IN CLAD Jacketing

new thermoformable covering

L'ISOLANTE K-FLEX
A NEW GENERATION OF INSULATION MATERIALS
www.kflex.com
Mission:

We **K-FLEX** understand the very unique and individual needs of our customers this is why we feel that our thermal and acoustic system should be engineered to meet each specific project requirements.

“**K-FLEX** is present from design to completion of your project to insure that you have the best possible solution for your project.”

Company Profile

**L’ISOLANTE K-FLEX**

is an Italian manufacturing company specialising in the production of thermal and acoustic elastomeric insulation materials. The company has production facilities and subsidiary networks around the globe in order to supply their products to a worldwide customer base. Its diversified product range provides solutions for various market sectors, including building, transportation, petrochemical and renewable energy.

**L’ISOLANTE K-FLEX**

is a worldwide market leader thanks to its focus on technological innovation and the quality of its products that play an essential role in energy consumption control and the reduction of greenhouse gas emission.

**L’ISOLANTE K-FLEX**

is present in 43 countries, with 12 production facilities and more than 1,500 employees. In addition, the company has a strong commercial distribution network and branches, located all over the world, for the efficient and effective global distribution process of its products.

The Company is **UNI EN ISO 9001:2008** registered and has over one thousand additional certifications for products that guarantee quality, reliability and performance standards for the whole insulation market.

**IN THE WORLD**

L’ISOLANTE K-FLEX has 11 production facilities located in:

- Italy (Roncello - Headquarters)
- Russia
- China (3 plants)
- Turkey
- Poland
- USA
- India
- Malaysia
- Dubai
- Poland

L’ISOLANTE K-FLEX also has commercial distribution branches in Spain, Norway, Germany, France, United Kingdom, Russia, Ukraine, Singapore, Australia, Egypt, Czech Republic / Slovakia, Baltic States, Romania and Japan.
QUALITY

The UNI EN ISO-9001 : 2008 certification guaranties that we are maintaining a high standard of quality for our customer satisfaction. This is based on efficient working process throughout the entire organisation.

At L’ISOLANTE K-FLEX the quality system provides a structured approach to help employees to achieve the highest quality standards.

HEALTH, SAFETY & ENVIRONMENT
L’ISOLANTE K-FLEX strongly supports a policy of sustainable development, that is a development through environmental protection, social responsibility and economic progress. We believe in helping to meet the needs of community today while understanding the need of future generations.

L’ISOLANTE K-FLEX has a long history of ensuring the health and safety of its employees. L’ISOLANTE K-FLEX has invested in health and safety world-wide in a number of ways, including providing health and safety training, personal protective equipment, and through capital investment in health and safety throughout the company.

At L’ISOLANTE K-FLEX, we believe that every accident, and therefore every injury, is preventable. Safety is integrated into all work practices, combining training programmes with safety regulations at manufacturing plants.
K-FLEX IN CLAD Jacketing

K-FLEX IN CLAD special polymer cladding is suitable and well recognised solution for Oil&Gas, Industrial, Petrochemical and Marine applications. The clever and easy to install solution suitable to protect thermal insulation material (MMF, PU, Cellular glass, FEF, etc.) in order to offer: Water and Vapour tight, Oil and grease resistance, reduces the risk for CUI, UV stability, Marine salt water resistance and Mechanical resistance.

K-FLEX IN CLAD special polymer jacketing, thermoformable that reduce installation time and keep maintenance costs low.

RANGE

<table>
<thead>
<tr>
<th>Colour</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>1 x 10m 1 x 25m 1 x 50m 1 x 175m</td>
</tr>
<tr>
<td>Gray</td>
<td>1 x 10m 1 x 25m 1 x 50m 1 x 175m</td>
</tr>
<tr>
<td>Beige*</td>
<td>1 x 10m 1 x 25m 1 x 50m 1 x 175m</td>
</tr>
</tbody>
</table>

* Customized colours available on demand for M.O.Q. orders.

