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Corrosion of Mild Steel Weldment in Sea Water

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Abstract

A characteristic localized corrosion in the mild steel weldment by sea water has been examined through an optical microscope. Various microstrutures developed during welding by different heating cycles were observed in the corroded part.

Analysis of the results indicates that the attack initiated from the undercut of weldment, but the preferential attack leading to the pit growth was in the microstructure of base metal where the pearlite and the ferrite had all been divided into fine-grained forms.

The initiation is explained by the well known differential aeration cell theory. Mechanism of further attack leading to the pit growth is described under the assumption that the hydrogen overvoltage on the cementite might be lower than that on the ferrite so that a local action cell would be formed between them. The production of the local acidification inside the pit is also explained.

음극방식용 아연양극재료의 분극특성

장 현 구

Anodic Polarization Characteristics of Zinc Alloys in Sea Water

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Abstract

The effect of alloying elements, such as aluminum, cadmium, mercury, indium and tin, on the anodic dissolution characteristics of zinc alloys, containing 70ppm iron, has been studied in laboratory scale. The results are as follows; Addition of aluminum, mercury or cadmium to zinc as an alloying element shifts anodic dissolution overvoltage to lower value, contrarily, indium or tin to higher value. 1.0% Al-Cd-Zn alloy containing 0.1~0.5% cadmium have activation characteristics super to 1.0% Al-Hg-Zn alloys containing 0.1~0.5% mercury. In these alloy systems, zinc alloys containing 0.5% Al, with 0.01~0.07% Cd are highly activated within the potential range that is useful for chthodic protection of steel structure in sea water, i.e. −1.06~−1.02V vs SCE at anodic current density of 1~10,000 $\mu A/cm^2$.