

## EFFECT OF HEAT TREATMENT ON STRESS CORROSION CRACKING RESISTANCE OF AL-ZN-MG-CU ALLOY USED IN AEROSPACE ENGINEERING APPLICATIONS

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### ABSTRACT

Agehardenable aluminium alloy belonging to the Al-Zn-Mg-Cu family have proved useful as structural materials primarily because of their unique combination of low density, high strength and good corrosion resistance and designated as 7xxx series of alloys. They find wide applications in airframe structures such as aircraft, space vehicles and light armored carriers. Different types of aluminium, steel, titanium alloys are used to manufacture high precision forgings and castings for various parts in aerospace industries which have been proactively developing newer methods of thermo mechanical treatment for various heat treatable aluminium alloys such as the 2XXX, 6XXX and the 7XXX series alloys. Aluminum alloy conforming to AA 7049 specification is a high strength aluminium alloy used extensively in aerospace sectors. These alloys exhibit a very high strength (more than 650 MPa) when subjected to T6 temper heat treatment but they are susceptible to corrosion. Therefore corrosion resistance can be increased by heat treating to T73 temper. However there will be reduction of 10 – 15% in strength but improvement in corrosion resistance could be because of reduction in residual stresses built during heat treatment process. In the present investigation, it is proposed to systematically study the effect of heat treatment on the stress corrosion cracking resistance (SCC) of this alloy. The raw material was in the form of extrusion of 60 mm diameter and 75 mm length and it is subjected to T6 and T73 heat treatment tempers. The SCC resistance was being studied in both the tempers by subjecting the specimens to test as per ASTM G 47 test standard. Also, the mechanical properties viz., Ultimate Tensile Strength, 0.2% proof stress, % elongation and hardness was determined in both T6 and T73 temper conditions. It is found that the stress corrosion cracking resistance was enhanced at T73 temper when compared to T6 temper. The mechanical properties were superior at T6 temper. The specimens at T73 temper exhibited higher resistance to corrosion when subjected to stress corrosion cracking test.

**KEYWORDS:** Aluminium Alloys, Stress Corrosion Cracking Resistance, Heat Treatment, Temper Conditions, Mechanical Properties