



ASM Aerospace Specification Metals Inc.



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Aluminum 6061-T4; 6061-T451

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

Close Analogs:

Composition Notes:

Aluminum content reported is calculated as remainder.

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

Key Words: al6061, AD-33 (Russia); AA6061-T451; AA6061-T4, UNS A96061; ISO AlMg1SiCu; Aluminum 6061-T451; Aluminium 6061-T4; Aluminium 6061-T451

| Component | Wt. % | Component | Wt. % | Component | Wt. % |
|-----------|-------------|--------------|-----------|-----------|-----------|
| Al | 95.8 - 98.6 | Mg | 0.8 - 1.2 | Si | 0.4 - 0.8 |
| Cr | 0.04 - 0.35 | Mn | Max 0.15 | Ti | Max 0.15 |
| Cu | 0.15 - 0.4 | Other, each | Max 0.05 | Zn | Max 0.25 |
| Fe | Max 0.7 | Other, total | Max 0.15 | | |

Material Notes:

Information provided by Alcoa 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.

Uses: 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.

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

| Physical Properties | Metric | English | Comments |
|---------------------|-----------------|---------------------------|-------------|
| Density | <u>2.7 g/cc</u> | 0.0975 lb/in ³ | AA; Typical |

Mechanical Properties

| | | | |
|-------------------|----|----|---------------------------------------|
| Hardness, Brinell | 65 | 65 | AA; Typical; 500 g load; 10 mm ball |
| Hardness, Knoop | 88 | 88 | Converted from Brinell Hardness Value |

| | | | |
|---------------------------|-----------------|-----------|--|
| Hardness, Vickers | 75 | 75 | Converted from Brinell Hardness Value |
| Ultimate Tensile Strength | <u>241 MPa</u> | 35000 psi | AA; Typical |
| Tensile Yield Strength | <u>145 MPa</u> | 21000 psi | AA; Typical |
| Elongation at Break | <u>22 %</u> | 22 % | AA; Typical; 1/16 in. (1.6 mm) Thickness |
| Elongation at Break | <u>25 %</u> | 25 % | AA; Typical; 1/2 in. (12.7 mm) Diameter |
| Modulus of Elasticity | <u>68.9 GPa</u> | 10000 ksi | AA; Typical; Average of tension and compression. Compression modulus is about 2% greater than tensile modulus. |
| Poisson's Ratio | 0.33 | 0.33 | Estimated from trends in similar Al alloys. |
| Fatigue Strength | <u>96.5 MPa</u> | 14000 psi | AA; 500,000,000 cycles completely reversed stress; RR Moore machine/specimen |
| Machinability | <u>50 %</u> | 50 % | 0-100 Scale of Aluminum Alloys |
| Shear Modulus | <u>26 GPa</u> | 3770 ksi | Estimated from similar Al alloys. |
| Shear Strength | <u>165 MPa</u> | 24000 psi | AA; Typical |

Electrical Properties

| | | | |
|------------------------|-------------------------|------------------|---------------------|
| Electrical Resistivity | <u>4.32e-006 ohm-cm</u> | 4.32e-006 ohm-cm | AA; Typical at 68°F |
|------------------------|-------------------------|------------------|---------------------|

Thermal Properties

| | | | |
|------------------------|--|--|---|
| CTE, linear 68°F | <u>23.6 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$</u> | 13.1 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$ | AA; Typical; Average over 68-212°F range. |
| CTE, linear 250°C | <u>25.2 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$</u> | 14 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$ | Estimated from trends in similar Al alloys. 20-300°C. |
| Specific Heat Capacity | <u>0.896 J/g$\cdot^\circ\text{C}$</u> | 0.214 BTU/lb $\cdot^\circ\text{F}$ | |
| Thermal Conductivity | <u>154 W/m$\cdot\text{K}$</u> | 1070 BTU-in/hr-ft ² $\cdot^\circ\text{F}$ | 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 | <u>582 °C</u> | 1080 °F | AA; Typical |
| Liquidus | <u>652 °C</u> | 1205 °F | AA; Typical |

Processing Properties

| | | | |
|----------------------|---------------|--------|---|
| Solution Temperature | <u>529 °C</u> | 985 °F | |
| Aging Temperature | <u>160 °C</u> | 320 °F | Rolled or drawn products; hold at temperature for 18 hr |
| Aging Temperature | <u>177 °C</u> | 350 °F | Extrusions or forgings; hold at temperature for 8 hr |

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.