

SCC CHARACTERIZATION OF AL-LI-CU-X ALLOYS

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In the past several decades many Al-Li-X alloys have been studied to understand the fracture properties due to its superior specific strength and modulus over the currently dominated 2024 & 7075 type aircraft structural alloys. It is also observed that their stress corrosion resistance is also good in the peak aged condition depending on the (Li/Cu) ratio. To understand its behavior with respect to its heat treatment, a systematic collection of data is required from the published literature.

We have collected such systematic data for three alloys from the early 1980's on Al-3Li, Al-2Li-3Cu and Al-1.5Li-4.5Cu, all with 0.12Zr to keep the grain structure predominantly un-recrystallized. Such alloys were tested in the S-T direction in 3.5%NaCl solution to obtain the plateau velocities (da/dt) and threshold K_{Isc} . It is observed that in all the alloys, (da/dt) decreased with aging heat treatment time, the decrease increased with (Li/Cu) ratio. This decrease is interpreted in terms of the degree of anodic dissolution of the grain boundary precipitates. The results are compared with the SCC behavior of 7050 and 2024 alloys. Additional data where reversion aging treatment was given shows that grain boundary precipitates play an important role in the SCC behavior. The overall trend in the SCC behavior is discussed in light of the current understanding of the aluminum alloy behavior in terms of anodic dissolution and the role of hydrogen.