

K-FLEX® LS TUBE

Flexible, closed-cell elastomeric pipe insulation
Designed for the professional contractor



DESCRIPTION

K-FLEX® LS TUBE is an environmentally-friendly, CFC-free, flexible elastomeric thermal pipe 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. K-FLEX® LS TUBE key physical properties are approved through supervision by *Factory Mutual Research Corporation*.

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

APPLICATIONS

K-FLEX® LS 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 loss for hot water plumbing, liquid heating, dual temperature piping, and many solar systems.

K-FLEX® LS TUBE is recommended for applications ranging from -297°F to 220°F (-182°C to 104°C). The expanded closed-cell structure makes K-FLEX® LS TUBE an efficient insulator and an effective moisture vapor retarder. K-FLEX® LS TUBE can be used with heat tracing/heat tapes. K-FLEX® LS TUBE has a very tough skin that withstands tearing, rough handling, and severe environmental conditions, yet is flexible for easy installation. K-FLEX® LS TUBE has superior cold weather flexibility.

INSTALLATION

With a factory-applied coating of talc on the

smooth inner surface, K-FLEX® LS 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 K-FLEX® LS 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 covers, flanges, etc. from K-FLEX® LS 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

K-FLEX® LS TUBE is made from a UV-resistant elastomeric blend. For moderate UV exposure, no additional protection is needed. For severe UV exposure (rooftop applications) or for optimum performance, K-FLEX® 374 Protective Coating, appropriate 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 K-FLEX® LS 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 K-FLEX® LS TUBE effectively retards the flow of moisture vapor, and is considered a low transmittance vapor retarder. For most indoor applications, K-FLEX® LS TUBE needs no ad-

ditional protection. Additional vapor barrier protection may be necessary for K-FLEX® LS TUBE when installed on low temperature surfaces that are exposed to continuous high humidity.

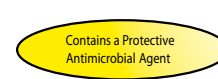
FLAME AND SMOKE RATING

K-FLEX® LS 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". K-FLEX® LS TUBE 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 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



PHYSICAL PROPERTIES		K-FLEX LS® TUBE	TEST METHODS
THERMAL CONDUCTIVITY (K)	90°F (32°C) MEAN TEMP	0.258 (0.0372)	ASTM C 177/C 518
BTU - IN/HR - FT ² - °F (W/MK)	75°F (24°C) MEAN TEMP	0.245 (0.0353)	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)

K-FLEX LS® 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

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.



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