Alley Wrap® over clean, dry sheet metal ducts.
- All sheet metal joints and seams must be sealed to prevent air leakage from the duct.



ALLEY WRAP®

Glass Mineral Wool Blanket Insulation

Temperature Limit: UNFACED: 350°F (177°C) |

FACED: 250°C (121°C)

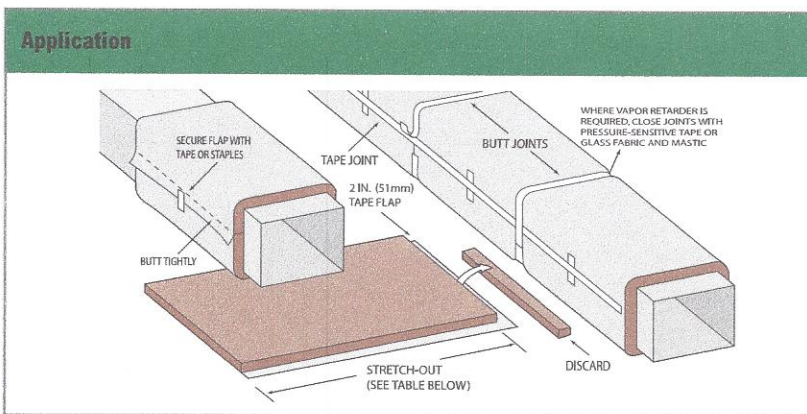


Application

- Install Manson Insulation Alley Wrap® with facing to the outside to obtain specified R-value using a maximum of 25% compression.
- Butt all insulation joints firmly together. Longitudinal seam of the vapor retarder must be overlapped a minimum of 2" (51 mm). A 2" (51 mm) tab is provided for the circumferential seam and must be overlapped.
- Where vapor retarder performance is necessary, all penetrations, joints, seams and damage to the facing should be sealed with an FSK, PSK or foil tape or glass fabric and mastic prior to system startup.
- Pressure sensitive tapes should be a minimum 3" (76 mm) wide and be applied with moving pressure using an appropriate sealing tool. Staples should be outward clinch and placed approximately 6" (152 mm) on center.
- Closure systems should have a 25/50 F.H.C. per UL 723.
- For rectangular ducts over 24" (610 mm) wide, secure the insulation to the bottom side of the duct with mechanical fasteners spaced on 18" (457 mm) centers to reduce sag. Care should be taken to avoid overcompressing the insulation with the retaining washer.
- It is neither necessary nor desirable to adhere Alley Wrap® to duct surfaces with adhesive.
- Unfaced Alley Wrap® should be overlapped with a minimum of 2" (51 mm) and fastened with 4" (102 mm) to 6" (152 mm) nails or skewers placed 4" (102 mm) apart, or secured with a wire or banding system. Care must be taken to avoid damaging the Alley Wrap®. Refer to diagram for staple stitching and butt-joint method.

Installation Procedures

- Use the table (below) to determine stretch-outs required for the nominal thickness of insulation to limit average compression of the insulation 25% or less.

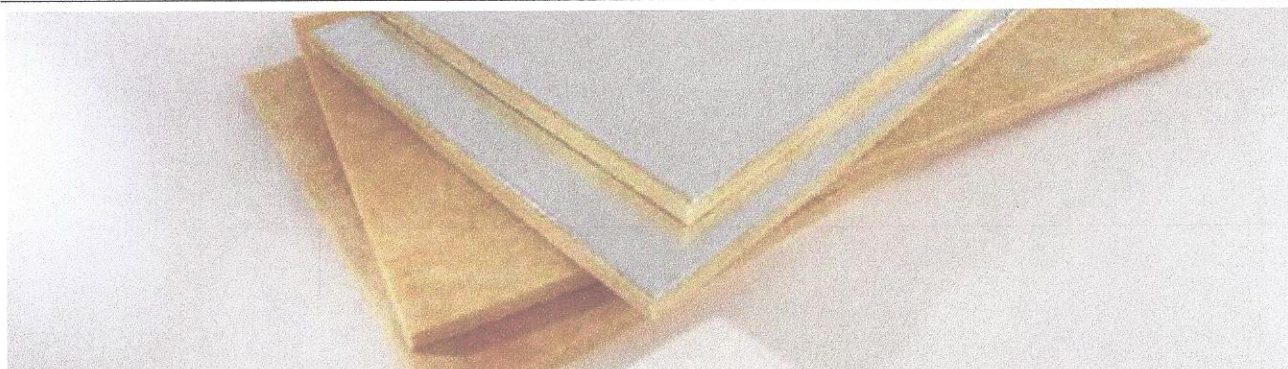


NOTES

The chemical physical properties of Manson Alley Wrap® blanket insulation represent typical average values determined in accordance with accepted test methods. The data is subject to normal manufacturing and testing variations. The data is supplied as a technical service and is subject to change without notice. References to numerical flame spread ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions. Check with your Manson sales representative to assure information is current.

Labeled Thickness	Installed Compressed Thickness	Round	Square	Rectangular
1½" (38 mm)	1⅞" (29 mm)	P+9½" (241 mm)	P+8" (203 mm)	P+7" (178 mm)
2" (51 mm)	1½" (38 mm)	P+12" (305 mm)	P+10" (254 mm)	P+8" (203 mm)
2⅜" (56 mm)	1⅝" (42 mm)	P+13" (330 mm)	P+11" (279 mm)	P+8½" (216 mm)
2½" (64 mm)	1⅞" (48 mm)	P+14½" (368 mm)	P+12½" (318 mm)	P+9½" (241 mm)
3" (76 mm)	2¼" (57 mm)	P+17" (432 mm)	P+14½" (368 mm)	P+11½" (292 mm)

P = Perimeter of duct to be installed.



AK BOARD® is a thermal and acoustical insulation product made from inorganic glass fibers preformed into boards bonded by a thermosetting resin. It is available plain, with a factory applied FSK or All Service Jacket (ASJ) facings.

USES

MANSON AK BOARD® is a versatile product for thermal and acoustical applications such as: heating and air conditioning ducts, power and process equipment, boiler and stack installations, metal and masonry walls, wall and roof panel systems, curtain wall assemblies and cavity walls.

AVAILABILITY

Manufactured dimensions are listed in the Manson Insulation product catalog.

SPECIFICATION COMPLIANCE

ASTM C 612

- Standard specification for mineral fibre board insulation
- Type IA (1.6, 2.25, 3.0, 6.0 pcf) (26, 36, 48, 96 kg/m³)
 - Type IB (3.0, 6.0 pcf) (48, 96 kg/m³)

ASTM C 1136 (facings) :

- FSK: Type II
ASJ: Type I, II

California Title 24

Corrosiveness (ASTM C 665)

- Will not accelerate corrosion of aluminum, steel or copper.

Puncture Resistance (TAPPI Test T803) (Beach Units)

- FSK facings: 25
- ASJ facings: 50

Water Vapor Transmission (ASTM E 96, Procedure A)

- FSK & ASJ vapor retarders have a maximum vapor transmission rate of .02 perms.

Water Vapor Sorption (ASTM C 1104)

- Less than 5% by weight when exposed to air at 120°F (49°C) and 95% humidity for 96 hours.

Shrinkage (ASTM C 356)

- Less than 0.3% linear shrinkage.

Microbial Growth (ASTM C 1338, G-21, G-22)

- Does not promote or support the growth of mold, fungi or bacteria.

CGSB 51-GP-10M

Canadian Specification for mineral fibre board insulation.

