SUPPLYING THE WORLD'S BEST

ALLOY 2099-T83 AND 2099-T8E67 EXTRUSIONS

High Strength / Low Density Extrusions

ALCOA AEROSPACE TECHNICAL FACT SHEET

DESCRIPTION

Alcoa has developed Al-Li Alloy 2099, also designated C460, for use in aerospace and high strength applications requiring low density, high stiffness, superior damage tolerance, excellent corrosion resistance and weldability. Li additions increase the strength and modulus of Al alloys while lowering their density.

Alloy 2099 extrusions are available in two tempers from 0.050 to 3.00 inch (1.2 to 76 mm) thicknesses. Alloy 2099-T83 has high strength and excellent corrosion resistance with moderate fracture toughness. Alloy 2099-T8E67 has somewhat lower strength, but very high fracture toughness and excellent fatigue crack growth resistance. Alloy 2099 is also available in T3- and T4- type and O tempers that meet stringent requirements of forming applications.

APPLICATIONS

Alloy 2099 extrusions can replace 2xxx, 6xxx, and 7xxx aluminum alloys in applications such as statically and dynamically loaded fuselage structures, lower wing stringers, and stiffness dominated designs. Alloy 2099 extrusions have exhibited very good machining, forming, fastening, and surface finishing behavior in production facilities.

MECHANICAL PROPERTIES

The data in the tables show how the tempers compare in static, damage tolerant, and corrosion properties. The T83 temper can meet or exceed the strength of 7075-T6511 and 7050-T76511 extrusions with improved corrosion and stiffness, and lower density. The T8E67 temper has strength much higher than 2024-T3511 or 2026-T3511 with better toughness, much better corrosion resistance and lower density.

CHEMICAL COMPOSITION LIMITS (WT.%)

Cu	2.4 - 3.0
Li	1.6 - 2.0
Zn	0.4 - 1.0
Mg	0.10 - 0.50
Mn	0.10 - 0.50
Zr	0.05 - 0.12
Ti	0.10 max
Fe	0.07 max
Si	0.05 max
Be	0.0001 max
Others, Each	0.05 max
Others, Total	0.15 max
Al	Remainder

MECHANICAL PROPERTIES 2099-T83/T8E67 Typical Values

Alloy/Temper		2099-T83		2099-T8E67
Thickness		0.50–0.999"	1.00–2.5"	1.00–2.5"
Tensile Strength, ksi (Mpa)	L LT	81 (560) 76 (525)	83 (595) 75 (520)	77 (530) 74 (510)
Yield Strength, ksi (Mpa)	L LT	76 (525) 70 (485)	78 (505) 68 (470)	70 (485) 62 (430)
Compressive Yield Strength, ksi (Mpa)	L LT	75 (520) 75 (520)	78 (540) 70 (485)	69 (475) 64 (440)
Elongation, %	L	9	9	10
Toughness K_{IC} ksi√in (Mpa√m)	L-T T-L	– –	27 (30) 25 (27)	60 (66) 50 (55)
EXCO Rating		P/EA	P/EA	P/EA
SCC (LT direction) Min ksi (Mpa) in ASTM G47		–	48 (330)	36 (250)
Tension Modulus, Msi (Gpa)		11.3 (78)		
Density, lbs./in^3 (g/cm^3)		0.095 (2.63)		

PRODUCT SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

AEAP-ALCOA ENGINEERED AEROSPACE PRODUCTS

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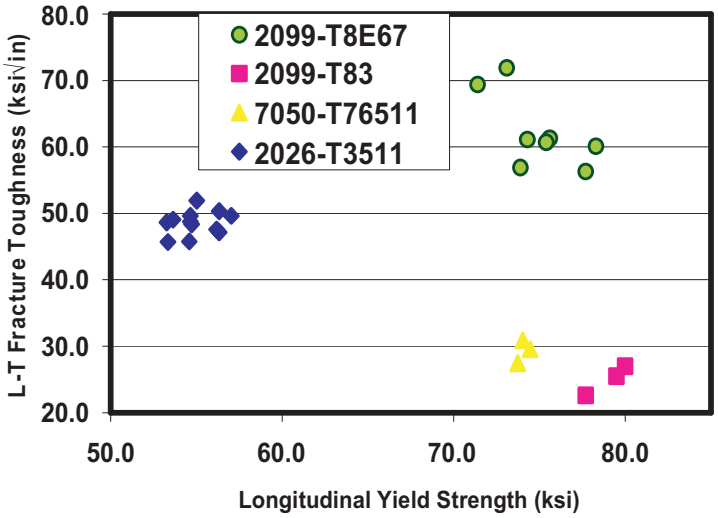
TOUGHNESS AND FATIGUE

