

# 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 applications, no additional protection is needed. However, for severe UV exposure applications (rooftop applications) or where optimum performance is required, K-FLEX® 374 Protective Coating, appropriate jacketing or K-FLEX Clad® AL should be used. For more detailed information refer to the *Installation Guide*.

## 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 additional 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
- Complies with requirements of CAN/ULC S102-M88 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



# K-FLEX® LS TUBE PRODUCT DATA

## Physical Properties

Temperature Range Tubes	-297°F to +220°F (-182°C to +104°C)	ASTM C 411	Odor	Negligible	
Color	Black		Ozone resistance	Good	ASTM D 1171
Thermal Conductivity	75°F Mean temp 0.245 BTU-in/hr-ft <sup>2</sup> -°F	ASTM C 177 ASTM C 518	% closed cells	>90	
Water vapor permeability	0.03 perm-in	ASTM E 96	Dimensional Stability	<4.0 @ 220°F	ASTM C 534
Water absorption %	0 (volume change)	ASTM C 209	Flame Spread (up to 2" wall)	Not greater than 25	ASTM E 84
Resistance to oil & greases	Good		Smoke Developed (up to 2" wall)	Not greater than 50	ASTM E 84
Density	3 pcf to 6 pcf	ASTM D 1622 ASTM D 3575	Flexibility	Excellent	
Resistance to U.V. & weather	Good <sup>1</sup>		Mildew / Air Erosion Resistance	Excellent	UL 181

<sup>1</sup> Outdoor applications should be protected with K-FLEX® 374 Protective Coating (2 or more coats), approved jacketing, or K-FLEX Clad® WT or AL applied to the recommended thickness.

## 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

\*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 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 high humidity, additional thickness of insulation may be required.

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

PIPE "R" VALUES PER SQUARE FOOT								
PIPE O.D. OR NOMINAL INS	"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 1-1/4" (32 MM) WALL	"R" VALUE 1-1/2" (38 MM) WALL	"R" VALUE 2" (50 MM) WALL	
3/8"	10 mm	2.7	3.6	5.6	—	—	—	—
1/2"	13 mm	2.5	3.4	5.4	—	—	—	—
5/8"	16 mm	2.5	3.3	5.4	7.5	10.5	12.8	17.8
3/4"	19 mm	2.3	3.1	5.4	7.5	9.9	12.1	16.8
7/8"	22 mm	2.3	3.2	5.4	7.2	9.5	11.6	16.1
1-1/8"	29 mm	2.2	3.1	5.5	7.1	8.9	10.8	15.8
1-3/8"	35 mm	2.2	3.2	5.3	7.3	8.4	10.2	14.9
1-5/8"	41 mm	2.4	3.1	5.1	7.1	8.1	9.8	14.6
1-1/2" IPS	48 mm	2.3	3.0	4.9	6.7	7.7	9.3	13.8
2-1/8"	54 mm	2.3	3.0	4.9	6.6	7.6	9.2	13.6
2" IPS	60 mm	2.3	2.9	4.8	6.5	7.4	9.0	13.3
2-1/2" IPS	64 mm	2.5	3.0	4.6	6.3	7.2	8.6	12.6
2-5/8"	67 mm	2.3	3.1	4.7	6.4	7.3	8.8	12.9
3-1/8"	79 mm	2.3	3.0	4.6	6.2	7.1	8.5	12.4
3" IPS	89 mm	2.3	3.2	4.6	6.1	7.0	8.3	12.2
3-5/8"	92 mm	2.3	3.2	4.6	6.1	6.9	8.3	12.1
4-1/8"	105 mm	2.3	3.1	4.6	6.0	6.8	8.1	11.7
4" IPS	114 mm	2.3	3.2	4.7	6.0	6.8	8.1	11.6
5" IPS	140 mm	—	3.2	4.5	5.9	6.6	7.8	11.1
6" IPS	168 mm	—	3.1	4.5	5.8	6.5	7.6	10.9
8" IPS	219 mm	—	3.1	4.4	—	—	—	—

Note: "R" factors were calculated using a K factor of 0.245 (0.245 plus 3% test error allowance at 75°F, 24°C mean temp.) and nominal wall thickness. Lower operating temperatures will result in improved R values. Contact Technical Services for specific recommendations.



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