Hydro


# Alloy 6101

Alloy 6101 is prominent in Extrusion North America's full line of bus conductor extruded products. As a heat treatable wrought alloy, alloy 6101 is best suited for applications involving moderate strength and maximum electrical conductivity. It is similar to alloy 6063, but with minor chemistry changes which enhance electrical conductivity. Although slightly lower in conductivity than alloy 1350, it offers greater strength.

Alloy 6101 can be produced in extruded rod, bar, structural profiles, structural and seamless pipe and tube. Although this alloy is primarily used for bus conductor applications (bus bar is available with sharp corners or radius corners), it is also an excellent choice for other electrical projects. This alloy is available in various temper conditions and as a result, the purchaser does not have to worry about additional heat treating. The wide variety of tempers provide different strengths, formability, and electrical conductivity levels which allows for design flexibility. Consult the Safety Data Sheet (SDS) for proper safety and handling precautions when using 6101 alloy.

This alloy is easily extruded and has better machinability than our 1XXX alloy series. Alloy 6101 offers good weldability, corrosion resistance, bendability, formability, and electrical and thermal conductivity. It satisfies all ASTM B 317 specifications for a wide variety of tempers covering a broad range of mechanical properties and electrical conductivity levels.

**Typical applications for 6101 alloy:**

- Electrical bus conductor products (bar, beams, tubing and custom shapes)
- Power transmission
- Power stations

## 6101 Temper Designations and Definitions

| Standard Tempers | Standard Temper Definitions* |
|---|---|
| F | As fabricated. There is no special control over thermal conditions and there are no mechanical property limits. |
| T6 | Solution heat-treated and artificially aged to maximum mechanical property levels. |
| T61 | Over-aged temper with higher conductivity but lower mechanical properties than -T6. |
| T63 | An "in-between" temper with higher conductivity than -T6, but less than -T61. |
| T64 | Highest conductivity and best temper for maximum formability. Partially annealed temper. |
| T65 | Medium strength and conductivity within this alloy temper. Controlled range of tensile and yield strengths to help control bending reproducibility. |

| Special Tempers | Special Temper Definitions** |
|---|---|
| T61P | Same conductivity as -T61 except a maximum is offered on the yield strength to help maintain consistency for bending performance. |
| T64P | Same conductivity as -T64 except maximum yield limit applies for bending consistency |

* For further details of definitions, see Aluminum Association's Aluminum Standards and Data manual and Tempers for Aluminum and Aluminum Alloy Products.

** Hydro Special Temper Designations are unregistered tempers for reference only, not recognized by the Aluminum Association, and are provided for customer use to identify unique processing, material or end use application characteristics.

## Flatwise Bending Radii[1] (Bus Bar Only)

| Alloy | Temper | Thickness, inches | Minimum Bend Radius, inches[2] |
|---|---|---|---|
| 6101 | -T6 | .125 - .375 | 2.0 x thickness |
| | | .376 - .500 | 2.5 x thickness |
| | -T61, -T61P | .125 - .500 | 1.0 x thickness |
| | | .501 - .749 | 2.0 x thickness |
| | | .750 - 1.000 | 3.0 x thickness |
| | | 1.001 - 1.625 | 4.0 x thickness |

| Alloy | Temper | Thickness, inches | Minimum Bend Radius, inches[2] |
|---|---|---|---|
| 6101 | -T63 | .125 - .375 | 1.0 x thickness |
| | | .376 - .500 | 1.5 x thickness |
| | | .501 - 1.000 | 2.5 x thickness |
| | -T64, -T64P | .125 - .750 | 1.0 x thickness |
| | | .751 - 1.000 | 2.0 x thickness |
| | -T65 | .125 - .500 | 1.0 x thickness |
| | | .501 - .749 | 2.0 x thickness |

1. Bends performed at room temperature through an angle of 90˚ to minimum inside radius, as shown, without cracking and with no evidence of slivers or other imperfections.
2. Applicable to widths up through 6 inches in -T6, -T61, -T63, and -T65 tempers and to widths up through 12 inches for -T64 temper.

# Alloy 6101

## Chemical Composition

Melting Temperature Range: 1150-1210 ºF    Density: 0.097 lb./in.3

| Alloy | Si | Fe | Cu | Mn | Mg | Cr | Zn | Ti | B | Others | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Each | Total |
| 6101 | 0.30-0.7 | 0.50 | 0.10 | 0.03 | 0.35-0.8 | 0.03 | 0.10 | – | 0.06 | 0.03* | 0.10 |

Chemical composition in weight percent maximum unless shown as a range or minimum.    Aluminum = Remainder

Average Coefficient of Thermal Expansion (68º to 212ºF) = $13.0 \times 10^{-6}$ (in./in.ºF)

