



ASM Aerospace Specification Metals Inc.



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Aluminum 7178-T6; 7178-T651

Subcategory: 7000 Series Aluminum Alloy; Aluminum Alloy; Metal; Nonferrous Metal

Close Analogs:

Composition Notes:

This designation is considered the sole original alloy for this alloy family.

Aluminum content reported is calculated as remainder.

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

Key Words: UNS A97178; Aluminium 7178-T6; Aluminium 7178-T651; AA7178-T651; AA7178-T6

| Component | Wt. % | Component | Wt. % | Component | Wt. % |
|-----------|-------------|--------------|-----------|-----------|-----------|
| Al | 85.3 - 89.5 | Mg | 2.4 - 3.1 | Si | Max 0.4 |
| Cr | 0.18 - 0.28 | Mn | Max 0.3 | Ti | Max 0.2 |
| Cu | 1.6 - 2.4 | Other, each | Max 0.05 | Zn | 6.3 - 7.3 |
| Fe | Max 0.5 | Other, total | Max 0.15 | | |

Material Notes:

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>2.83 g/cc</u> | 0.102 lb/in ³ | AA; Typical |

Mechanical Properties

| | | | |
|---------------------------|----------------|-----------|---------------------------------------|
| Hardness, Brinell | 160 | 160 | 500 kg load with 10 mm ball |
| Hardness, Knoop | 205 | 205 | Converted from Brinell Hardness Value |
| Hardness, Rockwell A | 55.3 | 55.3 | Converted from Brinell Hardness Value |
| Hardness, Rockwell B | 90 | 90 | Converted from Brinell Hardness Value |
| Hardness, Vickers | 189 | 189 | Converted from Brinell Hardness Value |
| Ultimate Tensile Strength | <u>607 MPa</u> | 88000 psi | AA; Typical |
| Tensile Yield Strength | <u>538 MPa</u> | 78000 psi | AA; Typical |

| | | | |
|----------------------------|-----------------|------------|--|
| Elongation at Break | <u>10 %</u> | 10 % | AA; Typical; 1/16 in. (1.6 mm) Thickness |
| Elongation at Break | <u>11 %</u> | 11 % | AA; Typical; 1/2 in. (12.7 mm) Diameter |
| Modulus of Elasticity | <u>71.7 GPa</u> | 10400 ksi | AA; Typical; Average of tension and compression. Compression modulus is about 2% greater than tensile modulus. |
| Compressive Yield Strength | <u>530 MPa</u> | 76900 psi | 0.1% Permanent Set |
| Notched Tensile Strength | <u>386 MPa</u> | 56000 psi | 2.5 cm width x 0.16 cm thick side-notched specimen, $K_t = 17$. |
| Ultimate Bearing Strength | <u>1089 MPa</u> | 158000 psi | Edge distance/pin diameter = 2.0 |
| Bearing Yield Strength | <u>807 MPa</u> | 117000 psi | Edge distance/pin diameter = 2.0 |
| Poisson's Ratio | 0.33 | 0.33 | Estimated from trends in similar Al alloys. |
| Fatigue Strength | <u>150 MPa</u> | 21800 psi | 500,000,000 Cycles |
| Machinability | <u>70 %</u> | 70 % | 0-100 Scale of Aluminum Alloys |
| Shear Modulus | <u>27 GPa</u> | 3920 ksi | Estimated from similar Al alloys. |
| Shear Strength | <u>360 MPa</u> | 52200 psi | |

Electrical Properties

| | | | |
|------------------------|-------------------------|------------------|---------------------|
| Electrical Resistivity | <u>5.49e-006 ohm-cm</u> | 5.49e-006 ohm-cm | AA; Typical at 68°F |
|------------------------|-------------------------|------------------|---------------------|

Thermal Properties

| | | | |
|------------------------|--|--|---|
| CTE, linear 68°F | <u>23.4 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$</u> | 13 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$ | AA; Typical; Average over 68-212°F range. |
| CTE, linear 250°C | <u>25.4 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$</u> | 14.1 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$ | Average over the range 20-300°C |
| Specific Heat Capacity | <u>0.856 J/g$\cdot^\circ\text{C}$</u> | 0.205 BTU/lb $\cdot^\circ\text{F}$ | |
| Thermal Conductivity | <u>125 W/m-K</u> | 870 BTU-in/hr-ft $^2\cdot^\circ\text{F}$ | AA; Typical at 77°F |
| Melting Point | 477 - 629 °C | 890 - 1165 °F | AA; Typical range based on typical composition for wrought products 1/4 inch thickness or greater. Homogenization may raise eutectic melting temperature 20-40°F but usually does not eliminate eutectic melting. |
| Solidus | <u>477 °C</u> | 890 °F | AA; Typical |
| Liquidus | <u>629 °C</u> | 1165 °F | AA; Typical |

Processing Properties

| | | | |
|-----------------------|---------------|--------|-----------|
| Annealing Temperature | <u>413 °C</u> | 775 °F | |
| Solution Temperature | <u>468 °C</u> | 875 °F | |
| Aging Temperature | <u>121 °C</u> | 250 °F | for 24 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.