

Pitting Corrosion Behavior of CUSTOM 450 Stainless Steel Using Electrochemical Characterization

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Abstract

In this study, the electrochemical polarization tests were performed on tensioned and non-tensioned CUSTOM 450 specimens in a 3.5 wt% NaCl solution to investigate pitting potential and stable pit initiation time. A potentiodynamic test was conducted to determine the exact amount of pitting potentials. According to the potentiostatic tests, a relation between applied potential and the stable pit initiation time was obtained. Concerning this relation, stable pitting time can be predicted without experimental works. Optical microscopy was used to evaluate the shape of the pits. Tensile stress led the pit to experience the “pit to crack” step. The corrosion rate of samples was studied by the determination of mass loss. Mass loss measurements and current density–time curve in potentiostatic tests demonstrated the rate of pitting corrosion decreased as time passed. Finally, the depth of the pits was measured by the eddy current technique. The results showed that tensile stress facilitated deeper pit development.