

Stress corrosion cracking behavior of aluminum alloy 2024 and 7075 after age hardening

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Abstrak

Paduan aluminium 2024 dan 7075 adalah material yang digunakan pada penelitian ini untuk mengetahui mekanisme korosi retak tegang (SCC) yang diakibatkan oleh proses penuaan (age hardening). Persiapan sampel dilakukan sesuai dengan ASTM G 49, sedangkan pengujian SCC dengan teknik pembebanan tarik secara langsung. Larutan pengujian terdiri dari 3% NaCl + 0,5% H₂O₂, pH 3, waktu pencelupan selama 48 jam. Karakteristik dari perpatahan yang dipengaruhi oleh SCC dianalisa dengan menggunakan scanning electron microscope (SEM) dan optical microscope (OM).

Hasil dari penelitian ini menunjukkan bahwa paduan aluminium 2024 dengan perlakuan natural aging lebih mudah terserang SCC dibandingkan dengan perlakuan over aging, namun demikian over aging mengakibatkan ketahanan terhadap korosi exfoliasi menurun. Paduan aluminium 7075 dengan perlakuan over aging memperlihatkan ketahanan SCC yang lebih baik dibandingkan dengan perlakuan artificial aging. Hal tersebut dibuktikan dengan keberadaan presipitat yang dihasilkan pada struktur mikro dari hasil proses penuaan.

Two types of aluminum alloys, 2024 and 7075 have been selected in this study to investigate mechanism of stress corrosion cracking due to many forms of age hardening process. Stress corrosion cracking test using the direct tension stress corrosion technique were carried out on these aluminum alloys and the specimens were prepared as mentioned in G 49 ASTM. This test was carried out by immersing the specimens in 3% natrium chloride (NaCl) + 0.5% peroxide (H₂O₂), used pH of 3 for 48h. The characteristic of fracture which is affected by stress corrosion cracking test was analyzed by means of scanning electron microscope (SEM) and optical microscope (OM).

The results showed that the susceptibility to stress corrosion cracking for aluminum alloy 2024 with natural aging is higher than the type with over aging condition although in this condition it has the worst exfoliation corrosion resistance. Meanwhile, aluminum alloy 7075, at over aging condition gives better stress corrosion cracking resistance rather than the artificial aging condition. These results refer to the precipitate in microstructure which is formed as a result of aging process.