# Aluminum 7075-T6; 7075-T651

**Categories:** Metal; Nonferrous Metal; Aluminum Alloy; 7000 Series Aluminum Alloy

**Material Notes:** General 7075 characteristics and uses (from Alcoa): Very high strength material used for highly stressed structural parts. The T7351 temper offers improved stress-corrosion cracking resistance.

**Applications:** Aircraft fittings, gears and shafts, fuse parts, meter shafts and gears, missile parts, regulating valve parts, worm gears, keys, aircraft, aerospace and defense applications; bike frames, all terrain vehicle (ATV) sprockets.

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

**Composition Notes**:
A Zr + Ti limit of 0.25 percent maximum may be used with this alloy designation for extruded and forged products only, but only when the supplier and the purchaser have mutually agreed.
Composition information provided by the Aluminum Association and is not for design.

**Key Words:** Aluminium 7075-T6; Aluminium 7075-T651, UNS A97075; ISO AlZn5.5MgCu; Aluminium 7075-T6; Aluminium 7075-T651; AA7075-T6

**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 | 2.81 g/cc | 0.102 lb/in³ | AA; Typical |

| Mechanical Properties | Metric | English | Comments |
|---|---|---|---|
| Hardness, Brinell | 150 | 150 | AA; Typical; 500 g load; 10 mm ball |
| Hardness, Knoop | 191 | 191 | Converted from Brinell Hardness Value |
| Hardness, Rockwell A | 53.5 | 53.5 | Converted from Brinell Hardness Value |
| Hardness, Rockwell B | 87 | 87 | Converted from Brinell Hardness Value |
| Hardness, Vickers | 175 | 175 | Converted from Brinell Hardness Value |
| Tensile Strength, Ultimate | 572 MPa | 83000 psi | AA; Typical |
| | 41.0 MPa @Temperature 371 °C | 5950 psi @Temperature 700 °F | |
| | 55.0 MPa @Temperature 316 °C | 7980 psi @Temperature 601 °F | |
| | 76.0 MPa @Temperature 260 °C | 11000 psi @Temperature 500 °F | |
| | 110 MPa @Temperature 204 °C | 16000 psi @Temperature 399 °F | |
| | 214 MPa @Temperature 149 °C | 31000 psi @Temperature 300 °F | |
| | 483 MPa @Temperature 100 °C | 70100 psi @Temperature 212 °F | |
| | 572 MPa @Temperature 24.0 °C | 83000 psi @Temperature 75.2 °F | |
| | 593 MPa @Temperature -28.0 °C | 86000 psi @Temperature -18.4 °F | |
| | 621 MPa @Temperature -80.0 °C | 90100 psi @Temperature -112 °F | |
| | 703 MPa @Temperature -196 °C | 102000 psi @Temperature -321 °F | |

