AMS 4596-C72900 (Hardiall®)

✓ STANDARD-STOCKED PRODUCT

Extruded and Drawn

lebronze alloys

Product Description:	Copper Nickel-Tin Bronze
Tempers:	TX 00 Solution Annealed and Spinodal Hardened
Solids:	0.75" to 4.25" (19.05 mm to 107.95 mm) O.D.*
	*Consult mill for other shapes/sizes

Typical Uses

Aerospace	brakes, compression fit airframe fasteners, control surface and actuator bushings and bearings, door hardware, electronic system connectors, helicopter controls, hydraulic actuators, landing gear bushings and bearings, steering joints, valves, wheel bearings, wing flap bearings
Electrical	connectors, contacts, controls, miniaturized sockets, relay elements, switches
Industrial	springs, wire
Marine	marine components
Oil and Gas	bearings, bushings, drilling components, sucker rod, valve guide bushing couplings

Chemical Composition

Ni + Co%	Sn%	Fe%	Zn%	Mn%	Cb%	Mg%	Pb%	Cu%
14.50-15.50	7.50-8.50	0.50	0.50	0.30	0.10	0.15	0.02	Rem.

Chemical Composition according to AMS 4596

Note: Copper + Sum of Named Elements, 99.5% min. Single values represent maximums.

Machinability

AMS	Machinability Rating	Density (lb/in^3)	Density (g/cm^3)
AMS 4596-C72900		0.323	8.94

CONCAST METAL PRODUCTS CO.

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Mechanical Properties

Mechanical properties according to AMS 4596
TX 00 Solution Annealed and Spinodal Hardened

SIZE RANGE: UP TO 4.249" (108 MM) INCLUSIVE (NOMINAL THICKNESS BETWEEN PARALLEL SIDES) BARS, RODS

Ultimate Tensile Strength, min		Yield Strength, at 0.2% Offset, min		Elongation, in 4D, min	Rockwell "C" Hardness	Remarks
ksi	MPa	ksi	MPa	%	min HRC	
132	910	107	738	9.5	30	

SIZE RANGE: 4.250" TO 8.500" (108 TO 216 MM) INCLUSIVE (NOMINAL THICKNESS BETWEEN PARALLEL SIDES) BARS, RODS

Ultimate Tensile Strength, min		Yield Strength, at 0.2% Offset, min		Elongation, in 4D, min	Rockwell "C" Hardness	Remarks
ksi	MPa	ksi	MPa	%	min HRC	
127	876	108	745	3	30	

Physical Properties

	US Customary	Metric
Melting Point – Liquidus	2039 ˚F	1115 ˚C
Melting Point – Solidus	1742 ˚F	950 ˚C
Density	0.323 lb/in^3 at 68 ˚F	8.94 gm/cm^3 at 20 ˚C
Specific Gravity	8.94	8.94
Electrical Conductivity	7.8% IACS at 68 ˚F	0.045 MegaSiemens/cm at 20 ˚C
Thermal Conductivity	17 Btu/sq ft/ft hr/˚F at 68 ˚F	29.4 W/m at 20 ˚C
Coefficient of Thermal Expansion 68-572	9.1 · 10^{-6} per ˚F (68-572 ˚F)	15.8 · 10^{-6} per ˚C (20-300 ˚C)
Specific Heat Capacity	0.09 Btu/lb/˚F at 68 ˚F	377.1 J/kg at 293 ˚C
Modulas of Elasticity in Tension	18500 ksi	127554 MPa
Modulus of Rigidity	7500 ksi	51711 MPa

Physical Properties provided by CDA

Fabrication Properties

Technique	Suitability
Soldering	Excellent
Brazing	Excellent
Oxyacetylene Welding	Good
Gas Shielded Arc Welding	Excellent
Coated Metal Arc Welding	Excellent
Spot Weld	Excellent
Seam Weld	Excellent
Butt Weld	Excellent
Capacity for Being Cold Worked	Excellent
Capacity for Being Hot Formed	Good

Fabrication Properties provided by CDA

Thermal Properties

Treatment	Minimum*	Maximum*
Annealing	1515	
Hot Treatment	1200	1600

Thermal Properties provided by CDA

*Temperature is measured in Fahrenheit.