

Electrochemical Behaviour of 2014 and 2024 Al-Cu-Mg Alloys of Various Tempers

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Abstract : Potentiodynamic polarization studies carried out on AA2024 and AA2014 Al-Cu-Mg alloys of various tempers in 3.5 wt. % NaCl and in 3.5 wt. % NaCl + 1.0 % H₂O₂ solution characteristic E-i curves. Corrosion potential (E_{corr}) value has shifted towards more negative potential with the increase of artificial aging time. The E_{corr} value for the alloy tempers has also shifted anodically in presence of H₂O₂ in 3.5 % NaCl solution. Further, passivity phenomenon has been observed in all the alloy tempers when tested in 3.5 wt. % NaCl solution at pH 12. Stress corrosion cracking (SCC) behaviour of friction stir weld (FSW) joint of AA2014 alloy has been studied by slow strain rate test (SSRT) in 3.5 wt. % NaCl solution. Optical micrographs of the corroded surfaces of polarised samples showed general corrosion, extensive pitting and intergranular corrosion as well. Further, potentiodynamic cyclic polarization curves displayed wide hysteresis loop indicating that the alloy tempers are susceptible to pit growth damage. Attempts have been made to explain the variation of observed electrochemical and SCC behaviour of the alloy tempers and the electrolyte conditions with the help of microstructural features.

Keywords : AA 2014 and AA 2024 Al-C-Mg alloy, artificial ageing, potentiodynamic polarization, TEM micrographs, stress corrosion cracking (SCC)

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