INSUL-TUBE®

Made in USA
Designed for the HVAC/R Industry

Pipe Insulation
Flexible Closed Cell Insulation

UL 94 (Recognition No. E147665)

UV resistant Refer to K-Flex USA L.L.C. Technical Bulletin (Outdoor Applications) for More Information

Protected by the Bio-Guard™ System

GREENGUARD Children & Schools Indoor Air Quality Certified

Factory Mutual System

DESCRIPTION

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

INSUL-TUBE® is non-porous, non-fibrous and resists mold growth. The Bio-Guard™ antimicrobial system provides added protection against mold, fungal and bacterial growth. The active ingredient in Bio-Guard™ is registered with the EPA.

K-Flex USA elastomeric insulation products are GREENGUARD **certified** as low VOC materials, meeting the requirements of the "Children and Schools" classification, the most stringent requirements. Additionally, all K-Flex USA elastomeric insulation products are GREENGUARD **listed** for mold resistance and meet the "mold resistant" criteria.

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 very tough skin which withstands tearing, rough handling, and severe environmental conditions, and yet is quite 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®.

OUTDOOR APPLICATIONS

INSUL-TUBE® Pipe Insulation is made from a UV resistant elastomeric blend. For moderate UV exposure, no additional protective coating is needed. However, for severe UV exposure (rooftop applications) or where optimum performance is required, 374 Protective Coating or approved jacketing or cladding should be used. *For more detailed information refer to the Installation Guidelines.*

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 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® Pipe Insulation in wall thicknesses of 1-1/2" (38 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 Method of Testing entitled: "Surface Burning Characteristics of Building Materials."

Duct/Plenum Applications
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 us 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 1056-00-2C1
New York City MEA 186-86-M Vol. IV
USDA Requirements

UL 94-5V Flammability Classification (Recognition No. E300774)
ASTM E 84 1-1/2" 25/50-tested according to UL 723 and NFPA 255
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)

INSUL-TUBE® Pipe Insulation

PRODUCT DATA

Physical Properties		INSUL-TUBE® Insulation	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	.27 (.039) .25 (.036)	ASTM C 177/C 518 ASTM C 177/C 518
Operating Temperature Range	Upper	220° F (104° C)	
Flexible to -40° F (-40° C)	Lower	-297° F (-182° C)	
Water Vapor Permeability Dry Cup. Perm-In		<0.06	ASTM E 96
Water Absorption %		<0.20 by volume	C209
Flame Spread (up to 1-1/2" wall)		Not greater than 25	ASTM E 84
Smoke Developed (up to 1-1/2" wall)		Not greater than 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	Line Temp 50°F	10°C	Line Temp 35°F	2°C	Line Temp 0°F	-18°C	Line Temp -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	1-3/4"	44 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 1.5" can be sleeved to achieve thickness desired. Subject to compliance with applicable code requirements.
Normal: Maximum severity of indoor conditions seldom 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 higher humidity, additional thickness of insulation may be required.

NOTE: Thickness recommendations calculated using 0.2575 K-factor (0.25 plus 3% test error allowance)

INSUL-TUBE® "R" Values

Pipe O.D. or Nominal Insulation I.D.		R Value 3/8" (10 mm) Wall	R Value 1/2" (13 mm) Wall	R Value 3/4" (19 mm) Wall	R Value 1" (25 mm) Wall	R Value 1 1/2" (38 mm) Wall
3/8"	10 mm	2.5	3.3	5.2	——	——
1/2"	13 mm	2.4	3.1	5.0	——	——
5/8"	16 mm	2.3	3.0	5.0	7.2	——
3/4"	19 mm	2.2	3.0	5.0	7.2	——
7/8"	22 mm	2.1	3.0	5.0	7.0	13.0
1-1/8"	29 mm	2.1	2.9	5.1	6.6	12.0
1-3/8"	35 mm	2.0	2.9	4.9	6.8	11.4
1-5/8"	41 mm	2.2	2.9	4.8	6.6	10.9
1-1/2" IPS	48 mm	2.3	2.7	4.5	6.3	10.5
2-1/8"	54 mm	2.2	2.8	4.5	6.1	10.2
2" IPS	60 mm	2.2	2.7	4.4	6.0	9.9
2-1/2" IPS	64 mm	2.1	2.8	4.3	5.9	9.5
2-5/8"	67 mm	2.0	2.7	4.3	5.8	9.5
3-1/8"	79 mm	2.0	2.7	4.1	5.6	9.1
3" IPS	89 mm	2.1	3.0	4.2	5.7	9.2
3-5/8"	92 mm	2.0	2.8	4.1	5.5	8.9
4-1/8"	105 mm	2.0	2.8	4.1	5.4	8.7
4" IPS	114 mm	——	3.0	4.4	5.6	8.9
5" IPS	140 mm	——	2.8	4.2	5.3	——
6" IPS	168 mm	——	2.8	4.1	5.3	——
8" IPS	219 mm	——	2.8	4.0	——	——

Note: "R" factors were calculated using a K factor of 0.2575 (0.25 plus 3% 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.

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