| | | | |
|---|---|---|---|
| | >= 462 MPa<br>@Thickness 88.93 - 102 mm | >= 67000 psi<br>@Thickness 3.501 - 4.00 in | Plate; T62, T651 |
| | >= 490 MPa<br>@Thickness 76.23 - 88.9 mm | >= 71100 psi<br>@Thickness 3.001 - 3.50 in | Plate; T62, T651 |
| | >= 496 MPa<br>@Thickness 63.53 - 76.2 mm | >= 71900 psi<br>@Thickness 2.501 - 3.00 in | Plate; T62, T651 |
| | >= 510 MPa<br>@Thickness 0.203 - 0.279 mm | >= 74000 psi<br>@Thickness 0.00800 - 0.0110 in | Sheet |
| | >= 524 MPa<br>@Thickness 0.305 - 0.991 mm | >= 76000 psi<br>@Thickness 0.0120 - 0.0390 in | Sheet |
| | >= 524 MPa<br>@Thickness 50.83 - 63.5 mm | >= 76000 psi<br>@Thickness 2.001 - 2.50 in | Plate; T62, T651 |
| | >= 531 MPa<br>@Thickness 25.43 - 50.8 mm | >= 77000 psi<br>@Thickness 1.001 - 2.00 in | Plate; T62, T651 |
| | >= 538 MPa<br>@Thickness 1.02 - 3.17 mm | >= 78000 psi<br>@Thickness 0.0400 - 0.125 in | Sheet |
| | >= 538 MPa<br>@Thickness 3.20 - 6.32 mm | >= 78000 psi<br>@Thickness 0.126 - 0.249 in | Sheet |
| | >= 538 MPa<br>@Thickness 6.35 - 12.7 mm | >= 78000 psi<br>@Thickness 0.250 - 0.499 in | Plate; T62, T651 |
| | >= 538 MPa<br>@Thickness 12.7 - 25.4 mm | >= 78000 psi<br>@Thickness 0.500 - 1.00 in | Plate; T62, T651 |
| Tensile Strength, Yield | 503 MPa | 73000 psi | AA; Typical |
| | >= 372 MPa<br>@Thickness 88.93 - 102 mm | >= 54000 psi<br>@Thickness 3.501 - 4.00 in | Plate; T62, T651 |
| | >= 400 MPa<br>@Thickness 76.23 - 88.9 mm | >= 58000 psi<br>@Thickness 3.001 - 3.50 in | Plate; T62, T651 |
| | >= 421 MPa<br>@Thickness 63.53 - 76.2 mm | >= 61100 psi<br>@Thickness 2.501 - 3.00 in | Plate; T62, T651 |
| | >= 434 MPa<br>@Thickness 0.203 - 0.279 mm | >= 62900 psi<br>@Thickness 0.00800 - 0.0110 in | Sheet |
| | >= 441 MPa<br>@Thickness 50.83 - 63.5 mm | >= 64000 psi<br>@Thickness 2.001 - 2.50 in | Plate; T62, T651 |
| | >= 462 MPa<br>@Thickness 0.305 - 0.991 mm | >= 67000 psi<br>@Thickness 0.0120 - 0.0390 in | Sheet |
| | >= 462 MPa<br>@Thickness 6.35 - 12.7 mm | >= 67000 psi<br>@Thickness 0.250 - 0.499 in | Plate; T62, T651 |
| | >= 462 MPa<br>@Thickness 25.43 - 50.8 mm | >= 67000 psi<br>@Thickness 1.001 - 2.00 in | Plate; T62, T651 |
| | >= 469 MPa<br>@Thickness 1.02 - 3.17 mm | >= 68000 psi<br>@Thickness 0.0400 - 0.125 in | Sheet |
| | >= 469 MPa<br>@Thickness 12.7 - 25.4 mm | >= 68000 psi<br>@Thickness 0.500 - 1.00 in | Plate; T62, T651 |
| | >= 476 MPa<br>@Thickness 3.20 - 6.32 mm | >= 69000 psi<br>@Thickness 0.126 - 0.249 in | Sheet |
| | 32.0 MPa<br>@Strain 0.200 %,<br>Temperature 271 °C | 4640 psi<br>@Strain 0.200 %,<br>Temperature 520 °F | |
| | 45.0 MPa<br>@Strain 0.200 %,<br>Temperature 316 °C | 6530 psi<br>@Strain 0.200 %,<br>Temperature 601 °F | |
| | 62.0 MPa<br>@Strain 0.200 %,<br>Temperature 260 °C | 8990 psi<br>@Strain 0.200 %,<br>Temperature 500 °F | |
| | 87.0 MPa<br>@Strain 0.200 %,<br>Temperature 204 °C | 12600 psi<br>@Strain 0.200 %,<br>Temperature 399 °F | |
| | 186 MPa<br>@Strain 0.200 %,<br>Temperature 149 °C | 27000 psi<br>@Strain 0.200 %,<br>Temperature 300 °F | |
| | 448 MPa<br>@Strain 0.200 %,<br>Temperature 100 °C | 65000 psi<br>@Strain 0.200 %,<br>Temperature 212 °F | |
| | 503 MPa<br>@Strain 0.200 %, | 73000 psi<br>@Strain 0.200 %, | |

