



Cupronickel or copper-nickel is an alloy of copper that contains nickel and strengthening elements, such as iron and manganese. cupronickel is highly resistant to corrosion in seawater, because its electrode potential is adjusted to be neutral with regard to seawater. Because of this, it is used for piping, heat exchangers and condensers in seawater systems, as well as marine hardware, and sometimes for the propellers, crankshafts and hulls of premium tugboats, fishing boats and other working boats.

Condenser tubes of this alloy are giving long and dependable service at sea. It is also highly satisfactory for tubes in evaporators, inter-after condensers, air ejectors of steam condensers and in boiler feedwater heaters. This alloy is particularly desirable where high temperatures are encountered. It has the property of forming protective films of corrosion products, making it particularly desirable for service where water velocities are high.

## CHEMICAL COMPOSITION

|           | Cu <sup>(1)</sup> | Fe      | Pb  | Mn  | Ni <sup>(2)</sup> | Zn  |
|-----------|-------------------|---------|-----|-----|-------------------|-----|
| MIN / MAX | Rem               | 1.0-1.8 | .05 | .07 | 9.0-11.0          | 1.0 |
| NOMINAL   | 88.6              | 1.4     | -   | -   | 10.0              | -   |

<sup>(1)</sup> Cu value includes Ag. <sup>(2)</sup> Ni value includes Co./ NOTE: Cu+(sum of named elements)=99.5% min.

[Request Quote](#)

## APPLICABLE SPECIFICATIONS

| Plate<br>Condenser Tube                   | Pipe<br>Seamless        | Tube<br>Condenser   | Tube<br>Finned                                  | Tube<br>U-Bend          | Tube,<br>Seamless                                     |
|---|-------------------------|---|---|-------------------------|---|
| ASME SB171<br>ASTM B171<br>SAE J463, J461 | ASME SB466<br>ASTM B466 | ASME SB111<br>ASTM B552, B111<br>MILITARY MIL-T-15005<br>SAE J463, J461 | ASME SB359<br>ASTM B359<br>MILITARY MIL-T-22214 | ASME SB395<br>ASTM B395 | ASME SB466<br>ASTM B466, B469<br>MILITARY MIL-T-16420 |

## FABRICATION PROPERTIES

| Soldering | Brazing   | Oxyacetylene<br>Welding | Gas Shielded<br>Arc Welding | Coated Metal<br>Arc Welding | Spot Weld | Seam Weld | Butt Weld | Capacity for<br>being Cold<br>Worked | Capacity for<br>being Hot-<br>Formed | Machinability<br>Rating |
|-----------|-----------|-------------------------|-----------------------------|-----------------------------|-----------|-----------|-----------|--------------------------------------|--------------------------------------|-------------------------|
| Excellent | Excellent | Fair                    | Excellent                   | Good                        | Good      | Good      | Excellent | Good                                 | Good                                 | 20                      |

## PHYSICAL PROPERTIES

| Melting<br>Point -<br>Liquidus | Melting<br>Point -<br>Solidus | Density                             | Specific<br>Gravity | Electrical<br>Resistivity   | Electrical<br>Conductivity     | Thermal<br>Conductivity                           | Coefficient of<br>Thermal<br>Expansion     | Specific Heat<br>Capacity   | Modulus of<br>Elasticity in<br>Tension | Modulus of<br>Rigidity |
|--------------------------------|-------------------------------|-------------------------------------|---------------------|-----------------------------|--------------------------------|---|--|-----------------------------|--|------------------------|
| 2100 F                         | 2010 F                        | 0.323 lb/in <sup>3</sup><br>at 68 F | 8.94                | 115.0 ohms-cmil/ft<br>@ 68F | 9 %IACS @ 68 F                 | 26.0 Btu - ft/(hr ·<br>ft <sup>2</sup> ·°F)at 68F | 9.5 ·10 <sup>-6</sup> per °F<br>(68-572 F) | 0.09 Btu/lb·°F<br>at 68 F   | 18000 ksi                              | 6800 ksi               |
| 1149 C                         | 1099 C                        | 8.94 gm/cm <sup>3</sup><br>@ 20 C   | 8.94                | 19.12 microhm-cm<br>@ 20C   | 0.053 MegaSiemens/cm<br>@ 20 C | 45.0 W/m · °K<br>@ 20 C                           | 17.1 ·10 <sup>-6</sup> per °C<br>(20-300C) | 377.1 J/kg · °K at<br>293 K | 124000 MPa                             | 46880 MPa              |

### MAXIMUM WORKING PRESSURE

P = Maximum working pressure (psi)  
S = Minimum tensile strength of material for a  
specific temper (It is the value of the tensile strength  
in psi in Mechanical properties table)  
D = Exterior diameter of tube  
T = Wall thickness of tube  
$$P = \frac{2TS}{SD}$$

### NON DESTRUCTIVE TESTS

Eddy Current Testing  
Hydrostatic Testing  
Air Underwater Testing  
Ultrasonic Testing  
(PMI) Positive Material Identification

### DESTRUCTIVE TESTS

Microstructure Test  
Tensile Test  
Flattening Test  
Expansion Test  
Optical Spectrometry Test