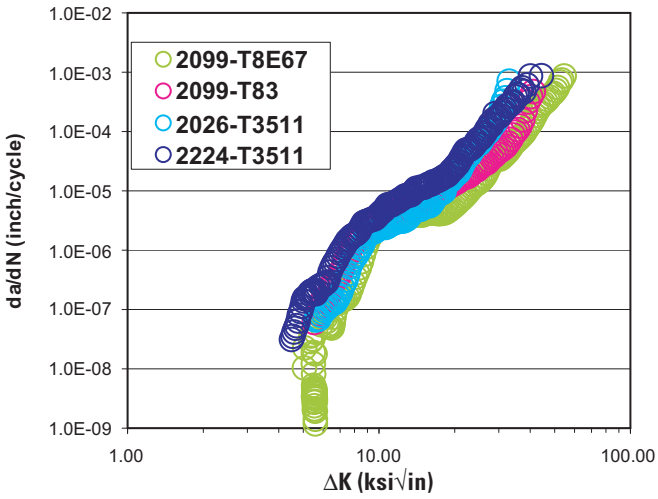
The fatigue crack growth resistance and the S/N fatigue performance of Alloy 2099 also shows improvement versus 2024-T3511 which has been a standard product for applications considered fatigue critical.

TOUGHNESS VS. STRENGTH

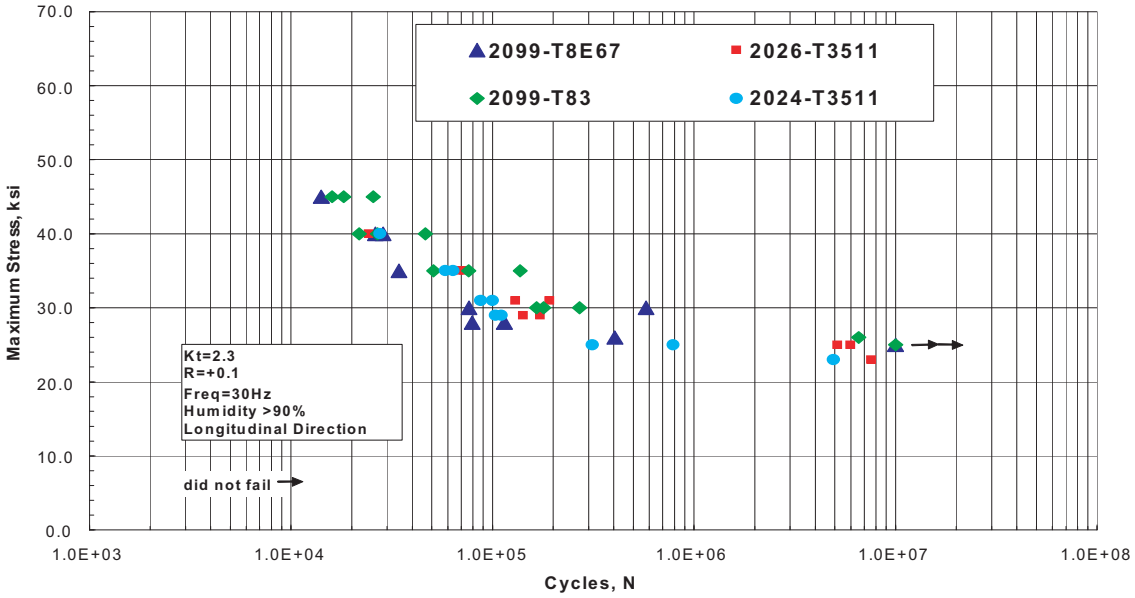


FCG CURVES

(da/dN vs ΔK , C(T) L-T, RH > 90% , R = 0.1 , Freq = 25 Hz)



S/N FATIGUE CURVES



CORROSION

The corrosion resistance of Alloy 2099 is much better than 7075-T6511 and 2024-T3511 with both the T8E67 and T83 tempers receiving EA (mild exfoliation) or better exfoliation ratings compared to the conventional alloys ED (very severe exfoliation) ratings. The stress-corrosion cracking performance is also much improved with long transverse ratings (per ASTM G64) of “A” for both tempers of Alloy 2099 compared to “B” and/or “C” for conventional alloys.

CONTACT AND PROCUREMENT

For additional information on 2099-T83 or -T8E67 extrusions, contact your local Alcoa Aerospace Sales Account Manager.

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