

C51000

Extruded and Drawn

Product Description: Phosphor Bronze 5% A

Tempers: H04 Hard, H08 Spring

Solids: 3/8" to 2 1/2" O.D.

Hex: 3/8" to 2" O.D.

Rectangles: Consult Mill

Standard Lengths: 144"

Typical Uses

Architecture bridge bearing plates

Electrical electrical connectors, electrical flexing contact blades, electromechanical spring components, electronic and precision instrument parts, electronic connectors, fuse clips, resistance wire, switch parts, wire brushes

Fasteners cotter pins, fasteners, lock washers

Industrial beater bar, bellows, bourdon tubes, chemical hardware, clutch disks, diaphragms, perforated sheets, pressure-responsive elements, sleeve bushings, springs, textile machinery, truss wire, welding rods

Similar or Equivalent Specification

CDA	ASTM	SAE	AMS	Federal	Military	Other
C51000	B139 B139M	J461 J463	4625			

Chemical Composition

Cu%	Pb%	Sn%	Zn%	Fe%	P%
Rem.	0.05	4.20- 5.80	0.30	0.10	0.03- 0.35

Chemical Composition according to ASTM B139/B139M-12(2017)

Note: Cu + Sum of Named Elements, 99.5% min. Single values represent maximums.

Machinability

Copper Alloy UNS No.	Machinability Rating	Density (lb/in ³ at 68 °F)
C51000	20	0.320

Mechanical Properties

Mechanical Properties according to ASTM B139/B139M-12(2017)

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H04 Hard

SIZE RANGE: ¼" TO ½" ROUND AND HEXAGONAL INCLUSIVE

Tensile Strength, min		Yield Strength, at 0.5% Extension Under Load, min		Elongation, 4x Diameter or Specimen Thickness, min	Rockwell "B" Hardness	Remarks
ksi	MPa	ksi	MPa	%	typical HRB	
70	485			13	87	

SIZE RANGE: OVER ½" TO 1" ROUND AND HEXAGONAL INCLUSIVE

Tensile Strength, min		Yield Strength, at 0.5% Extension Under Load, min		Elongation, 4x Diameter or Specimen Thickness, min	Rockwell "B" Hardness	Remarks
ksi	MPa	ksi	MPa	%	typical HRB	
60	415			15	87	

SIZE RANGE: OVER 1" ROUND AND HEXAGONAL

Tensile Strength, min		Yield Strength, at 0.5% Extension Under Load, min		Elongation, 4x Diameter or Specimen Thickness, min	Rockwell "B" Hardness	Remarks
ksi	MPa	ksi	MPa	%	typical HRB	
55	380			18	87	

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H08 Spring

SIZE RANGE: 0.026" TO ¼" ROUND INCLUSIVE

Tensile Strength, min		Yield Strength, at 0.5% Extension Under Load, min		Elongation, 4x Diameter or Specimen Thickness, min	Rockwell "B" Hardness	Remarks
ksi	MPa	ksi	MPa	%	typical HRB	
115	790					

SIZE RANGE: OVER 1/16" TO 1/8" ROUND INCLUSIVE

Tensile Strength, min		Yield Strength, at 0.5% Extension Under Load, min		Elongation, 4x Diameter or Specimen Thickness, min	Rockwell "B" Hardness	Remarks
ksi	MPa	ksi	MPa	%	typical HRB	
110	760					

SIZE RANGE: OVER 1/8" TO 1/4" ROUND INCLUSIVE

Tensile Strength, min		Yield Strength, at 0.5% Extension Under Load, min		Elongation, 4x Diameter or Specimen Thickness, min	Rockwell "B" Hardness	Remarks
ksi	MPa	ksi	MPa	%	typical HRB	
105	725			3.5		

SIZE RANGE: OVER 1/4" TO 3/8" ROUND INCLUSIVE

Tensile Strength, min		Yield Strength, at 0.5% Extension Under Load, min		Elongation, 4x Diameter or Specimen Thickness, min	Rockwell "B" Hardness	Remarks
ksi	MPa	ksi	MPa	%	typical HRB	
100	690			5		

SIZE RANGE: OVER 3/8" TO 1/2" ROUND INCLUSIVE

Tensile Strength, min		Yield Strength, at 0.5% Extension Under Load, min		Elongation, 4x Diameter or Specimen Thickness, min	Rockwell "B" Hardness	Remarks
ksi	MPa	ksi	MPa	%	typical HRB	
90	620			9	95	

Physical Properties

	US Customary	Metric
Melting Point – Liquidus	1920 °F	1049 °C
Melting Point – Solidus	1750 °F	954 °C
Density	0.32 lb/in ³ at 68 °F	8.86 gm/cm ³ at 20 °C
Specific Gravity	8.86	8.86
Electrical Conductivity*	15% IACS at 68 °F	0.088 MegaSiemens/cm at 20 °C
Thermal Conductivity	40 Btu/sq ft/ft hr/°F at 68 °F	69.2 W/m at 20 °C
Coefficient of Thermal Expansion 68-572	9.9 · 10 ⁻⁶ per °F (68-572 °F)	171 · 10 ⁻⁶ per °C (20-300 °C)
Specific Heat Capacity	0.09 Btu/lb/°F at 68 °F	377.1 J/kg at 20 °C
Modulus of Elasticity in Tension	16000 ksi	110310 MPa
Modulus of Rigidity	6000 ksi	41370 MPa

Physical Properties provided by CDA

*Determined on an alloy containing 5% tin and .2% phosphorus. This value will vary with the composition.

Fabrication Properties

Technique	Suitability
Soldering	Excellent
Brazing	Excellent
Oxyacetylene Welding	Fair
Gas Shielded Arc Welding	Good
Coated Metal Arc Welding	Fair
Spot Weld	Good
Seam Weld	Fair
Butt Weld	Excellent
Capacity for Being Cold Worked	Excellent
Capacity for Being Hot Formed	Poor
Machinability Rating	20

Fabrication Properties provided by CDA

Thermal Properties

Treatment	Minimum*	Maximum*
Annealing	900	1250

Thermal Properties provided by CDA

*Temperature is measured in Fahrenheit.