

ALLOY DATASHEET

C99500 Copper Alloy

Copper-Nickel-Iron-Aluminum Casting Alloy · Precipitation-Hardenable Special Alloy

UNS C99500	PRECIPITATION HARDENABLE	ASTM B505 / B763 / B30	Pb 0.09% MAX
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Description

C99500 is a precipitation-hardenable copper casting alloy from the special alloys (C99xxx) family, alloyed with nickel, iron, aluminum, and silicon. As sand cast it offers a minimum tensile strength of 70 ksi, and a solution treatment followed by precipitation aging raises typical tensile strength to 86 ksi and yield strength to 62 ksi. It combines moderate-to-high strength, retention of strength at elevated temperatures, and corrosion resistance to numerous environments, including salt water. Typical uses include valve stems, propeller wheels, gears for mining equipment, outboard marine components, and electrical parts.

Chemical Composition (%)

Element	Cu	Pb	Zn	Fe	Ni	Al	Mn	Si
Min	Rem	—	0.50	3.0	3.5	0.50	—	0.50
Max	Rem	0.09	2.0	5.0	5.5	2.0	0.50	2.0

Cu + sum of named elements 99.7% min. Cu reported as remainder. Source: Copper Development Association.

Mechanical Properties

Form / Temper	Tensile Strength (ksi)	Yield Strength 0.5% Ext (ksi)	Elongation (% in 2 in.)	Hardness
Sand Cast (M01)	70 min	40 min	12 min	145 HB typ (500 kgf)
Precipitation Hardened (TF00)	86 typ	62 typ	8 typ	196 HB typ (500 kgf)

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

Physical Properties

Property	Value
Density	0.30 lb/in ³ at 68°F
Specific Gravity	8.3
Electrical Conductivity	10% IACS at 68°F
Coefficient of Thermal Expansion (68–572°F)	8.3 x 10 ⁻⁶ per °F
Modulus of Elasticity in Tension	19,000 ksi

Fabrication Properties

Technique	Suitability
Gas Shielded Arc Welding	Good
Machinability Rating (C36000 = 100)	50

Heat Treatment

Treatment	Temp.	Time	Quench
Stress Relief	600°F min	—	—
Solution Treatment	1625°F	60 min	Water
Precip. Treatment	900°F	60 min	—

Heat treatment temperatures in °F; times in minutes. Source: Copper Development Association.

Casting Characteristics

Attribute	Rating
Fluidity	Medium
Casting Yield	Low
Drossing Tendency	Medium
Gassing Tendency	Low
Effect of Section Size	Low
Shrinkage During Solidification	High
Patternmaker's Shrinkage	3/16 in. per ft

Applicable Specifications

Product Form	System Standard	Title
Continuous Cast	ASTM B505/B505M	Copper Base Alloy Continuous Castings
Sand Cast	ASTM B763/B763M	Copper Alloy Sand Castings for Valve Applications
Ingot	ASTM B30	Copper Base Alloys in Ingot Form

C99500 develops its highest strength through heat treatment: a solution treatment at 1625°F for 60 minutes with a water quench, followed by precipitation aging at 900°F for 60 minutes, takes the alloy to the TF00 temper (86 ksi tensile / 62 ksi yield, typical).

Typical Applications

- Valve stems
- Propeller wheels
- Outboard marine components
- Gears for mining equipment
- Electrical parts
- Parts needing strength retention at elevated temperatures

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Data compiled from published Copper Development Association (CDA) alloy property records for C99500. 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.