



Sandvik super duplex corrosion resistant alloy withstands aggressive tropical marine atmosphere

Exposed to a demanding tropical marine atmosphere at the NASA Research Center, Florida, USA, super-duplex Sandvik SAF 2507™ hydraulic & instrumentation tubing remained corrosion free after an extensive one year trial.

Typically, hydraulic & instrumentation tubing used in the oil & gas industry are either offshore or shoreline installations subjected to high levels of salt, humidity, UV light and temperature. This is particularly the case in tropical marine installations where seawater evaporates leaving a higher concentration of chlorides on the tubing.

The study saw stainless steel seamless tube samples in 316L, 904L and 2507 positioned 150 feet from the mean high water mark on the east coast of Florida directly facing the Atlantic Ocean for a period of one year. Each tube sample was bent at 90°, the ends were terminated with fittings and mounted at 30° on a test rig facing the ocean.

Proximity to the ocean was typical of a shoreline petrochemical installation and close enough to ensure the test samples would be affected by salt spray and mist throughout the 12 month duration.

Conditions on the Florida coastline provided an ideal aggressive and extremely corrosive environment for the test samples with its prevailing tropical climate.

After conclusion of the one year's exposure the test samples were returned to the laboratory for detailed inspection and analysis.

Visual inspection revealed that the most corroded were the 316L tubes and more so on the section which had faced seawards. Corrosion damage, discoloration and pitting were found. Similarly, some discoloration and pitting were observed on the 904L samples, although this was to a lesser extent. It was, however, the 2507 super-duplex, that exhibited no pitting whatsoever. Some slight discoloration was observed, but this easily washed off after cleaning in water.

There was no stress corrosion cracking present on any of the tube samples.

When the fittings and ferrules were dismantled corrosion products were found on the treading of the fitting and the tube showed red corrosion products where they had been in contact with the treading. Close examination of the tubes with an optical microscope, once the fittings had been removed, revealed crevice corrosion on the 316L and 904L test samples, but not on the super-duplex 2507 tubes.

The test proved that despite the overall lower content of costly constituents such as nickel and molybdenum, super-duplex 2507 provides a similar performance in seawater to more expensive, highly alloyed austenitic stainless steels.

“For this exercise the coastline of Florida with its tropical marine conditions of high air temperature, high average relative humidity and high precipitation volumes was perfect in providing a testing environment,” said Andreas Furukrona of Sandvik Materials Technology.

“In these conditions, super-duplex Sandvik SAF 2507™ proved outstanding and a cost effective material for hydraulic & instrumentation tubing when the marine environment proves too severe for 316L and 904L materials.”

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For further information on Sandvik Materials Technology visit the website: www.smt.sandvik.com