MATERION

Data Sheet

Alloys 3 (C17510) and 10 (C17500) Tube

Alloy 3 and Alloy 10 tube from Materion provide high electrical and thermal conductivity coupled with moderate strength. Typical applications include heat exchanger tubing and resistance welding components.

Chemical Composition (Weight Percent)

Alloy	Nickel	Cobalt	Beryllium	Copper
3 (C17510)	1.4 - 2.2	-	0.2 - 0.6	Balance
10 (C17500)	-	2.4 - 2.7	0.4 - 0.7	Balance

Physical Properties*

Alloy	Elastic Modulus	Melting Point (Solidus)	Electrical Conductivity/ Resistivity	Density**	Thermal Expansion Coefficient	Thermal Conductivity (25 °C)
3	20,000 ksi 138 GPa	1900 °F 1040 °C	45 - 60% IACS 2.9 - 3.8 μΩ-cm	0.319 lb/in^3 8.83 g/cm^3	9.8 x 10^{-6} in/in °F 17.6 x 10^{-6} m/m °C	140 BTU/ft hr °F 240 W/m °C
10	20,000 ksi 138 GPa	1850 °F 1010 °C	45 - 60% IACS 2.9 - 3.8 μΩ-cm	0.319 lb/in^3 8.83 g/cm^3	9.8 x 10^{-6} in/in °F 17.6 x 10^{-6} m/m °C	115 BTU/ft hr °F 200 W/m °C

*Properties specified for the precipitation age hardened (heat treated) condition.
**Density in the un-heat-treated condition is 0.316 lb/in^3 (8.75 g/cm^3) for both alloys).

Mechanical Properties

Temper	Heat Treatment Required	Outside Diameter		0.2% Offset Yield Strength		Ultimate Tensile Strength		Elongation
	850 - 900°F 450 - 480°C	in	mm	ksi	MPa	ksi	MPa	Percent
A (TB00)	Before Heat Treatment	0.75 - 16	19.1 - 406	10 - 30	70 - 210	35 - 55	240 - 380	20 - 35
H (TD04)		0.375 - 3.75	9.5 - 76	50 - 75	340 - 520	65 - 80	450 - 550	10 - 15
AT (TF00)	After 3 hours	0.75 - 16	19.1 - 406	80 - 100	550 - 690	100 - 130	690 - 900	10 - 25
HT (TH04)	After 2 hours	0.375 - 3.75	9.5 - 76	95 - 125	660 - 860	110 - 140	760 - 970	5 - 25

*Properties may vary by tube wall thickness.

Forms Available

Alloys 3 and 10 tube are available with outside diameters ranging from 0.75" to 16" (19.1 to 406 mm) for Annealed (A) temper. Hard (H) temper is available in 0.375" to 3" (3.8 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. Alloys 3 and 10 are also available in rod, bar, wire, plate, and parts finished by drawing, extrusion, and machining. Alloy 3 is also available in strip.

Industry Standards and Specifications

Alloy 3: C17510, ASTM B 397, EN 12167, EN 12163, SAE J 461, SAE J 463
Alloy 10: C17500, ASTM B 397, EN 12165, EN 12163, SAE J 461, SAE J 463

Tolerances

	Outside Diameter (in)		Standard Diameter Tolerance (in)	Outside Diameter (mm)		Standard Diameter Tolerance (mm)
	Over	Including		Including	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
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 B937. 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 email at Materion-PS@Materion.com.

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