

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, as well as 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 lbs/in³ (8.36 g/cm³)

MECHANICAL PROPERTIES*

Temper*	Outer Diameter (Rod) or Thickness (Bar)		Heat Treatment Required 600 – 675 °F 315 – 357 °C	0.2% Offset Yield Strength		Ultimate Tensile Strength		Elongation Percent
	inch	mm		ksi	MPa	ksi	MPa	
A (TB00)	0.030 - 14	0.76 - 356	Before Heat Treatment	20 - 35	130 - 250	60 - 85	410 - 590	20 - 75
H (TD04)	0.030 - 0.375	0.76 - 9.5		75 - 105	520 - 720	90 - 130	620 - 900	8 - 30
H (TD04)	> 0.375 - 1	> 9.5 - 25.4		75 - 105	520 - 720	90 - 125	620 - 860	8 - 30
H (TD04)	1 - 3	> 25.4 - 76		75 - 105	520 - 720	85 - 120	590 - 830	8 - 20
AT (TF00)	0.030 - 3	0.76 - 76	After 3 hours	125 - 155	860 - 1070	150 - 190	1030 - 1310	4 - 10
AT (TF00)	> 3 - 14	> 76 - 356		125 - 155	860 - 1070	150 - 190	1030 - 1310	3 - 10
HT (TH04)	0.030 - 0.375	0.76 - 9.5	After 2 - 3 hours	145 - 185	1000 - 1280	170 - 210	1170 - 1450	2 - 5
HT (TH04)	> 0.375 - 1	> 9.5 - 25.4		145 - 185	1000 - 1280	170 - 210	1170 - 1450	2 - 5
HT (TH04)	> 1 - 3	> 25.4 - 76		135 - 175	930 - 1210	165 - 200	1140 - 1380	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) 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 (9.1m). Solution annealed tempers are available in diameters/ thicknesses ranging from 0.030" to 14" (0.76 mm to 356 mm) and hard drawn tempers are available

in 0.030" to 3" (0.76 mm 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 B-196, SAE J 461, SAE J 463

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	Out of Round	Over	Including	Diameter or Thickness	Out of Round
Cold Drawn	0.0300	0.0800	± 0.0003	0.0003	0.76	2.0	± 0.008	0.008
	0.0800	0.1250	± 0.0004	0.0004	2.0	3.2	± 0.010	0.010
	0.1250	0.2500	± 0.0006	0.0004	3.2	6.4	± 0.015	0.010
	0.2500	0.3125	± 0.0007	0.0007	6.4	7.9	± 0.018	0.018
	0.3125	0.3750	± 0.001	0.001	7.9	9.5	± 0.025	0.025
	0.3750	0.500	± 0.002		9.5	12.0	± 0.05	
	0.500	1.00	± 0.003		12.0	25.0	± 0.08	
	1.00	2.00	± 0.004		25.0	50.0	± 0.10	
Hot Worked	2.00	3.00	± 0.2% of Size		50.0	75.0	± 0.2% of Size	
	0.750	1.25	± 0.020		20	30	± 0.50	
	1.25	2.50	± 0.030		30	65	± 0.75	
	2.50	6.00	± 0.060		65	150	± 1.50	

Additional tolerances are per ASTM B 196. 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 800-375-4205. For pricing and availability, phone 800-521-8800 for rod > 0.5" (12.7 mm) diameter, 800-323-2438 for smaller diameter rod, or the local sales number listed on the bottom of this page.

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 e mail 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.