

## ■ C93200 Leaded Tin Bronze

### General Information

<b>Solids</b>	½" to 13" OD
<b>Tubes</b>	1" to 16" OD
<b>Rectangles</b>	Up to 20"
<b>Standard Lengths</b>	144"
<b>Shape/Form</b>	semi-finished, mill stock or near-net shapes, anode, bar stock, billet/bloom, squares, hex, plate, profile or structural shape, flats/rectangular bar

### Typical Uses

<b>Automotive</b>	automotive fittings
<b>Fasteners</b>	washers
<b>Industrial</b>	thrust washers, pumps, bushings, machine parts, main spindle bearings, machine tool bearings, bearings for cranes, trunion bearings, roll neck bearings, rolling mill bearings, linkage bushings for presses, fuel pump bushings, water pump bushings, diesel engine wrist pin bushings, forging press toggle lever bearings, hydraulic press stuffing box, hydraulic press main lining, pump impellers, general purpose bushings, fittings, pump fixtures, insert bearings, bearings

### Similar or Equivalent Specification

CDA	ASTM	ASARCON	SAE	AMS	FEDERAL	INGOT	MILITARY	OTHER
C93200	ASTM B505	77	SAE 660 SAE J461 SAE J462		QQ-C-390 B TYPE III	315	MIL-B-11553 COMP. 12	

### Chemical Composition

Alloy	Cu% <sup>1</sup>	Sn%	Pb%	Zn%	Fe%	Ni% <sup>2</sup>	Sb%	P% <sup>3</sup>	S%	Al%	Si%
C93200	81.00- 85.00	6.30- 7.50	6.00- 8.00	2.00- 4.00	0.20	1.00	0.35	0.15	0.08	0.005	0.005

Chemical Composition according to ASTM B505-12A

<sup>1</sup>In determining Cu min., Cu may be calculated as Cu + Ni.  
 Note: Cu + Sum of Named Elements, 99.0% min. Single values represent maximums.

<sup>2</sup>Ni value includes Co.

<sup>3</sup>For continuous castings, P shall be 1.5%, max.

### Machinability

Alloy	Machinability Rating	Density (lb/cu in.)
C93200	70	0.322

**Mechanical Properties**

Tensile Strength, min		Yield Strength, at .5% extension under load min		Elongation in 2 in. or 50 mm min	Brinell Hardness	Remarks
ksi	MPa	ksi	MPa	%	typical BHN	
35	241	20	138	10		

Mechanical Properties according to ASTM B505-12A

**Physical Properties**

	US Customary	Metric
Melting Point – Liquidus	1790° F	977° C
Melting Point – Solidus	1570° F	854° C
Density	0.322 lb/in <sup>3</sup> at 68° F	8.91 gm/cm <sup>3</sup> at 20° C
Specific Gravity	8.910	8.91
Electrical Resistivity	85.90 ohms-cmil/ft at 68° F	14.29 microhm-cm at 20° C
Electrical Conductivity	12% IACS at 68° F	0.07 MegaSiemens/cm at 20° C
Thermal Conductivity	33.60 Btu · ft/(hr · ft <sup>2</sup> · °F) at 68° F	58.2 W/m · °K at 20° C
Coefficient of Thermal Expansion	100 · 10 <sup>-6</sup> per °F (68°-212° F)	18.0 · 10 <sup>-6</sup> per °C (20°-100° C)
Specific Heat Capacity	0.090 Btu/lb/°F at 68° F	377.1 J/kg · °K at 293° K
Modulus of Elasticity in Tension	14500 ksi	100000 MPa

Physical Properties provided by CDA

**Fabrication Practices**

Joining Technique	Suitability
Soldering	Excellent
Brazing	Good
Oxyacetylene Welding	Not Recommended
Gas Shielded Arc Welding	Not Recommended
Coated Metal Arc Welding	Not Recommended

Fabrication Properties provided by CDA

**Thermal Properties**

Treatment	Temp./Time - US	Temp./Time - SI
Stress Temperature	500	260
Solution Minimum		
Solution Maximum		
Solution Time	0.0	
Solution Medium	None	
Precipitation Value		
Precipitation Time		
Precipitation Medium	None	
Annealing Minimum		
Annealing Maximum		
Annealing Time		
Hot Works Minimum		
Hot Works Maximum		

Thermal Properties provided by CDA