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.

**DESCRIPTION**

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 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 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 field-fabricated 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.

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

**OUTDOOR APPLICATION**

K-FLEX® INSUL-SHEET® is made from a UV-retardant elastomeric blend. For severe UV exposure (roof-top 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 (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 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 field-fabricated 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.

**RESISTENCE 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 (Exempt: Equipment)<br>  (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
TECHNICAL DATA

**PHYSICAL PROPERTIES**

<table>
<thead>
<tr>
<th>Test Methods</th>
<th>Test Methods</th>
<th>Test Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM C177</td>
<td>ASTM D1667</td>
<td>ASTM C209</td>
</tr>
<tr>
<td>ASTM D635</td>
<td>ASTM C534</td>
<td>ASTM E96</td>
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<tr>
<td>ASTM D1171</td>
<td>ASTM C1304</td>
<td>Compatibility Data Available on Request</td>
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<td>ASTM D1056</td>
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<tr>
<td>ASTM E84</td>
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<td>ASTM C534</td>
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<td>ASTM D635</td>
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<td>ASTM D1171</td>
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<td></td>
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<tr>
<td>Compatibility Data Available on Request</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Main Composition**

Flame-retarded NBR/PVC-based elastomeric foam

**Thermal Conductivity (K) (Btu-in/hr-Ft°-F (W/mK))**

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Mean Temp</th>
<th>ASTM C177</th>
</tr>
</thead>
<tbody>
<tr>
<td>90°F (32°C)</td>
<td>0.258</td>
<td>0.0372</td>
</tr>
<tr>
<td>75°F (24°C)</td>
<td>0.245</td>
<td>0.0353</td>
</tr>
<tr>
<td>32°F (0°C)</td>
<td>0.235</td>
<td>0.0339</td>
</tr>
</tbody>
</table>

**Density**

3-6 lb/ft³

**Operating Temperature Range**

-40°F (-40°C) to +200°F (93°C)

**Water Vapor Permeability (Dry Cup)**

<0.01 perm-in

**Water Absorption (Volume Change)**

0%

**Flame Spread / Smoke Development (up to 2" wall)**

<25/50

**Flammability**

Self-Extinguishing

**Dimensional Stability**

<7% Linear Shrinkage

**Hot Surface Performance (250°F for 96 hours)**

No Cracking or Delamination

**Ozone Resistance**

Pass

**Odor Emissions**

No Objectionable Odor

**Chemical/Solvent/Oil/Grease Resistance**

Good

**Flexibility**

Excellent

**Mildew Growth Resistance/Air Erosion**

Pass

**Corrosion Risk**

pH neutral: 6.6±0.04

**Leachable Chlorides**

<0.05% water-soluble chloride ions

**UV / Weather Resistance**

Good

**Sound Transmission Class (1")**

13

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

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

**THICKNESS RECOMMENDATIONS (TO PREVENT CONDENSATION)**

<table>
<thead>
<tr>
<th>Surface Size</th>
<th>Mild</th>
<th>Normal</th>
<th>Severe</th>
<th>Mild</th>
<th>Normal</th>
<th>Severe</th>
<th>Mild</th>
<th>Normal</th>
<th>Severe</th>
<th>Mild</th>
<th>Normal</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat Surface or Pipe ≥48&quot;</td>
<td>1/8&quot;</td>
<td>1/2&quot;</td>
<td>3/4&quot;</td>
<td>1/4&quot;</td>
<td>3/4&quot;</td>
<td>1-1/2&quot;</td>
<td>1/2&quot;</td>
<td>1&quot;</td>
<td>2&quot;</td>
<td>3/4&quot;</td>
<td>1-1/2&quot;</td>
<td>2-1/2&quot;</td>
</tr>
</tbody>
</table>

Thickness listed for the specified ranges will prevent condensation on indoor piping under the defined design conditions. Normal: 65°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.

**SOUND ABSORPTION COEFFICIENTS AT FREQUENCY (Hz) (ASTM C423)**

<table>
<thead>
<tr>
<th>Thickness</th>
<th>125</th>
<th>250</th>
<th>500</th>
<th>1000</th>
<th>2000</th>
<th>4000</th>
<th>6000</th>
<th>NRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot; (12mm)</td>
<td>0.03</td>
<td>0.02</td>
<td>0.06</td>
<td>0.10</td>
<td>0.22</td>
<td>0.27</td>
<td>0.10</td>
<td></td>
</tr>
<tr>
<td>1&quot; (25mm)</td>
<td>0.00</td>
<td>0.07</td>
<td>0.13</td>
<td>0.59</td>
<td>0.20</td>
<td>-0.05</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>1-1/2&quot; (38mm)</td>
<td>0.00</td>
<td>0.15</td>
<td>0.81</td>
<td>0.29</td>
<td>0.31</td>
<td>0.27</td>
<td>0.40</td>
<td></td>
</tr>
<tr>
<td>2&quot; (50mm)</td>
<td>0.22</td>
<td>0.65</td>
<td>0.48</td>
<td>0.54</td>
<td>0.47</td>
<td>0.45</td>
<td>0.55</td>
<td></td>
</tr>
</tbody>
</table>

*"R" VALUES (ALL SIZES ARE NOMINAL)*

<table>
<thead>
<tr>
<th>Thickness</th>
<th>3/8&quot;</th>
<th>1/2&quot;</th>
<th>3/4&quot;</th>
<th>1&quot;</th>
<th>1-1/2&quot;</th>
<th>2&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>