## 6101 Extruded Mechanical and Physical Property Limits[1*]

| Standard Tempers | Wall Thickness[2] (min.) | | Tensile Strength ksi (MPa) | | Typical Thermal Conductivity, @77°F, BTU-in./ft.$^2$hr.°F (W/m-K@25ºC) | Minimum Electrical Conductivity, @68ºF, % IACS |
|---|---|---|---|---|---|---|
| | inches | mm | Ultimate (min. ) | Yield - 0.2% offset (min.) | | |
| F | All | All | No Properties Apply | | | |
| T6 | 0.125 - 0.500 | 3.20 - 12.50 | 29.0 (200) | 25.0 (170) | 1510 (218) | 55.0 |
| T61 | 0.125 - 0.749 | 3.20 - 18.00 | 20.0 (140) | 15.0 (100) | 1540 (222) | 57.0 |
| | 0.750 - 1.499 | 18.01 - 35.00 | 18.0 (125) | 11.0 (75) | 1540 (222) | 57.0 |
| | 1.500 - 2.000 | 35.01 - 50.00 | 15.0 (100) | 8.0 (55) | 1540 (222) | 57.0 |
| T63 | 0.125 - 1.000 | 3.20 - 25.0 | 27.0 (185) | 22.0 (150) | 1510 (218) | 56.0 |
| T64 | 0.125 - 1.000 | 3.20 - 25.0 | 15.0 (100) | 8.0 (55) | 1570 (226) | 59.5 |
| T65 | 0.125 - 0.749 | 3.20 - 20.0 | 25.0-32.0 (170-220) | 20.0-27.0 (140-185) | 1510 (218) | 56.5 |
| **Special Tempers*** | | | | | | |
| OP | 0.125 - 1.000 | 3.20 - 25.0 | 19.0 (130) max | 8.0 (55) max | – | 59.5 |
| T61P | 0.125 - 0.749 | 3.20 - 19.00 | 20.0 (140) | 15.0-22.0 (100-150) | 1540 (222) | 57.0 |
| T64P | 0.125 - 1.000 | 3.20 - 25.0 | 15.0 (100) | 8.0-15.0 (55-100) | 1570 (226) | 59.5 |

* Elongation values are not required for this particular alloy.
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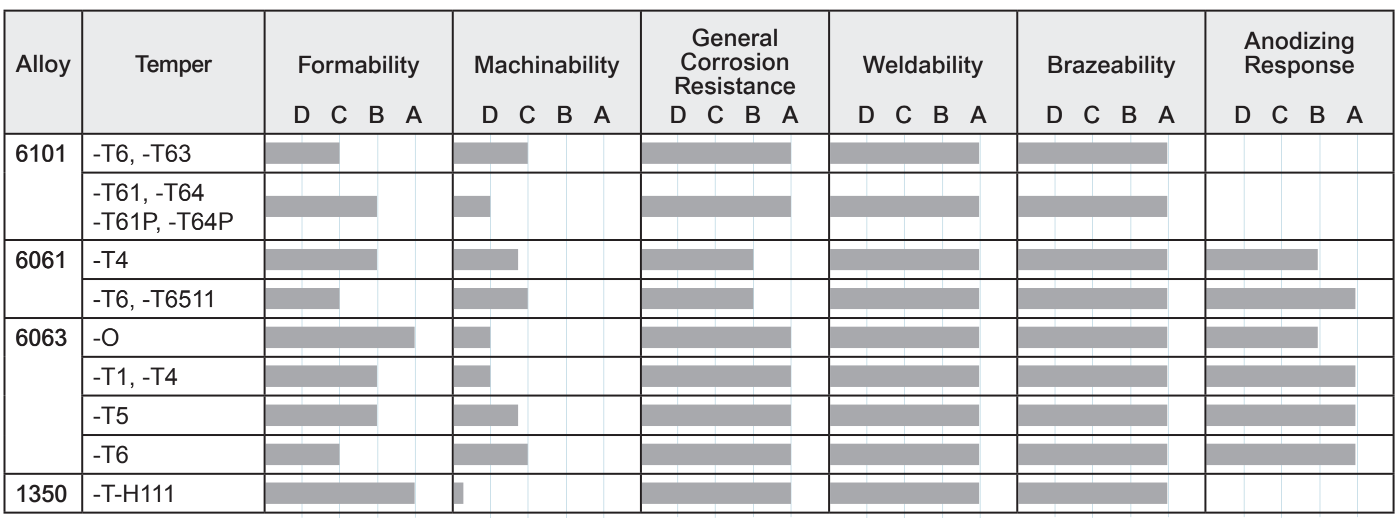
1. Minimum property levels unless shown as a range or indicated as a maximum (max.)
2. The thickness of the cross section from which the tension test specimen is taken determines the applicable mechanical properties.

## Comparative Characteristics of Related Alloys/Tempers[1]




1. Rating: A = Excellent B = Good C = Fair D = Poor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