

COPPER ALLOY No. C28000 (MUNTZ METAL, 60%)

Composition — percent

	Nominal	Minimum	Maximum
Copper	60	59.0	63.0
Lead	.....	.....	.30
Iron	.....	.....	.07
Zinc	40	Remainder	

Nearest Applicable A S T M Specifications

Flat Products	
Pipe	
Rod	
Shapes	
Tube	B111, B135, B395
Wire	

Physical Properties

	English Units	C. G. S. Units
Melting Point (Liquidus)	1660 F	905 C
Melting Point (Solidus)	1650 F	900 C
Density	.303 lb /cu in @ 68 F	8.39 gm /cu cm @ 20 C.
Specific Gravity	8.39	8.39
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	.0000116 per ° F from 68 F to 572 F	.0000208 per ° C from 20 C to 300 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	5,660 ksi	3,900 Kg /sq mm

Typical Uses

ARCHITECTURAL:	panels and large sheets, trim
HARDWARE:	large nuts and bolts
INDUSTRIAL:	brazing rod, condenser plates; condenser, evaporator and heat exchanger tubes; hot forgings

Common Fabrication Processes

Blanking, forming and bending, hot forging and pressing, hot heading and upsetting, shearing

Fabrication Properties

Capacity for Being Cold Worked	..... Fair
Capacity for Being Hot Formed	..... Excellent
Hot Forgeability Rating (Forging Brass = 100)	..... 90
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)	..... 40

Suitability for being joined by:		
Soldering	..... Excellent
Brazing	..... Excellent
Oxyacetylene Welding	..... Good
Gas Shielded Arc Welding	..... Fair
Coated Metal Arc Welding	..... Not Recommended
Resistance Welding	{ Spot Good
	{ Seam Not Recommended
	{ Butt Good

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																							
FLAT PRODUCTS	.100 (OS100)	.070 (OS070)	.050 (OS050)	.035 (OS035)	.025 (OS025)	.015 (OS015)	Soft Anneal (O60)	Light Anneal (O50)	Eighth Hard (H00)	Quarter Hard (H01)	Half Hard (H02)	Three Quarter Hard (H03)	Hard (H04)	Extra Hard (H05)	Spring (H08)	Extra Spring (H10)	Drawn — General Purpose (H58)	Hard Drawn (H80)	Light Drawn — Bending (H55)	As Hot Rolled (M20)	As Extruded (M30)	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.

Mechanical Properties

Form	Size Section in.	Temper	Tensile Strength ksi	Yield Strength (5% Ext. under Load) (2% Offset) ksi		Elongation in 2 in. %	Rockwell Hardness			Shear Strength ksi	Fatigue Strength	
				F	B		30T	ksi	Million Cycles			
FLAT PRODUCTS	.040 in.	Soft Anneal	54.0	21.0	.....	45	80	—	46	40.0	.....	.....
		As Hot Rolled	54.0	21.0	.....	45	85	—	49	40.0	.....	.....
		Eighth Hard	60.0	35.0	.....	30	—	55	54	42.0	.....	.....
		Half Hard	70.0	50.0	.....	10	—	75	67	44.0	.....	.....
ROD	1.0 in.	Soft Anneal	54.0	21.0	.....	50	80	—	—	40.0	.....	.....
		Quarter Hard	72.0	50.0	.....	25	—	78	—	45.0	.....	.....
		As Extruded	52.0	20.0	.....	52	78	—	—	39.0	.....	.....
TUBE	1.0 in. OD	Light Anneal	56.0	23.0	.....	50	82	—	47	.....	.....	.....
		X.065 in. Hard Drawn (30%)	74.0	55.0	.....	10	—	80	—	.....	.....	.....

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.