

C 172 Copper Beryllium

Per AMS 4535 (Tubing); Per AMS 4650 (Rod & Bar)

Alloy Family: Copper Beryllium

172
Color
Code

C 172 Copper Beryllium is the most specified copper beryllium and is available at Morgan Bronze in both Solution and Precipitation Heat Treated tubing as well as Solution Heat Treated Rod and Bar. In its age hardened condition C 172 attains the highest strength and hardness of any commercial copper based alloy. The ultimate tensile strength can exceed 200 ksi and the hardness approaches Rockwell C45. This alloy is used in bearings and pivoting members for aircraft landing gear, bushings and washers for tri-cone drilling bits, pressure housings for magnetometers and other instruments, as well as resistance welding applications.

Equivalent Specifications		
AMS 4535 - Tubing	AMS 4650 - Rod & Bar	
Reference Specifications		
ASTM B 643	ASTM B 196	AMS 4533

Equivalent specifications are verified and updated annually.
Specifications shown are current as of May 4, 2010.

Chemical Composition (%)					
Cu*	Ni + Co	Ni + Co + Fe	Be	Al	Si
Remainder	0.20 min.	0.6 max.	1.80 – 2.00	0.20 max.	0.20 max.
Sum of all named elements = 99.5%					
Mechanical Properties					
Tubing - Solution & Precipitation Heat Treated TF00 (formerly AT)		English	Metric		
Tensile Strength, min.		161 ksi	1110 MPa		
Yield Strength, min.		130 ksi	896 MPa		
Elongation in 4D, min		3%	3%		
Rod & Bar - Solution Heat Treated TB00 (formerly A)		English	Metric		
Tensile, maximum		85 ksi	586 MPa		
Elongation		35%	35%		
Rod & Bar - Solution & Precipitation Heat Treated		English	Metric		
Tensile Strength, min.		165 ksi	1138 MPa		
Yield Strength, min.		140 ksi	965 MPa		
Elongation		3%	3%		

Chemical and Mechanical Properties listed above are compliant with specification AMS 4535 for tubing and AMS 4650 for Rod & Bar

Available from stock at Morgan Bronze in:

Tubes

Solution & Precipitation Heat Tested

Per AMS 4535



Rod & Bar

Solution Heat Treated

Per AMS 4650



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 Alloy Family: Copper Beryllium
 (continued)

Machinability Rating 20 (Free Cutting Brass = 100)

Physical Properties		
	English	Metric
Melting Point – Liquidus	1800° F	982° C
Melting Point – Solidus	1590° F	866° C
Density	0.290 lb/in ³ at 68° F	8.25 gm/cm ³ @ 20° C
Specific Gravity	8.260	8.26
Electrical Resistivity (Annealed)	46.2 ohms-cmil/ft @ 68° F	7.68 microhm-cm @ 20° C
Electrical Conductivity*	22 %IACS @ 68° F	0.12 MegaSiemens/cm @ 20° C
Thermal Conductivity	62 Btu · ft/(hr · ft ² · °F) @ 68° F	107.3 W/m · °K @ 20° C
Coefficient of Thermal Expansion	9.90 · 10 ⁻⁶ per °F (68-572° F)	17.8 · 10 ⁻⁶ per °C (20-300° C)
Specific Heat Capacity	0.10 Btu/lb/°F @ 68°F	419.0 J/kg · °K @ 293° K
Modulus of Elasticity in Tension	18,500 ksi	128,000 MPa

*In the precipitation hardened condition
 Physical Properties provided by CDA

Fabrication Practices			
Soldering	Good	Capacity for Being Cold Worked	Good
Brazing	Good	Capacity for Being Hot Formed	Excellent
Oxyacetylene Welding	Not Recommended	Hot Forgeability Rating (Forging Brass = 100)	40
Gas Shielded Arc Welding	Good		
Coated Metal Arc Welding	Good	Hot Working Temperature	1200-1500° F or 649-816° C
Resistance Welding – Spot	Good	Annealing Temperature	1425-1475° F or 775-802° C
Resistance Welding – Seam	Fair		
Resistance Welding – Butt	Fair		

Fabrication Practices provided by CDA

DISCLAIMER:
 The Physical, Fabrication and Thermal Properties shown here represent reasonable approximations suitable for general engineering use. Due to commercial variations in compositions and to manufacturing limitations, they should not be used for specification purposes. See applicable ASTM International specification references.

