

GALVANIC CORROSION CHARACTERISTICS OF X65QT STEEL WELD AT VARIOUS TEMPERATURES IN CO₂ ENVIRONMENT

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Abstract

Preferential weld corrosion of X65QT pipeline steels have been increasingly observed in CO₂ containing media in spite of usage of corrosion inhibitors. These are due to unknown factors which are emanating from the operating conditions and changing process conditions after a period of pipeline in service. The resulting effect on weld zone which is exposed to the medium over a period of time is preferentially corroded. There are instances that the welding consumables got mixed up at construction sites in the ovens. In this study, the effect of galvanic corrosion was studied for four different consumables at various temperatures in CO₂ environment. All the electrodes were passive at all the temperature levels with exception of heat affected zone of particular three types of electrodes. The results were evaluated using polynomial regression analysis and found well fitting with the experimental results.

Preferential Weld Corrosion

A carbon steel weld which failed by CO₂ corrosion (at 6% CO₂ gas phase, 93°C with 85% water cut and 875 psi) which was treated with 5ppm corrosion inhibitor is shown in Fig.1¹. The Weld has three primary regions- base metal, weld metal and heat affected zone (HAZ) as shown in the Fig.2.

Keywords: Galvanic Corrosion-Composition – Microstructure – Temperature – CO₂ – Polynomial Regression Analysis