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|---|---|---|---|
| | Temperature 24.0 °C | Temperature 75.2 °F | |
| | 517 MPa<br>@Strain 0.200 %,<br>Temperature -28.0 °C | 75000 psi<br>@Strain 0.200 %,<br>Temperature -18.4 °F | |
| | 545 MPa<br>@Strain 0.200 %,<br>Temperature -80.0 °C | 79000 psi<br>@Strain 0.200 %,<br>Temperature -112 °F | |
| | 634 MPa<br>@Strain 0.200 %,<br>Temperature -196 °C | 92000 psi<br>@Strain 0.200 %,<br>Temperature -321 °F | |
| Elongation at Break  | 9.0 %<br>@Temperature -196 °C | 9.0 %<br>@Temperature -321 °F | |
| | 11 %<br>@Temperature -80.0 °C | 11 %<br>@Temperature -112 °F | |
| | 11 %<br>@Temperature -28.0 °C | 11 %<br>@Temperature -18.4 °F | |
| | 11 %<br>@Temperature 24.0 °C | 11 %<br>@Temperature 75.2 °F | |
| | 14 %<br>@Temperature 100 °C | 14 %<br>@Temperature 212 °F | |
| | 30 %<br>@Temperature 149 °C | 30 %<br>@Temperature 300 °F | |
| | 55 %<br>@Temperature 204 °C | 55 %<br>@Temperature 399 °F | |
| | 65 %<br>@Temperature 260 °C | 65 %<br>@Temperature 500 °F | |
| | 70 %<br>@Temperature 316 °C | 70 %<br>@Temperature 601 °F | |
| | 70 %<br>@Temperature 371 °C | 70 %<br>@Temperature 700 °F | |
|  | >= 3.0 %<br>@Thickness 88.93 - 102 mm | >= 3.0 %<br>@Thickness 3.501 - 4.00 in | Plate; T62, T651 |
| | >= 5.0 %<br>@Thickness 0.203 - 0.279 mm | >= 5.0 %<br>@Thickness 0.00800 - 0.0110 in | Sheet |
| | >= 5.0 %<br>@Thickness 50.83 - 63.5 mm | >= 5.0 %<br>@Thickness 2.001 - 2.50 in | Plate; T62, T651 |
| | >= 5.0 %<br>@Thickness 63.53 - 76.2 mm | >= 5.0 %<br>@Thickness 2.501 - 3.00 in | Plate; T62, T651 |
| | >= 5.0 %<br>@Thickness 76.23 - 88.9 mm | >= 5.0 %<br>@Thickness 3.001 - 3.50 in | Plate; T62, T651 |
| | >= 6.0 %<br>@Thickness 25.43 - 50.8 mm | >= 6.0 %<br>@Thickness 1.001 - 2.00 in | Plate; T62, T651 |
| | >= 7.0 %<br>@Thickness 0.305 - 0.991 mm | >= 7.0 %<br>@Thickness 0.0120 - 0.0390 in | Sheet |
| | >= 7.0 %<br>@Thickness 12.7 - 25.4 mm | >= 7.0 %<br>@Thickness 0.500 - 1.00 in | Plate; T62, T651 |
| | >= 8.0 %<br>@Thickness 1.02 - 3.17 mm | >= 8.0 %<br>@Thickness 0.0400 - 0.125 in | Sheet |
| | >= 8.0 %<br>@Thickness 3.20 - 6.32 mm | >= 8.0 %<br>@Thickness 0.126 - 0.249 in | Sheet |
| | >= 9.0 %<br>@Thickness 6.35 - 12.7 mm | >= 9.0 %<br>@Thickness 0.250 - 0.499 in | Plate; T62, T651 |
| | 11 %<br>@Thickness 1.59 mm | 11 %<br>@Thickness 0.0625 in | AA; Typical |
| | 11 %<br>@Diameter 12.7 mm | 11 %<br>@Diameter 0.500 in | AA; Typical |
| Modulus of Elasticity | 71.7 GPa | 10400 ksi | AA; Typical; Average of tension and compression. Compression modulus is about 2% greater than tensile modulus. |
| Poissons Ratio | 0.33 | 0.33 | |
| Fatigue Strength | 159 MPa<br>@# of Cycles 5.00e+8 | 23000 psi<br>@# of Cycles 5.00e+8 | completely reversed stress; RR Moore machine/specimen |
| Fracture Toughness | 17.6 MPa-m½ | 16.0 ksi-in½ | T651; Plate; S-L; average |
| | 16.5 - 19.8 MPa-m½ | 15.0 - 18.0 ksi-in½ | T651; Plate; S-L |

