


Aluminum 319.0-F, 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-F; UNS A03190; AA319.0-F, 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 ³	AA; Typical
Mechanical Properties	Metric	English	Comments
Hardness, Brinell	55 - 85	55 - 85	AA; Typical; 500 g load; 10 mm ball
Hardness, Knoop	93	93	Estimated from Brinell Hardness.
Hardness, Vickers	80	80	Estimated from Brinell Hardness.
Tensile Strength, Ultimate	>= 159 MPa	>= 23000 psi	AA
Tensile Strength, Yield	>= 89.6 MPa @Strain 0.200 %	>= 13000 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	130 MPa	18900 psi	
Poissons Ratio	0.33	0.33	
Fatigue Strength	70.0 MPa @# of Cycles 5.00e+8	10200 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	150 MPa	21800 psi	
Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.00000640 ohm-cm	0.00000640 ohm-cm	AA; Typical 27% IACS Conductivity
Thermal Properties	Metric	English	Comments
Heat of Fusion	389 J/g	167 BTU/lb	
CTE, linear 	21.4 µm/m-°C @Temperature 20.0 - 100 °C	11.9 µin/in-°F @Temperature 68.0 - 212 °F	AA; Typical
	22.9 µm/m-°C	12.7 µin/in-°F	AA; Typical; average over range

@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	754 BTU-in/hr-ft ² ·°F	AA; Typical at 25°C
Melting Point	516 - 604 °C	960 - 1120 °F	AA; Typical
Solidus	516 °C	960 °F	AA; Typical
Liquidus	604 °C	1120 °F	AA; Typical

Processing Properties	Metric	English	Comments
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
Casting Temperature	677 - 788 °C	1250 - 1450 °F	

Component Elements Properties	Metric	English	Comments
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 %	