


## Aluminum 319.0-T6, Sand Cast

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

**Composition Notes:**

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

**Key Words:** Aluminium 319.0-T6; UNS A03190; AA319.0-T6, ISO 3522: AISI5Cu3, AISI5Cu3Mn; AISi6Cu4; AISi6Cu4Mn. ISO R164: AISI5Cu3; AISI5Cu3Fe; AISi6Cu4; ISO 3522: AISI5Cu3

Physical Properties	Metric	English	Comments
Density	2.79 g/cc	0.101 lb/in <sup>3</sup>	
Mechanical Properties	Metric	English	Comments
Hardness, Brinell	65 - 95	65 - 95	AA; Typical; 500 g load; 10 mm ball
Hardness, Knoop	103	103	Estimated from Brinell Hardness.
Hardness, Rockwell B	49	49	Estimated from Brinell Hardness.
Hardness, Vickers	90	90	Estimated from Brinell Hardness.
Tensile Strength, Ultimate	>= 214 MPa	>= 31000 psi	AA
Tensile Strength, Yield	>= 138 MPa @Strain 0.200 %	>= 20000 psi @Strain 0.200 %	AA
Elongation at Break	>= 1.5 %	>= 1.5 %	AA; in 2 in. (50 mm) or 4D
Modulus of Elasticity	74.0 GPa	10700 ksi	In Tension; elastic modulus in compression is typically about 2% higher for aluminum alloys.
Compressive Yield Strength	170 MPa	24700 psi	
Poissons Ratio	0.33	0.33	
Fatigue Strength	75.0 MPa @# of Cycles 5.00e+8	10900 psi @# of Cycles 5.00e+8	Notch Status unknown, R.R. Moore Test
Machinability	50 %	50 %	0-100 Scale (100=best)
Shear Modulus	28.0 GPa	4060 ksi	
Shear Strength	200 MPa	29000 psi	
Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.00000640 ohm-cm	0.00000640 ohm-cm	
Thermal Properties	Metric	English	Comments
Heat of Fusion	389 J/g	167 BTU/lb	
CTE, linear 	21.4 µm/m-°C	11.9 µin/in-°F	

@Temperature 20.0 - 100 °C @Temperature 68.0 - 212 °F

22.9 µm/m-°C 12.7 µin/in-°F

@Temperature 20.0 - 300 °C @Temperature 68.0 - 572 °F

Specific Heat Capacity	0.963 J/g-°C	0.230 BTU/lb-°F
Thermal Conductivity	109 W/m-K	756 BTU-in/hr-ft <sup>2</sup> -°F
Melting Point	516 - 604 °C	961 - 1120 °F
Solidus	516 °C	961 °F
Liquidus	604 °C	1120 °F

<b>Processing Properties</b>	<b>Metric</b>	<b>English</b>	<b>Comments</b>
Melt Temperature	677 - 816 °C	1250 - 1500 °F	
Solution Temperature	502 - 507 °C	935 - 945 °F	hold at temperature 12 hr, cool in water at 150 to 212°F
Aging Temperature	152 - 157 °C	305 - 315 °F	hold at temperature 2 - 5 hr
Casting Temperature	677 - 788 °C	1250 - 1450 °F	

<b>Component Elements Properties</b>	<b>Metric</b>	<b>English</b>	<b>Comments</b>
Aluminum, Al	85.8 - 91.5 %	85.8 - 91.5 %	As remainder
Copper, Cu	3.0 - 4.0 %	3.0 - 4.0 %	
Iron, Fe	<= 1.0 %	<= 1.0 %	
Magnesium, Mg	<= 0.10 %	<= 0.10 %	
Manganese, Mn	<= 0.50 %	<= 0.50 %	
Nickel, Ni	<= 0.35 %	<= 0.35 %	
Other, total	<= 0.50 %	<= 0.50 %	
Silicon, Si	5.5 - 6.5 %	5.5 - 6.5 %	
Titanium, Ti	<= 0.25 %	<= 0.25 %	
Zinc, Zn	<= 1.0 %	<= 1.0 %	