

2055-T84 Aluminium Extrusions

Product Data Sheet

High Strength, Fatigue Resistant, Low-Density Extrusions

For motorsport & aerospace applications

We have developed Al-Li alloy 2055 extrusions for use in motorsport, aerospace and other applications requiring high tensile or compressive strength, high modulus, high fatigue resistance and low density with good fracture toughness and corrosion resistance.

Li additions increase the strength and modulus of Al-Li Alloys while lowering their density. The density of 2055 is 4 to 5% less than high strength 7xxx alloys. 2055-T84 extrusions exhibit superior machining, finishing and forming characteristics.

Applications:

The combination of high strength, stiffness, damage tolerance and durability makes 2055 suitable as a replacement for high strength 7xxx and 2xxx alloys in applications such as fuselage stringers, floor beams, compressor wheels, turbo impellers and other statically and dynamically-loaded applications requiring high strength and stiffness.

Commercial Status

Alloy 2055-T84 extrusions are covered by AMS 4257.

Material design allowables including static properties, physical properties, fracture toughness, corrosion resistance and S-N fatigue are available in MMPDS.

About Smiths High Performance

Smiths High Performance is a leading stockholder and supplier of high performance engineering materials to the global motorsport sector. We are supply partners in a range of specialist motorsport markets including Formula 1, Formula E, NASCAR, MOTO GP, WEC & WRC.



Chemical Composition

Chemical Composition Limits • AA 2055 (Wt.%)*

| | | | | |
|-----------|-----------|----------|----------|----------|
| Cu | Li | Zn | Ag | Mg |
| 3.2-4.2 | 1.0-1.3 | 0.30-0.7 | 0.20-0.7 | 0.20-0.8 |
| Mn | Zr | Fe | Si | Al |
| 0.10-0.50 | 0.05-0.15 | 0.10 max | 0.07 max | Rem |

* Other elements: 0.05 wt.% max (each);
0.15 wt.% max (total); Ti 0.10 max

Toughness & Fatigue

The damage tolerance and durability properties of 2055-T84 extrusions are superior to high strength 7xxx extrusions providing an improved combination of strength and toughness improved fatigue crack growth resistance and better S-N fatigue resistance.

Further technical data available on the reverse of this Datasheet

Mechanical Properties

The strength of 2055-T84 extrusions is similar to that of 7150 extrusions and superior to that of older 7xxx alloys such as 7075 and 7050, while providing higher stiffness, comparable or better fracture toughness and lower density.

Static Properties • 2055-T84 Extrusions • MMPDS Minimum Values (A- or S-Basis)

| Property | Dir. | 2055-T84 Extrusions (AMS 4257) | | | | | | |
|---|------|--------------------------------|---------------------------|-------------|--------------|---------------|---------------|---------------|
| | | Thickness (in.) | 0.040-0.125 | 0.126-0.249 | 0.250-0.499 | 0.500-0.749 | 0.750-1.249 | 1.250-1.500 |
| | | mm | 1.02 - 3.18 | 3.20 - 6.32 | 6.35 - 12.67 | 12.70 - 19.02 | 19.05 - 31.72 | 31.75 - 38.10 |
| Ult. Tensile, F_{tu} (A), ksi (MPa) | L | | 82 (565) | 83 (572) | 85 (586) | 87 (600) | 88 (607) | 90(620) |
| | LT | | --- | 84 (579) | 84 (579) | 84 (579) | 84 (579) | 84(579) |
| Yield Strength, F_{ty} (A), ksi (MPa) | L | | 78 (538) | 79 (545) | 80 (552) | 82 (565) | 84 (579) | 86(593) |
| | LT | | --- | 78 (538) | 78 (538) | 78 (538) | 78 (538) | 78(538) |
| % El. (S) (4D) | L | | 5 | 6 | 7 | 8 | 8 | 8 |
| | LT | | --- | 5 | 5 | 5 | 5 | 5 |
| Comp. Yield Strength, F_{cy} (A), ksi (MPa) | L | | 80 (552) | 81 (558) | 81 (558) | 83 (572) | 84(579) | 87(600) |
| | LT | | --- | --- | 84 (579) | 84 (579) | 84(579) | 84(579) |
| Fracture Toughness, K_{Ic} , ksi/in (MPa√m) | L | | --- | --- | --- | --- | 22(24) | 22(24) |
| | LT | | --- | --- | --- | --- | 19(21) | 19(21) |
| Tension / Compression Modulus, Msi (GPa) | | | 11.1 (76.5) / 11.5 (79.3) | | | | | |
| Density, lbs / in ³ (g/cm ³) | | | 0.098 (2.71) | | | | | |

Corrosion Resistance

The exfoliation corrosion and stress corrosion cracking resistance of 2055-T84 extrusions is similar or better than that of 7xxx alloys in the T76 and T77 tempers and superior to the T6 tempers. The typical exfoliation rating is P (pitting, no exfoliation). The minimum guaranteed SCC resistance (ASTM G47) in the ST direction is 25 ksi (172 MPa). Impressive corrosion resistance in both accelerated and seacoast environments is also a characteristic.

...where performance matters...

When you purchase high-performance materials from **Smiths High Performance**, you will be joining some of the biggest and best global engineering companies. We are a Tier 1 supply chain partner to the world's leading motorsport companies.