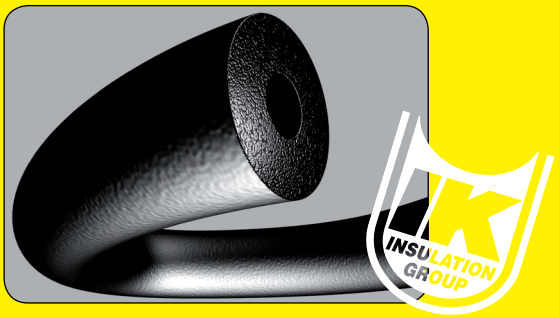
K-FLEX® INSUL-TUBE®

Closed Cell Flexible Elastomeric Foam Insulation



DESCRIPTION

K-FLEX® INSUL-TUBE® is an NBR/PVC-based closed cell, flexible elastomeric foam insulation. It is environmentally-friendly as it is free of CFCs, HFCs, HCFCs, PBDEs, formaldehyde and fibers. An EPA-registered antimicrobial agent is incorporated into the product providing additional protection against mold, fungal and bacterial growth. It is UL GREENGUARD® Gold Certified for low VOC emissions. The product's key physical properties are approved by Factory Mutual. The product is made in K-FLEX USA's ISO 9001:2008-certified manufacturing facility in North Carolina.

AVAILABILITY

K-FLEX® INSUL-TUBE® is black in color and is available in non-slit, 6' length tube form in wall thicknesses of 3/8" up to 2" in diameter sizes ranging from 3/8" I.D. to 8" IPS. (ID range is subject to variation depending on wall thickness).

APPLICATIONS

K-FLEX® INSUL-TUBE® is recommended for applications with service temperatures ranging from -297°F (-182°C) to +220°F (+104°C). For applications below -40°F (-40°C), contact K-FLEX technical support. The product is used to retard heat gain and prevent condensation or frost formation on below-ambient applications, including refrigerant, cold water plumbing, chilled water, and industrial process lines, among others. It can be used with heat tracing tapes. It also retards heat loss from medium hot systems, including hot water plumbing, liquid heating, dual temperature, and solar thermal piping, among others.

OUTDOOR APPLICATIONS

K-FLEX® INSUL-TUBE® is made from a UV-resistant elastomeric blend. For low-to-moderate UV exposure (residential applications), no additional protection is needed. For severe UV exposure (rooftop applications) or for optimum performance, K-FLEX® 374 Protective Coating, approved jacketing or K-FLEX Clad® is recommended.

UNDERGROUND APPLICATIONS

K-FLEX® INSUL-TUBE® is acceptable for use in buried applications using the same installation principles as above ground applications. For lines above the water table, use a clean fill such as sand (3"-5" layer) to protect the insulation before backfilling. For optimum performance, the lines should be encased in a conduit to protect them from problems associated with ground water intrusion and compaction. If a conduit is not used, the insulation thickness should be increased by one thickness size to compensate for compaction.

INSTALLATION

K-FLEX® INSUL-TUBE® is flexible (even at low temperatures), durable (non-fracturing and skin is resistant to tearing from handling and environment), safe to handle (non-dusting and non-abrasive), and lightweight for an efficient installation.

K-FLEX recommends that insulation is installed on non-operational systems with clean, dry surfaces in ambient conditions between 40°F and 100°F. Properly sized insulation tubing can be slid over piping (tubing should be pushed, not pulled) or, when applied to existing lines, can be slit lengthwise (using a sharp, non-serrated knife) and fitted into place. All seams, butt joints, termination points and open ends should be sealed with an approved contact adhesive, making sure both surfaces to be joined are coated. Longitudinal seams should face downward and vapor stops should be installed as needed. Fittings (elbows, tees, p-traps) and special parts (flanges, valves, etc.) can be field-fabricated from insulation tubes and sheets or K-Fit® factory-fabricated fittings can be used. ASTM C1710, *Installation Guide for Flexible Closed Cell Foams*, and the *K-FLEX Installation Manual* should be used as comprehensive installation guides.

RESISTANCE TO MOISTURE VAPOR FLOW

The expanded closed cell structure and unique formulation inherently resists moisture vapor intrusion and is considered a Class 1 vapor retarder per ASHRAE. For most indoor applications, K-FLEX® INSUL-TUBE® needs no additional protection. Additional vapor barrier protection may be necessary when installed on cold surfaces that are exposed to continuous high humidity.

FLAME AND SMOKE RATING

K-FLEX® 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 to ASTM E84, "Surface Burning Characteristics of Building Materials". It 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 C534 Type 1, Grade 1
- ASTM D1056-00-2B1
- New York City MEA 186-86-M Vol. V
- USDA Compliant
- CFIA Compliant
- RoHS Compliant
- UL 94-5V Flammability Classification (#E300774)
- ASTM E84 25/50-rated (to 2") - tested to UL 723, NFPA 255 and CAN/ULC S102-03
- FMVSS 302
- FAR 25.853
- FMRC Approval Guide: Chapter 14 Pipe Insulation
- NFPA No. 101 Class A Rating
- NFPA 90A, 90B
- MIL-P-15280, Form T
- Meets requirements of California ECB Title 24
- UL GREENGUARD® Gold Certified
- Meets energy code requirements of ASHRAE 90.1 and 189.1

