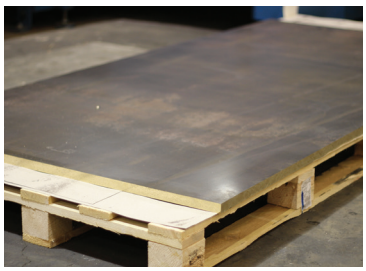
C63000 (AMS 4640) NICKEL ALUMINUM BRONZE

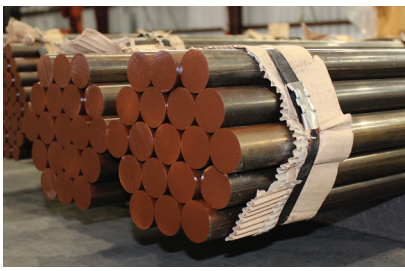
OFFERED IN SOLID BARS AND PLATES











C63000 (AMS 4640) Nickel Aluminum Bronze contains 5% nickel and is heat treatable. Available in both rod and forged form, it is intended for applications that require combinations of corrosion resistance, excellent bearing properties at considerable loads, and extremely high strength both at room and elevated temperatures.

TYPICAL USES

Aerospace
Landing Gear Bushings & Bearings, Flap Bushings, Actuator Parts, Strut Bushings, Hydraulic Valve Bushings

Oil & Gas
Valve Stems, Pump Shafts, Seal Glands, BOP Parts

Automotive
Valve Guides, Valve Seats, Timing Gears

Marine
Pump Parts, Bolts, Ship Propellers, Propeller Nuts, Shafts

Other Industrial
Balls, Gears, Cams, Shafting, Condenser Tube for Power Stations and Desalting Units, Pump Shafts, Structural Members, Tanks, Heat Exchanger Headers, Heat Exchanger Flanges, Bearings, Bushings, Valve Balls, Hydraulic Bushings for Earth Moving Equipment, Corrosion Resistant Articles, Welded Piping Systems, Plunger Tips

SIZES AVAILABLE

Solid Bar	3/8" – 15" diameter
Hex and Square Bars	made to order
Plates	cut to size, up to 4" thick

*Additional sizes and tubes available upon request.

NEAREST INTERNATIONAL STANDARDS

NF A 51-116	CuAl10Ni5Fe4	QQ-C-450
ASTM B150	C63000	ASTM B-124-14a
DIN 17665	CuAl10Ni5Fe4	
NF L 14-705	CuAl10Ni5Fe4	
EN 12163	CW307G	
AMS 4640 H 2011	C63000	

AVIVA METALS®

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C63000 (AMS 4640) NICKEL ALUMINUM BRONZE

Corrosion Resistance, Chemical Composition, Mechanical Properties, Physical Properties

CORROSION RESISTANCE

C63000 has good resistance to sulphuric, hydrochloric and other non-oxidizing acids, as well as salt water and brackish waters. Its superior erosion and cavitation properties facilitate use in pump and propeller applications. Retention of properties together with good oxidation resistance at elevated temperatures make C63000 suitable for service in internal combustion engines, steam plant applications and chemical processing applications. Very little deterioration takes place below 600° F and oxidation is retarded up to 1200° F by an oxide film. C63000 is very resistant to stress corrosion cracking in numerous applications. Galling is a common problem designers have to overcome when choosing materials. Affinity between two mating metallic surfaces can easily introduce galling when exposed to large bearing pressures and extreme temperatures. C63000 has great galling resistance, making it the material of choice for such applications.

Workability: Not suitable to be cold worked. C63000 can be easily hot worked in the temperature range of 1450°-1700° F.

MECHANICAL PROPERTIES

FORM	SECTION SIZE (INCHES, MM)		TENSILE MIN		YIELD MIN		ELONGATION IN HD MIN
	Inches	MM	KSI	MPa	KSI	MPa	
Rod	up to 1.0	25	110	760	68	470	10
	over 1.0 to 2.0	25 to 50 incl	110	760	60	415	10
	over 2.0 to 3.0	50 to 80 incl	105	725	55	380	10
	3.0 to 5.0	80 to 125 incl	100	690	50	345	10
	5.0 plus	125 plus	90	620	40	275	15
Forging	-		90	620	42.5	295	10

CHEMICAL COMPOSITION

	Cu	Sn	Zn	Fe	Ni	Al	Mn	Si
Min (%)				2.0	4.0	9.0		
Max (%)	Rem	0.20	0.30	4.0	5.5	11.0	1.5	0.25

DIFFERENT GENERAL CAPABILITIES

Hot Working	75	Very Good
Cold Working	20	Satisfactory
Free Cutting	40	Moderate
Corrosion Resistance	Excellent	

PHYSICAL PROPERTIES

	USA	Metric
Melting Point - Liquidus	**1930** °F	**1054** °C
Melting Point - Solidus	**1895** °F	**1035** °C
Density	**0.274** lb/cu in @ 68 °F	**7.58** gm/cu cm @ 20 °C
Specific Gravity	**7.58**	**7.58**
Electrical Resistivity	**116** ohms-cmil/ft @ 68 °F	**19.28** microhm-cm @ 20 °C
Electrical Conductivity	**7** % IACS @ 68 °F	**0.041** MegaSiemens/cm @ 20 °C
Thermal Conductivity	**22.6** Btu/sq ft/ ft hr/°F at 68°F	**39.1** W/m. °K @ 20 °C
Coefficient of Thermal Expansion	**9** 10^{-6} per °F (68-212 °F)	**16.2** 10^{-6} per °C (20-300 °C)
Specific Heat Capacity	**0.09** Btu/lb/ °F @ 68 °F	**377.1** J/kg. °K @ 20°C
Modulus of Elasticity in Tension	**17500** ksi	**121000** MPa
Modulus of Rigidity	**6400** ksi	**44130** MPa
Melting Range	**1940-1965** °F	**1060-1075** °C
Stress Relief Temperature	**570-750** °F	**300-400** °C
Hot Stamping Temperature	**1560-1785** °F	**850-975** °C
Annealing Temperature	**1200-1560** °F	**650-850** °C
Machinability Rating	**30** %	**30** %

WELDING AND BRAZING CAPABILITIES

Welding	
Oxy-acetylene	Not Recommended
Gas-shielded arc	Good
Coated metal-arc	Good
Carbon arc	Satisfactory
Resistance	Good

Brazing	
Soft	Not Recommended
Strong	Satisfactory

AVIVA Color Code

DARK BROWN

Aviva Metals now produce and hold substantial inventories of AMS 4880 Nickel Aluminum Bronze. AMS 4880 is made in tube form and typically meets the full mechanicals of AMS 4640/C63000.
There are substantial cost savings available by utilizing AMS 4880.

The values listed on this document 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.

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