Tech Note 4:
Insulation & Stainless Steel (Lagging)

TN.04

Related Documents:
- Tech Note TN.01 Chlorides, Chlorine & Stainless Steel

One of the most common applications for stainless steel is to convey hot & warm potable water. With efficiency and environmental requirements, insulating (or lagging) these lines is required to maintain the temperatures within. Our stainless products, including AusPress Stainless Press-Fit, are suitable to insulate providing the following precautions are addressed.

Insulation & Chlorides

As part of the manufacturing process, standard insulation contains chlorides (chloride ions) that remain in the insulation as a final product. This includes blanket, batt & foam types.

Chloride ions will always be present in the “normal building site environment” too and may be deposited on the stainless steel surface during the handling and installation of all insulating materials. The presence of an insulation material, of any generic type, is more likely to concentrate chloride ions at the stainless steel surface.

Chlorides and stainless steel are not a suitable combination – see our Tech Note ‘TN01 Chloride & Stainless Steel’ regarding this interaction for more information.

Conditions & Effects

With the direct contact of the insulation and the external surface of the stainless steel, the conditions of elevated temperatures, chlorides in the insulation and possible trapped condensation (moisture) needs to be considered before installation.

Austenitic stainless steel (grades 304 & 316) can be sensitive to corrosive attack by soluble inorganic chlorides in the presence of oxygen and moisture, especially when at the same time, the alloy is highly stressed. This is known as stress corrosion cracking (SCC).

The stress corrosion reaction is not usually significant at temperatures below 50ºC but can be severe in the temperature range 50ºC to 105ºC. The most likely time that moisture may be present on the surface is when the plant is restarted after shut down.

Photo: Venison Processing Plant, NZ – 2015 (SCC and localised corrosion induced by ‘standard’ lagging).

Common Installation Considerations:
Although insulation has never been proven to have been a contributing factor towards any observed case of SCC in austenitic stainless steel pipework, the fact it contains chlorides could potentially contribute. For this reason, and because high concentrations of chloride ions are usually present in any "normal building site environment", it is considered best practice to follow the additional application advice below when installing any insulation material on austenitic stainless steel pipework.

Insulation	Specify low-chloride insulation (identified as having a soluble chloride ion content by weight less than 0.05%). This is available from the leading manufacturers and should be checked onsite before and after installing. Note: 0.05% w/w = 500ppm; 0.0012% = 12ppm.
Condensation	Installing with fall to allow any moisture trapped between the stainless and the insulation to drain freely.
Barrier Wrapping	Separate the insulation from the stainless using a wrapped barrier of aluminium foil, not less than 0.06 mm thick, be applied to austenitic stainless steel surfaces ensuring that it is fitted to shed water with an overlap of at least 50mm at the joints, prior to the insulation and regardless of which insulation type is to be applied. *Ref: BS 5970:1992. Section 8, Paragraph 32.16.3.1 (Page 75)*
Barrier Painting	As an alternative to aluminium foil, that specially formulated paints may be used for this type of resistance application. However, the paint manufacturer's instructions should be followed closely and the temperature limitations of the paint should not be exceeded. *Ref: BS 5970:1992. Section 8*

Each project is different and should be assessed individually – please contact us at technical@auspress.com.au for advice before installation.