

COPPER No. C10300

Composition -- percent

	Nominal	Minimum	Maximum
Copper (incl. Silver)	.....	99.95	.....
+ Phosphorus	.003	.001	.005

Nearest Applicable A S T M Specifications

Flat Products	B133, B152, B187, B272, B432
Pipe	B42, B186, B302
Rod	B133, B187
Shapes	B133, B187
Tube	B68, B75, B88, B111, B280, B306, B359, B360, B372, B395, B447, B640, B641
Wire	
Nipples	B687

Physical Properties

	English Units	C. G. S. Units
Melting Point (Liquidus)	1981 F	1083 C
Melting Point (Solidus)	1981 F	1083 C
Density	.323 lb/cu in @ 68 F	8.94 gm/cu cm @ 20 C.
Specific Gravity	8.94	8.94
Coefficient of Thermal Expansion	.0000094 per °F from 68 F to 212 F	.0000170 per °C from 20 C to 100 C
Coefficient of Thermal Expansion	.0000096 per °F from 68 F to 392 F	.0000173 per °C from 20 C to 200 C
Coefficient of Thermal Expansion	.0000098 per °F from 68 F to 572 F	.0000177 per °C from 20 C to 300 C
Thermal Conductivity	223 Btu/sq ft/ft/°F @ 68 F	.918 cal/sq cm/cm/sec/°C @ 20 C
Electrical Resistivity (Annealed)	10.5 Ohms (circ mil/ft) @ 68 F	1.74 Microhm-cm @ 20 C
Electrical Conductivity* (Annealed)	99 % IACS @ 68 F	.574 Meghmho-cm @ 20 C
Thermal Capacity (Specific Heat)	.092 Btu/lb °F @ 68 F	.092 cal/gm °C @ 20 C
Modulus of Elasticity (Tension)	17,000 ksi	12,000 Kg/sq mm
Modulus of Rigidity	6,400 ksi	4,500 Kg/sq mm

Typical Uses

Bus bars, electrical conductors, tubular bus and applications requiring good conductivity and welding or brazing properties.

Common Fabrication Processes

Blanking, coining, coppersmithing, drawing, etching, forming and bending, heading and upsetting, hot forging and pressing, piercing and punching, roll threading and knurling, shearing, spinning, squeezing and swaging, stamping

Fabrication Properties

Capacity for Being Cold Worked	Excellent
Capacity for Being Hot Formed	Excellent
Hot Forgeability Rating (Forging Brass = 100)	65
Hot Working Temperature	1400-1600 F or 750-875C
Annealing Temperature	700-1200 F or 375-650C
Machinability Rating (Free Cutting Brass = 100)	.20

Suitability for being joined by:

Soldering	Excellent						
Brazing	Excellent						
Oxyacetylene Welding	Fair						
Gas Shielded Arc Welding	Excellent						
Coated Metal Arc Welding	Not Recommended						
Resistance Welding	<table border="1"> <tbody> <tr> <td>Spot</td> <td>Not Recommended</td> </tr> <tr> <td>Seam</td> <td>Not Recommended</td> </tr> <tr> <td>Butt</td> <td>Good</td> </tr> </tbody> </table>	Spot	Not Recommended	Seam	Not Recommended	Butt	Good
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Forms and Tempers Most Commonly Used

	Annealed Tempers					Rolled or Drawn Tempers						Hot Finished Tempers										
	Nominal Grain Size mm																					
	.100 (OS100)	.070 (OS070)	.050 (OS050)	.035 (OS035)	.025 (OS025)	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 (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 otherwise moderately cold worked) is needed.

Mechanical Properties

Form	Size Section in.	Temper	Tensile Strength ksi	Yield Strength		Elongation in 2 in. %	Rockwell Hardness			Shear Strength ksi	Fatigue Strength	
				(.5% Ext. under Load) ksi	(.2% Offset) ksi		F	B	30T		ksi	Million Cycles
FLAT PRODUCTS	.040 in.	.050 mm	32.0	10.0	...	45	40	--	22.0	...	...	...
		.025 mm	34.0	11.0	...	45	45	--	23.0	11.0	100	...
		Eighth Hard	36.0	28.0	...	30	60	10 25	25.0	...	...	...
		Quarter Hard	38.0	30.0	...	25	70	25 36	25.0	...	...	...
		Half Hard	42.0	36.0	...	14	84	40 50	26.0	13.0	100	...
		Hard	50.0	45.0	...	6	90	50 57	28.0	13.0	100	...
	.250 in.	.050 mm	32.0	10.0	...	50	40	--	22.0	...	...	...
		Eighth Hard	36.0	28.0	...	40	60	10 --	25.0	...	...	...
		Hard	50.0	45.0	...	12	90	50 --	28.0	...	...	...
		As Hot Rolled	32.0	10.0	...	50	40	--	22.0	...	...	...
		Hard	45.0	40.0	...	20	85	45 --	26.0	...	...	...
		ROD	.250 in.	Hard (40%)	55.0	50.0	...	20	94	60 --	29.0	...
Hard (35%)	48.0			44.0	...	16	87	47 --	27.0	...	...	...
Hard (16%)	45.0			40.0	...	20	85	45 --	26.0	...	...	...
TUBE	1.0 in. OD X .065	.050 mm	32.0	10.0	...	45	40	--	22.0	...	...	...
		.025 mm	34.0	11.0	...	45	45	--	23.0	...	...	...
		Light Drawn (15%)	40.0	32.0	...	25	77	35 45	26.0	...	...	...
		Hard Drawn (40%)	55.0	50.0	...	8	95	60 63	29.0	...	...	...
PIPE	3/4 SPS	Hard (30%)	50.0	45.0	...	10	90	50 --	28.0	...	...	...
SHAPES	.500 in.	.050 mm	32.0	10.0	...	50	40	--	22.0	...	...	...
		Hard (15%)	40.0	32.0	...	30	--	35 --	26.0	...	...	...

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.