

Features of Copper Beryllium

Copper Beryllium is a copper alloy with the optimum combination of mechanical and physical properties such as tensile strength, fatigue strength, performance under elevated temperatures, electrical conductivity, bending formability and corrosion resistance. Copper Beryllium is widely used as contact springs in various applications like connectors, switches, relays, etc. NGK offers a variety of Copper Beryllium alloys in several tempers to cover different applications. Our Copper Beryllium products are available in strip, plate, rod and wire forms.

Tensile Strength

Copper Beryllium can attain the tensile strength of 1500N/mm² through precipitation hardening and can withstand very high bending stress.

Bending Formability

Age hardenable material can be formed into complicated shapes and precipitation hardened afterwards. Among Mill-hardened material, which does not require heat-treatment after stamping or forming, "Type-B" and "Type-S" have especially well-balanced performance in strength and formability.

Electrical Conductivity

The electrical conductivity of beryllium copper ranges from 20 to 70% IACS, depending on alloy and temper. Copper Beryllium is often used as a high current density spring material.

Fatigue Strength

Because Copper Beryllium exhibits excellent resistance to fatigue, it is also used in components where a longer life in service with a cycle stress environment is needed.

Thermal Stability

Due to less stress relaxation at elevated temperatures Copper Beryllium can be used in a wide range of temperatures with little loss of mechanical properties.

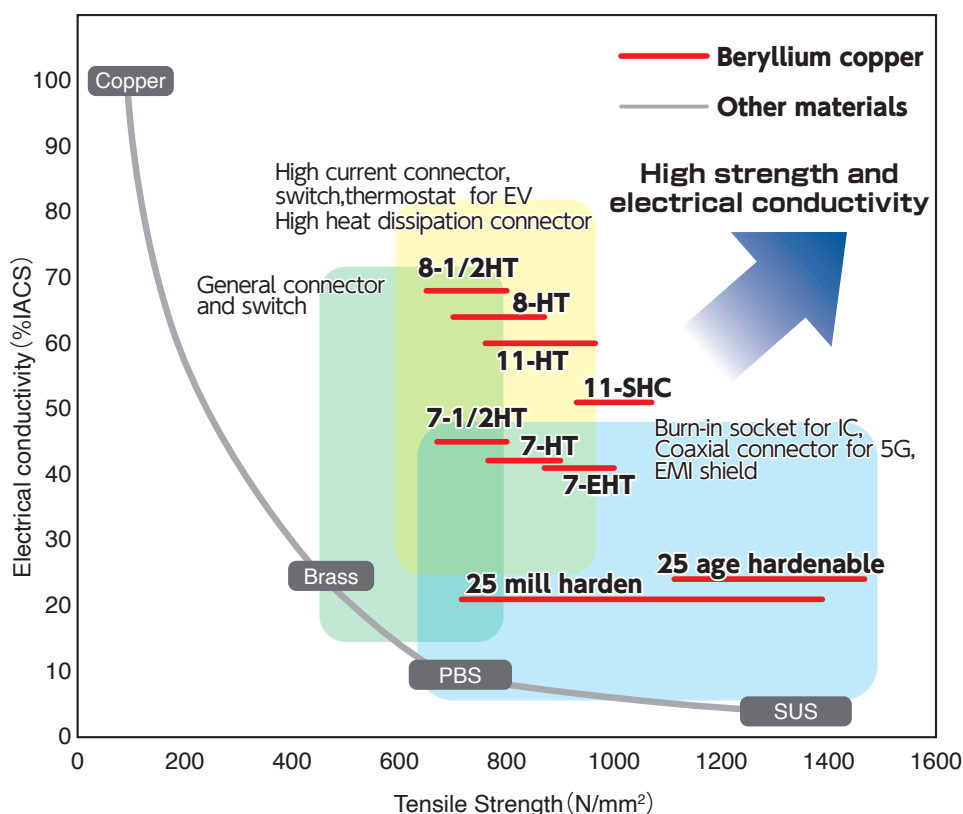
Corrosion Resistance

Copper Beryllium has excellent corrosion resistance, nearly the same as Nickel Silver.

Non-magnetic

Copper Beryllium is suitable for EMC shielding applications. The magnetic permeability is 1/100 of stainless steel (SUS304).

Tensile Strength vs. Electrical Conductivity



Chemical Composition

NGK Alloy	Chemical Composition (wt%)		Major Features	Form
25	Be Ni+Co Ni+Co+Fe Cu+Be+Ni+Co+Fe	1.80-2.00 min. 0.20 max. 0.60 min. 99.5	High strength High Fatigue strength High electrical conductivity Wear resistance Non-magnetic	Strip, Rod/Bar, Wire
8-11	Be Ni Cu+Be+Ni	0.20-0.60 1.40-2.20 min. 99.5	High electrical conductivity High fatigue strength	
7	Be Ni+Co Al Cu+Be+Ni+Co+Al	0.20-0.40 1.80-2.50 max. 0.60 min. 99.0	High strength Non-magnetic	Strip

Physical Properties*

Item		NGK Alloy 25	NGK Alloy 8-11	NGK Alloy 7
Melting Point (solidus)	°C	865	1004	1050
Melting Point (liquidus)	°C	980	1070	1081
Density	g/cm ³ at 20°C	8.36	8.82	8.71
Specific Heat	J/(kg·K) at 20°C	419	419	419
Thermal Expansion Coefficient	/ °C at 20~300°C	17.8×10 ⁻⁶	17.6×10 ⁻⁶	17.6×10 ⁻⁶
Modulus of Elasticity	kN/mm ²	127	132	127
Modulus of Rigidity	kN/mm ²	49	52	49
Poisson's Ratio		0.3	0.3	0.3
Magnetic Permeability	μ ($\mu=1+4\pi k$)	1.000042	1.000031	1.000027

Electrical conductivity and thermal conductivity * (at 20°C)

	NGK Alloy 25		NGK Alloy 8		NGK Alloy 11		NGK Alloy 7		
	Age Hardenable	Mill hardened	8-1/2HT	8-HT	11-HT	11-SHC	7-1/2HT	7-HT	7-EHT
Thermal conductivity W/(m · K)	99	85	298	280	262	221	194	180	176
Electrical conductivity (%IACS)	24	21	68	64	60	51	45	42	41

Physical properties and Electrical conductivity, thermal conductivity are for reference only.