

EtchMet Wire

EtchMet® alloy from Materion is a material that is tailor-made for the springs in voice coil motors and optical image stabilization systems common in smart phone cameras. These devices have a relatively large mass suspended by extremely small, thin springs. The small size of the springs requires very high strength material to withstand shock loads when the phone is dropped or deliberately tapped against an NFC reader. Therefore, the springs must be made from a very robust material. Furthermore, the lack of a damping mechanism makes high spring stiffness important to combat vibration.

EtchMet wire provides a number of advantages that make it the ideal material for this application:

- It has a uniform elastic modulus across all thicknesses/diameters and product forms. This provides consistent stiffness and damping behavior which makes spring calculations easy.
- It has a very high resilience allowing it to withstand impact loads without fracturing or permanently deforming.
- It has high fatigue strength to withstand many drops and actuation cycles.
- It solders and welds readily.

Chemical Composition (Weight Percent)

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

Physical Properties*

Elastic Modulus	Electrical Conductivity/ Resistivity	Density**	Thermal Expansion Coefficient	Thermal Conductivity (25 °C)	Relative Magnetic Permeability
19,000 ksi 131 GPa	22 - 28% IACS 6.2 - 7.8 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 K	< 1.001

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

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

Mechanical Properties*

Temper**	Heat Treatment Required	0.2% Offset Yield Strength		Ultimate Tensile Strength		Elongation†
		ksi	MPa	ksi	MPa	Percent
A	Before Heat Treatment	20 - 30	130 - 210	58 - 85	410 - 585	30 - 75
H		130 - 160	890 - 1110	140 - 165	960 - 1140	1 - 8
AT	After 1 hour	145 - 180	990 - 1250	160 - 200	1100 - 1380	3 min.
HT		180 - 220	1240 - 1520	195 - 230	1340 - 1590	1 min.

*Properties may vary by diameter.

**Wire is typically provided in a cold drawn temper and heat treated after forming. Wire may also be provided pretempered (heat treated).

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

Post heat treatment properties are provided for reference only. Thin diameter wire would likely be redrawn by outside vendors, so properties may vary from Materion's certification lab.

Forms Available

EtchMet wire is supplied in loose coils. It is available in diameters ranging from 0.030" to 0.080" (0.76 to 2.0 mm). Smaller diameter wire may be produced by wire redrawers. EtchMet alloy is also available in thin gauge strip for photochemically machined parts.

Tolerances

Wire Diameter (inches)		Standard Diameter Tolerance (inches)		Wire Diameter (mm)		Standard Diameter Tolerance (mm)	
Over	Including	Cold Drawn Tempers	Annealed	Over	Including	Cold Drawn Tempers	Annealed
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

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.

Related Information

Additional technical or safe handling information on EtchMet wire may be obtained by phoning +1.800.375.4205. For pricing and availability, phone +1.800.323.2438.

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.