

# Manganese Bronze (High Strength Yellow Brass) C86300

## Chemical Composition

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

	Cu <sup>(1)(2)</sup>	Sn	Pb	Zn	Fe	Ni (incl Co)	Al	Mn	Si
Min./Max.	60.0-66.0	.20	.20	22.0-28.0	2.0-4.0	1.0	5.0-7.5	2.5-5.0	–
Nominal	63.0	–	–	25.0	3.0	–	6.2	3.7	–

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

2. In determining Cu min., Cu may be calculated as Cu + Ni.

## Applicable Specifications

Process or Ingot	Specification	
Centrifugal	AMS	4862
	ASTM	B 271
	SAE	J461, J462
Continuous	ASTM	B 505
Ingot	ASTM	B 30
	FEDERAL	QQ-C-523
	INGOT	424
Precision	MILITARY	MIL-C-11866
Sand	AMS	4862
	ASTM	B 22, B 584, B 763
	SAE	J461, J462

## Casting Characteristics

Characteristic	Value
Effect of Section Size	Small
Patternmakers Shrinkage	1/4 in./ft
Drossing	High
Gassing	Low
Fluidity	Medium
Shrinkage	High
Casting Yield	Low

## Fabrication Practices

Joining Technique	Suitability
Soldering	Poor
Brazing	Poor
Oxyacetylene Welding	Poor
Gas Shielded Arc Welding	Poor
Coated Metal Arc Welding	Good

**Machinability Rating: 80**  
(C36000, Free Cutting Brass = 100)

## Typical Uses

Slow Speed Heavy Duty Load Bearings  
Extra Heavy Duty High Strength Alloy  
Bridge Turntable and Wear Hardware  
Screwdown Nuts  
Gears  
Gibs and Cams  
Hydraulic Cylinder Parts  
Large Valve Stems

## Heat Treatment

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

	US Customary	Metric
Melting Range, Liquidus	1693 F	923 C
	Solidus	1625 F
Density	0.283 lb/in. <sup>3</sup> at 68 F	7.83 g/cm <sup>3</sup> at 20 C
Specific Gravity	7.83	7.83
Electrical Resistivity	130.8 ohm•cmil/ft at 68 F	21.7 microhm-cm at 20 C
Coefficient of Thermal Expansion	12.0 10 <sup>-6</sup> per °F (68-572 F)	21.6 10 <sup>-6</sup> per °C (20-300 C)
Magnetic Permeability (F.S.=16kA/m)	1.09	1.09
Thermal Conductivity	20.5 Btu•ft/(hr•ft <sup>2</sup> •°F) at 68 F	35.5 W/m•K at 20 C
Electrical Conductivity	8 %IACS at 68 F	0.046 Siemens/cm at 20 C
Specific Heat Capacity	0.09 Btu/lb/°F at 68 F	377 J/kg•K at 20 C
Modulus of Elasticity in Tension	14,200 ksi	97,900 MPa

## Mechanical Properties\*

<i>M01 - AS SAND CAST</i>		US Customary	Metric	Applicable Specifications	
Tensile Strength	Minimum	110 ksi	760 MPa	ASTM B 22	
	Minimum	110 ksi	758 MPa	ASTM B 584, B 763	
	Minimum	110 ksi	760 MPa	SAE J462-A	
	Typical	119 ksi	821 MPa		
Yield Strength	0.5% Ext. under load	Minimum	60 ksi	415 MPa	ASTM B 22
		Minimum	60 ksi	414 MPa	ASTM B 584, B 763
		Typical	67 ksi	462 MPa	
	0.2% Offset	Minimum	60 ksi	415 MPa	SAE J462-A
Elongation	Minimum	12 %, in 2 in.	12 %, in 51 mm	ASTM B 22, B 584, B 763; SAE J462-A	
	Typical	18 %, in 2 in.	18 %, in 51 mm		
Brinell Hardness	3000 kg load	Minimum	223	223	ASTM B 22
		Typical	225		
Compressive Strength	0.001 in. set/in.	Typical	60 ksi	414 MPa	
	0.1 in. set/in.	Typical	97 ksi	689 MPa	
Impact Strength	Izod	Typical	15 ft-lb	20 J	
	Charpy V-Notch	Typical	12 ft-lb	16 J	
Fatigue Strength	at 10 <sup>6</sup> cycles	Typical	25 ksi	172 MPa	
Creep Strength,	0.1%/10 <sup>4</sup> h				
	at 250 F (121 C)	Typical	57 ksi	390 MPa	
	at 350 F (177 C)	Typical	19 ksi	131 MPa	
	at 450 F (232 C)	Typical	1 ksi	3 MPa	
Compression	Deformation Limit	Minimum	55 ksi	380 MPa	ASTM B 22

### Mechanical Properties\*

<b>M02 - AS CENTRIFUGAL CAST</b>		<b>US Customary</b>	<b>Metric</b>	<b>Applicable Specifications</b>
<b>Tensile Strength</b>	Minimum	110 ksi	758 MPa	ASTM B 271
	Minimum	110 ksi	760 MPa	SAE J462-A
<b>Yield Strength</b>				
0.5% Ext. under load	Minimum	60 ksi	414 MPa	ASTM B 271
0.2% Offset	Minimum	60 ksi	415 MPa	SAE J462-A
<b>Elongation</b>	Minimum	12 %, in 2 in.	12 %, in 51 mm	ASTM B 271; SAE J462-A

<b>M07 - AS CONTINUOUS CAST</b>		<b>US Customary</b>	<b>Metric</b>	<b>Applicable Specifications</b>
<b>Tensile Strength</b>	Minimum	110 ksi	758 MPa	ASTM B 505
	Minimum	110 ksi	760 MPa	SAE J462-B
<b>Yield Strength</b>				
0.5% Ext. under load	Minimum	62 ksi	427 MPa	ASTM B 505
0.2% Offset	Minimum	62 ksi	425 MPa	SAE J462-B
<b>Elongation</b>	Minimum	14 %, in 2 in.	14 %, in 51 mm	ASTM B 505; SAE J462-B

\* For alloys listed under SAE J462, suffix symbols are to distinguish between two or more sets of mechanicals properties, heat treatments, conditions, etc., as applicable. See Society of Automotive Engineers Inc., SAE Handbook, Vol. 1 Materials, 1989, Warrendale, PA 15096.