FIRE HAZARD CLASSIFICATION

(UL 723, CAN/ULC-S102-M-88, ASTM E84, NFP90A & 90B)
Flame Spread Index not exceeding 25 and Smoke Developed Index not exceeding 50.

CONTRACTOR:

JOB NAME:

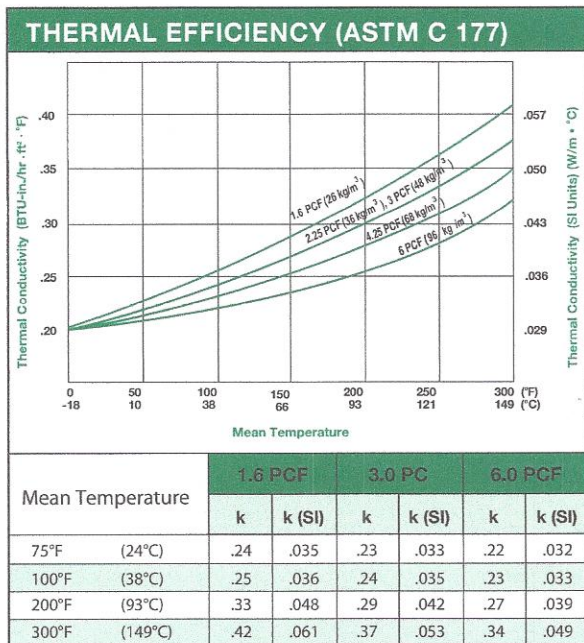
DATE:

AK BOARD®

Fiberglass Board Insulation
Temperature Limit: 450°F (232°C)



Sound Absorption Coefficients (ASTM C 423, Type A Mounting)									
Type	Facing	Thickness	1/3 Octave Band Center Frequency (cycles/sec.)						NRC
			125	250	500	1000	2000	4000	
1.6 PCF (26 kg/m³)	Plain	1½" (38 mm)	.19	.44	.86	.98	1.00	1.02	.80
		2" (51 mm)	.31	.57	.96	1.04	1.03	1.03	.90
		2½" (64 mm)	.43	.82	1.12	1.07	1.04	1.03	1.00
		3" (76 mm)	.47	.92	1.17	1.06	1.06	1.04	1.05
2.25 PCF (36 kg/m³)	Plain	1" (25 mm)	.05	.24	.59	.86	.97	1.00	.65
		1½" (38 mm)	.17	.49	.93	1.03	1.03	.99	.85
		2" (51 mm)	.26	.62	1.05	1.07	1.04	1.05	.95
	FSK	1" (25 mm)	.14	.69	.81	.99	.55	.27	.75
2" (51 mm)		.63	.76	1.11	.75	.42	.22	.75	
3.0 PCF (48 kg/m³)	Plain	1" (25 mm)	.08	.23	.62	.88	.96	.99	.65
		1½" (38 mm)	.09	.39	.89	1.03	1.06	1.01	.85
		2" (51 mm)	.29	.65	1.11	1.13	1.06	1.03	1.00
		3" (76 mm)	.54	1.01	1.18	1.07	1.07	1.04	1.10
	FSK	4" (102 mm)	.95	1.11	1.17	1.07	1.07	1.06	1.10
		1" (25 mm)	.21	.63	.84	.93	.51	.22	.75
		1½" (38 mm)	.45	.60	.99	.73	.53	.27	.70
	ASJ	2" (51 mm)	.67	.77	.93	.74	.47	.28	.75
		1" (25 mm)	.15	.71	.65	.82	.41	.16	.65
		1½" (38 mm)	.42	.55	.91	.69	.40	.23	.65
2" (51 mm)	.75	.71	.80	.66	.41	.24	.65		
6.0 PCF (96 kg/m³)	Plain	1" (25 mm)	.05	.26	.77	1.04	1.04	1.03	.80
		1½" (38 mm)	.61	.47	.78	.61	.51	.35	.60
		2" (51 mm)	.13	.58	1.01	1.05	1.00	1.01	.90
	FSK	1" (25 mm)	.23	.65	.39	.48	.47	.32	.50
		1½" (38 mm)	.61	.47	.78	.61	.51	.35	.60
		2" (51 mm)	.77	.50	.72	.58	.53	.41	.60
	ASJ	1½" (38 mm)	.60	.46	.62	.48	.47	.31	.50
		2" (51 mm)	.77	.44	.60	.50	.41	.30	.50



INSTALLATION

Manson AK BOARD® insulation is usually installed in accordance with the procedure in the publication "Commercial & Industrial Standards" by the National Insulation Association (NIA).

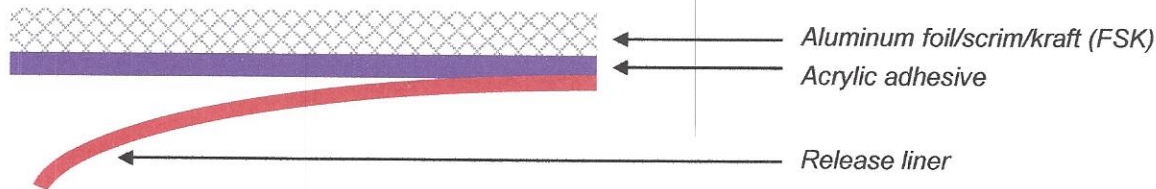
Manson Insulation Products Ltd. has no control over installation design, installation workmanship, accessory materials, or conditions of application. Manson does not warrant the performance or results of any installation containing their products. This warranty disclaimer includes all implied warranties, including the warranties of merchantability and fitness for a particular purpose.

1525CW

FSK INSULATION TAPE

VentureTape® 1525CW COLD WEATHER FSK is a foil/scrim/kraft (FSK) lamination coated with Venture's cold weather solvent acrylic pressure sensitive adhesive. This versatile FSK tape applies easily to both fibrous and sheet metal ducts and easily conforms to irregular surfaces. Venture Tape 1525CW excels in demanding temperature and humidity applications and provides superior performance and durability over a wide range of environmental conditions.

Product Construction



Features & Benefits

- UL723 Classified (5/10 Flame/Smoke Rating)
UL file # R10984
- FSK facing meets ASTM C1136, type II and IV
- Tri-directionally reinforced 2 x 3 squares per inch fiberglass scrim, UL listed FSK lamination
- High performance insulation tape is ideal for use as a vapor seal for reinforced fiberglass or mineral wool thermal insulation
- Venture CW® cold weather solvent acrylic adhesive performs well over a wide temperature range

Test	Typical Value	Typical Value (Metric)	Test Method
Product Thickness ^Δ	9.5 mils	0.24 mm	PSTC-133
Peel Adhesion ^Δ	45 oz/in	12.5 N/25 mm	PSTC-101
Shear Adhesion	>24 hrs @ 2.2 psi	>24 hrs @ 15.2 kPa	PSTC-107
Tensile Strength	40 lb/in	180.8 N/25 mm	PSTC-131
Elongation	2 %	2 %	PSTC-131
WVTR	0.02 perms		ASTM E96
Service Temperature	-40 to 150 °F	-40 to 66 °C	

^Δ - excluding liner

^Δ - 20 minute dwell
Typical values are not intended to be used for specification development. Technical data is believed to be true and accurate; Venture Tape recommends that the purchaser test for fitness of use in all applications.

