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Nickel Silver

Description

Zinc White Copper (BZn15-20) is a ternary alloy of copper-nickel-zinc, commonly known as "German silver". It is not heat-treatable and is strengthened through cold working.
Its most notable characteristics are its silver-white luster (similar to silver but containing no actual silver), high strength (≥440 MPa), excellent hot and cold formability, and good corrosion resistance. However, it has relatively poor weldability and machinability. It is primarily used for instrument parts, spring tubes, jewelry, and telecommunication components in humid or corrosive environments.

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Zinc White Copper Material Data Sheet

1. Chemical Composition (%)

Designation	Cu	Ni+Co	Zn	Fe	Mn	Pb	Other	Note
BZn15-20	62.0~65.0	13.5~16.5	Balance	≤0.5	≤0.3	≤0.02	≤0.9(impurities)	GB, commonly known as "German silver"
C75400	63.0~66.0	14.0~16.0	Balance	≤0.25	≤0.50	≤0.05	≤0.5	US standard, equivalent to BZn15-20
BZn18-18	60.0~63.0	17.0~19.0	Balance	≤0.25	≤0.50	≤0.05	—	High-nickel type with superior corrosion resistance
BZn18-26	53.5~56.5	16.5~19.5	Balance	≤0.25	≤0.50	≤0.05	—	High-zinc type with higher strength

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2. Physical Properties (BZn15-20 as an example)

Performance parameters	Value	Unit	Note
Density	8.6~8.7	g/cm³	High density
Melting range	1050~1100	°C	Solidus–Liquidus range
Elastic modulus	110~130	GPa	Tensile state
Poisson's ratio	0.33	—	Typical Value
Coefficient of Thermal Expansion	16.2~18.0	μm/m·K	20~300°C
Thermal conductivity	25~35	W/(m·K)	Relatively low
Electrical conductivity	6~15	% IACS	Low electrical conductivity
Resistivity	28.8~33.3	μΩ·cm	20°C
Specific heat capacity	0.377~0.393	kJ/(kg·K)	
Gloss	Silver-white	—	Similar to silver, with good tarnish resistance

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3. Mechanical Properties (BZn15-20 by Temper)

State	Tensile strength Rm (MPa)	Yield strength Rp0.2 (MPa)	Elongation A (%)	Hardness HB	Feature description
O (annealing)	340~450	140~250	≥30	~100	Fully softened with extremely high plasticity
1/2H	440~540	250~350	8~15	—	Half-hard, balanced strength and formability
H (hard temper)	≥440	≥300	≥5	—	Standard hard temper, high strength
EH (extra hard)	540~640	400~480	2~5	—	For elastic components

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4. Process Performance

Items	Performance classification	Description
Cold working	★★★★★ Excellent	Suitable for deep drawing, bending, and spinning, as well as pressure working in both hot and cold conditions
Weldability	★★☆☆☆ Poor	Poor weldability; requires specialized welding techniques
Machinability	★★☆☆☆ Poor	Poor machinability; requires sharp tools
Corrosion resistance	★★★★★ Excellent	Resistant to atmospheric, seawater, and humid environments
Electroplatability	★★★★★ Excellent	Excellent performance for nickel plating, chrome plating, and gold plating
Elasticity	★★★★☆ Good	Superior elasticity compared to QSn6.5-0.1 tin bronze
Heat treatment	—	Not heat-treatable, strengthened only by cold working

5. Characteristics and Applications

Core characteristics	Typical applications
Silver-white luster for aesthetic appeal	Jewelry, eyeglass frames, watch components, decorative items
High strength and corrosion resistance	Components for humid environments, instrument parts, spring tubes
Excellent hot and cold formability	Deep-drawn containers, bellows, complex-shaped parts
Excellent elasticity	Springs, diaphragms, elastic components, telecommunication parts
Excellent electroplating properties	High-end sanitary ware, automotive trim, electronic connectors
Resistant to seawater corrosion	Ship parts, marine engineering components, chemical apparatus

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6. Codes and Standards

Standard system	Designation	Standard No.
Chinese standard	BZn15-20	GB/T 4423-1992, GB/T 2053-1989
U.S. standard	C75400	ASTM B122
Japanese standard	C7521	JIS H3110
European standard	CuNi15Zn21	EN 1652, CW409J
German standard	CuNi18Zn20	DIN 17664