

# Copper-Nickel-Zinc Alloy (Nickel Silvers) C97300

## Chemical Composition (% max., unless shown as range or min.)

	Cu <sup>(1)</sup>	Sn	Pb	Zn	Fe	Sb	Ni (incl Co)	S	P	Al	Mn	Si
<b>Min./Max.</b>	53.0-58.0	1.5-3.0	8.0-11.0	17.0-25.0	1.5	.35	11.0-14.0	.08	.05	.005	.50	.15
<b>Nominal</b>	55.5	2.2	9.5	21.0	—	—	12.5	—	—	—	—	—

1. Cu + Sum of Named Elements, 99.0% min.

### Applicable Specifications

Process or Ingot	Specification	
Centrifugal	ASTM	B 271
Continuous	ASTM	B 505
	SAE	J461, J462
Ingot	ASTM	B 30
	INGOT	410
Sand	ASTM	B 584, B 763

### Fabrication Practices

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

**Machinability Rating: 70**  
(C36000, Free Cutting Brass = 100)

### Typical Uses

Ornamental Castings  
Statuary  
Hardware Fittings  
Valves and Fittings

### Casting Characteristics

Characteristic	Value
Effect of Section Size	Medium
Patternmakers Shrinkage	3/16 in./ft
Drossing	High
Gassing	Medium
Fluidity	High
Shrinkage	Medium
Casting Yield	Medium

### Heat Treatment

Stress Relieving: 500 F (260 C) for 1h/in. of Section Thickness
Cannot be Strengthened by Heat Treatment

## Physical Properties

	US Customary	Metric
<b>Melting Range</b> , Liquidus	1904 F	1040 C
	Solidus	1850 F
<b>Density</b>	0.321 lb/in. <sup>3</sup> at 68 F	8.89 g/cm <sup>3</sup> at 20 C
<b>Specific Gravity</b>	8.89	8.89
<b>Electrical Resistivity</b>	182.3 ohm•cmil/ft at 68 F	30.3 microhm-cm at 20 C
<b>Coefficient of Thermal Expansion</b>	9.0 10 <sup>-6</sup> per°F (68-572 F)	16.2 10 <sup>-6</sup> per°C (20-300 C)
<b>Thermal Conductivity</b>	16.5 Btu•ft/(hr•ft <sup>2</sup> •°F) at 68	28.6 W/m•°K at 20 C
<b>Electrical Conductivity</b>	6 %IACS at 68 F	0.033 Siemens/cm at 20 C
<b>Specific Heat Capacity</b>	0.09 Btu/lb/°F at 68 F	377 J/kg•°K at 20 C
<b>Modulus of Elasticity in Tension</b>	16,000 ksi	110,000 MPa

## Mechanical Properties

<b>M01 - AS SAND CAST</b>		US Customary	Metric	Applicable Specifications
<b>Tensile Strength</b>	Minimum	30 ksi	207 MPa	ASTM B 584, B 763
	Typical	35 ksi	241 MPa	
<b>Yield Strength</b>				
0.5% Ext. under load	Minimum	15 ksi	103 MPa	ASTM B 584, B 763
	Typical	17 ksi	117 MPa	
<b>Elongation</b>	Minimum	8 %, in 2 in.	8 %, in 51 mm	ASTM B 584, B 763
	Typical	20 %, in 2 in.	20 %, in 51 mm	
<b>Brinell Hardness</b>				
500 kg load	Typical	55	55	

<b>M02 - AS CENTRIFUGAL CAST</b>		US Customary	Metric	Applicable Specifications
<b>Tensile Strength</b>	Minimum	30 ksi	207 MPa	ASTM B 271
	Typical			
<b>Yield Strength</b>				
0.5% Ext. under load	Minimum	15 ksi	103 MPa	ASTM B 271
	Typical			
<b>Elongation</b>	Minimum	8 %, in 2 in.	8 %, in 51 mm	ASTM B 271

<b>M07 - AS CONTINUOUS CAST</b>		US Customary	Metric	Applicable Specifications
<b>Tensile Strength</b>	Minimum	30 ksi	207 MPa	ASTM B 505
	Typical			
<b>Yield Strength</b>				
0.5% Ext. under load	Minimum	15 ksi	103 MPa	ASTM B 505
	Typical			
<b>Elongation</b>	Minimum	10 %, in 2 in.	10 %, in 51 mm	ASTM B 505