Aluminum 6061-T6; 6061-T651

**Subcategory:** 6000 Series Aluminum Alloy; Aluminum Alloy; Metal; Nonferrous Metal

**Composition Notes:**
Aluminum content reported is calculated as remainder.
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

<table>
<thead>
<tr>
<th>Component</th>
<th>Wt. %</th>
<th>Component</th>
<th>Wt. %</th>
<th>Component</th>
<th>Wt. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al</td>
<td>95.8 - 98.6</td>
<td>Mg</td>
<td>0.8 - 1.2</td>
<td>Si</td>
<td>0.4 - 0.8</td>
</tr>
<tr>
<td>Cr</td>
<td>0.04 - 0.35</td>
<td>Mn</td>
<td>Max 0.15</td>
<td>Ti</td>
<td>Max 0.15</td>
</tr>
<tr>
<td>Cu</td>
<td>0.15 - 0.4</td>
<td>Other, each</td>
<td>Max 0.05</td>
<td>Zn</td>
<td>Max 0.25</td>
</tr>
<tr>
<td>Fe</td>
<td>Max 0.7</td>
<td>Other, total</td>
<td>Max 0.15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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.

**Physical Properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Metric</th>
<th>English</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>2.7 g/cc</td>
<td>0.0975 lb/in³</td>
<td>AA; Typical</td>
</tr>
</tbody>
</table>

**Mechanical Properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Metric</th>
<th>English</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardness, Brinell</td>
<td>95</td>
<td>95</td>
<td>AA; Typical; 500 g load; 10 mm ball</td>
</tr>
<tr>
<td>Hardness, Knoop</td>
<td>120</td>
<td>120</td>
<td>Converted from Brinell Hardness Value</td>
</tr>
<tr>
<td>Hardness, Rockwell A</td>
<td>40</td>
<td>40</td>
<td>Converted from Brinell Hardness Value</td>
</tr>
<tr>
<td>Hardness, Rockwell B</td>
<td>60</td>
<td>60</td>
<td>Converted from Brinell Hardness Value</td>
</tr>
<tr>
<td>Hardness, Vickers</td>
<td>107</td>
<td>107</td>
<td>Converted from Brinell Hardness Value</td>
</tr>
<tr>
<td>Ultimate Tensile Strength</td>
<td>310 MPa</td>
<td>45000 psi</td>
<td>AA; Typical</td>
</tr>
<tr>
<td>Tensile Yield Strength</td>
<td>276 MPa</td>
<td>40000 psi</td>
<td>AA; Typical</td>
</tr>
<tr>
<td>Elongation at Break</td>
<td>12 %</td>
<td>12 %</td>
<td>AA; Typical; 1/16 in. (1.6 mm) Thickness</td>
</tr>
<tr>
<td>Elongation at Break</td>
<td>17 %</td>
<td>17 %</td>
<td>AA; Typical; 1/2 in. (12.7 mm) Diameter</td>
</tr>
</tbody>
</table>
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, Kt = 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

Poisson's Ratio
0.33 0.33 Estimated from trends in similar Al alloys.

Fatigue Strength
96.5 MPa 14000 psi AA; 500,000,000 cycles completely reversed stress; RR Moore machine/specimen

Fracture Toughness
29 MPa-m1/2 26.4 ksi-in1/2 Kic; TL orientation.

Machinability
50 % 50 % 0-100 Scale of Aluminum Alloys

Shear Modulus
26 GPa 3770 ksi Estimated from similar Al alloys.

Shear Strength
207 MPa 30000 psi AA; Typical

Electrical Properties

Electrical Resistivity
3.99e-006 ohm-cm
3.99e-006 ohm-cm AA; Typical at 68°F

Thermal Properties

CTE, linear 68°F
23.6 µm/m-°C
13.1 µin/in-°F AA; Typical; Average over 68-212°F range.

CTE, linear 250°C
25.2 µm/m-°C
14 µin/in-°F Estimated from trends in similar Al alloys. 20-300°C.

Specific Heat Capacity
0.896 J/g-°C
0.214 BTU/lb-°F

Thermal Conductivity
167 W/m-K
1160 BTU-in/hr-ft²-°F AA; Typical at 77°F

Melting Point
582 - 652 °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
652 °C
1205 °F AA; Typical

Processing Properties

Solution Temperature
529 °C
985 °F

Aging Temperature
160 °C
320 °F Rolled or drawn products; hold at temperature for 18 hr

Aging Temperature
177 °C
350 °F Extrusions or forgings; hold at temperature for 8 hr

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 disclaimer and terms of use regarding this information. MatWeb data and tools provided by MatWeb, LLC.

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