Product Configurations

- Standard sizes: 3" x 50Y, 4" x 50Y, 5" x 50Y, 6" x 50Y
- Custom widths and lengths available, contact Venture Tape for specifications and requirements

Contact Venture Tape today for a complete list of products or a free sample

Toll Free North America 800-343-1076

From United Kingdom 0-800-962-957

From Australia 1-800-122-797

www.venturetape.com

VentureTape®

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GTA

TAPES & ADHESIVES
a 3M Company



ALLEY-K® pipe insulation is a preformed insulation product composed of high quality glass fibres, bonded together with a thermosetting resin. The 36" pipe sections are available with or without the All Service Jacket (ASJ). Our all service vapour retarder jacket (ASJ) reinforced with glass fibres comes with a factory applied pressure sensitive self-sealing lap closure system (SSL). Butt strips are also supplied.

USES

ALLEY-K® pipe insulation is intended as a thermal insulation product for hot and cold service piping. Typical uses include domestic hot and cold water, hot water heating, high temperature, dual temperature, steam, condensate and refrigerated lines. As a component of a suitable insulation system, plain ALLEY-K® pipe insulation may be used for light industrial applications, while ALLEY-K® pipe insulation with ASJ jacket may be used for commercial and institutional usage.

AVAILABILITY

Manufactured dimensions are listed in the Manson Insulation product catalog.

SPECIFICATION COMPLIANCE

ASTM C547 - TYPE I

Standard Specifications for Mineral Pipe Insulation

ASTM C795, MIL-I-24244C, NRC 1.36

Specification for wicking-type thermal insulation for use over austenitic stainless steel

CITY OF NEW YORK MEA 325-83-M

NATIONAL FIRE PROTECTION ASSOCIATION

NFPA 90A & 90B

CGSB 51-GP-9M

FIRE HAZARD CLASSIFICATION

(UL 723, CAN/ULC-S102-M88, ASTM E84, NFPA 255)

JACKETING

- UL 723/ASTM E84
- CGSB 51-GP-52M
- ASTM C1136 (Type I, II)
- Water Vapour Permeance (ASTM E-96) : 0.02 perms MAX
- ASTM C1338 : Does not promote microbial growth
- TAPPI T803 (Beach Units) Jacket minimum rating of 50 units.

GREENGUARD Environmental Institute™

Children & SchoolsSM Certified for superior indoor air quality (IAQ) performance

PRODUCT FEATURES

WATER VAPOUR ABSORPTION

ASTM C 1104 - Less than 0.2% by volume

ALKALINITY (ASTM C 871)

Less than 0.6% as Na₂O.
pH between 7.5 and 10.0

MICROBIAL GROWTH (ASTM C 1338)

Does not promote microbial growth

HOT SURFACE PERFORMANCE

ASTM C 411 - Rated to 850°F (454°C)

LINEAR SHRINKAGE

(ASTM C 356) Negligible

STRESS CORROSION

Complies with ASTM C 795,
MIL-I-24244C and NRC 1.36.

CORROSIVENESS (ASTM C 665)

No greater than sterile cotton.

CONTRACTOR:

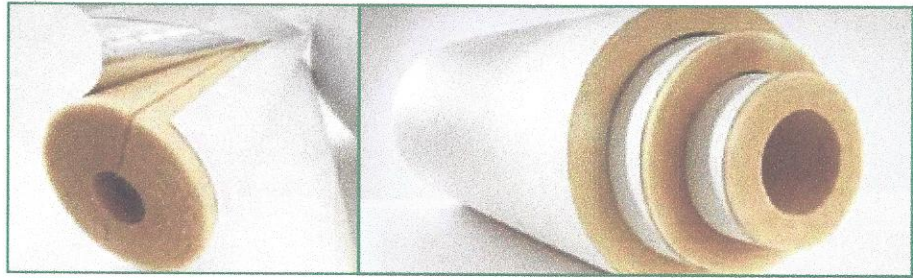
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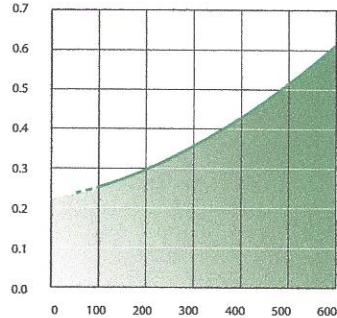
ALLEY-K®

Fiberglass Pipe Insulation

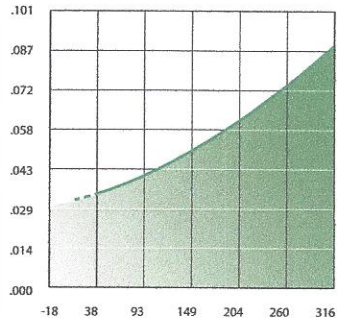
0°F to 850°F (-18°C to 454°C)



THERMAL CONDUCTIVITY
(Btu.in/hr.ft².°F)



METRIC THERMAL CONDUCTIVITY
(W/m.°C)



THERMAL CONDUCTIVITY
(ASTM C835)

MEAN TEMPERATURE		THERMAL CONDUCTIVITY	
°F	°C	Btu.in/ hr.ft ² .°F	W/m.°C
75	24	0.23	0.033
100	38	0.24	0.035
200	93	0.28	0.040
300	149	0.34	0.049
400	204	0.42	0.061
500	260	0.51	0.074
600	316	0.62	0.089

USAGE QUALIFICATIONS

1. Hot surface performance: tested to 850°F (454°C) according to ASTM C411.
2. A sufficient thickness of insulation must be used to keep maximum surface temperature of Alley-K® pipe insulation with ASJ jacket below 140°F (60°C).
3. At operating temperatures above 500°F (260°C), Alley-K® pipe insulation must be applied in a thickness ranging from 2" (51mm) min to 6" (152mm) max.
4. Due to the fact that binder is organic in nature, we recommend the following heat up schedule for operating temperatures from 500°F (260°C) to 850°F (454°C). (see table)
5. When pressure sensitive self-sealing tape and butt strips are used, the material must be stored in a clean, dry environment. When adhering SSL tape and butt strip, rub firmly with a hard object such as a plastic squeegee or back of a knife to assure good vapour seal.
6. Fibrous insulation can emit a acrid odour during the initial heat-up when applied to hot surfaces above 392°F (200°C). It is recommended that adequate ventilation be provided and /or workers be supplied with approved full face respirators.

FIRE HAZARD
CLASSIFICATION

	FLAME SPREAD	SMOKE DEVELOPED
Plain	25	50
ASJ	25	50

HEAT UP SCHEDULE

TIME	TEMPERATURE @	TOTAL TIME
3.5 hrs	550°F (288°C)	3.5 hrs
2.5 hrs	650°F (343°C)	6 hrs
2 hrs	750°F (399°C)	8 hrs

INSTALLATION

Manson Alley-K® pipe insulation is usually applied in accordance with the procedure in the publication "Commercial & Industrial Standards" by the National Insulation Association.

Manson Insulation Products Ltd. has no control over installation design, installation workmanship, accessory materials, or conditions of application. Manson does not warrant the performance or results of any installation containing their products. This warranty disclaimer includes all implied warranties, including the warranties of merchantability and fitness for a particular purpose.

PROTO FITTING COVERS

25/50 RATED
PER ASTM E-84 — LoSMOKE® PVC

SUBMITTAL SHEET

Effective: 05/01/07

Submitted Date: _____

PVC FITTING COVERS, PRE-MOLDED, INSULATED
WHITE GLOSS FINISH — INDOOR OUTDOOR GRADE

DESCRIPTION

The Proto Fitting Cover System consists of one piece and two piece pre-molded high impact LoSMOKE® PVC fitting covers with fiberglass inserts and accessories, which include elbows, tee/valves, end caps, mechanical line couplings, specialty fittings, white and indoor color jacketing, Protop® Tank End Panels, tack fasteners, tapes and specialty items.

