

**MATERION****DATA SHEET**

Alloy 165 (C17000) Tube

Alloy 165 Tube from Materion provides strength close to that of Alloy 25, with slightly lower beryllium content. Alloy 165 features high fatigue strength and magnetic permeability approaching unity. Typical applications include undersea instrument housings and repeater housings.

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)	Relative Magnetic Permeability
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	< 1.0006

*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*	Heat Treatment Required 600 - 675°F 315 - 357°C	Outside Diameter		0.2% Offset Yield Strength		Ultimate Tensile Strength		Elongation
		in	mm	ksi	MPa	ksi	MPa	Percent
A (TB00)	Before Heat Treatment	0.75 - 16	19.1 - 406	20 - 35	130 - 250	60 - 85	410 - 590	20 - 60
H (TD04)	Before Heat Treatment	≤ 0.375	≤ 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	5 - 120	590 - 830	8 - 20
AT (TF00)	After 3 - 4 hours	0.75 - 3	19.1 - 76	125 - 155	860 - 1070	150 - 190	1030 - 1310	4 - 10
AT (TF00)		> 3 - 16	> 76 - 406	125 - 155	860 - 1070	150 - 190	1030 - 1310	3 - 10
HT (TH04)	After 2 - 3 hours	≤ 0.375	≤ 9.5	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 tube wall thickness.

FORMS AVAILABLE

Alloy 165 tube is available with outside diameters ranging from 0.75" to 16" (19.1 mm to 406 mm) for Annealed (A) temper. Hard (H) temper is available in 0.375" to 3" (9.5 mm to 76 mm) outside diameters. Wall thickness is typically 10 to 20% of the outside diameter, subject to certain maximum and minimum constraints. Smaller diameter tube may be produced by tube redrawers. Alloy 165 is also available in strip, rod, bar, plate and parts finished by drawing, extrusion, and machining. Alloys 3 and 10 are also available in rod, bar, plate, tube, strip and parts finished by drawing, extrusion, and machining.

INDUSTRY STANDARDS AND SPECIFICATIONS

C17000, ASTM B-251, SAE J 461, SAE J 463

RELATED INFORMATION

Additional technical information on Alloy 165 tube may be obtained by phoning 800-375-4205. For pricing and availability, phone 800- 521-8800 or the local sales number listed on the bottom of this page.

TOLERANCES

Outside Diameter (inches)		Standard Diameter Tolerance (inches)		Outside Diameter (mm)		Standard Diameter Tolerance (mm)	
Over	Including	Cold Drawn Tube	Extruded Tube Over	Over	Including	Cold Drawn Tube	Extruded Tube Over
0.375	0.500	± 0.002		9.5	12	± 0.05	
0.500	1.00	± 0.003		12	25	± 0.08	
1.00	2.00	± 0.004		25	50	± 0.10	
2.00	3.00	± 0.02% of OD		50	75	± 0.02% of OD	
0.75	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 251. 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.

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.

