

Typical Uses

HOUSEHOLD: Air conditioners, gas lines, heater lines and units, oil burner tubes, plumbing pipe and tube, refrigerators **INDUSTRIAL:** Air conditioners, brewery tubes, condensers, evaporator and heat exchanger tubes, dairy tubes, distiller tubes, kettles, pulp and paper lines, steam and water lines, tanks

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.

Composition-Percent

	Nominal	Min	Max
Copper Phosphorus	.02	.015	.040

Physical Properties	English Units	CG.S. Units
Melting Point (Liquidus)	1,981°F	1,083°C
Melting Point (Solidus)	°F	°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	.0000095 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	196 Btu./sq. ft./hr./°F @ 68°F	.81 cal/sq. cm/cm/sec/°C @ 20°C
Electrical Resistivity (Annealed)	12.2 Ohms (circ. mil./ft.) @ 68°F	2.03 Microhm-cm @ 20°C
Electrical Conductivity* (Annealed)	85% IACS @ 68°F	.493 Megohm-cm @ 20°C
Thermal Capacity (Specific Heat)	.092 Btu./lb./°F @ 68°F	.092 cal/gm./°C @ 20°C
Modulus of Elasticity (Tension)	17,000,000 psi	12,000 Kg/sq. mm
Modulus of Rigidity	6,400,000 psi	4,500 Kg/sq. mm

*Volume and weight basis

Fabrication Properties

Capacity for being Cold Worked	Excellent
Capacity for being Hot Formed	Excellent
Hot Forgeability Rating (Forging Brass =100)	65
Hot Working Temperature	1,400-1,600°F or 750-875°C
Annealing Temperature	700-1,200°F or 375-650°C
Machinability Rating (Free Cutting Brass =100)	20

Suitability for being joined by:

Soldering	Excellent						
Brazing	Excellent						
Oxyacetylene Welding	Good						
Carbon Arc Welding	Good						
Gas Shielded Arc Welding	Excellent						
Coated Metal Arc Welding	Not Recommended						
Resistance Welding	<table> <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> </table>	Spot	Not Recommended	Seam	Not Recommended	Butt	Good
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Mechanical Properties

Form	Size Section	Temper	Nominal Tensile Strength psi	Nominal Yield Strength (1/2% Extension Under Load) psi	Reduction of Area - %	Elongation in 2" - %	Nominal Rockwell Hardness			Shear Strength psi	Fatigue Strength	
							F	B	30T		psi	Million Cycles
FLAT PRODUCTS	0.040 in.	0.050 mm	32,000	10,000	-	45	40	-	-	22,000	-	-
		0.025 mm	34,000	11,000	-	45	45	-	-	23,000	11,000	100
		Eighth Hard	36,000	28,000	-	30	60	10	25	25,000	-	-
		Quarter Hard	38,000	30,000	-	25	70	25	36	25,000	-	-
		Half Hard	42,000	36,000	-	14	84	40	50	26,000	13,000	100
		Hard	50,000	45,000	-	6	90	50	57	28,000	13,000	100
		Spring	55,000	50,000	-	4	94	60	63	29,000	14,000	100
		Extra Spring	57,000	53,000	-	4	95	62	64	29,000	-	-
	0.250 in.	As Hot Rolled	34,000	10,000	-	45	45	-	-	23,000	-	-
		0.050 mm	32,000	10,000	-	50	40	-	-	22,000	-	-
		Eighth Hard	36,000	28,000	-	40	60	10	-	25,000	-	-
		Quarter Hard	38,000	30,000	-	35	70	25	-	25,000	-	-
	1.0 in.	Hard	50,000	45,000	-	12	90	50	-	28,000	-	-
		As Hot Rolled	32,000	10,000	-	50	40	-	-	22,000	-	-
	Hard	45,000	40,000	-	20	85	45	-	-	26,000	-	-

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.

owned by: