

K-FLEX™ LS TUBE

UL 94
(Recognition No. E147665)
UV resistant Refer to K-Flex USA L.L.C.
Technical Bulletin
(Outdoor Applications) for More Information



Flexible closed cell elastomeric pipe insulation
Designed for the professional contractor
Contains Bio-Guard™, a proprietary antimicrobial agent.



Tube Unslit

DESCRIPTION

K-FLEX™ LS Pipe Insulation is an environmentally friendly, CFC-free, flexible elastomeric thermal insulation. It is black in color, identified as K-FLEX™ LS, 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. K-FLEX™ LS key physical properties are approved through supervision by Factory Mutual Research Corporation. K-FLEX™ LS Tube is non-porous, non-fibrous and resists mold growth.

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

K-FLEX™ LS 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 is designed for the professional contractor.

K-FLEX™ LS 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 an efficient insulator and an effective moisture vapor retarder.

K-FLEX™ LS has a very tough skin which withstands tearing, rough handling, and severe environmental conditions, and yet is quite flexible for easy installation. K-FLEX™ LS has superior cold weather flexibility. K-FLEX™ LS Tube can be used with heat tracing/heat tapes.

INSTALLATION

With a factory-applied coating of talc on the smooth inner surface, K-FLEX™ LS 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 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 K-FLEX™ LS SHEET.

OUTDOOR APPLICATIONS

K-FLEX™ LS Pipe Insulation 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, 374 UV Protective Coating or appro-

appropriate jacketing or cladding 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 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.

RESISTANCE TO MOISTURE VAPOR FLOW

The closed-cell structure and unique formulation of K-FLEX™ LS effectively retards the flow of moisture vapor, and is considered a low transmittance vapor retarder. For most indoor applications, K-FLEX™ LS needs no additional protection.

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

FLAME AND SMOKE RATING

K-FLEX™ LS Pipe Insulation in wall thicknesses of 1½" (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." K-FLEX™ LS 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 1056-00-2C1
New York City MEA 186-86-M Vol. IV
USDA Requirements

UL 94-5V Flammability Classification (Recognition No. E300774)
ASTM E 84 1" 25/50-tested according to UL 723 and NFPA 255
Complies with requirements of CAN/ULC S102-M88

FMRC Approval Guide

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)

Made in USA

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 |
| Thermal Conductivity | 75°F Mean temp 0.25 BTU-in/hr-ft ² -°F | ASTM C 177 ASTM C 518 | % closed cells | >90 |
| Water vapor permeability | <0.06 perm-in | ASTM E 96 | Dimensional Stability | <4.0 @ 220°F ASTM C 534 |
| Water absorption % | <0.20 by volume | ASTM C 209 | Flame Spread (up to 1" wall) | Not greater than 25 ASTM E 84 |
| Resistance to oil & greases | Good | | Smoke Developed (up to 1" 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 ¹ | | | |

¹ Outdoor applications should be protected with an approved K-Flex coating applied to the recommended thickness. Two or more coats may be required.

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 in thickness noted within the specified temperature ranges will prevent condensation on indoor piping under design conditions defined below.

Thickness recommendations above 1-1/2" 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 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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