

INSUL-SHEET®

CLOSED CELL FLEXIBLE ELASTOMERIC
FOAM INSULATION

DESCRIPTION

K-FLEX® INSUL-SHEET® 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 is made in K-FLEX® USA's ISO 9001:2008-certified manufacturing facility in North Carolina.

AVAILABILITY

K-FLEX® INSUL-SHEET® is black in color and is available in flat sheet (3' x 4') or roll (4' wide) form in thicknesses of 1/8" up to 2". (The product is supplied skin-two-sides in 1/4" thickness and above).

APPLICATION

K-FLEX® INSUL-SHEET® is recommended for applications with service temperatures ranging from -297°F (-182°C) to +220°F (+104°C). For full adhesion applications (i.e. ductwork), the upper temperature limit is +200°F (+93°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 utility and industrial process equipment, tanks, vessels, ducts and large OD pipes. It can be used with heat tracing tapes. It also retards heat loss from medium hot surfaces.

OUTDOOR APPLICATION

K-FLEX® INSUL-SHEET® is made from a UVretardant elastomeric blend. For severe UV exposure (rooftop applications), reduction of surface defects, or for optimum performance, K-FLEX® 374 Protective Coating, approved jacketing or K-FLEX® Clad® is recommended.

UNDERGROUND APPLICATIONS

K-FLEX® INSUL-SHEET® 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.

INSTALLATIONS

K-FLEX® INSUL-SHEET® is flexible (even at low temperatures), durable (non-fracturing and skin is resistant to tearing from handling and environment), safe to handle (nondusting 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 sheets can be installed onto large OD round surfaces or flat surfaces. For round surfaces (piping or ductwork), the sheet should be wrapped (without stretching the insulation) around the pipe and sealed at the longitudinal seam with an approved contact adhesive. All seams, butt joints, termination points and open ends should be sealed with adhesive, making sure both surfaces to be joined are coated. For ductwork and equipment, 100% coverage of an approved contact adhesive should be used, making sure to coat both surfaces. Compression joints should be used on all butt edges.

Fittings (elbows, tees, p-traps) and special parts (flanges, valves, etc.) can be fieldfabricated from insulation sheets. 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-SHEET® 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-SHEET® in 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 2, Grade 1
- ASTM D1056-00-2B1
- New York City MEA 186-86-M Vol. V
- USDA Compliant
- CFIA Compliant
- RoHS Compliant
- UL 94-5V, V0 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
- NFPA No. 101 Class A Rating
- NFPA 90A, 90B
- MIL-P-15280, Form S
- R-8 (2") meets IECC requirements for Outdoor Ductwork
- UL GREENGUARD® Gold Certified
- Meets energy code requirements of ASHRAE 90.1 and 189.1

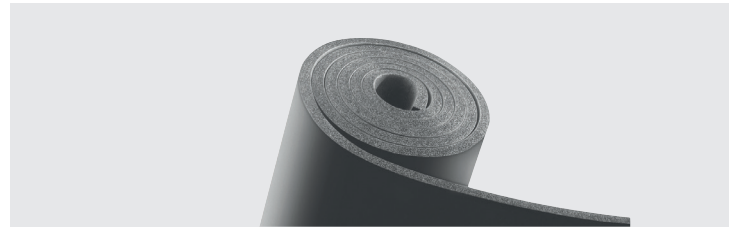
The K-FLEX® USA website contains the most recent version of all K-FLEX® USA literature. Please refer to the website for current versions of K-FLEX® USA literature at www.kflexusa.com



Contains a Protective
Antimicrobial Agent



www.kflexusa.com



K-FLEX® K-FLEX® INSUL-SHEET® ► TECHNICAL DATA

▼ Physical properties ▼	▼ K-FLEX® INSUL-SHEET® ▼	▼ Test methods ▼
Main Composition	Flame-retarded NBR/PVC-based elastomeric foam	
Thermal Conductivity (K) Btu-in/hr-Ft ² -°F (W/mK)	90°F (32°C) Mean Temp = 0.258 (0.0372) 75°F (24°C) Mean Temp = 0.245 (0.0353) 32°F (0°C) Mean Temp = 0.235 (0.0339)	ASTM C177
Density	3-6 lb/ft ³	ASTM D1667
Operating Temperature Range	-40°F (-40°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
Flammability	Self-Extinguishing	ASTM D635
Dimensional Stability	<7% Linear Shrinkage	ASTM C534
Hot Surface Performance (250°F for 96 hours)	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	Good	ASTM G90
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 for optimum performance.