APPLICATIONS

The Proto Fitting Cover System is used to insulate mechanical piping systems at fitting locations and provide a PVC jacketing for straight run piping. Both give a quality appearance and have excellent durability.

FEATURES AND BENEFITS

25/50 Rated. All Proto PVC Fittings are made of LoSMOKE® grade PVC. Roll Jacketing is available in either 25/50 rated or regular PVC Grade (not 25/50 rated). The 25/50 products meet fire and smoke safety requirements of federal, state and local building codes.

Excellent Appearance. Bright high-gloss white coloring adds a distinct quality appearance to the system. The standard line of Proto Fitting Covers are made in LoSMOKE® PVC designed for indoor and outdoor use. Virtually all sizes pass 25/50 when made of LoSMOKE® PVC. Colored PVC is manufactured from a LoSMOKE® formula that is suitable for indoor use only.

Easy To Clean. Due to the smooth, high gloss finish on Proto PVC Fittings, the product cleans easily with soap and water. This makes the system ideal for food and drug facilities.

Low Cost Installation. Significant cost savings vs. conventional cement, molded sections, and mitered sections.

Fast and Easy. At fitting locations, wrap the fiberglass insert around the pipe fitting, apply the Proto PVC Fitting over the insert and tack or tape in place. Do not use tacks where a vapor retarder is applied.

Wide Temperature Range. May be used for mechanical piping systems operating from -20°F to +140°F surface temperature of insulation. Variety: LoSMOKE®, Indoor/Outdoor, Exod®, Exotuff®. Proto products are also available in LoSMOKE® Indoor colors. Exod® is CPVC, GOOD TO 225° F.

Long Lasting. Can be used more than once on retrofit projects, general maintenance.

Excellent Thermal Value. K value of .26 at 75°F (.037 W/m °C at 24°C) of fiberglass insert, mean temperature assures better thermal efficiency than conventional cement fittings.

Resistance To Fungi and Bacteria. (ASTM G 21, ASTM G 22) Does not promote growth of fungi or bacteria.

U.V. Resistant. Can be used on indoor or outdoor applications, for both (White) LoSMOKE® PVC and Regular PVC. Extra thick fitting covers should be used outdoors. (All Std. Proto Fitting covers are made of LoSMOKE® PVC.)

TECHNICAL PHYSICAL PROPERTIES OF PVC LoSMOKE® MATERIALS

Specific Gravity (ASTM D-792)1.41
Tensile Modulus, PSI (ASTM D-638)361,000 (25,380 kg/cm²)
Tensile Strength, PSI (ASTM D-638)6,011

PROTO REGULAR PVC LoSMOKE® PVC JACKETING

PROTO CORP.

10500 47th Street North
Clearwater, FL 33762-5017
Tel: (727) 573-4665
Fax: (727) 572-6823
Toll Free (800) 875-7768

SUBMITTAL SHEET DOES NOT SUPERCEDE WRITTEN
SPECIFICATIONS OR OWNER AGREEMENT.

Flexural Strength, PSI (ASTM D-790)9,396
Izod Impact (1/4") ft. lb./in (ASTM D-256)3.7
Heat Deflection Temp. (ASTM D-648)157°F (70°C)
at 264 PSI (8.95 kg/cm²), °F
VICAT Softening Temp. (ASTM D-1525)198°F (92°C)

Water Vapor Transmission

ASTM E 96-95

70°F & 50% Relative Humidity

.015" thick = .058

.020" thick = .047

.030" thick = .027

Surface Burning Characteristics of All Fitting Covers and Jacketing
LoSMOKE® PVCpasses 25/50 ASTM-E 84
Up to .035" Thk.

Puncture Resistance (ASTM D 781) .. .006" thick = 178 Beach Units
.015" thick = 221 Beach Units

FEDERAL SPECIFICATIONS COMPLIANCE— POLY VINYL CHLORIDE — ASTM 1784-92

LP-1035A Type II Grade GU and Type III

LP-535E Type II Grade GU and Type III

United States Department of Agriculture Authorized
Agriculture Canada Authorized

New York City MEA 243-84-M, Chicago, Los Angeles ASTM
C-585-76 (sizes)

Canada CAN/CGSB - 51.53-95

TECHNICAL PROPERTIES OF FIBERGLASS INSERT MATERIAL

Thermal Conductivity (ASTM C 177)

Mean Temperature — °F	"k" — BTU in./hr. Ft.2 °F
75° 1(24°C)	.26 (.037 W/m. °C)
150° 1(66°C)	.33 (.048 W/m. °C)
250° (121°C)	.44 (.063 W/m. °C)

APPLICATION AND SPECIFICATION GUIDELINES

A. STORAGE

Protect cartons from water damage or other abuse. Proto Fitting Cover cartons are not designed for outside storage.

B. PREPARATION

Proto Fitting Covers should be applied on clean, dry surfaces.

C. APPLICATION

1. **General:** The matching fiberglass insert shall be wrapped completely around the metal fitting leaving no voids. Loose wrappings of twine is helpful in shaping difficult surfaces. The Proto Fitting Cover shall then be applied over the fitting and insert, and the throat secured by either tack fastening or taping.

2. **Cold Pipe:** Fitting systems below ambient temperature must have a continuous vapor retarder or vapor retardant mastic as specified by the engineer. When using Proto PVC Tape, a 2" (51mm) minimum downward overlap is recommended for optimum performance. Care should be taken not to stretch the last 2" (51mm) of Proto PVC Tape, to avoid stretching or creeping.

3. **Hot Pipe:** Insulate as per General Instructions given above. Due to PVC softening point at approximately 159°F (70.6°C), care should be taken to ensure sufficient insulation thicknesses are applied.

For hot piping which requires Pipe Insulation over 1 1/2" (38 mm) wall thickness, an extra fiberglass insert shall be applied for each additional inch of pipe insulation wall thickness. Proto recommends the surface temperature of the Pipe Insulation and PVC to be no higher than 125°F (52°C). To complete application of Proto PVC Fittings on hot piping, the throat seam shall be tack fastened or taped. Seal all laps outdoors and in wash down areas.

CAUTION: During initial heat-up to operating temperatures above 350°F, (177°C) an acrid odor and some smoke may be given off as a portion of the bonding material used in the insulation begins to undergo a controlled decomposition. If natural convection is not adequate in confined areas, forced ventilation should be provided in order to protect against any harmful fumes and vapors that might be generated.

4. Outdoor Pipe: Insulate as per above instructions.

Minimum Proto PVC Jacketing thickness for outdoor applications should be .030" (.7 mm). Over 15" O.D., .040" is recommended. Under 3 1/8" O.D., .020" is permitted. The PVC Jacketing shall be overlapped a minimum of 2" (51 mm) on the down side so as to shed water. All long and round joints shall be completely weather sealed with caulk adhesive.

On all piping, insulation shall be of sufficient thickness to keep the surface temperature below 125°F (52°C). Additionally, a slip type expansion joint of 8" (202 mm) minimum width shall be applied at least every 25 lineal feet (6.1 lineal meters) and between fittings.

Painting: Painting must be done only after priming the PVC surface with a suitable primer, such as X-1-M 400W Primer, or a similar, approved product.

Outdoor Painting: Only over White Exotuff® 195°F deflection temp. (modified PVC) or EXOD™ 225°F deflection temp. CPVC after X-1-M primer, or a similar, approved product. Use PVC compatible paints without strong solvents. Test paint a section before proceeding.