JACKETING ACCESSORIES

- IN CLAD Band
- Cleaner K-420
- K-420/K425 Glue
- K-Mastic 55

WIDER RANGE OF FITTING AVAILABLE ON DEMAND

- Elbows, “T” pieces, Valves, Reductions, Pipe Supports, Endcaps and Flanges

www.kflex.com
**TECHNICAL DATA**

**IN CLAD SYSTEM with K-FLEX ST**

<table>
<thead>
<tr>
<th>PROPERTIES</th>
<th>VALUES</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Flexible polymeric barrier</td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>Grey and Black</td>
<td></td>
</tr>
<tr>
<td>Thickness</td>
<td>1.2±0.2 mm</td>
<td></td>
</tr>
<tr>
<td>MAX Surface Temperature</td>
<td>80°C (176°F)</td>
<td></td>
</tr>
<tr>
<td>MAX application temperature, IN CLAD System</td>
<td>105°C (221°F)</td>
<td>IN CLAD with K-FLEX ST (Short time)</td>
</tr>
<tr>
<td></td>
<td>120°C (248°F)</td>
<td>IN CLAD with K-FLEX ECO (Short time)</td>
</tr>
<tr>
<td>MIN application temperature for IN CLAD System</td>
<td>-200°C (-328°F)</td>
<td>IN CLAD System with K-FLEX ST tested at -163°C (-263°F) and approved with a statement of feasibility by DNV</td>
</tr>
<tr>
<td>Water Vapour Permeability Moisture Resistance Factor (covering)</td>
<td>µ &gt; 90.000</td>
<td>EN12086</td>
</tr>
<tr>
<td>Specific weight</td>
<td>1.6± 0.1 g/cm³</td>
<td></td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>&gt;=6,9 Mpa</td>
<td>ISO 37 (Typical value 7.5 Mpa)</td>
</tr>
<tr>
<td>Elongation to break</td>
<td>&gt;=100%</td>
<td>ISO 37 (Typical values: elongation at 70%, elongation to break 300%)</td>
</tr>
<tr>
<td>Elastic Modulus</td>
<td>&gt;=60 Mpa</td>
<td>ISO 37 (Typical value 70 Mpa)</td>
</tr>
<tr>
<td>Modulus 10%</td>
<td>&gt;1.5 Mpa</td>
<td>ISO 37</td>
</tr>
<tr>
<td>Peel adhesion</td>
<td>&gt;50 Kpa</td>
<td>ISO 2411</td>
</tr>
<tr>
<td>Shear strength</td>
<td>&gt;20 N/25mm</td>
<td>ISO 34-1</td>
</tr>
<tr>
<td>Hardness</td>
<td>&gt;48 ShA</td>
<td>ISO 7619, ASTM D2240</td>
</tr>
<tr>
<td>UV Resistance</td>
<td>Extremely good</td>
<td>2 years of exposure in New River, Arizona (USA) as per ASTM G 7-97, no pitting, no cracking, no blistering</td>
</tr>
<tr>
<td>Salt Spray resistance</td>
<td>Extremely good</td>
<td>ISO 3768 / ASTM B 117-73, 480 hours. No color shade, no scaling, no blistering</td>
</tr>
<tr>
<td>Ozone resistance</td>
<td>Extremely good</td>
<td>ASTM D1171 72h 50ppmth 20%, no oxidation</td>
</tr>
<tr>
<td>Resistance to aging</td>
<td>Extremely good</td>
<td>ISO 4982, after 360h, 72M, elongation to break and modulus conform to specification</td>
</tr>
<tr>
<td>Resistance to oil</td>
<td>Extremely good</td>
<td>ISO 1817; after 72h immersion in oil IRM 903, elongation to break and modulus conform to specification</td>
</tr>
<tr>
<td>Impact resistance</td>
<td>Extremely good</td>
<td>EN12691; 1 Kg, 20mm, 600mm</td>
</tr>
<tr>
<td>Health aspects</td>
<td>Dust and fiber free</td>
<td></td>
</tr>
<tr>
<td>Spread of flame</td>
<td>Pass</td>
<td>BS 476 pt 7</td>
</tr>
<tr>
<td>Spread of flame</td>
<td>Pass</td>
<td>NF 92501</td>
</tr>
<tr>
<td>Fire propagation</td>
<td>Pass</td>
<td>BS 476 pt 6</td>
</tr>
<tr>
<td>Fire requirements for shipbuilding</td>
<td>Pass</td>
<td>IMO 61/67 part 2&amp;5</td>
</tr>
</tbody>
</table>

**OTHER PROPERTIES:**

The product is compliant to the requirements of Norsok standard R-004 ed 3 (par. 5.9 non metallic jacketing)

Application: Product is flexible down to -20°C

Fixing: neoprene glue (K-FLEX K414, K-FLEX K420)

Sealing: SMP sealant (K-FLEX K-Mastic 56)
FIXING THE K-FLEX IN CLAD COVERING INTO THE “T” CONNECTION

a) Thoroughly degrease each section of the prefabricated K-FLEX IN CLAD “T” connection with the correct thinners.
b) The “T” connections are made in three pieces which should be directly applied onto the elastomeric sections.
First install the main section of the “T” connection followed by the coupling sections.
c) Apply K-FLEX K 420 glue, as shown in figures 20 onwards, both to the elastomeric material and the K-FLEX IN CLAD covering.
d) Once the K-FLEX IN CLAD covering is positioned onto the insulation, carefully seal all the overlaps with K-FLEX K 420 glue, (fig. 6).
e) Finally, press the overlaps down with force to make sure that both surfaces firmly adhere together, (fig. 8).
f) Proceed to apply the K-FLEX IN CLAD covering onto the coupling, repeating the same procedure as before, (figs. 9 and 10).
g) Finally, spread glue over all the joints, (fig. 11).
h) The “T” connection is now ready to be sealed with K-FLEX K-Mastic 55 (fig. 12).

APPLYING MARINE SEALANT:
a) Apply a 10 mm layer of marine sealant K-FLEX K-Mastic 55 on both sides of all the joints.
b) Proceed carefully as indicated in figures 13 - 14.
c) K-FLEX K-Mastic 55 should be applied to all joints as can be seen in figure 16.
APPLICATIONS

INDUSTRIAL PLANTS
Chemical, Medical, Food&Beverage, etc.

