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 six foot 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 protective coating is needed. For severe outdoor exposure (rooftop applications), K-FLEX® 374 Protective Coating, approved jacketing or K-FLEX Clad® AL is recommended.

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 1056-00-2C1
- 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
- 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

K-FLEX USA INNOVATION IN INSULATION

UL 94 (Recognition No. E300774)

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

FM APPROVED

Made in USA

Contains a Protective Antimicrobial Agent

GREENGUARD Children & Schools Indoor Air Quality Certified

Physical Properties		INSUL-TUBE® Insulation	Test Methods
Thermal Conductivity (K)	90° F (32° C) Mean Temp	0.27 (.039)	ASTM C 177/C 518
BTU -in/hr - Ft² - °F (W/mK)	75° F (24° C) Mean Temp	0.25 (.036)	ASTM C 177/C 518
Density		3-6 PCF	ASTM D 1622/D 3575
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 2" wall)		Not greater than 25	ASTM E 84
Smoke Developed (up to 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	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	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 2" 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

Nominal Insulation ID	R Value 3/8" wall	R Value 1/2" wall	R Value 3/4" wall	R Value 1" wall	R Value 1-1/4" wall	R Value 1-1/2" wall	R Value 2" wall
3/8"	2.6	3.5	5.5	——	——	——	——
1/2"	2.5	3.3	5.2	——	——	——	——
5/8"	2.4	3.2	5.3	7.4	10.3	12.5	17.5
3/4"	2.3	3.0	5.3	7.3	9.7	11.8	16.5
7/8"	2.2	3.1	5.3	7.0	9.3	11.3	15.8
1-1/8"	2.3	3.1	5.5	7.1	8.7	10.8	15.5
1-3/8"	2.1	3.1	5.2	7.2	8.3	10.0	14.6
1-5/8"	2.5	3.1	5.2	7.1	8.0	9.8	14.4
1-1/2" IPS	2.4	3.0	5.0	6.7	7.6	9.3	13.6
2-1/8"	2.5	3.2	5.0	6.8	7.5	9.3	13.4
2" IPS	2.5	3.1	4.9	6.6	7.3	9.1	13.0
2-1/2" IPS	2.5	3.2	4.8	6.4	7.0	8.7	12.4
2-5/8"	2.4	3.2	4.8	6.5	7.1	8.8	12.7
3-1/8"	2.3	3.1	4.6	6.2	6.9	8.4	12.2
3" IPS	2.4	3.3	4.7	6.2	6.9	8.4	11.9
3-5/8"	2.3	3.2	4.6	6.0	6.8	8.2	11.8
4-1/8"	2.3	3.1	4.6	5.9	6.6	8.0	11.5
4" IPS	2.3	3.2	4.6	5.9	6.7	7.9	11.4
5" IPS	——	3.0	4.3	5.6	6.4	7.5	10.9
6" IPS	——	3.1	4.4	5.7	6.3	7.5	10.6
8" IPS	——	3.0	4.3	——	——	——	——

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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