5. CAUTION: Fiberglass may cause temporary skin irritation. Wear long-sleeved, loose-fitting clothing, head covering, gloves and eye protection when handling and applying material. Wash with soap and warm water after handling. Wash work clothes separately and rinse washer. A disposable mask designed for nuisance type dusts should be used where sensitivity to dust and airborne particles may cause irritation to the nose or throat.

D. HEAVY INDUSTRIAL APPLICATIONS OUTDOORS

Use .030" or higher PVC Jacketing. Use "heavy duty" two piece fitting covers made from minimum .030" thick to .050" thick PVC sheet depending on size of fitting cover. Jacketing to be cut and oven precured

E. FIRE TEST RESULTS: PROTO LoSMOKE® — PVC

USA: E-84 25/50 Rated up to .035" thick (The Best Rated PVC)

CANADA: Conforms to CAN 4-S102.2

LoSMOKE® fitting covers conform to virtually all city, state and federal codes, for use in hotel, commercial and industrial buildings.

LoSMOKE® fitting covers will be labeled on the box "Passes ASTM E-84." Flame spread 25; smoke developed 50".

All E-84 ratings shown here were tested on flat sheets from which fitting covers are made.

Virtually all Proto LoSMOKE® fitting covers will pass E-84 25/50 flame spread and smoke development rating requirements.

SUGGESTIONS

Slide Joints: Do not apply PVC Jacketing too tightly. Slide joints plus PVC thickness must work together to prevent cracks and puckering.

Caulk/Adhesives:

Use: Celulon® (Red Devil Inc.) water base "Clear". Service temp. 0°F to +180°F
Use: Celulon® (Red Devil Inc.) water base "White". Service temp. -25°F to +175°F

PVC Cement: Avoid use if possible. Heavy application can cause puckering and cracks. Learn how to use it sparingly.

Vapor Retarder: A vapor retarder is required under all fitting covers for systems operating below ambient temperatures, such as chilled water lines, and is recommended for all outdoor applications. The fitting vapor retarder should provide a continuous seal with the adjacent pipe vapor retarder.

Outdoor Fitting Covers: Use extra thick, plastic heavy duty covers.

Outdoor and Indoor Washdown Areas: Use EXOD™ (CPVC) by Proto, for its higher deflection temperature (225°F). It is light grey.

PVC Outdoor Thickness (Reg. PVC Jacketing): Use .030" thick cut and oven precured jacketing. Use "heavy duty" plastic fitting covers formed from minimum .030" to .050" thick PVC sheet depending on size of fitting cover. On pipe insulation larger than 15" O.D. use .040" thick PVC.

PVC Indoor Thickness: Use white or indoor color LoSMOKE® on piping. Use .020" thick with standard one piece fitting cover, .030" jacketing can also be used.

Vessels and Tank Tops: Use .050" or .060" thick tank panels for outdoor applications and .030" or .040" for indoor tanks. Use .050" thick Protop® segments for tank heads. (Only Proto Corp. has them.) Made of LoSMOKE® PVC.

Pipe Insulation End Caps: Use on all outdoor, indoor washdown areas, and all vapor sealed systems. End caps will be PVC, metal, or gasket materials appropriate for the metal pipe temperatures. Silicone rubber (500°F) can be applied (min. 1/16" thick) as an end cap outdoors.

Indoor hot piping need not be sealed to the end cap. Cap will be sealed or taped to the jacket.

Two-Ply Waterproofing System: Use .010" thick PVC with self-sealing long lap tape, as the first waterproof layer. Overlap ends 3" and PVC tape over. Caulk all openings with Celulon® or similar, approved product. The finished jacketing material should employ staggered joints with at least a .010 mil thick first layer. Recaulk again over last layer. Install slide joints every 25', caulk shut all other seams, openings, or end overlaps with PVC tape or caulk. Use vapor seal jacketing (instead of .010" thick PVC first layer) where a vapor seal system is required.

CPVC-High Chemical Resistance and High Deflection Temperature: Use "Exod™" CPVC jacketing and fitting covers for 225°F deflection temperature and maximum chemical resistance. Offered only by Proto Corp. as a substitute for stainless steel.

Regular PVC Jacketing Outdoors: Use regular PVC jacketing outdoors. It is less expensive, does the same job as LoSMOKE® PVC. Regular PVC has very good fire (self-extinguishing) properties — not as good as the LoSMOKE® PVC used in confined people areas (buildings), however much better than common plastics used outdoors.

Vessels with ends 24" O.D. or larger: Use .040" thick jacketing up to 48" O.D. On sides of vessels larger than 48" O.D. See Protop® brochure for instructions requiring a suspended band system, to hang panels from, (Gerrard & Company or equal). Use thick PVC panels on Outdoor Tanks not PVC Roll Jacketing. See Tank Tops above for end segments.

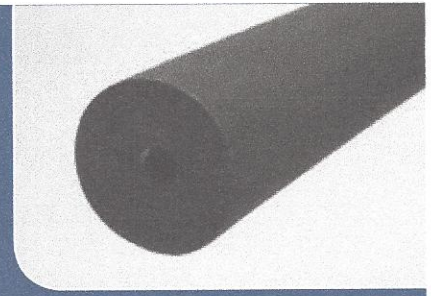
PROTO **PVC**
CORP™

10500 47th Street North
Clearwater, FL 33762-5017
Tel: (727) 573-4665
Fax: (727) 572-6823
Toll Free (800) 875-7768

The physical and chemical properties of Proto Corp. PVC represent typical average values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. They are supplied as a technical service and are subject to change without notice. Numerical flame spread rating is not intended to reflect hazards presented by this or any other materials under actual fire conditions. Check with Proto Corp. office to assure current information. Purchaser will be responsible to determine suitability of this product for purchaser's use. Proto Corp. liability will be limited to the purchase price of the material. No person is authorized to alter this without a Proto Corp. officer's written approval.

INSUL-TUBE®

Flexible, Closed-Cell Pipe Insulation
Designed for the HVAC/R Industry



DESCRIPTION

INSUL-TUBE® pipe insulation is an environmentally-friendly, CFC-free, flexible elastomeric thermal insulation. It is black in color and is available in unslit tubular form in wall thicknesses of 3/8", 1/2", 3/4", 1", 1-1/4", 1-1/2" or 2" in sizes ranging from 3/8" I.D. to 8" IPS. (Available in 6' lengths and coils). INSUL-TUBE® key physical properties are approved through supervision by Factory Mutual Research Corporation.

INSUL-TUBE® is non-porous, fiber-free and resists mold growth. An EPA-registered antimicrobial agent is incorporated into the product providing additional protection against mold, fungal and bacterial growth.

INSUL-TUBE® is GREENGUARD® certified as a low VOC material, meeting the requirements of the "Children & Schools" and "Indoor Air Quality" classifications.

APPLICATIONS

INSUL-TUBE® is used to retard heat gain and prevent condensation or frost formation on refrigerant lines, cold water plumbing, and chilled water systems. It also retards heat flow for hot water plumbing, liquid heating, dual temperature piping, and many solar systems. INSUL-TUBE® is designed for the HVAC and Refrigeration industry.

INSUL-TUBE® is recommended for applications ranging from -297°F to 220°F (-182°C to 104°C). The expanded closed-cell structure makes INSUL-TUBE® an efficient insulator and provides effective moisture vapor resistance. INSUL-TUBE® can be used with heat tracing/heat tapes.

INSUL-TUBE® has a tough skin that withstands tearing, rough handling, and severe environmental conditions, yet is flexible for easy installation. INSUL-TUBE® has superior cold weather flexibility.

