

**MATERION****DATA SHEET**

Emery Low Lead (C17210) Rod and Wire

Emery Low Lead™ alloy from Materion is a RoHS-compliant (<1000 ppm lead), machinable, high-performance copper alloy. The alloy's properties minimize signal distortion in coaxial RF connectors and reduce power loss in circular connectors and contact probes. Emery Low Lead alloy is available in straight rod or coiled wire product forms and in different tempers to accommodate diverse design requirements. After machining and forming operations, parts made from this alloy can be easily heat treated and plated to obtain maximum mechanical and electrical performance. Applications requiring stability to 175°C or reliable contact force in miniaturized designs specify Emery Low Lead alloy, which delivers performance and reliability superior to other free-machining copper alloys such as leaded brass or bronze in demanding electronic applications.

Chemical Composition (Weight Percent)

Alloy	Beryllium	Nickel + Cobalt	Nickel + Cobalt + Iron	Lead	Copper
C17210	1.80 – 2.0	0.20 min.	0.60 max.	<1000 ppm	Balance

Typical Physical Properties*

Elastic Modulus	Melting Point (Solidus)	Electrical Conductivity/ Resistivity	Density**	Thermal Expansion Coefficient	Thermal Conductivity (25°C)	Machinability Index***
19,000 ksi 131 GPa	1600°F 870°C	22 – 28 IACS 5.9 – 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 K	40% (vs. free-cutting brass)

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

**Value listed is the density after heat treatment. The density before heat treatment is 0.30 lb./in³ (8.30 g/cm³).

***Based on independent third-party testing.

Rod Typical Mechanical Properties*

Temper**	Diameter		Heat Treatment Required	0.2% Offset Yield Strength		Ultimate Tensile Strength		Elongation
	inch	mm	600 – 675°F 315 – 357°C	ksi	MPa	ksi	MPa	Percent
H (TD04)	0.059 - 0.236	1.50 – 6.0	Before heat treatment	75 - 105	520 - 720	90 – 130	620 - 900	8 - 30
HT (TH04)	0.059 - 0.236	1.50 – 6.0	After 2 - 3 hours	160 - 200	1100 - 1380	185 - 225	1280 - 1550	2 - 9

* Properties may vary by diameter.

**Rod is typically provided in a cold drawn temper and heat treated after machining.

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Wire Typical Mechanical Properties*

Temper**	Heat Treatment	0.2% Offset Yield Strength		Ultimate Tensile Strength		Elongation
	600 - 625°F 315 - 330°C	ksi	MPa	ksi	MPa	Percent
H (TD04)	Before heat treatment	130 - 160	890 - 1110	140 - 165	960 - 1140	1 - 8
HT (TH04)	After 1 hour	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.

Forms Available

Rod is supplied in straight lengths up to 12 ft (3.7 m) and in diameters ranging from 0.059" to 0.236" (1.5 to 6 mm). Rod may be purchased with pointed and/or chamfered ends.

Wire is supplied in loose coils or on spools or reels. It is available in H temper from 0.059" to 0.080" (1.5 to 2.0 mm) diameters.

Industry Standards and Specifications

In process.

Rod Tolerances (Cold Drawn)*

Rod Diameter (inches)		Standard Diameter Tolerance (inches)		Rod Diameter (mm)		Standard Diameter Tolerance (mm)	
Over	Including	Diameter	Out of Round	Over	Including	Diameter	Out of Round
0.030	0.080	± 0.0003	0.0003	0.76	2.0	± 0.008	0.008
0.080	0.1250	± 0.0004	0.0004	2.0	3.2	± 0.010	0.010
0.1250	0.250	± 0.0006	0.0004	3.2	6.4	± 0.015	0.010

*Additional rod tolerances are per ASTM B196.

Wire 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
0.030	0.080	± 0.0003	± 0.001	0.8	2.0	± 0.008	± 0.030
0.080	0.1250	± 0.0004	± 0.002	2.0	3.2	± 0.010	± 0.050
0.1250	0.250	± 0.0006	± 0.002	3.2	6.4	± 0.015	± 0.050

*Additional wire 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 Emery Low Lead alloy may be obtained by calling +1.800.375.4205 (from inside the U.S.) or +1.216.383.6800 (from outside the U.S.). For pricing and availability, please contact your local service center or sales office.

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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