OIL & GAS
Oil & Gas treatment plants, Refineries, Petrochemical complexes, Marine terminals, etc.

MARINE
LNG, Floating production storage and offloading, Oil tankers, etc.

Kashagan - Offshore Barges, Agip Kco, Kazakhstan

Kashagan Barges, Navalnare, Italy

Lng Loading Facilities, Montoire-de-Bretagne, Gas de France, France
Central Azeri Platform, BP, Azerbaijan
Fpso P43/P50 Barracuda Field, Petrobras, Brazil
Tgpl 500, BP, Azerbaijan
D-6 Platform, Lukoil, Russia
T-47 Drilling Rig, Agip Kco, Kazakhstan
Yastreb Drilling Rig, Exxonmobil, Russia
Visotskij Rpk Oil Terminal, Lukoil, Russia
Fpso P54, Petrobras, Brazil
Moligaq Platform, Shell, Russia
Sangachal Gas Plant, BP, Azerbaijan
Kashagan Facilities, Agip Kco, Kazakhstan
Fpso Sable, Exxonmobil, Canada
Sakhalin Il, Sakhalin Energy Investment Co., Russia
Fpso Terra Nova, Transcanada, Canada
Thebaut Platform, Exxonmobil, Canada
Prirazlomnaya Platform, Russia
Marevo-Vasilevskij (Oil Tankers), Novoship, Russia
Scarabeo 5 - Drilling Semi-Sub Vessel, Statoil - Saipem, Norway
Statford A Platform, Statoil, Norway
Qarn Alam, Saipem, Oman
Fpso Golfinho, Petrobras, Brazil
Ogva 7500 Semi Rig, Sea Drill, Norway
Kashagan - Offshore Barges, Agip Kco, Kazakhstan
LNG O-Max (Cryostar, ‘EcoRel’ Boil-off Gas Re-liquefaction)
Exxonmobil, Korea
LNG Loading Facilities, Montoire-de-Bretagne, Gaz De France, France
DSME LNGC 2273, Korea
Moho - Bilondo, Hyundai H.I., Congo
Yadana Gas Field, Hyundai H.I., Myanmar
LNG Peak Shaving Plant, Saipem - Sofregaz, China
LNG Terminal Arzew, Algeria
FPSO Akpo - Usan Field, Hyundai H.I., Nigeria
2 LNG Carriers Hull No 2273 and 2277 147 000 m³, DSME, Brunei
Kashagan - Offshore Barges, Weir Gabbionetta, Kazakhstan
LNG Terminal Arzew, Saipem - Cape, Algeria
EcoRel Reliquefaction System, Process lines Nitrogen at -196°C, Tecnocryo, Italy
Kashagan – Hook up, Aker Solutions - BIS, Kazakhstan
Nitrogen-Oxygen Plant, SIAD, Italy
Menzel Ledjmet East Field, Saipem - JCCC, Algeria
**Product Features**
IN CLAD is a very versatile jacketing, its mechanical and chemical features allows it to be applied on several insulation materials: Flexible Elastomeric Foam (FEF), Mineral Fibres (MMF), Polyurethane (PU) etc...

**K-FLEX IN CLAD**
Flexible polymeric covering of 1 mm in thickness. K-FLEX IN CLAD gives long lasting protection against aggressive marine environments and is UV and vapour resistant. Preformed pipes are available up to 610 mm in diameter.

**Range of preformed IN CLAD Fittings**
- “T” pieces
- Elbows
- Endcaps
- Flanges
- Valves
- Pipe supports
- Reductions

**IN CLAD Jacketing - MMF**

*Standard Application*

*THF Application*
Pipes, Flanges, Fittings and Valves

For on-site insulations it is possible to order the various sections based on technical drawings for linear tubes, curves, “T” couplings, flanges and valves. Each section is produced precise and accurate using a high-pressure water jet.

STRAIGHT PIPES

The preformed IN CLAD sheets for pipes with diameters larger than 168 mm are supplied with a 5 cm elastomeric overlap at both ends and a 5 cm IN CLAD longitudinal overlap to facilitate installation. The end joints should be covered with the special IN CLAD band and fixed down with K-Mastic 55.

“T” PIECES

The “T” pieces are made in three pieces which should be directly applied onto the elastomeric sections (two pieces). First install the main section of the “T” connection followed by the coupling sections.

FLANGES

Fringes are cut into the overlaps of the outer and inner edges of the IN CLAD disks to help sealing onto the elastomeric insulation.
To cover the elbow, the appropriate number of “fish” IN CLAD sections are created and laid over either K-FLEX ST or ECO elastomeric insulation.

Reductions are pre-cut in three sections. An overlap of 5 cm with a fringes edge is added to ensure a tight seal over the elastomeric insulation, ST or ECO.

To facilitate installation of the IN CLAD covering, fringes are cut into the overlap of the sections which will then be sealed with adhesive onto the K-FLEX ST or ECO elastomeric insulation.
IN CLAD Jacketing