

ALLOY DATASHEET

C89833 Bismuth Tin Bronze

Copper-Tin-Zinc-Bismuth Casting Alloy · Lead-Free Alternative to C83600

UNS C89833	LEAD-FREE (Pb 0.09% MAX)	ASTM B584 / B30	BISMUTH BRONZE
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Description

C89833 is a lead-free copper-tin-zinc casting alloy that uses 1.7–2.7% bismuth in place of the lead found in traditional red brasses, making it a lead-free alternative to leaded alloy C83600 (85-5-5-5). It offers moderate strength, good corrosion and wear resistance, and a machinability rating of 81. With a high casting yield, low dropping tendency, and low shrinkage during solidification, it is well suited to sand casting corrosion-resistant, pressure-tight castings such as pump components and impellers.

Chemical Composition (%)

Element	Cu	Pb	Sn	Zn	Fe	P	Ni	Al	Bi	S	Sb	Si
Min	86.0	—	4.0	2.0	—	—	—	—	1.7	—	—	—
Max	91.0	0.09	6.0	6.0	0.30	0.050	1.0	0.005	2.7	0.08	0.25	0.005

Cu + sum of named elements 99.3% min. Ni value includes Co. Source: Copper Development Association.

Mechanical Properties

Casting Method	Tensile Strength (ksi)	Yield Strength 0.5% Ext (ksi)	Elongation (% in 2 in.)	Hardness	Impact Strength (Izod)
Sand Cast (M01)	37 typ	17 typ	28 typ	60 HB typ (500 kgf)	12 ft-lb typ

Properties measured at room temperature, 68°F (20°C). Source: Copper Development Association.

Physical Properties

Property	Value
Melting Point – Liquidus	1877°F (1025°C)
Melting Point – Solidus	1454°F (790°C)
Density	0.317 lb/in ³ (8.78 g/cm ³) at 68°F
Electrical Conductivity	17.8% IACS at 68°F
Thermal Conductivity	41 Btu/sq ft/ft hr/°F at 68°F
Coefficient of Thermal Expansion (68–392°F)	13 x 10 ⁻⁶ per °F
Specific Heat Capacity	0.085 Btu/lb/°F at 68°F
Modulus of Elasticity in Tension	15,500 ksi

Fabrication Properties

Technique	Suitability
Soldering	Excellent
Brazing	Good
Oxyacetylene Welding	Not Recommended
Gas Shielded Arc Welding	Not Recommended
Coated Metal Arc Welding	Poor
Machinability Rating (C36000 = 100)	81

Casting Characteristics

Attribute	Rating
Fluidity	Medium
Casting Yield	High
Drossing Tendency	Low
Gassing Tendency	Medium
Effect of Section Size	Low
Shrinkage During Solidification	Low
Patternmaker's Shrinkage	11/64 in. per ft

Applicable Specifications

Product Form	System Standard	Title
Sand Cast	ASTM B584	Copper Alloy Sand Castings for General Applications
Ingot	ASTM B30	Copper Base Alloys in Ingot Form

C89833 replaces lead with bismuth (1.7–2.7%) and holds lead to 0.09% max, giving a lead-free alternative to leaded red brass C83600 for corrosion-resistant, pressure-tight castings.

Typical Applications

- Corrosion-resistant, pressure-tight castings
- Pumps and pump components
- Impellers
- Lead-free alternative to C83600 (85-5-5-5 red brass)

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Data compiled from published Copper Development Association (CDA) alloy property records for C89833. Values are nominal/typical or stated minimums as indicated and are intended for general engineering reference. Actual properties can vary with casting method, section size, and foundry practice — consult your supplier's certified test reports for design-critical applications.