

Corrosion behavior of different stainless steel alloys exposed to flowing fresh seawater by electrochemical impedance spectroscopy (EIS)

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ABSTRACT

EIS technique was used to study the effect of the seasonal changes of the Arabian Gulf seawater on the corrosion behavior of UNS No. S 30400 stainless steel, UNS No. S 31600 stainless steel and UNS No. S 62800 sanicro 28 that were exposed to continuous fresh seawater for 180 days. Two types of additives (4 ppm of Cl_2 and 5 ppm of NH_3) were also added to the seawater to investigate the effect of residual seawater pollutants on the surfaces of these alloys. At the end of the tests, visual inspection revealed a thin layer of marine micro fouling was spread on the whole surface of the alloys, whereas the corrosion parameters obtained by EIS technique showed a slight increase in the corrosion resistance of the tested alloy, with the decrease of the seawater temperature. In addition, the corrosion resistance was increased for SS 304 and SS316, when 4 ppm of chlorine was added to the seawater, however there was insignificant influence of the ammonia addition to seawater, observed on the tested samples.

Keywords: Stainless steel alloys; Seawater corrosion; EIS; Marine fouling
