



AS9100:2016/EN 9100:2016/JISQ 9100:2016



EC71500 (UNS C71500) 70/30 COPPER – NICKEL ALLOY

Electralloy's **EC71500** is a 70 percent copper, 30 percent nickel wrought alloy that demonstrates moderate strength and good resistance to all forms of corrosive attack in fresh water and seawater, including general attack, pitting, stress corrosion, and surface fouling from marine organisms.

CHEMICAL COMPOSITION (Nominal Analysis, weight percent)

Copper (<i>min</i>)	65.0	Phosphorus (<i>max</i>)	0.02
Nickel	29.0 / 33.0	Sulfur (<i>max</i>)	0.02
Zinc (<i>max</i>)	0.50	Carbon (<i>max</i>)	0.05
Iron	0.40 / .070	Copper, plus sum of named elements	99.50
Lead (<i>max</i>)	0.02		
Manganese	1.0		

TYPICAL APPLICATIONS

Electralloy's **EC71500** is used in a wide variety of applications related to exposure to seawater and other chloride solutions. The iron and manganese additions improve corrosion resistance, particularly to impingement attack in high velocity seawater and erosion by sand or silt. This alloy is stronger, and retains strength at high temperature, better than EC70600 due to its higher nickel content. It is the alloy of choice for condensers and saltwater piping for both surface vessels and submarines of the United States Navy. It is used in high temperature and high pressure steam power plants and suitable for use at temperatures up to 700°F. The alloy finds more applications in petro-chemical plants where process liquids or vapors are very corrosive or temperatures and/or pressures are too high for other copper alloys.

EC71500 can be supplied to meet requirements of the following specifications, and more...

ASTM B151, ASTM B122
MIL-C-15726, MIL-C-24679

EC71500 is available in a wide variety of sizes and forms, including ingot, billet, bar, and rod.

PHYSICAL PROPERTIES

Melting Range:		2140°F to 2260°F (1170°C to 1240°C)	
Density:		.323 lb./in ³ (8.94 gm/cm ³)	
Specific Heat:		(68°F) 0.09 Btu/lb/°F (20°C) 0.09 cal/g/°C	
Coefficient of Thermal Expansion			
Temperature (°F)	Temperature (°C)	u/in./°F	u/m/°C
68 to 572	20 to 300	9.0	16.2
Thermal Conductivity			
Temperature (°F)	Temperature (°C)	Btu/ft ² /ft/hr/°F	cal/cm ² /cm/ sec/°C
68	20	17	0.07
Electrical Resistivity:		68°F 225 ohms(mil/ft) (annealed)	
Electrical Conductivity: (%IACS)		4.6 (annealed)	
Modulus of Elasticity: (tension)		22.0 x 10 ⁶ psi	

TYPICAL MECHANICAL PROPERTIES

Tensile Data: (bar and rod)					
Room Temp. Condition	UTS		0.5 % YS		EI
	ksi	MPa	ksi	MPa	%
Soft	55	380	20	140	45
Typical Hardness: (soft)					HRB 37

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HEAT TREATMENT

Typical annealing temperature for EC71500 is 1200 - 1500°F (650-815°C). This alloy cannot be hardened by any heat treatment. High sulfur fuels are to be avoided since the alloy is susceptible to sulfur embrittlement.

WORKABILITY

EC71500 exhibits good formability by both hot and cold working. It does not work harden rapidly, permitting severe drawing and bending operations. Recommended hot working temperature range for this alloy is 1500-1900°F (925-1040°C).

CORROSION RESISTANCE

EC71500 exhibits excellent general corrosion resistance to seawater and other chloride solutions. The copper-nickel alloys are more resistant to impingement attack caused by high velocities than other copper alloys, and EC71500 is particularly useful in these conditions. It is also the most resistant of the copper base alloys to stress corrosion. In addition, the alloy demonstrates resistance to fouling by marine organisms.

WELDING

Alloy is very suitable for joining by brazing and soldering. Fair to good weldability by oxyacetylene method can be achieved. Excellent weldability can be obtained using gas shielded arc, metallic arc, and resistance welding. Carbon arc welding is not recommended.

MACHINING

Machinability rating of EC71500 is approximately 20% of free-cutting brass.

MECHANICAL PROPERTIES

The copper-nickel wrought alloys exhibit only moderate strength in the annealed (soft) condition. When extra strength is needed the alloys may be used in the cold worked condition. These alloys retain their strength at elevated temperatures better than most other copper alloys. EC71500 retains high ductility and toughness at low temperature and is suitable for some cryogenic applications.

