

COPPER ALLOY Nos. C36500 (LEADED MUNTZ METAL, UNINHIBITED), C36600 (LEADED MUNTZ METAL, ARSENICAL), C36700 (LEADED MUNTZ METAL, ANTIMONIAL) and C36800 (LEADED MUNTZ METAL, PHOSPHORIZED)

Composition — percent

	Nominal	Minimum	Maximum
Copper	59.5	58.0	61.0
Lead	.5	.25	.7
Iron	.....	.....	.15
Tin	.....	.....	.25
Zinc	40	Remainder	
As, Sb or P*	.....	.02**	.10**

Nearest Applicable A S T M Specifications

Flat Products	B171, B432
Pipe	
Rod	
Shapes	
Tube	
Wire	

*The uninhibited alloy is Copper Alloy No. C36500
 *Arsenic, Antimony and Phosphorus inhibited alloys are identified respectively by Copper Alloy Nos. C36600, C36700 and C36800

Physical Properties

	English Units	C. G. S. Units
Melting Point (Liquidus)	1650 F	900 C
Melting Point (Solidus)	1630 F	885 C
Density	.304 lb /cu in @ 68 F	8.41 gm /cu cm @ 20 C.
Specific Gravity	8.41	8.41
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	per °F from 68 F to 572 F	per °C from 20 C to 300 C
Thermal Conductivity	.0000116 Btu /sq ft /ft /hr /°F @ 68 F	.0000208 cal /sq cm /cm /sec /°C @ 20 C
Thermal Conductivity	71 Btu /sq ft /hr /°F @ 68 F	.29 cal /sq cm /cm /sec /°C @ 20 C
Electrical Resistivity (Annealed)	37.0 Ohms (circ mil /ft) @ 68 F	6.16 Microhm-cm @ 20 C
Electrical Conductivity* (Annealed)	28 % IACS @ 68 F	.162 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

INDUSTRIAL: condenser tube plates

Common Fabrication Processes

Machining

Fabrication Properties

Capacity for Being Cold Worked Fair
 Capacity for Being Hot Formed Excellent
 Hot Forgeability Rating (Forging Brass = 100)
 Hot Working Temperature 1150-1450 F or 625-800 C
 Annealing Temperature 800-1100 F or 425-600 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 Not Recommended
 Seam Not Recommended
 Butt Fair

Forms and Tempers Most Commonly Used

	Nominal Grain Size mm	Annealed Tempers				Rolled or Drawn Tempers						Hot Finished Tempers														
		.100 (O5T00)	.070 (O5070)	.050 (O5050)	.035 (O5035)	.025 (O5025)	.015 (O5015)	Soft Anneal (O60)	Light Anneal (O50)	Eighth 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 (H68)	Hard Drawn (H80)	Light Drawn — Bending (H55)	As Hot Rolled (W20)	As Extruded (M30)	Special Tempers			
FLAT PRODUCTS	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 otherwise moderately cold worked) is needed.

Mechanical Properties

Form	Size Section in.	Temper	Tensile Strength ksi	Yield Strength (1.5% Ext. under Load) ksi	Yield Strength (.2% Offset) ksi	Elongation in 2 in. %	Rockwell Hardness			Shear Strength ksi	Fatigue Strength	
							F	B	30T		ksi	Million Cycles
PLATE	1.0 in.	As Hot Rolled	54.0	20.0	.....	45	80	—	—	40.0	.....	.....

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.