

## Aluminum 6061-T6; 6061-T651

**Categories:** [Metal](#); [Nonferrous Metal](#); [Aluminum Alloy](#); [6000 Series Aluminum Alloy](#)

**Material Notes:** 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.

**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.

Data points with the AA note have been provided by the Aluminum Association, Inc. and are NOT FOR DESIGN.



**Composition Notes:**



Composition information provided by the Aluminum Association and is not for design.

**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:** [Click here to view all available suppliers for this material.](#)

Please [click here](#) if you are a supplier and would like information on how to add your listing to this material.

Physical Properties	Metric	English	Comments
Density	2.70 g/cc	0.0975 lb/in <sup>3</sup>	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
Tensile Strength, Ultimate	310 MPa	45000 psi	AA; Typical
	24.0 MPa @Temperature 371 °C	3480 psi @Temperature 700 °F	
	32.0 MPa @Temperature 316 °C	4640 psi @Temperature 601 °F	
	51.0 MPa @Temperature 260 °C	7400 psi @Temperature 500 °F	
	131 MPa @Temperature 204 °C	19000 psi @Temperature 399 °F	
	234 MPa @Temperature 149 °C	33900 psi @Temperature 300 °F	
	290 MPa @Temperature 100 °C	42100 psi @Temperature 212 °F	
	310 MPa @Temperature 24.0 °C	45000 psi @Temperature 75.2 °F	
	324 MPa @Temperature -28.0 °C	47000 psi @Temperature -18.4 °F	
	338 MPa @Temperature -80.0 °C	49000 psi @Temperature -112 °F	
	414 MPa @Temperature -196 °C	60000 psi @Temperature -321 °F	
Tensile Strength, Yield	276 MPa	40000 psi	AA; Typical
	12.0 MPa @Temperature 371 °C	1740 psi @Temperature 700 °F	0.2% Offset
	19.0 MPa @Temperature 316 °C	2760 psi @Temperature 601 °F	0.2% Offset
	34.0 MPa @Temperature 260 °C	4930 psi @Temperature 500 °F	0.2% Offset
	103 MPa @Temperature 204 °C	14900 psi @Temperature 399 °F	0.2% Offset
	214 MPa @Temperature 149 °C	31000 psi @Temperature 300 °F	0.2% Offset
	262 MPa @Temperature 100 °C	38000 psi @Temperature 212 °F	0.2% Offset
	276 MPa @Temperature 24.0 °C	40000 psi @Temperature 75.2 °F	0.2% Offset
	283 MPa @Temperature -28.0 °C	41000 psi @Temperature -18.4 °F	0.2% Offset
	290 MPa @Temperature -80.0 °C	42100 psi @Temperature -112 °F	0.2% Offset
	324 MPa	47000 psi	0.2% Offset

	@Temperature -196 °C	@Temperature -321 °F	
Elongation at Break 	17.0 % @Temperature -28.0 °C	17.0 % @Temperature -18.4 °F	
	17.0 % @Temperature 24.0 °C	17.0 % @Temperature 75.2 °F	
	18.0 % @Temperature -80.0 °C	18.0 % @Temperature -112 °F	
	18.0 % @Temperature 100 °C	18.0 % @Temperature 212 °F	
	20.0 % @Temperature 149 °C	20.0 % @Temperature 300 °F	
	22.0 % @Temperature -196 °C	22.0 % @Temperature -321 °F	
	28.0 % @Temperature 204 °C	28.0 % @Temperature 399 °F	
	60.0 % @Temperature 260 °C	60.0 % @Temperature 500 °F	
	85.0 % @Temperature 316 °C	85.0 % @Temperature 601 °F	
	95.0 % @Temperature 371 °C	95.0 % @Temperature 700 °F	
	12.0 % @Thickness 1.59 mm	12.0 % @Thickness 0.0625 in	AA; Typical
	17.0 % @Diameter 12.7 mm	17.0 % @Diameter 0.500 in	AA; Typical
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 <sup>1/2</sup>	26.4 ksi-in <sup>1/2</sup>	$K_{IC}$ ; 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
<b>Electrical Properties</b>	<b>Metric</b>	<b>English</b>	<b>Comments</b>
Electrical Resistivity	0.00000399 ohm-cm @Temperature 20.0 °C	0.00000399 ohm-cm @Temperature 68.0 °F	AA; Typical
<b>Thermal Properties</b>	<b>Metric</b>	<b>English</b>	<b>Comments</b>
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 <sup>2</sup> -°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
<b>Processing Properties</b>	<b>Metric</b>	<b>English</b>	<b>Comments</b>
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
<b>Component Elements Properties</b>	<b>Metric</b>	<b>English</b>	<b>Comments</b>
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 %

[References](#) for this datasheet.

Some of the values displayed above may have been converted from their original units and/or rounded in order to display the information in a consistent format. Users requiring more precise data for scientific or engineering calculations can click on the property value to see the original value as well as raw conversions to equivalent units. We advise that you only use the original value or one of its raw conversions in your calculations to minimize rounding error. We also ask that you refer to MatWeb's [terms of use](#) regarding this information. [Click here](#) to view all the property values for this datasheet as they were originally entered into MatWeb.