

**Typical Uses**

**ELECTRICAL:** Bus bars and bus conductors, and other electrical conductors, wave guides, copper to glass seals in electronic appliances

**Composition—Percent**

	Nominal	Minimum	Maximum
Copper	—	99.95	—
Residual Deoxidants	—	None	None

**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

**Physical Properties**

	English Units	C.G.S. Units
Melting Point (Liquidus)	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	226 Btu./sq. ft./ft./hr./°F. @ 68°F.	.934 cal./sq. cm./cm./sec./°C. @ 20°C.
Electrical Resistivity (Annealed)	10.3 Ohms (circ. mil./ft.) @ 68°F.	1.71 Microhm-cm. @ 20°C.
Electrical Conductivity* (Annealed)	101% IACS @ 68°F.	.586 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 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 ..... 1400-1600°F. or 750-875°C.  
 Annealing Temperature ..... 600-1200°F. or 315-650°C.  
 Machinability Rating (Free Cutting Brass = 100) ..... 20

Suitability for being joined by:

Soldering ..... Excellent  
 Brazing ..... Excellent  
 Oxyacetylene Welding ..... Fair  
 Carbon Arc Welding ..... Fair  
 Gas Shielded Arc Welding ..... Good  
 Coated Metal Arc Welding ..... Not Recommended  
 Resistance Welding { Spot ..... Not Recommended  
 { Seam ..... Not Recommended  
 { Butt ..... Good

**Mechanical Properties**

Form	Size Section	Temper	Tensile Strength psi	Yield Strength (½% Extension Under Load) psi	Reduction of Area %	Elongation in 2" %	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	—	—
		As Hot Rolled	34,000	10,000	—	45	45	—	—	23,000	—	—
	0.250 in.	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	—	—
		Hard	50,000	45,000	—	12	90	50	—	28,000	—	—
		As Hot Rolled	32,000	10,000	—	50	40	—	—	22,000	—	—
	1.0 in.	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.