

Alloys 3 (C17510) and 10 (C17500) Wire

Materion Alloys 3 and 10 wire provide good strength with high electrical conductivity and good resistance to stress relaxation. Typical applications include coil springs and formed wire contacts.

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	1900 °F	45 - 60% IACS	0.319 lb/in ³	9.8 x 10 ⁻⁶ in/in °F	140 BTU/ft hr °F
	138 GPa	1040 °C	2.9 - 3.8 μΩ-cm	8.83 g/cm ³	17.6 x 10 ⁻⁶ m/m °C	240 W/m °C
10	20,000 ksi	1850 °F	45 - 60% IACS	0.319 lb/in ³	9.8 x 10 ⁻⁶ in/in °F	115 BTU/ft hr °F
	138 GPa	1010 °C	2.9 - 3.8 μΩ-cm	8.83 g/cm ³	17.6 x 10 ⁻⁶ m/m °C	200 W/m °C

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

**Value listed is the density after heat treatment. The density before heat treatment is 0.316 lb/in³ (8.75 g/cm³).

Mechanical Properties

Temper*	Heat Treatment Required	0.2% Offset Yield Strength		Ultimate Tensile Strength		Elongation***
	900 - 925 °F 480 - 495 °C	ksi	MPa	ksi	MPa	Percent
A (TB00)	Before Heat Treatment	10 - 30	60 - 210	35 - 55	240 - 380	20 - 60
H (TD04)		55 - 75	370 - 520	65 - 80	40 - 560	2 - 20
AT (TF00)	After 3 hours	80 - 110	550 - 760	100 - 130	680 - 900	10 min.
HT (TH04)	After 2 hours	95 - 125	650 - 870	110 - 140	750 - 970	10 min.

*Properties may vary by diameter.

**Wire is typically provided in an annealed or cold drawn temper and heat treated after forming. In special cases, wire may also be provided pretempered (heat treated).

***Elongation numbers valid only for wire greater than 0.004" (0.10 mm) diameter.

Forms Available

Alloys 3 and 10 wire are supplied in loose coils or on spools or reels. They are available in diameters ranging from 0.050" to 0.5" (1.27 mm to 12.7 mm). Smaller diameter wire may be produced by a number of wire redrawers. 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

Alloy 3: C17510, EN 12167, EN 12166

Alloy 10: C17500, EN 12165, EN 12166

Related Information

Additional technical or safe handling information on Alloy 3 or Alloy 10 wire may be obtained by phoning +1.800.375.4205. For sales inquiries and more information on strip of 0.060" (1.5 mm) thick or less, or wire and rod of 0.5" (12.7 mm) diameter or less, call our service center at +1.800.521.8800.

Tolerances

Wire Diameter (Inches)		Standard Diameter Tolerance (inches)		Wire Diameter (mm)		Standard Diameter Tolerance (mm)	
Over	Including	Cold Drawn Tempers	Annealed Temper	Over	Including	Cold Drawn Tempers	Annealed Temper
0.0300	0.0800	± 0.0003	± 0.001	0.8	2.0	± 0.008	± 0.025
0.0800	0.1250	± 0.0004	± 0.002	2.0	3.2	± 0.010	± 0.050
0.1250	0.2500	± 0.0006	± 0.002	3.2	6.4	± 0.015	± 0.050
0.2500	0.3125	± 0.0007	± 0.002	6.4	8.0	± 0.018	± 0.050
0.3125	0.4060	± 0.0010	± 0.002	8.0	10	± 0.025	± 0.050
0.4060	0.5000	± 0.0010	± 0.002	10	12	± 0.025	± 0.050

Additional tolerances are per ASTM B250. 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.

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.

MATERION Alloys and Composites

6070 Parkland Boulevard
Mayfield Heights, OH 44124 USA

Contact Us:

materion.com/ContactPAC
+1.800.375.4205

MATERION Global Headquarters

6070 Parkland Boulevard
Mayfield Heights, OH 44124 USA
DS-AM-49 © 2021 Materion Corporation