BIBUS METALS

lebronze alloys

Technical datasheet

SICLANIC S®

SICLANIC S® can be supplied in two conditions; solution annealed/quenched state for optimum formability or precipitation heat-treated which offers the best compromise of formability and properties. SICLANIC S® has exceptional bending properties.

Available products

Strip	0.05 - 3.5 mm
Wire	1 - 12 mm dia

Chemical composition (%)

Cu	Ni	Si
96.9	2.5	0.6

Physical properties

Density	8.9 g/cm^3	
Melting range	1040-1060 °C	
Coefficient of expansion 0-300°C	19 x10^{-6}/°C	
	Quenched state	**Precipitation treated**
Resistivity at 20°C	7.8 µΩ/cm	Max 4.1 µΩ/cm
Electrical conductivity at 20°C	22 % IACS	Min 43 % IACS
Thermal conductivity at 20°C	84 W/m. °C	188.4 W/m. °C
Modulus of elasticity	120 GPa	130 GPa

Mechanical properties

Temper	Tensile strength (MPa)	Yield Strength (MPa)	Elongation (%)	Vickers hardness	Bending elasticity limit (MPa)
Solution treated and cold worked					
TB quenched	270-300	140-170	30-47	70-85	
TD3 quenched - 1/2 hard	320-400	290-380	10-20	105-125	
TD4 quenched – 4/4 hard	400-470	390-450	3-9	195-250	
Precipitation heat treated (ppt)					
TF quenched + ppt	580-680	450-550	10-20	170-190	430
TH3 quenched 1/2 hard + ppt	600-700	530-630	10-15	190-218	500
TH4 quenched 4/4 hard + ppt	630-800	590-700	8-2	195-250	560

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Bending characteristics

Condition	90° minimum bending radius as a function of thickness, t	
	Across rolling direction	Along rolling direction
TB	0 x t	0 x t
TD3	0 x t	1 x t
TD4	3 x t	3 x t
TF	0 x t	0 x t
TH3	1 x t	1 x t
TH4	1 x t	2 x t

Key attributes

SICLANIC S® offers electrical conductivity greatly superior to that of bronzes, brasses and nickel-silver grades combined with mechanical properties equivalent to those of bronze and copper-cobalt-beryllium grades. It also has excellent fatigue strength. This combination of properties makes SICLANIC S® highly suitable for the production of conductive contact blades. The following table compares it with the principal alloys for this type of application.

	Tensile strength (MPa)	Yield strength (MPa)	Vickers hardness	Electrical conductivity (% IACS)	Fatigue strength* (MPa)	Bending elasticity limit (MPa)
SICLANIC S®	630-800	590-700	195-250	≥43	245	560
CuSn8 (H14) Bronze 158	700-780	≥680	210-230	13	210	440
CuNiZn20 (H15) Niclal 180	≥680	≥650	≥215	5.4	200	510

*Cyclic bending, 106 cycles

In the precipitation heat-treated condition SICLANIC S® has excellent resistance to stress relaxation and thus the contract pressure applied by a contact blade remains stable over time. Mechanical properties also remain stable even after extended use at temperatures up to 400 °C.

Applications

Connectors
Switches/circuit breakers
Automotive accumulators
Relay springs
Washers for pressure/pressure sensitive switches