MATERION

Data Sheet

Alloy 165 (C17000) Rod and Bar

Alloy 165 rod and bar from Materion provide strength close to that of Alloy 25, with slightly lower beryllium content. This alloy features high fatigue strength, good electrical and thermal conductivity, and excellent resistance to wear, corrosion, galling and stress relaxation. Typical applications include bushings, bearings and resistance welding components.

Chemical Composition (Weight Percent)

Alloy	Beryllium	Nickel + Cobalt	Nickel + Cobalt + Iron	Copper
C17000	1.60 - 1.85	0.20 min.	0.6 max.	Balance

Physical Properties*

Elastic Modulus	Melting Point (Solidus)	Electrical Conductivity/ Resistivity	Density**	Thermal Expansion Coefficient	Thermal Conductivity (25 °C)
19,000 ksi 131 GPa	1600 °F 870 °C	25 - 30% IACS 5.8 - 6.9 μΩ-cm	0.304 lb/in^3 8.41 g/cm^3	9.7 x 10^{-6} in/in °F 17.5 x 10^{-6} m/m °C	60 BTU/ft hr °F 105 W/m K

*Properties specified for the precipitation age hardened (heat treated) condition.
**Value listed is the density after heat treatment. The density before heat treatment is 0.302 lb/in^3 (8.36 g/cm^3).

Mechanical Properties*

Temper**	Outer Diameter (Rod) or Thickness (Bar)		Heat Treatment Required	0.2% Offset Yield Strength		Ultimate Tensile Strength		Elongation
	inch	mm	600 - 675°F 315 - 357°C	ksi	MPa	ksi	MPa	Percent
A (TB00)	0.030 - 6	0.76 - 150	Before Heat Treatment	20 - 35	130 - 250	60 - 85	410 - 590	20 - 75
H (TD04)	0.030 - 0.375 > 0.375 - 1 1 - 3	0.76 - 9.5 > 9.5 - 25.4 > 25.4 - 76		75 - 105 75 - 105 75 - 105	520 - 720 520 - 720 520 - 720	90 - 130 90 - 125 85 - 120	620 - 900 620 - 860 590 - 830	8 - 30 8 - 30 8 - 20
AT (TF00)	0.030 - 3 > 3 - 6	0.76 - 76 > 76 - 150	After 3 hours	125 - 155 125 - 155	860 - 1070 860 - 1070	150 - 190 150 - 190	1030 - 1310 1030 - 1310	4 - 10 3 - 10
HT (TH04)	0.030 - 0.375 > 0.375 - 1 > 1 - 3	0.76 - 9.5 > 9.5 - 25.4 > 25.4 - 76	After 2 - 3 hours	145 - 185 145 - 185 135 - 175	1000 - 1280 1000 - 1280 930 - 1210	170 - 210 170 - 210 165 - 200	1170 - 1450 1170 - 1450 1140 - 1380	2 - 5 2 - 5 4 - 9

*Properties may vary by diameter (rod) or thickness (bar).

**Rod and bar typically provided in an annealed or cold drawn temper and heat treated after machining. Only rod or bar greater than 0.4375" (12.0 mm) diameter or thickness may also be purchased in the pre-heat-treated condition.

Forms Available

Alloy 165 rod and bar are supplied in straight lengths up to 30 ft (9.1 m). Solution annealed tempers are available in diameters/thicknesses ranging from 0.030" to 6" (0.76 to 356 mm) as extruded. Larger diameters and thickness up to 14" are available as forgings. Hard drawn tempers are available in 0.030" to 3" (0.76 to 76 mm). Alloy 165 is also available in strip, plate, tube and parts finished by drawing, extrusion and machining.

Industry Standards and Specifications

C17000, ASTM B196, ASTM B249, SAE J461, SAE J463

Tolerances

	Rod Diameter or Bar Thickness (inches)		Standard Diameter Tolerance (in)	Rod Diameter or Bar Thickness (mm)		Standard Diameter Tolerance (mm)
	Over	Including	Diameter or Thickness	Over	Including	Diameter or Thickness
Cold Drawn	0.15	0.50	± 0.002	3.8	12.0	± 0.05
	0.50	1.00	± 0.003	12.0	25.0	± 0.08
	1.00	2.00	± 0.004	25.0	50.0	± 0.10
	2.00	3.00	± 0.2% of Size	50.0	75.0	± 0.2% of Size
Hot Worked	0.75	1.00	± 0.020	20	25	± 0.50
	1.00	2.00	± 0.030	25	50	± 0.75
	2.00	3.0	± 0.050	50	75	± 1.30
	3.00	3.50	± 0.070	75	90	± 1.80
	3.50	14.0	± 0.120	90	150	± 3.00

Additional tolerances are per ASTM B249. Please specify the exact tolerances that you require when you place your order. Tighter tolerances may be available at additional cost. Please contact your local sales engineer to confirm the requested capability.

Related Information

Additional technical information on Alloy 165 rod or bar may be obtained by phoning +1.800.375.4205. For pricing and availability, phone +1.800.521.8800.

Health and Safety

Processing beryllium-containing alloys poses a health risk if safe practices are not followed. Inhalation of airborne beryllium can cause serious lung diseases in some individuals. Occupational safety and health regulatory agencies worldwide have set mandatory limits on occupational respiratory exposures. Read and follow the guidance in the Safety Data Sheet (SDS) before working with this material. The SDS and additional important beryllium health and safety information and guidance can be found at berylliumsafety.com, berylliumsafety.eu and Materion.com. For questions on safe practices for beryllium-containing alloys, contact the Materion Product Stewardship Group at +1.800.862.4118 or contact us by email at Materion-PS@Materion.com.

Disclaimer:

Only the buyer can determine the appropriateness of any processing practice, end-product or application. Materion does not make any warranty regarding its recommendations, the suitability of Materion's product, or its processing suggestions for buyer's end product, application or equipment.

The properties presented on this data sheet are for reference purposes only, intended only to initiate the material selection process. They do not constitute, nor are they intended to constitute, a material specification. Material will be produced to one of the applicable industry standards, if any, listed in the Industry Standards and Specification section.

Actual properties may vary by thickness and/or part number. Please contact your local sales engineer for detailed properties to be used in simulation.

Any properties marked as preliminary are subject to change at any time as the manufacturing process is further refined.

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