

Stress Corrosion Cracking

Stress corrosion cracking (SCC) is a known condition, which can sometimes occur when certain conditions are met and occurring simultaneously.

Conditions

1. A material susceptible to SCC.
2. Inherent stress (arising from the manufacturing process) or induced stress (arising from incorrect installation).
3. A corrosive environment (such as would arise from chemical dosing of a system (using corrosive species such as Silver Peroxide (a compound of Silver Nitrate and Hydrogen Peroxide))) or, indeed, from such items as phenolic foam insulation (which arises when the foam becomes wet and results in the leaching of chloride from the material).

Components

Some processes can naturally result in higher levels of inherent stress, by virtue of the extent of metal working involved. Residual stresses will have typically been determined via neutron diffraction analysis and the appropriate heat-treatment(s) applied.

Forged components are typically less susceptible to inherent stress as the high temperatures they are worked at result in naturally lower stress levels following forging.

Installation and Operation

Where SCC does occur, the root cause of the stress factor is typically as a result of induced torsional stress during installation, hoop-stress during joint formation (particularly on compression fittings), or cyclic flexural stress during operation.

Installation of any Crane product must precisely follow the instructions defined in the IOM, using the correct tools, avoiding the use of augmented jointing material and ensuring over-tightening is avoided.

Chemical Compatibility

Typically, ammoniacal compounds or ammonia itself have been seen to be causal in some instances (in addition to the compounds already noted herein).

The source of such chemicals can be from chemical system dosing, waste material (with biological source), fire retarding treatments, refrigerants, insulative materials, etc.

Condensate

A key aspect of Stress Corrosion Cracking is the presence of moisture, particularly on chilled systems where the insulative material and the product will be in almost constant contact with moisture, held at the surface, and representing a significant risk of SCC developing over time.

This is particularly pertinent with materials such as phenolic foam and similar materials with leachable elements present.

General Caveat

Crane (and its related brands) manufacture hardware (valves, couplings, etc) for the Building Services industry and Utilities industries (including Gas and Water industries) however, we are not system designers or operators. The use of chemicals for system dosing must be determined by the user as all aspects of system variables (biocides, inhibitors, system medium, raw water condition (where used), existing micro-biological processes within the system, temperature, mechanical configuration, etc) must be established and considered, and the effect of the chemicals used (including compounds arising from chemical combinations) must also be established in order to accurately determine compatibility. Crane cannot make recommendations regarding chemical compatibility for the system, as a result of the above variables, which includes all components, substances and materials. Any comments from Crane regarding chemical compatibility shall relate solely to the Crane product and does not constitute a recommendation on compatibility for the wider system, resultant chemical compounds, components, substances or materials, in whole or in part.