COPPER ALLOY Nos. C36000 and C36200 *(FREE CUTTING BRASS)*

Composition — percent

	Alloy No. C36000			Alloy No. C36200		
	Nominal	Minimum	Maximum	Nominal	Minimum	Maximum
Copper	61.5	60.0	63.0	61.5	60.0	63.0
Lead	3.1	2.5	3.7	4	3.5	4.5
Iron		....	.35		....	.15
Zinc	35.4	Remainder		34.5	Remainder	

Nearest Applicable A S T M Specifications

Flat Products	B16
Pipe	
Rod	B16
Shapes	B16
Tube	
Wire	

Physical Properties

	English Units	C. G. S. Units
Melting Point (Liquidus)	1650 F	900 C
Melting Point (Solidus)	1630 F	885 C
Density	.307 lb /cu in @ 68 F	8.50 gm /cu cm @ 20 C.
Specific Gravity	8.50	8.50
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	.0000114 per ° F from 68 F to 572 F	.0000205 per ° C from 20 C to 300 C
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)	14,000 ksi	9,800 Kg /sq mm
Modulus of Rigidity	5,300 ksi	3,700 Kg /sq mm

* Volume Basis

Typical Uses

HARDWARE: Gears, pinions
INDUSTRIAL: Automatic high speed screw machine parts

Common Fabrication Processes

Machining, roll threading and knurling

Fabrication Properties

Capacity for Being Cold Worked ..... Poor
Capacity for Being Hot Formed ..... Fair
Hot Forgeability Rating (Forging Brass = 100) .....
Hot Working Temperature ..... 1300-1450 F or 700-800 C
Annealing Temperature ..... 800-1100 F or 425-600 C
Machinability Rating (Free Cutting Brass = 100) 100

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

Forms and Tempers Most Commonly Used

		Annealed Tempers: Nominal Grain Size mm .100 (OS100)	.070 (OS070)	.050 (OS050)	.035 (OS035)	.025 (OS025)	.015 (OS015)	Soft Anneal (O60)	Light Anneal (O50)	Rolled or Drawn Tempers: 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 (H58)	Hard Drawn (H80)	Light Drawn – Bending (H55)	Hot Finished Tempers: As Hot Rolled (M20)	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 (.5% Ext. under Load) ksi	Yield Strength (1.2% Offset) ksi	Elongation in 2 in. %	Rockwell Hardness F	B	30T	Shear Strength ksi	Fatigue Strength ksi	Fatigue Strength Million Cycles
FLAT PRODUCTS	.250 in.	Quarter Hard (11%)	56.0	45.0	....	20		– 62 –		33.0	....	....
ROD	1.0 in.	Soft Anneal	49.0	18.0	....	53	68	– –		30.0	....	....
	.250 in.	Half Hard (25%)	68.0	52.0	....	18		– 80 –		38.0	....	....
	1.0 in.	Half Hard (20%)	58.0	45.0	....	25		– 78 –		34.0	....	....
	2.0 in.	Half Hard (15%)	55.0	44.0	....	32		– 75 –		32.0	20.0*	100
											14.0*	100
SHAPES	.500 in.	As Extruded	49.0	18.0	....	50	68	– –		30.0	....	....
		Quarter Hard (11%)	56.0	45.0	....	20		– 62 –		33.0	....	....

* Independent rotating beam tests, diameter of test section: 0.350 in.