K-FLEX® K-FLEX® INSUL-SHEET® ► THICKNESS RECOMMENDATIONS - TO PREVENT CONDENSATION

SERVICE TEMPERATURE	50°F (10°C)			35°F (2°C)			0°F (-18°C)			-20°F (-29°C)		
▼ Surface Size ▼	▼ Mild ▼	▼ Normal ▼	▼ Severe ▼	▼ Mild ▼	▼ Normal ▼	▼ Severe ▼	▼ Mild ▼	▼ Normal ▼	▼ Severe ▼	▼ Mild ▼	▼ Normal ▼	▼ Severe ▼
Flat Surface or Pipe ≥48"	1/8"	1/2"	3/4"	1/4"	3/4"	1-1/2"	1/2"	1"	2"	3/4"	1-1/2"	2-1/2"

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.

K-FLEX® INSUL-SHEET® ► SOUND ABSORPTION COEFFICIENTS AT FREQUENCY (HZ) (ASTM C423)

▼ Thickness ▼	▼ 125 ▼	▼ 250 ▼	▼ 500 ▼	▼ 1000 ▼	▼ 2000 ▼	▼ 4000 ▼	▼ NRC ▼
1/2" (12mm)	0.03	0.02	0.06	0.10	0.22	0.27	0.10
1" (25mm)	0.00	0.07	0.13	0.59	0.20	-0.05	0.25
1-1/2" (38mm)	0.00	0.15	0.81	0.29	0.31	0.27	0.40
2" (50mm)	0.22	0.65	0.48	0.54	0.47	0.45	0.55

K-FLEX® INSUL-SHEET® ► "R" VALUES (ALL SIZES ARE NOMINAL)

▼ 3/8" ▼	▼ 1/2" ▼	▼ 3/4" ▼	▼ 1" ▼	▼ 1-1/2" ▼	▼ 2" ▼
1.5	2	3	4	6	8

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).

APPLICATION

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. K-FLEX® USA NBR/PVC elastomeric insulation products can withstand temperature "spikes" up to 250°F (121°C). Because these spikes can vary in temperature and duration, long term effects may vary. Refer to technical bulletin TA36 for additional information.

OUTDOOR APPLICATION

K-FLEX® INSUL-TUBE® is made from a UV-resistant elastomeric blend. 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.

INSTALLATIONS

K-FLEX® INSUL-TUBE® is flexible (even at low temperatures), durable (nonfracturing 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 HF-1, V-0, 5VA Flammability Classification, File #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

The K-FLEX® USA website contains the most recent version of all K-FLEX® USA literature.

Please refer to the website for current versions of K-FLEX® USA literature at www.kflex.com/en-us



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K-FLEX® INSUL-TUBE® ► TECHNICAL DATA

▼ Physical properties ▼		▼ Insul-tube® ▼	▼ Test methods ▼
Thermal Conductivity (K)	90°F (32°C) Mean Temp	0.258 (0.0372)	ASTM C 177
BTU - in/hr - Ft² - °F (W/mK)	75°F (24°C) Mean Temp	0.245 (0.0353)	
	32°F (0°C) Mean Temp	0.235 (0.0339)	
Density		3-6 lb/ft³	ASTM D 1667
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 (250°F for 96 hours)		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 Resistance¹		Pass	QUV Chamber Test
Sound Transmission Class (1")		13	ASTM E90

*For applications below -40°F (-40°C), contact K-FLEX® technical support.

**Intermittent temperature "spikes" to 250°F (121°C)

¹ Outdoor applications should be protected with an approved K-FLEX® coating or cladding.

K-FLEX® INSUL-TUBE® ► 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 ▼
1/4" 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.

K-FLEX® INSUL-TUBE® ► 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 ▼
1/4"	2.9	4.2	6.4	10.1	17.9	23.0
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	9.9	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	-