Corrosion: Know the type and learn how to handle it (Part 2) – by Rajasegaran A/L Munion

Are you facing corrosion problems in your plant and equipment? Are you second guessing on what to do with it? Don't fret! We are giving you more types of corrosion and how to handle them.

Localized Crevice Corrosion in Chloride-Containing Media

In a typical fluid system, crevices exist between tubing and tube supports or tube clamps, between adjacent tubing runs, and underneath dirt and deposits that may have accumulated on surfaces. Crevices are virtually impossible to avoid in tubing installations, and tight crevices pose the greatest danger for corrosion to occur.

Localized Crevice Corrosion in Chloride-Containing Media

How It Forms

Like pitting corrosion, crevice corrosion starts with the breakdown of the passive oxide layer that protects the metal. This breakdown leads to the formation of small pits. The pits grow larger and deeper until they cover the whole crevice. In some places, tubing can be perforated. Crevice corrosion occurs at far lower temperatures than pitting corrosion.

Material Matters

When seawater diffuses into a crevice, some Fe++ ions dissolve and cannot rapidly diffuse out of a tight crevice. In saltwater, negatively charged chloride ions (Cl-) are attracted by these positively charged Fe++ ions and begin to diffuse into the crevice. As the chloride concentration increases, the crevice solution becomes more corrosive, causing more iron to dissolve, which in turn attracts more chloride ions to diffuse into the crevice. Ultimately, the crevice solution turns into an acidic solution with high chloride concentration, which is very corrosive.

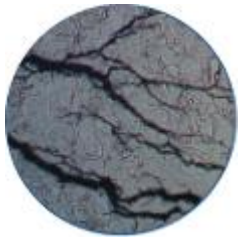
Potential Solutions

- 6-Moly Alloys
- Alloy 2507
- Alloy 825
- Alloy 625
- Alloy C-276
- Alloy 400

Stress Corrosion Cracking in Chloride-Containing Media

Stress corrosion cracking (SCC) is dangerous because it can destroy a component at stress levels below the yield strength of an alloy. In the presence of chloride ions, austenitic stainless steels are susceptible to SCC. The ions interact with the material at the tip of a crack where tensile stresses are highest, making it easier for the crack to grow. While in progress, SCC can be difficult to detect, and final failure can occur suddenly.

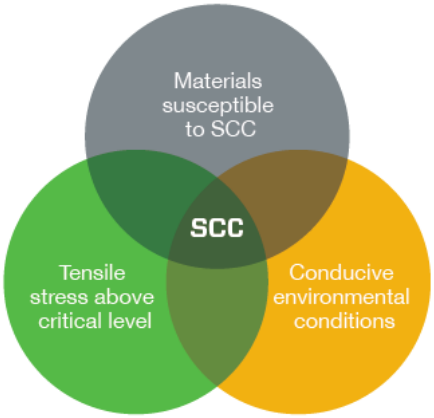
Stress Corrosion Cracking in Chloride-Containing Media

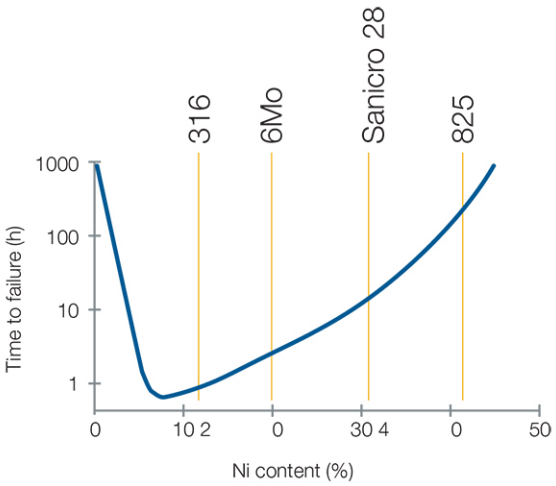


How It Forms

For SCC to occur, three conditions must be met simultaneously:

- The metal must be susceptible to SCC
- Environmental (fluid or temperature) conditions conducive to SCC must exist
- The tensile stress (applied + residual) must be above critical level





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