

Alloy 25 (C17200) Tube

Alloy 25 tube from Materion provides the highest strength of any copper alloy, with electrical conductivity considerably greater than other high strength copper alloys. This alloy features high fatigue strength and magnetic permeability approaching unity. Typical applications include bushings and bearings for aircraft as well as drill collars and instrument housings for oil and gas exploration.

Chemical Composition (Weight Percent)

Alloy	Beryllium	Nickel + Cobalt	Nickel + Cobalt + Iron	Copper
C17200	1.80 - 2.00	0.20 min.	0.6 max.	Balance

Typical Physical Properties*

Elastic Modulus	Melting Point (Solidus)	Electrical Conductivity/ Resistivity	Density**	Thermal Expansion Coefficient (20-200 °C)	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	0.302 lb/in ³ 8.36 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 °C	< 1.0006

*Properties listed for the precipitation age hardened (heat treated) condition.

**Value listed is the density after heat treatment. The density before heat treatment is 0.300 lb/in³ (8.30 g/cm³).

Typical Mechanical Properties*

Temper*	Heat Treatment Required	Outside Diameter		0.2% Offset Yield Strength		Ultimate Tensile Strength		Elongation
	600 - 675°F 315 - 357°C	in	mm	ksi	MPa	ksi	MPa	Percent
A (TB00)	Before Heat Treatment	0.75 - 16	19 - 406	20 - 35	130 - 250	60 - 85	410 - 590	20 - 75
H (TD04)		0.75 - 3	19 - 76	75 - 105	520 - 720	85 - 115	590 - 800	8 - 30
AT (TF00)	After 3 - 4 hours	0.75 - 3	19 - 76	145 - 175	1000 - 1210	165 - 200	1140 - 1380	4 - 10
AT (TF00)		> 3 - 16	> 76 - 406	130 - 175	900 - 1210	165 - 200	1140 - 1380	3 - 10
HT (TH04)	After 2 - 3 hours	≤ 0.375	≤ 9.5	160 - 200	1100 - 1380	185 - 225	1280 - 1550	2 - 9
HT (TH04)		> 0.375 - 1	> 9.5 - 25.4	155 - 195	1070 - 1340	180 - 220	1240 - 1520	2 - 9
HT (TH04)		> 1 - 3.75	> 25.4 - 76	145 - 190	1000 - 1310	175 - 215	1210 - 1480	4 - 9
DST	-	1 - 7	25 - 180	110 min.	760 min.	140 min.	970 min.	12 min.
DST	-	> 7 - 11	> 180 - 280	100 min.	690 min.	135 min.	930 min.	13 min.
DST	-	> 11	> 280	90 min.	620 min.	120 min.	830 min.	13 min.

*Properties may vary by tube wall thickness.

Forms Available

Alloy 25 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. For extruded tube, available wall thickness is about 10 to 20% of the outer diameter, subject to certain minimum and maximum constraints. Smaller diameter tube may be produced by tube redrawers. Alloy 25 is also available in strip, rod, bar, plate, wire, and parts finished by drawing, extrusion, and machining.

Industry Standards and Specifications

UNS# C17200, ASTM B643, ASTM B251, AMS 4535, SAE J 461, SAE J 463, JIS H3270, EN 1654, EN 12163, EN 12165, EN 12167, GB5233, GB4431, BMS 7-353 Type 2, MIL-C-21657

Tolerances

	Average Diameter (in)		Standard Diameter Tolerance (in)	Average Diameter (mm)		Standard Diameter Tolerance (mm)
	Over	Including		Over	Including	
Cold Worked	0.375	0.625	± 0.003	9.5	15.9	± 0.08
	0.625	0.75	± 0.006	15.9	19.1	± 0.15
	0.75	1.00	± 0.006	19.1	25.4	± 0.15
	1.00	2.00	± 0.008	25.4	50.8	± 0.20
	2.00	3.00	± 0.010	50.8	76.2	± 0.25
	3.00	3.75	± 0.012	76.2	95.3	± 0.30
Hot Worked (Extruded)	0.75	1.25	± 0.020	19.1	31.8	± 0.51
	1.25	2.00	± 0.030	31.8	50.8	± 0.76
	2.00	3.00	± 0.040	50.8	76.2	± 1.02
	3.00	4.00	± 0.050	76.2	102	± 1.27
	4.00	6.00	± 0.060	102	152	± 1.52
	6.00	8.00	± 0.100	152	203	± 2.54
	8.00	16.0	± 0.125	203	406	± 3.18

Additional tolerances are per ASTM B643. 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 or safe handling information on Alloy 25 tube may be obtained by phoning +1.800.375.4205.

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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