

USE OF K-FLEX ELASTOMERIC INSULATION PRODUCTS ON STAINLESS STEEL

K-Flex Insul-Tube / Sheet and K-Flex Duct Liner Gray brands of elastomeric insulation contain small amounts of leachable chlorides / halogens, which in the presence of moisture and elevated temperatures can cause stress corrosion cracking of stainless steel. These products should not be used on stainless steel piping, vessels or ductwork if the system operates at 90°F (32°C) or higher either continuously, cyclically or intermittently without proper protection of the stainless substrate. K-Flex ECO or K-Flex PE are recommended for these systems subject to suitability for specific applications and / or code compliance. Please review the information below for more details.

Stress Crack Corrosion or Pitting Corrosion of stainless steel (austenitic) continuously or intermittently at temperatures above 90°F is well documented. Corrosion can occur when the following factors are present: structural stresses, moisture and a corrosive source. Stresses and moisture are always present. Corrosive sources are generally agents containing halogens, for which there are many sources (e.g. many cleaning agents). All NBR/PVC based elastomeric insulation products on the market today would have the potential to be a corrosive source for stainless steel even though the measured residual chloride ions in the product are very small. EPDM based products may also have leachable chloride levels greater than those recommended for use on stainless steel operating above 90°F.

K-Flex Elastomeric insulation products can be used in conjunction with stainless steel providing certain restrictions are considered and precautions are taken. The conservative approach to the prevention of the problem is to treat the stainless steel. Use of foils, i.e. aluminum, typically 46 standard wire gauge, acts as a physical barrier and provides cathode protection. The foil is simply wrapped around the piping with overlays. This method, when done properly, provides suitable resistance to stress corrosion. Paints offer some protection. Some that are recommended are silicone-alkyd, aluminum rich silicone-alkyd, epoxy/phenolic, amine epoxy, and polyamide epoxy paint. Anti-corrosion gels such as Polyguard Products RG2400ET also offer protection from stress crack or pitting corrosion (per the manufacturer).

Standard black NBR/PVC tube and sheet insulation with standard solvent-based contact adhesives (K-FLEX 320, 420, 620, 373 and 720 LVOC), when properly installed, have been used successfully on applications using stainless steel without any protective coating. These have been low temperature applications (**below 90°F**) with selected grades of stainless steel. All seams, butt joints and terminations must be properly sealed to prevent water penetration. Proper installation practices greatly reduce the risk of corrosion caused by outside sources.

K-FLEX ECO® elastomeric insulation is a special purpose product designed without the presence of halogens (chlorine containing materials). K-FLEX 720 low VOC / non- halogenated contact adhesive can be used to further limit the possibility of halogens coming in contact with the stainless steel. The absence of halogens lessens the possibility of corrosion occurring. In addition, the combustion products of **K-FLEX ECO®** are non-corrosive. However, **K-FLEX ECO®** only meets a 25/50 (flame/smoke) rating up to ¾" thickness when tested according to ASTM E84, and as such, should not be used on applications greater than ¾" insulation thickness where a 25/50 rating is required.

Flexible closed cell insulation products have been successfully used on applications involving the use of stainless steel, i.e. breweries, food / meat processing plants and nuclear power plants, but these applications require special considerations, and precautions may need to be taken to insure a successful application, particularly at elevated temperatures.

References: ASHRAE Handbook, "Corrosion of Metals Under Thermal Insulation" by Pollock Barnhart.

