Detailed Introduction of C17500 Beryllium-Copper

Material Overview

C17500 beryllium-copper (also known as beryllium-cobalt copper, CuCo2Be) is a precipitation hardening type copper-based alloy, belonging to the "high-conductivity beryllium copper" category. It achieves a balance of high strength, high conductivity, and high-temperature resistance by adding a suitable amount of beryllium (Be) and cobalt (Co) to copper.

Chemical Composition (mass fraction %)

- **Copper (Cu): Balance --- as the conductive matrix**
- **Beryllium (Be): 0.40 - 0.70 --- to provide precipitation strengthening and form Co_2Be precipitate phase.**
- **Cobalt (Co): 2.40 - 2.70 --- to inhibit grain boundary reactions and enhance strength and thermal stability.**
- **Iron (Fe): ≤ 0.10**
- **Silicon (Si): ≤ 0.20**
- **Aluminum (Al): ≤ 0.20**
- **Note: Beryllium and cobalt are the main alloying elements, while iron, silicon, and aluminum are trace impurity control items.**

Physical and mechanical properties

Parameter	Value/Performance
Density	8.83 g/cm^3
Electrical conductivity	≥45% IACS (International Standard for Annealed Copper)
Thermal conductivity	195~200 W/m・K（20℃）
Melting point	1000~1070℃
Tensile strength (after heat treatment)	≥680 MPa，up to980 MPa
Yield strength (0.2%)	≥550 MPa
Strain rate	≥10%
Hardness	Half hard：180~210 HV；Full hard：36~42 HRC
Softening temperature	≥700℃
Elastic modulus	138 GPa

Corrosion resistance	It performs exceptionally well in seawater, fresh water, the atmosphere and dilute acids.
Impact-free spark-free and non-magnetic	yes

Reference data: ASTM B441/B534, GB/T 5231, and mainstream manufacturers in the industry.

Processing and Heat Treatment Processes

Cold processing performance: Excellent. It can undergo precision processing such as cold rolling, cold drawing, turning, and grinding.
Hot processing performance: Good. It can be hot forged and hot extruded.
Heat treatment: Solution annealing: Improves machinability and conductivity.
Tempering treatment: Significantly enhances strength, hardness, and fatigue resistance. The recommended tempering temperature is 480-520℃, and the tempering time is 2-4 hours.

International grade comparison and implementation standards

System	Brand/Standard
ASTM	C17500
RWMA Class	3
DIN	2.1285
EN	CW104C
UNS	C17500
China	Like QBe0.4-1.8

Main execution standards:

ASTM B441-1985, B534-1990 (bars, plates, strips, tubes)
GB/T 5231-2001 (chemical composition and product shapes of copper and copper alloys)

RWMA Class 3 (resistive welding electrode materials)
JB/T 4281-1999 (resistive welding electrode and accessory materials).

Typical application fields

1. Electrical and Electronic Industry
High-reliability connectors, relays, switches, fuse clips, springs, micro-motor brushes, connectors, conductive spring sheets, etc.

2. Mold Industry
Core parts, inserts, hot runner nozzles of injection molds, blow molding molds, die casting molds, etc. Especially suitable for precision molds that require high thermal conductivity, rapid cooling, and long service life.

3. Welding and Electrode Materials
Resistance welding electrodes, electrode handles, shafts, gaskets, large-scale molds for spot welding machines, etc. Especially suitable for scenarios that require high electrode pressure, such as welding stainless steel and high-temperature alloys.

4. Aerospace and Automotive
Engine key components, high-strength springs, non-magnetic explosion-proof parts, wear-resistant structural parts.

5. Other High-End Manufacturing
Submarine cable repeaters, precision instruments, medical equipment, non-magnetic tools, high-strength bearings, etc.

The differences from C17200 and C17510

Project	C17500	C17200	C17510
Main alloying elements	Cu-Be-Co	Cu-Be	Cu-Be-Ni
Conductivity	45% IACS	22~28% IACS	45% IACS
Strength/hardness	Medium-high intensity	Maximum intensity	Medium-high intensity
High-temperature stability	Better	Poor	Better
Typical applications	Electrodes, molds, conductive components	High elasticity and high strength springs, precision parts	Welding electrodes, high-temperature structural components

C17500 features both high conductivity and high strength, and is suitable for applications where a balance between conductivity and mechanical properties is required.

Supply form, specifications and market conditions

Common supply forms

Bar, plate, strip, pipe, wire, forging, custom-shaped parts.
Delivery condition: black skin, polished, polished, acid washed, etc.

Specification examples

Bar: Φ4 - 200mm × 1000 - 6000mm
Plate: Thickness 1 - 100mm × Width 200 - 600mm × Length 2000mm
Strip: Thickness 0.08 - 1.5mm × Width 200 - 300mm

Notes and Selection Suggestions

Beryllium toxicity: Beryllium and its compounds are harmful to the human body. During production, processing, and usage, strict protection measures are required to avoid inhalation of dust and skin contact.
Anti-rust after processing: The surface is prone to oxidation after processing. It is recommended to perform anti-rust treatment promptly.
Welding temperature: Avoid excessive temperature during welding to prevent damage to hardness and conductivity.

Selection Suggestions:

For high conductivity, medium high strength, choose C17500;
For extremely high strength and elasticity, choose C17200;
For high-temperature oxidation resistance, choose C17510.

Summary

C17500 beryllium copper, with its unique combination of "high strength + high conductivity + high temperature resistance", has become an indispensable material in high-end manufacturing, electronic and electrical, molds and welding fields. It has excellent processing performance, a mature supply system, and is an ideal choice for precision structural components and high-reliability components.
If you need specific contact information of suppliers, the original text of detailed technical standards, the spot price of a certain batch, or custom drawing processing services, please provide further details. I will precisely search and organize for you!