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Atmospheric Corrosion Behavior of Al 6xxx Alloys in Qatar State

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Al 6000 series [Al-Mg-Si-Cu] are widely used in oil field for frames, tanks, pipelines and machinery applications. They showed a relatively high corrosion resistant, thermal and electrical conductivity and low cost. Establishing a materials map (Corrosion Atlas) for different region in Qatar. Al 6063 and Al 6082 are part of this map. Studying the forms of corrosion for the two Al alloys at different sites. Studying the corrosion rate, pit aspect ratio and pit density of the Al alloys after different times of exposure at different atmospheric condition. Many authors have been studied the corrosion behavior of aluminum alloys indoor significantly than the outdoor studies. However, the indoor corrosion studies seem to be markedly ignored numbers of air pollutants practically sulfur and chloride contaminations. In addition, weather exposure designs (outdoor tests) of aluminum and its alloys have been performed in different atmosphere all over the world by many countries. The aim of this article is to investigate the atmospheric corrosion behavior of Aluminum alloy Al-6063 after 6 months of exposure at seven different sites in Qatar which are representing different environments (Desert, industrial, coastal and marine) by visual observation with low power optical analysis for counting the pit depth and pit density for each site. In addition, electrochemical techniques were applied on the collected specimens to show the effect of the formed oxide layer on the corrosion behavior. SEM was used to study the susceptibility of studied alloys to intergranular corrosion and the influence of sulfur and chloride compounds in intergranular corrosion. The results were put in comparison with indoor test in 3.5% NaCl + 1% HCl mixture using SEM and Accelerated electrochemical techniques.

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