INSTALLATION

With a factory-applied coating of talc on the smooth inner surface, INSUL-TUBE® slides easily over pipe or tubing for quick installation. When applied to existing lines, tubing is slit lengthwise and fitted into place. (Slitting can be done on the job with a sharp knife or pre-slit INSUL-TUBE® is available on request). All seams and butt joints should be sealed with an approved contact adhesive, making sure both surfaces to be joined are coated with adhesive. Fittings are fabricated from miter-cut tubular sections, and cover, flanges, etc., from INSUL-SHEET®. K-Fit® factory fabricated fittings are also available. ASTM C1710, *Installation Guide for Flexible Closed Cell Foams*, should be used as an installation guide.

OUTDOOR APPLICATIONS

INSUL-TUBE® is made from a UV-resistant elastomeric blend. For moderate UV exposure (residential applications), no additional protection is needed. For severe UV exposure (rooftop applications) or for optimum performance, K-FLEX® 374 Protective Coating, approved jacketing or K-FLEX Clad® is required.

UNDERGROUND

For buried lines above the water table, use a clean fill such as sand (3"-5" layer) to protect INSUL-TUBE® before backfilling. It is recommended that materials to be buried are properly sealed at all seams and butt joints with an approved contact adhesive. For optimum performance, the lines should be encased in a conduit to protect them from problems associated with ground water intrusion and compaction.

RESISTANCE TO MOISTURE VAPOR FLOW

The closed-cell structure and unique formulation of INSUL-TUBE® effectively retards the flow of moisture vapor, and is considered a low transmittance vapor retarder. For most indoor applications, INSUL-TUBE® needs no additional protection. Additional vapor barrier protection may be necessary for INSUL-TUBE®

when installed on low temperature surfaces that are exposed to continuous high humidity.

FLAME AND SMOKE RATING

INSUL-TUBE® in wall thicknesses of 2" (50 mm) and below has a flame spread rating of 25 or less and a smoke development rating of 50 or less as tested by ASTM E84, "Surface Burning Characteristics of Building Materials". INSUL-TUBE® is acceptable for duct/plenum applications, meeting the requirements of NFPA 90A/B.

Numerical flammability ratings alone may not define the performance of products under actual fire conditions. They are provided only for use in the selection of products to meet limits specified when compared to a known standard.

SPECIFICATION COMPLIANCE

- ASTM C 534 Type 1 (Tubing), Grade 1
- ASTM D 1056-00-2B1
- New York City MEA 186-86-M Vol. V
- USDA Compliant
- RoHS Compliant
- UL 94-5V Flammability Classification (Recognition No. E300774)
- ASTM E 84 2" 25/50-tested according to UL 723 and NFPA 255
- FMVSS302
- Complies with requirements of CAN/ULC S102-03
- FMRC Approval Guide Chapter 14 Pipe Insulation
- NFPA No. 101 Class A Rating
- Meets requirements of NFPA 90A Sect. 2.3.3 for Supplementary Materials for Air Distribution Systems
- Meets requirements of ASTM C 411 (Test Method for Hot Surface Performance of High Temperature Thermal Insulation)
- Meets requirements of UL 181 sections 11.0 and 16.0 (Mold Growth/Air Erosion)
- MIL-P-15280, For T (Tubing)
- Meets residential and non-residential requirements for California Energy Commission Building Energy Efficient Standards Title 24
- GREENGUARD® certified under Children & Schools and Indoor Air Quality classifications
- Meets energy code requirements of ASHRAE 90.1 and 189.1.



UV resistant under K-Flex USA L.L.C.
Patented Subject
(Outdoor Applications) for More Information



Made in USA



Contains a Protective
Antimicrobial Agent



PHYSICAL PROPERTIES		INSUL-TUBE®	TEST METHODS
Thermal Conductivity (K) BTU - in/hr - Ft ² - °F (W/mK)	90°F (32°C) Mean Temp 75°F (24°C) Mean Temp	0.258 (0.0372) 0.245 (0.0353)	ASTM C 177/C 518 ASTM C 177/C 518
Density		3-6 PCF	ASTM D 1622/D 3575
Operating Temperature Range (Flexible to -40°F (-40°C))		-297°F (-182°C) to +220°F (104°C)	
Water Vapor Permeability Dry Cup. Perm-In		0.03	ASTM E 96
Water Absorption % (Volume Change)		0	ASTM C 209
Flame Spread / Smoke Developed (up to 2" wall)		<25/50	ASTM E 84
Ozone Resistance		Pass	ASTM D 1171
Chemical/Solvent Resistance		Good	
Mildew Resistance/Air Erosion		Pass	UL 181
UV Weather Resistance		Pass	QUV Chamber Test

THICKNESS RECOMMENDATIONS - TO CONTROL CONDENSATION				
PIPE SIZE	50°F (10°C)	35°F (2°C)	0°F (-18°C)	-20°F (-29°C)
Normal Conditions (Max 85°F, 29°C - 70% R.H.)				
3/8" I.D. thru 1-3/8" I.D.	3/8" (10 mm)	1/2" (13 mm)	3/4" (19 mm)	1" (25 mm)
Over 1-3/8" thru 3" IPS	3/8" (10 mm)	1/2" (13 mm)	1" (25 mm)	1" (25 mm)
Over 3" IPS thru 4" IPS	1/2" (13 mm)	1/2" (13 mm)	1" (25 mm)	1-1/2" (38 mm)
Over 4" IPS	1/2" (13 mm)	3/4" (19 mm)	1" (25 mm)	1-1/2" (38 mm)
Mild Conditions (Max 80°F, 26°C - 50% R.H.)				
3/8" I.D. thru 2-1/8" I.D.	3/8" (10 mm)	3/8" (10 mm)	1/2" (13 mm)	1/2" (13 mm)
Over 2-1/8" thru 3" IPS	3/8" (10 mm)	3/8" (10 mm)	1/2" (13 mm)	3/4" (19 mm)
Over 3" IPS thru 4" IPS	1/2" (13 mm)	1/2" (13 mm)	3/4" (19 mm)	3/4" (19 mm)
Over 4" IPS	1/2" (13 mm)	1/2" (13 mm)	3/4" (19 mm)	3/4" (19 mm)
Severe Conditions (Max 90°F, 32°C - 80% RH)				
3/8" I.D. thru 1-1/8" I.D.	3/4" (19 mm)	3/4" (19 mm)	1-1/2" (38 mm)	1-1/2" (38 mm)
Over 1-1/8" I.D. thru 4" IPS	3/4" (19 mm)	1" (25 mm)	1-1/2" (38 mm)	1-1/2" (38 mm)
Over 4" IPS	3/4" (19 mm)	1" (25 mm)	2" (50 mm)	2" (50 mm)

INSUL-TUBE® in thickness noted within the specified temperature ranges will prevent condensation on indoor piping under design conditions defined below. Thickness recommendations above 2" can be sleeved to achieve thickness desired. Normal: Maximum severity of indoor conditions rarely exceed 85°F (29°C) and 70% R.H. in United States. Mild: Typical conditions are most air-conditioned spaces and arid climates. Severe: Generally found in areas where excessive moisture is introduced or in poorly ventilated areas where the temperature may be depressed below the ambient. Under conditions of high humidity, additional thickness of insulation may be required. NOTE: Thickness recommendations calculated using 0.2575 K-factor (0.245 plus 5% test error allowance).

