Crevice corrosion study of saf 3207 hd in 6% fecl3 solution using polarization, weight loss, and electrochemical impedance spectroscopy methods

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Abstrak

Hyperduplex Stainless Steel 3207 (SAF 3207 HD) is one of the materials used in the oil and gas industry, especially for umbilical, which is a system to connect cables or instrumental setups between control platforms and wellhead station. It is used in deep water containing high chloride ion (Cl-), so it needs high tensile strength and must be a highly corrosion-resistant material. In this research, several corrosion resistance tests were conducted on 3207 hyperduplex stainless steel such as polarization and weight loss testing. Roughness surface tests were carried out to observe alterations to the surface caused by underwater corrosion. SAF 3207 HD can form a passive layer due to an environmental reaction; to observe this phenomenon, an EIS test was conducted at the interface of the material. The weight loss test was conducted on a particular sample, in accordance with ASTM G48-97 method B. The corrosion test was carried out at temperatures of 60-90°C (at 5°C intervals) in 6% FeCl3 solution. The results show that SAF 3207 HD has good crevice corrosion resistance, although crevices were not seen below temperatures of 70oC, which is known as critical crevice temperature. At this temperature, the corrosion rate reached 10.032 mm/year and the crevice depth was 1.034 ?m. This means that the operating temperature of the umbilical can be increased up to 70oC.