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FM APPROVED

GREENGUARD GOLD

Contains a Protective Antimicrobial Agent

Made in USA

PHYSICAL PROPERTIES		K-FLEX® INSUL-TUBE®	TEST METHODS
Main Composition		Flame-retarded NBR/PVC-based elastomeric foam	
Thermal Conductivity (K) Btu-in/hr-Ft²-°F (W/mK)	90°F (32°C) Mean Temp 75°F (24°C) Mean Temp 32°F (0°C) Mean Temp	0.258 (0.0372) 0.245 (0.0353) 0.235 (0.0339)	ASTM C177
Density		3-6 lb/ft³	ASTM D1667
Operating Temperature Range		-297°F* (-183°C) to +220°F (+104°C)	ASTM C534
Water Vapor Permeability (Dry Cup)		<0.01 perm-in	ASTM E96
Water Absorption (Volume Change)		0%	ASTM C209
Flame Spread / Smoke Development (up to 2" wall)		<25/50	ASTM E84
Dimensional Stability		<7% Linear Shrinkage	ASTM C534
Hot Surface Performance (220°F)		No Cracking or Delamination	ASTM C411
Ozone Resistance		Pass	ASTM D1171
Odor Emissions		No Objectionable Odor	ASTM C1304
Chemical/Solvent/Oil/Grease Resistance		Good	Compatibility Data Available on Request
Flexibility		Excellent Pass: Cold Crack Test at -40°F (-40°C)	ASTM C534 ASTM D1056
Mildew Growth Resistance/Air Erosion		Pass	UL 181, ASTM G21
Corrosion Risk		pH neutral: 6.6±0.04	DIN 1988
Leachable Chlorides		<0.05% water-soluble chloride ions	DIN 1988
UV / Weather Resistance[1]		Pass	QUV Chamber Test
Sound Transmission Class (1")		13	ASTM E90

*For applications below -40°F (-40°C), contact K-FLEX technical support.
[1] Outdoor applications should be protected with an approved K-FLEX® coating or cladding.

THICKNESS RECOMMENDATIONS (TO PREVENT CONDENSATION)

SERVICE TEMPERATURE	50°F (10°C)			35°F (2°C)			0°F (-18°C)			-20°F (-29°C)		
Pipe Size	**Mild**	**Normal**	**Severe**	**Mild**	**Normal**	**Severe**	**Mild**	**Normal**	**Severe**	**Mild**	**Normal**	**Severe**
3/8" ID to 1-1/8" ID	3/8"	3/8"	3/4"	3/8"	1/2"	3/4"	1/2"	3/4"	1-1/2"	1/2"	1"	1-1/2"
1-3/8" ID to 3" IPS	3/8"	3/8"	3/4"	3/8"	3/4"	1"	1/2"	1"	1-1/2"	3/4"	1-1/2"	1-1/2"
4" IPS to 8" IPS	1/2"	1/2"	3/4"	1/2"	3/4"	1"	3/4"	1"	2"	3/4"	1-1/2"	2"

Thickness listed for the specified ranges will prevent condensation on indoor piping under the defined design conditions. Normal: 85°F and 70% R.H. Mild: Most air conditioned spaces and arid climates: 80°F and 50% R.H. Severe: Areas where excessive moisture is introduced or in poorly ventilated areas where the temperature may be depressed below the ambient: 90°F and 80% R.H. Contact K-FLEX technical support for additional information.

PIPE "R" VALUES PER SQUARE FOOT (ALL SIZES ARE NOMINAL)

NOMINAL INSULATION I.D.	3/8" WALL	1/2" WALL	3/4" WALL	1" WALL	1-1/2" WALL	2" WALL
3/8"	2.7	3.6	5.6	8.5	14.6	20.4
1/2"	2.5	3.4	5.4	7.9	13.5	18.9
5/8"	2.5	3.3	5.4	7.5	12.8	17.8
3/4"	2.3	3.1	5.4	7.5	12.4	16.8
7/8"	2.3	3.2	5.4	7.2	11.6	16.1
1-1/8"	2.2	3.1	5.5	7.1	10.8	15.8
1-3/8"	2.2	3.2	5.3	7.3	10.2	14.9
1-5/8"	2.4	3.1	5.1	7.1	9.8	14.6
1-1/2" IPS	2.0	2.6	4.4	6.2	8.9	13.8
2-1/8"	2.3	3.0	4.9	6.6	9.2	13.6
2" IPS	2.3	2.9	4.8	6.5	9.0	13.3
2-1/2" IPS	2.3	3.0	4.6	6.3	8.6	12.6
2-5/8"	2.3	3.1	4.7	6.4	8.8	12.9
3-1/8"	2.3	3.0	4.6	6.2	8.5	12.4
3" IPS	2.3	3.2	4.6	6.1	8.3	12.2
3-5/8"	2.3	3.2	4.6	6.1	8.3	12.1
4-1/8"	2.3	3.1	4.6	6.0	8.1	11.7
4" IPS	2.2	3.2	4.6	5.5	8.0	11.6
5" IPS	——	3.0	4.5	5.7	7.7	11.1
6" IPS	——	3.0	4.4	5.6	7.5	10.9
8" IPS	——	2.9	4.2	5.3	7.2	——

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INDS-0001-0215