PIPE "R" VALUES PER SQUARE FOOT	PIPE "R" VALUES PER SQUARE FOOT							
	NOMINAL INSULATION I.D.	3/8" WALL	1/2" WALL	3/4" WALL	1" WALL	1-1/4" WALL	1-1/2" WALL	2" WALL
3/8"	2.7	3.6	5.6	8.5	12.0	14.6	20.4	
1/2"	2.5	3.4	5.4	7.9	11.1	13.5	18.9	
5/8"	2.5	3.3	5.4	7.5	10.5	12.8	17.8	
3/4"	2.3	3.1	5.4	7.5	9.9	12.1	16.8	
7/8"	2.3	3.2	5.4	7.2	9.5	11.6	16.1	
1-1/8"	2.3	3.1	5.5	7.1	8.9	10.8	15.8	
1-3/8"	2.2	3.2	5.3	7.3	8.4	10.2	14.9	
1-5/8"	2.4	3.1	5.1	7.1	8.1	9.8	14.6	
1-1/2" IPS	2.3	3.0	4.9	6.7	7.7	9.3	13.8	
2-1/8"	2.3	3.0	4.9	6.8	7.6	9.2	13.6	
2" IPS	2.3	2.9	4.8	6.5	7.4	9.0	13.3	
2-1/2" IPS	2.3	3.0	4.6	6.3	7.2	8.6	12.6	
2-5/8"	2.3	3.1	4.7	6.4	7.3	8.8	12.9	
3-1/8"	2.3	3.0	4.6	6.2	7.1	8.5	12.4	
3" IPS	2.3	3.2	4.6	6.1	7.0	8.3	12.2	
3-5/8"	2.3	3.2	4.6	6.1	6.9	8.3	12.1	
4-1/8"	2.3	3.1	4.6	6.0	6.8	8.1	11.7	
4" IPS	2.3	3.2	4.7	6.0	6.8	8.1	11.6	
5" IPS	—	3.2	4.5	5.9	6.6	7.8	11.1	
6" IPS	—	3.1	4.5	5.8	6.5	7.6	10.9	
8" IPS	—	3.1	4.4	5.6	—	7.4	—	

Note: "R" factors were calculated using a K factor of 0.245 (at 75°F, 24°C mean temp.) and nominal wall thickness is each case. Lower operating temperatures will result in improved R values. Contact Technical Services for specific recommendations.



K-FLEX USA - 100 Nomaco Drive - Youngsville, NC 27596 - toll free 800-765-6475 - fax 800-765-6471 - www.kflexusa.com

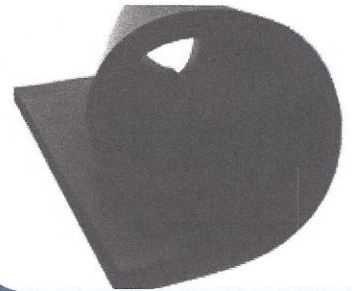
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INDS-0001-1211

INSUL-SHEET®

S2S
SKIN2SIDES

Flexible, Closed-Cell Sheet Insulation
Designed for the HVAC/R Industry



DESCRIPTION

INSUL-SHEET® is an environmentally-friendly, CFC-free, flexible elastomeric thermal insulation. It is black in color and supplied as flat sheets (36" x 48") or rolls (48" wide) in standard thicknesses of 1/8" thru 2". It is supplied skin two sides in 1/4" and above. INSUL-SHEET® key physical properties are approved through supervision by *Factory Mutual Research Corporation*.

INSUL-SHEET® is non-porous, fiber-free and resists mold growth. An EPA-registered antimicrobial agent is incorporated into the product providing additional protection against mold, fungal and bacterial growth. INSUL-SHEET® is GREENGUARD® certified as a low VOC material, meeting the requirements of the "Children and Schools" and "Indoor Air Quality" classifications.

APPLICATIONS

INSUL-SHEET® is used to retard heat gain and prevent condensation or frost formation on cold equipment, tanks, vessels, ducts, or large O.D. pipes. It also effectively retards heat loss when used on hot equipment, ducts, or large pipes. INSUL-SHEET® is recommended for applications ranging from -297°F to 220°F (-182°C to 104°C) when used as pipe insulation where only the longitudinal seams and butt joints are glued. On full adhesion applications, the upper limit is 200°F (93°C).

INSUL-SHEET® has a tough skin that withstands tearing, rough handling, and severe environmental conditions, yet is flexible for easy installation. INSUL-SHEET® has superior cold weather flexibility.

INSUL-SHEET® thickness has been calculated to control condensation on cold surfaces. Refer to the table on the reverse side for specific recommendations.

INSTALLATION

When INSUL-SHEET® is applied to duct work and equipment, use 100% coverage of an approved contact adhesive. With a contact adhesive, both surfaces to be joined should be coated and then joined after the adhesive is dry to the touch.

Compression joints with adhesive applied should be used on all butt edges. INSUL-SHEET® is also available with pre-applied pressure sensitive adhesive (PSA) with an easy-to-use release liner. ASTM C1710, *Installation Guide for Flexible Closed Cell Foams*, should be used as an installation guide.

OUTDOOR APPLICATIONS

INSUL-SHEET® is made from a UV-resistant elastomeric blend. For severe UV exposure or for optimum performance, K-FLEX® 374 Protective Coating, approved jacketing, or K-FLEX Clad® is required.

RESISTANCE TO MOISTURE VAPOR FLOW

The closed-cell structure and unique formulation of INSUL-SHEET® effectively retards the flow of moisture vapor, and is considered a low transmittance vapor retarder. For most applications, INSUL-SHEET® needs no additional protection.

Additional vapor barrier protection may be necessary for INSUL-SHEET® when installed on low temperature surfaces that are exposed to continuous high humidity.

FLAME AND SMOKE RATING

INSUL-SHEET® in thicknesses of 2" (50 mm) and below has a flame spread rating of 25 or less and a smoke development rating of 50 or less as tested by ASTM E 84, "Surface Burning Characteristics of Building Materials".

INSUL-SHEET® is acceptable for use in duct/plenum applications meeting the requirements of NFPA 90A/B.

Numerical flammability ratings alone may not define the performance of products under actual fire conditions. They are provided only for use in the selection of products to meet limits specified when compared to a known standard.

SPECIFICATION COMPLIANCE

- ASTM C 534 Type 2 (Sheet), Grade 1
- ASTM D 1056-00-281
- New York City MEA 186-86-M Vol. IV
- USDA Compliant
- RoHS Compliant
- STC = 17 at 1" per ASTM E 90
- NRC = .35 at 1" per ASTM C423
- UL 94-5V Flammability Classification (Recognition No. E300774)
- ASTM E 84 2" 25/50-tested according to UL 723 and NFPA 255
- FMVSS302
- Complies with requirements of CAN/ULC S102-03 NEPA No. 101 Class A Rating
- Meets requirements of NFPA 90A/B Sect. 2.3.3 for Supplementary Materials for Air Distribution Systems
- Meets requirements of UL 181 sections 11.0 and 16.0 (Mold Growth/Air Erosion)
- Meets requirements of ASTM C 411 (Test Method for Hot Surface Performance of High Temperature Thermal Insulation)
- MIL-P-15280, Form S (Sheet)
- R8 Sheet meets R-value requirements of the International Energy Conservation Code for Outdoor Ductwork
- GREENGUARD certified under the "Children & Schools" and "Indoor Air Quality" classifications
- Meets energy code requirements of ASHRAE 90.1 and 189.1



Made in USA



Contains a Protective
Antimicrobial Agent



PHYSICAL PROPERTIES		INSUL-SHEET®	TEST METHODS
THERMAL CONDUCTIVITY (K)	90°F (32°C) MEAN TEMP	0.258 (0.0372)	ASTM C 177/ ASTM C 518
BTU - IN/HR - FT² - °F (W/MK)	75°F (24°C) MEAN TEMP	0.245 (0.0353)	
DENSITY		3-6 PCF	ASTM D 1622/ ASTM D 3575
OPERATING TEMPERATURE RANGE (FLEXIBLE TO -40°F)		-297°F (-182°C) TO +220°F (104°C)	
WATER VAPOR PERMEABILITY DRY CUP. PERM-IN		0.03	ASTM E 96
WATER ABSORPTION % (VOLUME CHANGE)		0	ASTM C 209
FLAME SPREAD / SMOKE DEVELOPED (UP TO 2" WALL)		<25/50	ASTM E 84
OZONE RESISTANCE		GOOD	ASTM D 1171
CHEMICAL/SOLVENT/OIL & GREASE RESISTANCE		GOOD	
MILDEW RESISTANCE/AIR EROSION		PASS	UL 181
RESISTANCE TO U.V. & WEATHER¹		PASS	QUV CHAMBER TEST
ODOR		NOT OBJECTIONABLE	ASTM C 1304
FLEXIBILITY		EXCELLENT	

¹ OUTDOOR APPLICATIONS SHOULD BE PROTECTED WITH AN APPROVED K-FLEX® COATING OR CLADDING.

