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Perth	08 9258 2600	08 9358 6206

PRODUCT DATA SHEET

High Lead Tin Bronze

UNS C93200

Copper Alloys

Also known as leaded phosphor bronze

Chemical Composition

(%maximum, unless shown as range or minimum)

	Copper ⁽¹⁾	Aluminium	Antimony	Iron	Lead	Nickel ⁽²⁾	Phosphorus ⁽³⁾	Silicon	Sulphur	Tin	Zinc
Min./Max.	81.0 - 85.0	0.005	0.35	0.20	6.0 - 8.0	1.0	0.15	0.005	0.08	6.3 - 7.5	1.0 - 4.0
Nominal	83.0	-	-	-	7.0	-	-	-	-	6.9	2.5

(1) In determining copper minimum, copper may be calculated as copper + nickel.

(2) Nickel value includes cobalt.

(3) For continuous castings, phosphorus shall be 1.5% maximum.

Note: Copper + Sum of Named Elements, 99.0% minimum.

Applicable Specifications

Product	Specification
Centrifugal	ASTM B271 SAE J461, J462
Continuous	ASTM B505 SAE J461, J462
Ingot	ASTM B30
Permanent Mold	SAE J461, J462
Sand	ASTM B584, B66, B763 SAE J461, J462

Fabrication Properties

Joining Technique	Suitability
Soldering	Excellent
Brazing	Good
Oxyacetylene Welding	Not Recommended
Gas Shielded Arc Welding	Not Recommended
Coated Metal Arc Welding	Not Recommended
Machinability Rating	70

Mechanical Properties

(measured at room temperature, 68°F (20°C))

Temper	Cold Work	Typical/Minimum	Temperature	Tensile Strength	Yield Strength (0.5% ext. under load)	Elongation	Brinell Hardness	Fatigue Strength at 10 ⁸ cycles	Izod Impact Strength
	%		°C	MPa	MPa	%		MPa	J
As Centrifugal Cast									
M02	0	Minimum	20	207	97	15	-	-	
As Continuous Cast									
M07	0	Minimum	20	241	138	10	-	-	
As Sand Cast									
M01	0	Minimum	20	207	97	15	-	-	
M01	0	Typical	20	241	124	20	65	110	8.0

Physical Properties

	US Customary	Metric
Melting Point - Liquidus	1790°F	977°C
Melting Point - Solidus	1570°F	854°C
Density	0.322 lb/in ³ at 68°F	8.91 gm/cm ³ @ 20 C
Specific Gravity	8.91	8.91
Electrical Resistivity	85.9 ohms-cmil/ft @ 68°F	14.29 microhm-cm @ 20°C
Electrical Conductivity	12 %IACS @ 68°F	0.07 MegaSiemens/cm @ 20°C
Thermal Conductivity	33.6 Btu · ft/(hr · ft ² · °F) at 68°F	58.2 W/m · °K at 20°C
Coefficient of Thermal Expansion	10.0 · 10 ⁻⁶ per °F (68-212°F)	18.0 · 10 ⁻⁶ per °C (20-100°C)
Specific Heat Capacity	0.09 Btu/lb/°F at 68°F	377.0 J/kg · °K at 293°K
Modulus of Elasticity in Tension	14, 500 ksi	100,000 MPa

Typical Uses**Automotive:** Automotive Fittings**Fasteners:** Washers

Industrial: Pump Impellers, Diesel Engine Wrist Pin Bushings, Forging Press Toggle Lever Bearings, Hydraulic Press Stuffing Box, Hydraulic Press Main Lining, 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, Pump Fixtures, Fittings, Insert Bearings, Bearings, Thrust Washers, Pumps, Bushings, Machine Parts, General Purpose Bushings