



AS/EN/JISQ 9100:2009



## EC63000/EC63200 (UNS C63000 & C63200) NICKEL-ALUMINUM-BRONZE

Electralloy's EC63000 and EC63200 are heat treatable aluminum bronze alloys containing ~5% nickel combining wear resistance with high strength and good corrosion resistance at both room and elevated temperatures.

### CHEMICAL COMPOSITION (Nominal Analysis, weight percent)

Copper ( <i>nominal</i> ) .....	80 / 82	Manganese ( <i>max</i> ) .....	1.2 / 1.5
Aluminum .....	9.0 / 9.5	Silicon ( <i>max</i> ) .....	0.10
Nickel .....	4.0 / 4.8	Tin ( <i>max</i> ) .....	0.20
Iron .....	3.5 / 4.0	Zinc ( <i>max</i> ) .....	0.30
Lead ( <i>max</i> ) .....	0.02		

### TYPICAL APPLICATIONS

Electralloy's nickel-aluminum bronzes, **EC63000 & EC63200**, are used as bar, rod, and forgings in shafts, nuts, bolts, pump parts, propellers, and miscellaneous applications requiring corrosion resistance and spark resistance in industrial, marine, and submarine environments. This material excels in saltwater marine drive component applications. The alloys resist stress corrosion cracking and are recommended for applications where high compressive loads are experienced with little lubrication.

**EC63000 and/or EC63200** can be supplied to meet requirements of the following specifications, and more . . .

**ASTM B150**

**MIL-B-24059**

**QQ-C-00465**

**EC63000 and EC63200** are available in a wide variety of sizes and forms, including ingot, billet, bar, and rod.

The information and data contained in this Product Data sheet are intended for general information and do not constitute any warranty, expressed or implied, of suitability for any applications or design.

## PHYSICAL PROPERTIES

<b>Melting Range:</b>	1895°F to 1930°F (1035°C to 1055°C)		
<b>Density:</b>	0.275 lb./in <sup>3</sup> (7.61 gm/cm <sup>3</sup> )		
<b>Magnetic Permeability:</b>	1.05		
<b>Specific Heat:</b>	(68°F) 0.09 Btu/lb./°F (20°C) 0.09 cal/g/°C		
<b>Coefficient of Thermal Expansion</b>			
Temperature (°F)	Temperature (°C)	u/in./°F	u/m/°C
68 to 572	20 to 300	9.0	16.2
<b>Thermal Conductivity</b>			
Temperature			
°F	°C	Btu/ft <sup>2</sup> /ft./hr./°F	cal/cm <sup>2</sup> /cm/sec/°C
68	20	22	0.09
<b>Electrical Conductivity: (%IACS)</b>			~8.0
<b>Modulus of Elasticity: (tension)</b>			17 x 10 <sup>6</sup> psi

## HEAT TREATMENT

Typical annealing practice for these alloys is to heat to 1550-1650°F (845-900°C) then water quench. Alloy is then typically tempered at 1300°F (705°C) for three to nine hours and air cooled.

## WORKABILITY

Electralloy's nickel-aluminum bronze alloys exhibit suitable hot workability. They are not suitable for cold working. Recommended hot working temperature range for this material is 1300-1650°F (705-900°C).

## CORROSION RESISTANCE

Aluminum bronzes exhibit good general corrosion in all waters, whether fresh, brackish, or seawater. Electralloy's nickel-aluminum bronzes demonstrate superior resistance to cavitation-erosion in high velocity seawater. The alloys also exhibit good resistance to non-oxidizing acids. Oxidation resistance is good at elevated temperatures. It is not suitable for oxidizing acid applications.

## TYPICAL MECHANICAL PROPERTIES

<b>Tensile Data: (bar and rod)</b>					
Room Temp. Condition	UTS		0.5 % YS		EI
	ksi	MPa	ksi	MPa	%
Anneal & temper	100	690	50	345	25
<b>Typical Hardness: (anneal &amp; temper)</b>					189 BHN

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## WELDING

Alloy is satisfactorily welded using gas shielded arc, metallic arc, or resistance methods. Preheating is recommended. Brazing may be accomplished with special fluxes. Soldering and oxyacetylene welding are not recommended.

## MACHINING

Machinability rating of nickel-aluminum bronze is approximately 30-50% of free-cutting brass. Tool steel or carbide may be used. Turnings may be stringy and long. Good lubrication and cooling are essential.

## MECHANICAL PROPERTIES

EC63000 and EC63200 are both high strength, ductile, nickel-aluminum bronze. They combine high strength with hardness and good abrasion and wear resistance.

