

Criterion for cathodic protection of 25CD4/Inconel 182 system

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Abstract: This study aims to investigate the cathodic protection criterion of a galvanic system of low alloy steel 25CD4 substrate /Inconel 182 austenitic stainless-steel filler metal couple obtained using Shield Metal Arc Welding(SMAW) process. The microstructure investigation revealed the presence of Type II boundary along the steel substrate/Inconel interface where high carbon content and high hardness were recorded. The electrochemical tests evaluated in marine environment (3.5% NaCl) at room temperature revealed that the corrosion potential (E) of the interface was between the steel substrate and the Inconel 182 filler metal ones, On the other hand, the current density (I_{corr}) and corrosion rate were slightly higher in the overlaid area. In order to determine the system protection criterion, chronopotentiometry method was introduced. It was found that the cathodic protection criterion for the assembly is based on the criterion of the least noble material which is the steel substrate.

Keywords : cathodic protection, 25CD4, Inconel 182, overlay, Chronopotentiometry.