

PHOSPHOR BRONZE ALLOYS

Flat, Shaped and Round Wire

Applications

Electrical switch springs, Fuse clips, Electrical connectors, Lock washers, Bearing plates, Gears, Thrust washers, Springs

Description

Phosphor Bronzes between 0.5 and 11% tin and 0.01 to 0.35 % phosphorous. The addition of tin increases the corrosion resistance and strength of the alloy. The phosphorous increases the wear resistance and stiffness of the alloy. Phosphor Bronzes have superb spring qualities, high fatigue resistance, excellent formability and solderability, and high corrosion resistance. They are primarily used for electrical products, other uses include corrosion resistant bellows, diaphragms, and spring washers. Leaded phosphor bronzes combine good strength and fatigue resistance with good machinability, high wear resistance and corrosion resistance.

Chemistry Typical

UNS #	COPPER	TIN	LEAD	IRON	ZINC	PHOSPHORUS
C51000	Balance	4.2-5.8	0.05 max	0.10 max	0.30 max	0.03-0.35
C51100	Balance	3.5-4.9	0.05 max	0.10 max	0.30 max	0.03-0.35
C52100	Balance	7.0-9.0	0.05 max	0.10 max	0.20 max	0.03-0.35
C54400	Balance	3.5-4.5	3.0-4.0	0.10 max	1.5-4.5	0.01-0.35

* Contact Ulbrich Wire for request regarding the availability of other copper alloys.

* Contact Ulbrich Technical Department for limits for additional trace elements and impurity levels.

* Copper plus sum of named elements 99.7% min.

* C54400 with the lead content of 3-4% can be considered as a machining grade.

Physical Properties

Typical Density: 0.318 - 0.321 lb/in³, 8.80 - 8.88 g/cm³

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Electrical Conductivity: (% IACS at 68°F 20°C, annealed): 13 - 20%

Thermal Conductivity: BTU-in/hr-ft²-°F
At 68°F: 36 - 50

Mean Coefficient of Thermal Expansion: $\mu\text{in/in-}^\circ\text{F}$
68 - 572 °F: 9.6 - 10.1

Modulus of Elasticity: KSI
16 x 10³ in tension

Forms

Profile, Round, Flat, Square

Mechanical Properties at Room Temperature

Properties: Annealed Typical

Ultimate Tensile Strength: 45 KSI min (448 MPa min)
Yield Strength: 22 KSI min (151 MPa min)
Elongation: 45% min

Properties: Tempered

Phosphor Bronze alloys can be cold worked to various tempers.

** Actual physical and mechanical properties are alloy dependent. Contact Ulbrich Technical Service for alloy specific properties.*

Additional Properties

Corrosion Resistance

Contact Ulbrich Wire for specific information.

Wire Finishes

XC - Extra clean. Annealed or annealed and cold rolled.
Contact Ulbrich Wire with special finish requests.

Heat Treatment

Phosphor Bronze alloys are not hardenable by heat treatment.

Welding

Contact Ulbrich Wire for specific information.

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