
Aluminium Alloy 6063 Data Sheet

Alloy 6063

Alloy 6063 is a heat-treatable 0.7% magnesium, 0.4% silicon alloy offering good mechanical properties commonly available in a wide range of extruded sections. It's ready extrudability enables thin walled and intricate hollow shapes to be produced: flats, angles, channels and hollow circular and square sections are all standard profiles. 6063 responds well to polishing, chemical brightening, anodising and dyeing.

Similar alloys to 6063 are 6061, 6005 and 6005A, all of which are possible alternatives.

Corrosion Resistance

Excellent in a wide range of atmospheric environments and it is also acceptable in many marine environments. This alloy is particularly suitable for anodising for architectural applications.

The magnesium content is low enough that it does not suffer from the stress corrosion cracking that can affect alloys with more than about 3.5% Mg, such as 5083.

Heat Treatment

Alloy 6063 is hardenable by solution treating (522°C followed by water quenching) and ageing (precipitation) heat treatment. It is most commonly supplied in the aged T5 or T6 tempers.

To soften Alloy 6063 back to Temper O it can be annealed by heating to 415°C, holding for 2 – 3 hours then cooling; the rate of cooling should be about 30°C per hour down to 260°C. The rate of cooling below that is not important.

Heating to 345°C followed by uncontrolled cooling may be used to remove the effects of cold work, or to partially remove the effects of heat treatment.

Welding

Excellent weldability by all standard methods; gas, electric and resistance welding. GMAW and GTAW are preferred and widely used to produce structural welds. Filler alloy recommended for welding exposed surfaces that will be anodised for decorative purposes is 5356. Alloy 4043 filler may be used for other applications. The strength in the heat affected zone may be reduced by over-aging. Other filler alloys may also be used.

Machining

Average machinability in all the commonly available tempers.

Typical Applications

Handrailing, furniture and various extruded architectural profiles such as window frames.

Specified Properties

These properties are specified for extruded product (bar, rod, solid and hollow shapes) in AS/NZS 1866:1997. Similar but not necessarily identical properties are specified in AA and ASTM and other specifications and for other products.

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Composition Specification (%) (Single values are maxima except as noted)

Alloy	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others	
									Each	Total
6063	0.20-0.6	0.35	0.10	0.10	0.45-0.9	0.10	0.10	0.10	0.05	0.15

Mechanical Property Specification (Single values are minima except as noted)

Alloy & Temper	Diameter or Thickness (mm)	Tensile Strength (Mpa)	Yield Strength 0.2% Proof (Mpa) min.	Elongation (%) (GL = 50mm or 5.65√A) min
6063-O	All	130 max.	-	16
6063-T1	Up to 12.0	115 min.	60	12
	12.0 - 25.00	110 min.	55	10
6063-T5	Up to 12.0	150 min.	110	8
	12.0 - 25.00	145 min.	105	6
6063-T6	Up to 25.00	205 min.	170	8

- Other tempers such as T42, T52 and T62 are also possible in 6063 – refer to standards for details.

Physical Properties (Typical values)

Alloy	Density (kg/m ³)	Elastic Modulus (GPa)	Mean Coefficient of Thermal Expansion	Thermal Conductivity	Electrical Conductivity MS/m at 20°C		Electrical Resistivity
			20-100°C (µm/m/°C)	at 25°C (W/m.K)	Equal Volume	Equal Mass	(nΩ.m)
6063	2700	69	23.4	209	32	105	31

Grade Specification Comparison

Alloy	UNS No	ISO	BS	DIN	
				No	Name
6063	A96063	AlMgSi	H19	3.3206	AlMgSi0.5

These comparisons are approximate only. The list is intended as a comparison of functionally similar materials **not** as a schedule of contractual equivalents. If exact equivalents are needed original specifications must be consulted.

Possible Alternative Alloys

Alloy	Why it might be chosen instead of 6063
5052	Similar or higher strength required in a flat rolled sheet or plate form.

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References

- AS/NZS 1866:1997 Aluminium and Aluminium Alloys – Extruded Rod, Bar, Solid And Hollow Shapes.
- Aluminium Association – Aluminium Standards and Data – 2009 Metric SI.
- WTIA Technical Note 2 – Successful Welding of Aluminium.

Limitation of Liability

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