

COPPER ALLOY Nos. C33000, C33100 and C33200 (LOW AND HIGH LEADED BRASS TUBE)

Composition — percent

	Copper Alloy No. C33000			Copper Alloy No. C33100			Copper Alloy No. C33200		
	Nom.	Min.	Max.	Nom.	Min.	Max.	Nom.	Min.	Max.
Copper	66	65.0	68.0	66	65.0	68.0	66	65.0	68.0
Lead	.5	.20*	.7	.1	.8	1.5	.2	1.5	2.5
Iron	.....	.....	.07	.....	.....	.06	.....	.....	.07
Zinc	33.5	Rem.		33	Rem.		32	Rem.	

*For tube over 5 inches OD, lead may be less than .20 percent.

Nearest Applicable A S T M Specifications

Flat Products
Pipe
Rod
Shapes
Tube
Wire

B135

** Refer to specific ASTM specification for alloys concerned.

Forms and Tempers Most Commonly Used

FLAT PRODUCTS	Annealed Tempers						Rolled or Drawn Tempers						Hot Finished Tempers											
	Nominal Grain Size mm																							
	.100 (C6100)	.070 (C6070)	.060 (C6060)	.036 (C6036)	.025 (C6025)	.015 (C6015)	Soft Anneal (C660)	Light Anneal (C650)	Eight Hard (H80)	Quarter Hard (H40)	Half Hard (H20)	Three Quarter Hard (H30)	Hard (H04)	Extra Hard (H06)	Spring (H08)	Extra Spring (H10)	Drawn - General Purpose (H58)	Hard Drawn (H80)	Light Drawn - Bending (H55)	As Hot Rolled (H20)	As Extruded (H30)	Special Tempers		
Strip, 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 (H55) 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.

Physical Properties

	English Units		C. G. S. Units	
Melting Point (Liquidus)				
Copper Alloy Nos. C33000 and C33100	1720	F	940	C
Copper Alloy No. C33200	1710	F	930	C
Melting Point (Solidus)				
Copper Alloy Nos. C3300 and C33100	1660		940	
Copper Alloy No. C33200	1650		900	
Density				
Copper Alloy Nos. C3300 and C33100	.307		850	
Copper Alloy No. C33200	.308		8.53	
Specific Gravity				
Copper Alloy Nos. C33000 and C33100	8.50		8.50	
Copper Alloy No. C33200	8.53		8.53	
Coefficient of Thermal Exp. 68-572F				
Copper Alloy Nos. C33000 and C33100	.0000112		.0000202	
Copper Alloy No. C33200	.0000113		.0000203	
Thermal Conductivity	67	Btu/sq ft/ft/hr/°F @ 68 F	.28	cal/sq cm/cm/sec/°C @ 20 C
Electrical Resistivity (Annealed)	39.9	Ohms (circ mil/ft) @ 68 F	6.63	Microhm-cm @ 20 C
Electrical Conductivity* (Annealed)	26	% IACS @ 68 F	.151	Megmho-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

GENERAL PURPOSES: Where some degree of machinability is required, together with moderate cold working properties
INDUSTRIAL: Pump and power cylinders and liners
MUNITIONS: Primers
PLUMBING: Plumbing accessories, plumbing brass goods

Common Fabrication Processes

Forming and bending, machining, piercing and punching

Fabrication Properties

Capacity for Being Cold Worked Excellent
 Capacity for Being Hot Formed Poor
 Hot Forgeability Rating (Forging Brass = 100)
 Hot Working Temperature F or C
 Annealing Temperature 800-1200 F or 425-650 C
 Machinability Rating (Free Cutting Brass = 100)60

Suitability for being joined by:

Soldering Excellent
 Brazing Good
 Oxyacetylene Welding Fair
 Gas Shielded Arc Welding Fair
 Coated Metal Arc Welding Not Recommended
 Resistance Welding { Spot Fair
 Seam Not Recommended
 Butt Fair

Mechanical Properties

Form	Size Section	Temper	Tensile Strength	Yield Strength		Elongation in 2 in.	Rockwell Hardness			Shear Strength	Fatigue Strength
				(.5% Ext. under Load)	(.2% Offset)		F	B	30T			ksi	Million Cycles
TUBE	1.0 in. OD X .065 in.	.050 mm	47.0	15.0	.....	60	64	26	.....	.....	.....
		.025 mm	52.0	20.0	.....	50	75	37	.....	.....	.....
		Hard Drawn (35%)	75.0	60.0	.....	7	80	69	.....	.....	.....

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.