

## Aluminum 319.0-F, Sand Cast


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**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 <sup>3</sup>                     | 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<br>@Strain 0.200 %             | >= 13000 psi<br>@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<br>@# of Cycles 5.00e+8           | 10200 psi<br>@# 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<br>@Temperature 20.0 - 100 °C | 11.9 µin/in-°F<br>@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 <sup>2</sup> ·°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         |

| <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 |
| 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 %       |                 |