

Aluminum 6061-T6; 6061-T651	
Categories:	Metal ; Nonferrous Metal ; Aluminum Alloy ; 6000 Series Aluminum Alloy
Material Notes:	<p>Information provided by Alcoa, Starmet and the references. General 6061 characteristics and uses: Excellent joining characteristics, good acceptance of applied coatings. Combines relatively high strength, good workability, and high resistance to corrosion; widely available. The T8 and T9 tempers offer better chipping characteristics over the T6 temper.</p> <p>Applications: Aircraft fittings, camera lens mounts, couplings, marines fittings and hardware, electrical fittings and connectors, decorative or misc. hardware, hinge pins, magneto parts, brake pistons, hydraulic pistons, appliance fittings, valves and valve parts; bike frames.</p> <p>Data points with the AA note have been provided by the Aluminum Association, Inc. and are NOT FOR DESIGN.</p> <p>Composition Notes: Composition information provided by the Aluminum Association and is not for design.</p>
Key Words:	al6061, UNS A96061; ISO AlMg1SiCu; Aluminium 6061-T6, AD-33 (Russia); AA6061-T6; 6061T6, UNS A96061; ISO AlMg1SiCu; Aluminium 6061-T651, AD-33 (Russia); AA6061-T651
Vendors:	<p>Click here to view all available suppliers for this material.</p> <p>Please click here if you are a supplier and would like information on how to add your listing to this material.</p>

Physical Properties	Metric	English	Comments
Density	2.70 g/cc	0.0975 lb/in ³	AA; Typical
Mechanical Properties	Metric	English	Comments
Hardness, Brinell	95	95	AA; Typical; 500 g load; 10 mm ball
Hardness, Knoop	120	120	Converted from Brinell Hardness Value
Hardness, Rockwell A	40	40	Converted from Brinell Hardness Value
Hardness, Rockwell B	60	60	Converted from Brinell Hardness Value

Hardness, Vickers	107	107	Converted from Brinell Hardness Value
Ultimate Tensile Strength	310 MPa	45.0 ksi	AA; Typical
Tensile Yield Strength	276 MPa	40.0 ksi	AA; Typical
Elongation at Break	12.0 %	12.0 %	AA; Typical; 1/16 in. (1.6 mm) Thickness
	17.0 %	17.0 %	AA; Typical; 1/2 in. (12.7 mm) Diameter
Modulus of Elasticity	68.9 GPa	10000 ksi	AA; Typical; Average of tension and compression. Compression modulus is about 2% greater than tensile modulus.
Notched Tensile Strength	324 MPa	47000 psi	2.5 cm width x 0.16 cm thick side-notched specimen, $K_t = 17$.
Ultimate Bearing Strength	607 MPa	88000 psi	Edge distance/pin diameter = 2.0
Bearing Yield Strength	386 MPa	56000 psi	Edge distance/pin diameter = 2.0
Poissons Ratio	0.330	0.330	Estimated from trends in similar Al alloys.
Fatigue Strength	96.5 MPa @# of Cycles 5.00e+8	14000 psi @# of Cycles 5.00e+8	completely reversed stress; RR Moore machine/specimen
Fracture Toughness	29.0 MPa-m ^{1/2}	26.4 ksi-in ^{1/2}	K_{Ic} ; TL orientation.
Machinability	50 %	50 %	0-100 Scale of Aluminum Alloys
Shear Modulus	26.0 GPa	3770 ksi	Estimated from similar Al alloys.
Shear Strength	207 MPa	30000 psi	AA; Typical
Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.00000399 ohm-cm	0.00000399 ohm-cm	AA; Typical at 68°F
Thermal Properties	Metric	English	Comments
CTE, linear	23.6 μm/m-°C @Temperature 20.0 - 100 °C	13.1 μin/in-°F @Temperature 68.0 - 212 °F	AA; Typical; average over range
	25.2 μm/m-°C @Temperature 20.0 - 300 °C	14.0 μin/in-°F @Temperature 68.0 - 572 °F	

Specific Heat Capacity	0.896 J/g-°C	0.214 BTU/lb-°F	
Thermal Conductivity	167 W/m-K	1160 BTU-in/hr-ft ² -°F	AA; Typical at 77°F
Melting Point	582 - 651.7 °C	1080 - 1205 °F	AA; Typical range based on typical composition for wrought products 1/4 inch thickness or greater; Eutectic melting can be completely eliminated by homogenization.
Solidus	582 °C	1080 °F	AA; Typical
Liquidus	651.7 °C	1205 °F	AA; Typical
Processing Properties			
	Metric	English	Comments
Solution Temperature	529 °C	985 °F	
Aging Temperature	160 °C	320 °F	Rolled or drawn products; hold at temperature for 18 hr
	177 °C	350 °F	Extrusions or forgings; hold at temperature for 8 hr
Material Components Properties			
	Metric	English	Comments
Aluminum, Al	95.8 - 98.6 %	95.8 - 98.6 %	As remainder
Chromium, Cr	0.040 - 0.35 %	0.040 - 0.35 %	
Copper, Cu	0.15 - 0.40 %	0.15 - 0.40 %	
Iron, Fe	<= 0.70 %	<= 0.70 %	
Magnesium, Mg	0.80 - 1.20 %	0.80 - 1.20 %	
Manganese, Mn	<= 0.15 %	<= 0.15 %	
Other, each	<= 0.050 %	<= 0.050 %	
Other, total	<= 0.15 %	<= 0.15 %	
Silicon, Si	0.40 - 0.80 %	0.40 - 0.80 %	
Titanium, Ti	<= 0.15 %	<= 0.15 %	
Zinc, Zn	<= 0.25 %	<= 0.25 %	