



ALLOY 7055-T74511 AND 7055-T76511 EXTRUSIONS

ALCOA AEROSPACE TECHNICAL FACT SHEET

Superior Combination of High Strength • Excellent Corrosion Resistance • Toughness • Fatigue • Formability

DESCRIPTION

Alcoa has developed 7055 extrusions in two new tempers, T74511 and T76511 in order to achieve a combination of high strength and improved corrosion resistance (exfoliation corrosion rating of EB or better). These two new tempers were developed with the end user in mind i.e., the tempers are “user friendly” allowing for subcontractors and end users to perform forming, solution heat treatment and final aging. The need for new alloys to replace antiquated alloys, specifically 7075-T6511 and 7178-T6511, is clear and present. The cost of managing the aging U.S. Military fleet has soared with time, and this problem is exacerbated by the continued use of incumbent materials due to their susceptibility to corrosion damage and poor damage tolerance. With the development of the user-friendly alloy and tempers, Alcoa now offers materials for retrofit and replacement applications within the U.S. Military's aging aircraft fleet. The new generation of high-strength Alcoa alloys will extend service life and reduce costs with their improved properties.

Alloy 7055 extrusions are currently available in thicknesses from 0.050 in. to 3.00 inches for both the T74511 and T76511 tempers.

APPLICATIONS

Alloy 7055-T74511 and T76511 tempers are targeted for the replacement of 7075-T6511 and 7178-T6511 alloy tempers, respectively, as well as other applications that require high tensile and compressive strengths and need excellent exfoliation corrosion and SCC resistance, such as upper wing structures, keel beams and longerons. Other applications include seat tracks, cargo tracks, fuselage frames and fuselage stringers.

CHEMICAL COMPOSITION LIMITS (WT. %)

	Alloy 7055	Alloy 7178	Alloy 7075
Zn	7.6 – 8.4	6.3 – 7.3	5.1 – 6.1
Mg	1.8 – 2.3	2.4 – 3.1	2.1 – 2.9
Cu	2.0 – 2.6	1.6 - 2.4	1.2 – 2.0
Zr	0.08 – 0.25	-----	-----
Cr	0.04 max	0.18 – 0.28	0.18 – 0.28
Si	0.10 max	0.40 max	0.40 max
Fe	0.15 max	0.50 max	0.50 max
Mn	0.05 max	0.30 max	0.30 max
Ti	0.06 max	0.20 max	0.20 max
Others Each	0.05 max	0.05 max	0.05 max
Others Total	0.15 max	0.15 max	0.15 max
Remainder	Aluminum	Aluminum	Aluminum

Corrosion Resistance

Exfoliation Corrosion Resistance

The exfoliation corrosion performance of 7055-T76511 and T74511 is significantly better than the corrosion resistance of 7178-T6511 & 7075-T6511. The EXCO test (ASTM G34) gives a rating of EB (moderate exfoliation) for 7055-T76511 & T74511 compared to ED (very severe exfoliation) for 7178-T6511 & 7075-T6511. Results from ANCIT (Aluminum-Nitrate-Chloride-Immersion Test) tests further demonstrate the superior corrosion resistance of 7055 over 7075. The ANCIT environment, which has been shown to correlate better with natural environments than EXCO, commonly gives 7075-T6511 ratings of ED while 7055-T76511 & T74511 showed ratings of mostly EA (mild exfoliation) with some EB's.

Stress Corrosion Cracking (SCC) Resistance

When tested in the short transverse direction according to ASTM G47 a minimum of 35 ksi per 20 days capability is guaranteed for 7055-T74511 and 25 ksi per 20 days for 7055-T76511. 7075-T6511 has SCC rating less than 10 ksi.

MECHANICAL PROPERTIES

"S" - Basis Mechanical Properties are compared below. A & B Basis values are available upon request.

