

COPPER ALLOY No. C65500 (HIGH SILICON BRONZE A)

Composition — percent

	Nominal	Minimum	Maximum
Copper	97	Remainder	
Lead	.....	.....	.05
Iron	.....	.....	.8
Zinc	.....	.....	1.5
Manganese	.....	.50	1.3
Silicon	3	2.8	3.8
Nickel	.....	.....	.6

Nearest Applicable A S T M Specifications

Bolts	F468
Flat Products	B96, B98, B100, B124, B432
Nuts	F467
Pipe	B315
Rod	B98, B124
Screws	F468
Shapes	B98, B124, B283
Studs	F468
Tube	B315
Wire	B99, B105

Physical Properties

	English Units	C. G. S. Units
Melting Point (Liquidus)	1880 F	1025 C
Melting Point (Solidus)	1780 F	970 C
Density	.308 lb/cu in @ 68 F	8.53 gm/cu cm @ 20 C
Specific Gravity	8.53	8.53
Coefficient of Thermal Expansion	per °F from 68 F to 212 F	per °C from 20 C to 100 C
Coefficient of Thermal Expansion	per °F from 68 F to 392 F	per °C from 20 C to 200 C
Coefficient of Thermal Expansion	.0000100 per °F from 68 F to 572 F	.0000180 per °C from 20 C to 300 C
Thermal Conductivity	21 Btu/sq ft/ft/hr/°F @ 68 F	.09 cal/sq cm/cm/sec/°C @ 20 C
Electrical Resistivity (Annealed)	148 Ohms (circ mil/ft) @ 68 F	24.6 Microhm-cm @ 20 C
Electrical Conductivity* (Annealed)	7.0 % IACS @ 68 F	.0406 Meghm-cm @ 20 C
Thermal Capacity (Specific Heat)	.09 Btu/lb °F @ 68 F	.09 cal/gm/°C @ 20 C
Modulus of Elasticity (Tension)	15,000 ksi	10,500 Kg/sq mm
Modulus of Rigidity	5,600 ksi	3,900 Kg/sq mm

* Volume Basis

Typical Uses

- AIRCRAFT:** hydraulic pressure lines
HARDWARE: bolts, burrs, butts, clamps, cotter pins, hinges, marine hardware, nails, nuts, pole line hardware, screws
INDUSTRIAL: bearing plates, bushings, cable, channels, chemical equipment, heat exchanger tubes, kettles, piston rings, tanks, rivets, screen cloth and wire, screen plates, shafting
MARINE: propeller shafts

Common Fabrication Processes

Blanking, drawing, forming and bending, heading and upsetting, hot forging and pressing, roll threading and knurling, shearing, squeezing and swaging

Fabrication Properties

- Capacity for Being Cold Worked Excellent
 Capacity for Being Hot Formed Excellent
 Hot Forgeability Rating (Forging Brass = 100) 40
 Hot Working Temperature 1300-1600 F or 700-875 C
 Annealing Temperature 900-1300 F or 475-700 C
 Machinability Rating (Free Cutting Brass = 100) 30

Suitability for being joined by:

- Soldering Good
 Brazing Excellent
 Oxyacetylene Welding Good
 Gas Shielded Arc Welding Excellent
 Coated Metal Arc Welding Fair
 Resistance Welding { Spot Excellent
 Seam Excellent
 Butt Excellent

Forms and Tempers Most Commonly Used

Forms and Tempers Most Commonly Used	Annealed Tempers						Rolled or Drawn Tempers						Hot Finished Tempers										
	Nominal Grain Size mm																						
	.100 (OS100)	.070 (OS070)	.060 (OS060)	.036 (OS036)	.025 (OS025)	.015 (OS015)	Light Anneal (O80)	Light Anneal (O80)	Eight Hard (H00)	Quarter Hard (H01)	Half Hard (H02)	Three Quarter Hard (H03)	Hard (H04)	Extra Hard (H06)	Spring (H08)	Extra Spring (H10)	Drawn - General Purpose (H58)	Hard Drawn (H80)	Light Drawn - Bending (H85)	As Hot Rolled (M20)	As Extruded (M30)	Special Tempers	
FLAT PRODUCTS	Strip, Rolled	•	•	•	•	•			•	•	•	•	•	•	•	•							
	Rolled Strip, Drawn	•	•	•	•	•			•	•	•	•	•	•	•	•							
	Flat Wire, Rolled	•	•	•	•	•																	
	Flat Wire, Drawn	•	•	•	•	•																	
	Bar, Rolled	•	•	•	•	•																	
	Bar, Drawn	•	•	•	•	•																	
	Sheet	•	•	•	•	•																	
	Plate	•	•	•	•	•																	
	ROD	•	•	•	•	•																	
	WIRE	•	•	•	•	•																	
TUBE	•	•	•	•	•				•	•	•	•	•	•	•	•							
PIPE	•	•	•	•	•				•	•	•	•	•	•	•	•							
SHAPES	•	•	•	•	•																		

DRAWN-GENERAL PURPOSE (H58) temper is used for general purpose tube only, usually where there is no real requirement for high strength or hardness on the one hand or for bending qualities on the other.

HARD DRAWN (H80) temper is used only where there is need for a tube as hard or as strong as is commercially feasible for the size in question.

LIGHT DRAWN BENDING (H85) temper is used only where a tube of some stiffness but yet capable of readily being bent (or other wise moderately cold worked) is needed.

Mechanical Properties

Form	Size Section in.	Temper	Tensile Strength ksi	Yield Strength (ksi)		Elongation in 2 in. %	Rockwell Hardness			Shear Strength ksi	Fatigue Strength		
				(.5% Ext. under Load)	(.2% Offset)		F	B	30T		ksi	Million Cycles	
FLAT PRODUCTS	.040 in.	.070 mm	56.0	21.0	...	63	76	40	...	42.0			
		.035 mm	60.0	25.0	...	60	85	62	...	43.0			
		.015 mm	63.0	30.0	...	55	90	66	...	45.0			
		Quarter Hard	68.0	35.0	...	30	75	67	...	47.0			
		Half Hard	78.0	45.0	...	17	87	75	...	50.0			
		Hard	94.0	58.0	...	8	93	78	...	57.0			
		Extra Hard	104.0	60.0	...	6	96	80	...	60.0			
		Spring	110.0	62.0	...	4	97	81	...	63.0			
		ROD	1.0 in.	.050 mm	58.0	22.0	...	60	60	...	43.0		
				Half Hard (20%)	78.0	45.0	...	35	85	...	52.0		
Hard (36%)	92.0			55.0	...	22	90	...	58.0				
Extra Hard (50%)	108.0			60.0	...	13	95	...	62.0				
WIRE	.080 in.	.035 mm	60.0	25.0	...	60	...	...	43.0			
		Eighth Hard	70.0	40.0	...	35	...	...	48.0			
		Quarter Hard	80.0	48.0	...	20	...	...	52.0			
		Half Hard	98.0	57.0	...	8	...	...	58.0			
		Hard	125.0	65.0	...	5	...	...	65.0	29.0	100	
		Spring (80)	145.0	70.0	...	3	...	...	70.0	30.0	100	
TUBE	1.0 in. OD	.050 mm	57.0	...	...	70	45	...				
		X .065 in. Hard Drawn (35%)	93.0	...	...	22	92	78	...			

The values listed above represent reasonable approximations suitable for general engineering use. Due to commercial variations in composition and to manufacturing limitations, they should not be used for specification purposes. See applicable A.S.T.M. specification references.