

# Beryllium Copper

**C17200 • C17510**

Beryllium copper is a highly versatile material capable of attaining a strength and hardness unrivalled by any other copper-based alloy. It offers a wide combination of mechanical and electrical properties combined with outstanding formability. The machining characteristics ensure that cutting tool life is excellent, whether for high speed steel or carbide tools.

Beryllium copper is particularly well suited to machining into intricate shapes. In the age hardened condition, the alloy's machinability is comparable to many other copper alloys and superior to that of stainless steel. It also has better dimensional stability than any other copper alloy.

Columbia Metals offers two variants of beryllium copper: high strength and high conductivity.



### High strength | C17200 (TB00 (A) & TD04 (H) temper)

C17200, also known as CuBe<sub>2</sub>, is the most commonly specified beryllium copper and offers a wide combination of properties including good electrical conductivity, good formability and very high electrical and mechanical properties after heat treatment. This grade is supplied in age hardenable tempers TB00 (A) and TD04 (H). These require heat treatment to produce the alloy's maximum strength and conductivity. The solution annealed TB00 (A) temper contains no cold work and is the softest temper.

This grade is most commonly used in applications such as springs, electrical connectors, bearings, moulds and corrosion resistant hardware.

### High conductivity | C17510 (TH04 (HT) temper)

C17510 contains around 2% nickel and features good mechanical properties, high electrical conductivity and very good machinability. As a result, it has moderate strength and finds application in current-carrying springs, thermal control devices, welding electrodes and power connectors.

Other tempers of both grades of beryllium copper are available on request.

Beryllium copper is well suited to both fresh water and sea water because of its low corrosion rate and inherent resistance to biofouling. At low velocity, the corrosion rate of beryllium copper in sea water is comparable to copper-nickel alloys. Undersea communication cable housings are often made from beryllium copper because of its excellent strength, machinability and resistance to corrosion and fouling.

The alloy displays immunity to stress corrosion cracking in chloride-containing environments, unlike stainless steel which can crack in several hours under high chloride conditions. This makes beryllium copper ideal for oil and gas applications in subsea environments.

#### Available tempers of beryllium copper (listed from soft to hard)

<b>TB00 (A)</b>	Solution annealed
<b>TD02 (1/2 H)</b>	Solution annealed and moderately cold worked
<b>TD04 (H)</b>	Solution annealed and fully cold worked
<b>TF00 (AT)</b>	Precipitation hardened A temper
<b>TH02 (1/2 HT)</b>	Precipitation hardened 1/2 H temper
<b>TH04 (HT)</b>	Precipitation hardened H temper

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## Technical Data

### Nominal Composition (%)

	Cu	Be	Ni	Co	Co + Ni + Fe
<b>C17200</b>	Rem	1.8 - 2.0	-	0.3 max	0.6 max
<b>C17510</b>	Rem	0.2 - 0.6	1.8 - 2.2	-	-

### Mechanical Properties upon Precipitation Hardening (specification minima unless stated)

	<b>C17200</b> TB00 (A)	<b>C17200</b> TD04 (H)	<b>C17510</b> TH04 (HT)
<b>Ultimate Tensile Strength (N/mm<sup>2</sup>)</b>	1140 - 1380	1210 - 1482	750 - 950
<b>0.2% Proof Strength (N/mm<sup>2</sup>)</b>	900	1000 - 1100	670 - 900
<b>Elongation (%)</b>	3	2	5
<b>Hardness (HRC)</b>	36 - 42	37 - 45	18 - 26

### Typical Physical Properties

	<b>C17200</b>	<b>C17510</b>
<b>Density (g/cm<sup>3</sup>)</b>	8.26	8.75
<b>Modulus of Elasticity (N/mm<sup>2</sup>)</b>	130,000	132,000
<b>Modulus of Rigidity (N/mm<sup>2</sup>)</b>	50,000	52,000
<b>Thermal Conductivity (W/m°C)</b>	84 - 130	167 - 260
<b>Electrical Resistivity (10<sup>-8</sup>Ω/m)</b>	7.9	3.8
<b>Electrical Conductivity (IACS)</b>	25	50

### Round Bar Weight and Stock Sizes

Diameter	Weight		Diameter	Weight		Diameter	Weight	
	ins	kg/ft kg/m		ins	kg/ft kg/m		ins	kg/ft kg/m
0.375	0.19 0.63	0.875	1.05 3.45	2.250	6.96 22.83			
10mm	0.21 0.70	1.000	1.37 4.51	2.500	8.59 28.19			
0.4375	0.26 0.86	1.250	2.15 7.05	2.750	10.39 34.10			
0.500	0.34 1.13	1.375	2.60 8.53	3.000	12.37 40.58			
0.5625	0.43 1.43	1.500	3.09 10.15	3.250	14.52 47.65			
0.625	0.54 1.76	1.750	4.21 13.82	3.500	16.83 55.26			
0.750	0.77 2.54	2.000	5.50 18.04	4.000	21.99 72.18			

NB Weight data for guidance only