Thickness Ranges		0.050 – 0.249				0.250 – 0.499				0.500 – 3.000			
Alloy/Temper		7055-T74511	7075-T6511	7055-T76511	7178-T6511(a)	7055-T74511	7075-T6511	7055-T76511	7178-T6511(a)	7055-T74511	7075-T6511	7055-T76511	7178-T6511
Ultimate Tensile Strength	L LT	83 78	78 75	89 83	84 80	84 79	81 78	90 84	87 82	85 80	81 77	91 85	86 74
Tensile Yield Strength	L LT	76 72	70 66	85 79	76 71	77 73	73 69	85 79	78 72	78 74	72 65	86 80	77 64
Compressive Yield Strength	L LT	76 77	70 72	84 86	75 78	77 78	73 74	85 86	77 79	78 79	72 73	88 87	76 72
Elongation %	L	8	7	7	5	8	7	9	5	8	7	10	5
EXCO Rating		EB or better	ED	EB or better		EB or better	ED	EB or better		EB or better	ED	EB or better	
SCC (ST direction)	—	—	—	—	—	—	—	—	—	> 0.75" 35ksi min	> 0.75" <10ksi	> 0.75" 25ksi min	
Fracture Toughness (Typical) Compact Specimen per ASTM E399													
K _{IC} (ksi√in) Typical	L-T T-L	—	—	—	—	35 29.4	29.7 25.0	27.9 23.4	<18	41.5 25.8	35.3 21.9	32.6 20.8	

(a) "A" - Basis Value

Fracture Toughness — The results listed above show that the fracture toughness values for 7055-T7X511 extrusions are much higher than the incumbent materials. Specifically, the toughness values measured for the 7055-T74511 extrusions exceed those of the 7075-T6511 extrusions, and the toughness values for the 7055-T76511 are significantly higher than the typical value provided for 7178-T6511. The increase in toughness is on the order of 20%.

Procurement — For additional information on alloy temper 7055-T74511 or T76511 extrusions, Contact your local Alcoa Aerospace Sales Account Manager

Fatigue Crack Growth — 7055 in the -T74511 & -T76511 tempers provides equivalent or slightly improved resistance to fatigue crack propagation.

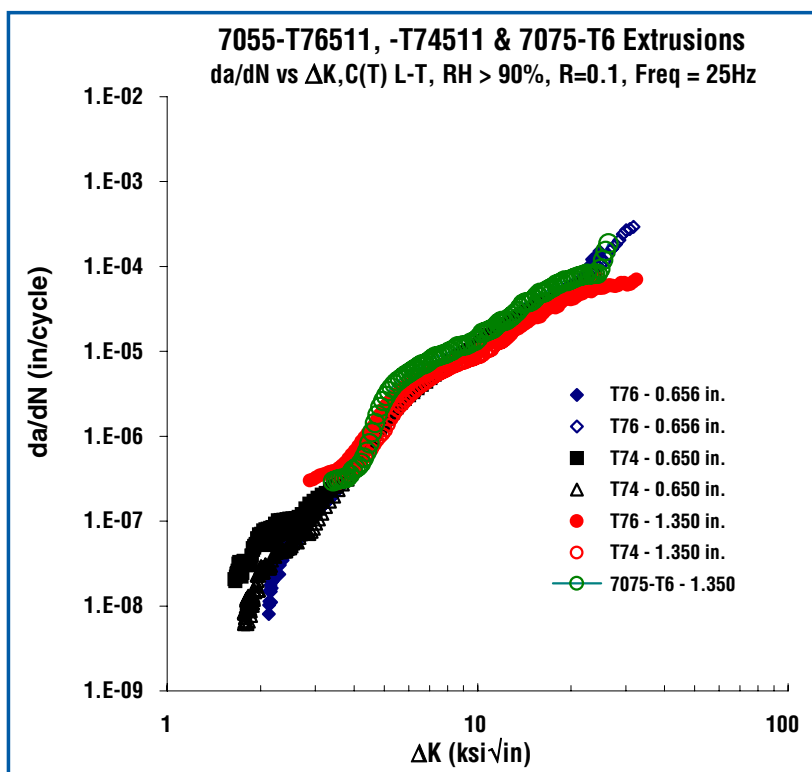
Contact & Procurement Information

For additional information on Extrusion Alloy 7055, contact your local Alcoa Aerospace Sales Account Manager.

PRODUCT SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

AEAP-ALCOA ENGINEERED AEROSPACE PRODUCTS

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