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|---|---|---|---|
| | 18.7 MPa-m½ | 17.0 ksi-in½ | T651; Forgings; S-L |
| | 20.0 MPa-m½ | 18.2 ksi-in½ | K(IC) in S-L Direction |
| | 22.0 - 25.3 MPa-m½ | 20.0 - 23.0 ksi-in½ | T651; Plate; T-L |
| | 24.2 MPa-m½ | 22.0 ksi-in½ | T651; Plate; T-L; average |
| | 25.0 MPa-m½ | 22.8 ksi-in½ | K(IC) in T-L Direction |
| | 28.6 MPa-m½ | 26.0 ksi-in½ | T651; Plate; L-T; average |
| | 27.5 - 29.7 MPa-m½ | 25.0 - 27.0 ksi-in½ | T651; Plate; L-T |
| | 29.0 MPa-m½ | 26.4 ksi-in½ | K(IC) in L-T Direction |
| Machinability | 70 % | 70 % | 0-100 Scale of Aluminum Alloys |
| Shear Modulus | 26.9 GPa | 3900 ksi | |
| Shear Strength | 331 MPa | 48000 psi | AA; Typical |

| **Electrical Properties** | **Metric** | **English** | **Comments** |
|---|---|---|---|
| Electrical Resistivity | 0.00000515 ohm-cm @Temperature 20.0 °C | 0.00000515 ohm-cm @Temperature 68.0 °F | AA; Typical |

| **Thermal Properties** | **Metric** | **English** | **Comments** |
|---|---|---|---|
| CTE, linear | 21.6 µm/m-°C @Temperature -50.0 - 20.0 °C | 12.0 µin/in-°F @Temperature -58.0 - 68.0 °F | |
| | 23.4 µm/m-°C @Temperature 20.0 - 100 °C | 13.0 µin/in-°F @Temperature 68.0 - 212 °F | |
| | 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 |
| | 24.3 µm/m-°C @Temperature 20.0 - 200 °C | 13.5 µin/in-°F @Temperature 68.0 - 392 °F | |
| | 25.2 µm/m-°C @Temperature 20.0 - 300 °C | 14.0 µin/in-°F @Temperature 68.0 - 572 °F | |
| Specific Heat Capacity | 0.960 J/g-°C | 0.229 BTU/lb-°F | |
| Thermal Conductivity | 130 W/m-K | 900 BTU-in/hr-ft²-°F | AA; Typical at 77°F |
| Melting Point | 477 - 635.0 °C | 890 - 1175 °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 | 477 °C | 890 °F | AA; Typical |
| Liquidus | 635.0 °C | 1175 °F | AA; Typical |

| **Processing Properties** | **Metric** | **English** | **Comments** |
|---|---|---|---|
| Annealing Temperature | 413 °C | 775 °F | |
| Solution Temperature | 466 - 482 °C | 870 - 900 °F | |
| Aging Temperature | 121 °C | 250 °F | |

| **Component Elements Properties** | **Metric** | **English** | **Comments** |
|---|---|---|---|
| Aluminum, Al | 87.1 - 91.4 % | 87.1 - 91.4 % | As remainder |
| Chromium, Cr | 0.18 - 0.28 % | 0.18 - 0.28 % | |
| Copper, Cu | 1.2 - 2.0 % | 1.2 - 2.0 % | |
| Iron, Fe | <= 0.50 % | <= 0.50 % | |
| Magnesium, Mg | 2.1 - 2.9 % | 2.1 - 2.9 % | |
| Manganese, Mn | <= 0.30 % | <= 0.30 % | |
| Other, each | <= 0.05 % | <= 0.05 % | |

| | | |
|---|---|---|
| Other, total | <= 0.15 % | <= 0.15 % |
| Silicon, Si | <= 0.40 % | <= 0.40 % |
| Titanium, Ti | <= 0.20 % | <= 0.20 % |
| Zinc, Zn | 5.1 - 6.1 % | 5.1 - 6.1 % |

**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.