SOUND ABSORPTION CO-EFFICIENTS AT FREQUENCY							
ASTM C-423/E-795 TYPE A MOUNTING/SABINS/SQ. FT							
THICKNESS	125 HZ	250 HZ	500 HZ	1000 HZ	2000 HZ	4000 HZ	NRC
1/4" (6mm)	0.00	0.03	0.05	0.10	0.25	0.45	0.10
1/2" (12mm)	0.03	0.04	0.08	0.15	0.40	0.25	0.20
1" (25mm)	0.10	0.15	0.45	0.30	0.40	0.33	0.35
2" (50mm)	0.22	0.65	0.48	0.54	0.47	0.45	0.55

Sound Transmission Class at 1" = 17 per ASTM E 90

THICKNESS RECOMMENDATIONS - TO CONTROL CONDENSATION				
OUTSIDE TEMPERATURE	SURFACE TEMPERATURE			
	50°F (10°C)	35°F (2°C)	0°F (-18°C)	-20°F (-29°C)
Normal Conditions (Max 85°F, 29°C - 70% R.H.)	1/2" (13 mm)	3/4" (19 mm)	1" (25 mm)	1-1/2" (38 mm)
Mild Conditions (Max 80°F, 26°C - 50% R.H.)	1/8" (3 mm)	1/4" (6 mm)	1/2" (13 mm)	3/4" (19 mm)
Severe Conditions (Max 90°F, 32°C -80% RH)	3/4" (19 mm)	1" (25 mm)	2" (50 mm)	2" (50 mm)

INSUL-SHEET® in thickness noted within the specified temperature ranges will prevent condensation on indoor piping under design conditions defined below. Normal: Maximum severity of indoor conditions rarely exceed 85°F (29°C) and 70% R.H. in United States. Mild: Typical conditions are most air-conditioned spaces and arid climates. Severe: Generally found in areas where excessive moisture is introduced or in poorly ventilated areas where the temperature may be depressed below the ambient. Under conditions of high humidity, additional thickness of insulation may be required. NOTE: Thickness recommendations calculated using 0.2575 K-factor (0.245 plus 5% test error allowance)

"R" VALUES						
3/8"*	1/2"*	3/4"*	1"*	1-1/2"*	2"*	
1.5	2	3	4	6	8	
*All sizes are nominal						

NOTE: "R" FACTORS WERE CALCULATED USING A K FACTOR OF 0.2575 (0.245 PLUS 5% TEST ERROR ALLOWANCE AT 75° F, 24°C MEAN TEMP.) AND NOMINAL WALL THICKNESS IS EACH CASE. LOWER OPERATING TEMPERATURES WILL RESULT IN IMPROVED R VALUES. CONTACT TECHNICAL SERVICES FOR SPECIFIC RECOMMENDATIONS.



K-FLEX USA - 100 Nomaco Drive - Youngsville, NC 27596 - toll free 800-765-6475 - fax 800-765-6471 - www.kflexusa.com
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K-FLEX® 320/620 CONTACT ADHESIVE



DESCRIPTION

K-FLEX® 320 & 620 Contact Adhesives are air-drying solvent-based neoprene contact adhesives that are excellent for joining seams and butt joints of elastomeric pipe and sheet insulation. K-FLEX® 320 & 620 Contact Adhesives make resilient moisture- and heat-resistant bonds when used with elastomeric and polyolefin products. K-FLEX® 320 & 620 Contact Adhesives' higher solids content allows them to be brushed or roller applied easily without running. They are ideal for bonding porous and non-porous materials, as they will not be absorbed easily.

Caution: Adhesive contains notable solvents and container not in use should be kept closed. Keep adhesive away from sparks and open flames. Use with adequate ventilation and avoid excessive contact with the skin.

USES

K-FLEX® 320 & 620 Contact Adhesives may be used for bonding elastomeric products to a variety of materials (i.e., other elastomers, metal, wood, leather, felt, concrete, etc.). The adhesives will make resilient and heat-resistant bonds. They are suitable for line temperatures up to 220°F (104°C) on applications requiring bonded seams and joints. When the adhesives are applied to large flat or curve surfaces, they are suitable for temperatures up to 200°F (93°C). The products are supplied in a variety of sizes ranging from pint brush top containers to gallon containers. Larger containers are available upon request.

APPLICATION INSTRUCTIONS

For proper adhesion, the surfaces to which the insulation is to be applied must be thoroughly cleaned, dry and unheated. Primed and painted surfaces should be adhesive tested to be sure

the insulation will not lift off after application. The adhesive should be thoroughly mixed. Brush or roll a thin even coat of adhesive on both surfaces to be joined. Allow the adhesive films to become dry to the touch, but tacky, before joining the surfaces. Press the two surfaces together. Be sure the insulation is in the desired position before the adhesive surfaces make initial contact, since the adhesive forms an instant bond, and repositioning after contact is difficult. Moderate pressure should then be applied to the entire bonding area to ensure complete contact. Avoid heat, sparks, and open flames, and use only proper ventilation. Close container after use. K-FLEX® 320 & 620 Contact Adhesives should be applied at above 40°F (4°C) temperatures, and allowed to dry for 24 hours before equipment operation.

Protective coatings can be applied to applications with bonded joints and seams, after allowing 24 hours dry time. Applications such as large tanks, or vessels where full adhesive coverage is required, must be allowed to dry 7 days prior to applying a protective coating.

The surface may be allowed to dry and can be solvent reactivated by wiping with a toluene dampened cloth. Thinning the adhesive is not recommended. Common lacquer thinners can be used for clean up.

PHYSICAL PROPERTIES

Color	Amber (320), Black (620)
Base	Neoprene
Solvents	Toluene, Hexane, Acetone
Viscosity	Medium Syrup
Solid Content	25% ± 2%
Weight per gallon	6.98± .2 lbs.
Coverage	200 sq. ft. per gallon (one surface)
Shelf Life	One year in original sealed container. Storage temperature 60°F
Minimum Dry Time	2-4 minutes under normal conditions
Open Time	Not to exceed 10 minutes
Temperature Limits	220°F (104°C) for pipe insulation seams and joints 200°F (93°C) for full bonding sheets
Flammability	ASTM E84 10/0 Flamespread/Smoke Developed
Flash Point	Less than -4°F
Freight Classifications	<ul style="list-style-type: none"> • Adhesives NOS. Flammable Liquid 4620 Sub 5, class 60, Un 1133, IMDG class 3.1 • PG:11 (packaging group II)

Made in USA



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