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PRODUCT DATA SHEET

Aluminium 5005 UNS A95005

Aluminium Alloys

Aluminium alloy 5005 contains nominally 0.8% magnesium. It has medium strength, good weldability, and good corrosion resistance in marine atmospheres. It also has the low density and excellent thermal conductivity common to all aluminium alloys. It is the most commonly used grade of aluminium in sheet and plate form.

Typical Applications Architectural applications, general sheet metal work, high strength foil.

Chemical Composition

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Element	%	Element	%
Aluminium	Balance	Manganese	0.20 max
Magnesium	0.50 – 1.10	Chromium	0.10 max
Silicon	0.30 max	Zinc	0.25 max
Iron	0.07 max	Others, each	0.05 max
Copper	0.20 max	Others, total	0.15 max

Temper	0.2% Proof Stress, MPa min [†]	Tensile Strength, MPa	Elongation % min [‡]
O (annealed)	35	105 – 145	12 – 22
H12	95	125 – 165	2 – 8
H14	115	145 – 185	1 – 6
H16	135	165 – 205	1 – 3
H18	–	> 185	1 – 3
H32	85	115 – 160	3 – 9
H34	105	135 – 180	2 – 7
H36	125	160 – 200	1 – 4
H38	–	> 180	1 – 4

[†] For information only, proof stress is not specified or measured except by prior agreement

[‡] Minimum elongation, actual value depends on thickness – thicker gauges have higher elongation

Specified Mechanical Properties

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Key to tempers:

Temper	Condition
O	Annealed (soft)
H1x	Strain hardened only
H3x	Strain hardened and then stabilised (i.e. low temperature heat treated to pre-empt natural ageing, by reducing strength and increasing ductility)
Second digit: (x)	
8	full hard 4 ½ hard
6	¾ hard 2 ¼ hard

Description Aluminium 5005 is a lean aluminium magnesium alloy which can be hardened by cold work: it is not heat treatable to higher strength.

Austral Wright Metals can supply this alloy as plate, sheet and strip. See Austral Wright Metals Catalogue for normal stock sizes and tempers.

Corrosion Resistance 5005 has the same high resistance to general corrosion as other non heat treatable aluminium alloys. It also has the higher resistance to slightly alkaline conditions common to the 5000 series alloys. The atmospheric corrosion resistance of 5005 is similar to that of 3003. When anodised to improve corrosion resistance, the film on 5005 is clearer than on 3003, and gives better colour match with 6063 architectural extrusions.

The corrosion resistance of aluminium alloys relies on a protective surface oxide film, which when damaged is readily repaired by the rapid reaction between aluminium and oxygen. However, the

high reactivity of the base metal can give rapid corrosion if the film cannot be repaired, so aluminium alloys are not suitable for use with reducing media.

Since aluminium is a reactive metal, it may corrode more quickly when in electrical contact with most other metals. The prediction of galvanic corrosion is complex, please consult Austral Wright Metals for specific advice.

Pressure Vessels AS1210 Pressure Vessels and AS4041 Pressure Piping do not prequalify the alloy for pressure service.

Physical Properties

Property	At	value	unit	Property	at	Value	unit
Density	20°C	2,700	kg/m ³	Specific Heat	20°C	900	J/kg . °C
Melting Range		632 – 655	°C	Mean Coefficient of Expansion	20°C	23.75	x 10 ⁻⁶ / °C
Modulus of Elasticity				Thermal Conductivity	25°C	201	W / m . °C
Tension	20°C	68.2	GPa	Electrical Resistivity	20°C	0.033	micro-ohm . m
Torsion	20°C	25.9	GPa	Electrical conductivity			
Compression	20°C	69.5	GPa	equal volume	20°C	52	% IACS
				equal weight	20°C	172	% IACS

Fabrication Aluminium 5005 is not generally hot worked. It is readily cold formable in the annealed condition, as it is a relatively soft and ductile alloy. Forming loads and tool & press wear are generally less than with carbon steel. For piercing and blanking the punch to die clearance should be about 6% of the thickness per side for the H32 & H34 tempers. Sharp tools are required.

Temper	Up to 1.6 mm	3.2 mm	5 mm	10 mm	12.5 mm
H32	0 t	½ t	1 t	1½ t	2 t
H34	0 t	1 t	1½ t	2 t	2½ t

Indicative minimum bend radii for 90° cold forming for various thickness, t mm

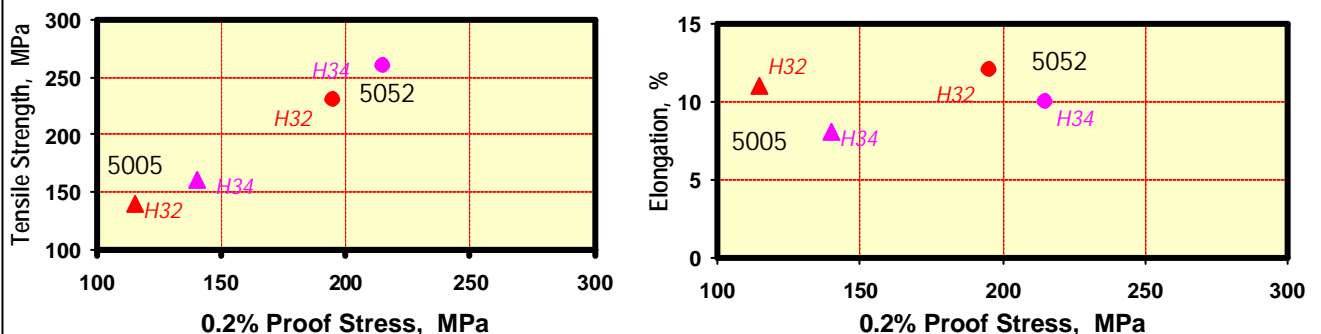
Machinability 5005 is readily machinable by conventional methods. It should be machined at high speed with copious lubrication to avoid thermal distortion of the workpiece. Sharp tools are essential. High speed steel or tungsten carbide may be used. Cuts should be deep and continuous, with high cutting speeds. Woodworking machinery may be suitable for short runs.

Welding 5005 is readily weldable by standard techniques. It is frequently welded with GTAW (TIG) or GMAW (MIG). Aluminium must be very dry & clean to avoid contamination & porosity of the weld. Filler metals 1100, 4043 or 4047 are used. 4043 is the most crack tolerant. Best colour match is obtained with 1188 filler metal. Shielding gas must be dry & free of hydrogen.

Heat Treatment Aluminium 5005 is annealed at 345°C, time at temperature and cooling rate are unimportant. Stress relief is rarely required, but can be carried out at about 220°C. If loss of strength is of concern, stress relief tests should be conducted.

	Specification	Title
ASTM Product Specifications	B209	Aluminium and Aluminium Alloy Sheet and Plate
	B316	Aluminium and Aluminium Alloy Rivet & Cold Heading Wire & Rods
	B210	Aluminium and Aluminium Alloy Drawn Seamless Tubes
	B483	Aluminium and Aluminium Alloy Drawn Tubes for General Purpose Applications

Typical strength and ductility of alloys 5005 & 5052 in the H32 & H34 tempers



Austral Wright Metals supplies a comprehensive range of stainless steels, copper alloys, nickel alloys and other high performance metals for challenging service conditions. Our engineers and metallurgists will be pleased to provide further data and applications advice.