

70/30 cupronickel

CN107 / C71500 / CW354H / DEF STAN 02-780

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70/30 is a copper nickel alloy noted for its excellent resistance to corrosion, erosion and pitting combined with a good strength, workability and weldability. It has enjoyed a long and successful history in the marine sector that has since extended to industries including offshore oil and gas, power generation, desalination and cooling plants.

The most popular specifications covering this alloy are the CN107 and C71500 designations, although the Naval Engineering specifications DEF STAN 02-780 or NES 780 offer tighter controls on impurities and mechanical properties together with a mandatory impact value.

70/30 is best renowned for its excellent corrosion and erosion resistance, especially in marine environments. Its corrosion resistance is improved in higher velocity waters (up to 4.5m/s) and polluted seawater. It is also highly resistant to stress corrosion cracking and corrosion fatigue and has a high retention of mechanical properties from sub-zero temperatures to ~300°C.

In the annealed condition, 70/30 offers moderate strength levels which enable it to be used in more demanding applications. In addition, it displays inherent resistance to biofouling. A protective oxide film forms naturally over the material during the initial period of use, creating an inhospitable surface that deters marine growth.

70/30 responds well to most fabrication processes and is readily hot and cold worked. It is also easily joined by soldering, brazing and a variety of welding methods. With good hot and cold formability and a malleability approaching that of copper, 70/30 does not harden rapidly, lending the material to drawing and spinning.

The alloy is mainly used for seawater service as forged and machined valve and pump components, fittings, flanges and hardware thanks to its inherent corrosion resistance. It is also used in submarine and sea water pipework, offshore fire water systems, heat exchangers, condensers, sheathing of legs and risers on offshore platforms and boat hulls, hydraulic lines, desalination units and areas where high corrosion resistance is required and concern over chloride stress-corrosion cracking prevents the use of stainless steels.



Fabrication properties of 70/30 cupronickel

Hot & cold workability	Good
Machinability rating (free-cutting brass=100)	20
Hot working temperature	925 - 1025°C
Annealing temperature	650 - 850°C
Soldering & brazing	Good
Oxyacetylene welding	Good
Gas shielded arc welding	Excellent

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Technical Data

Nominal Composition (%)

Cu	Ni	Mn
Rem	30	1

Mechanical Properties (specification minima)

	12 - 25mm dia
Ultimate Tensile Strength (N/mm ²)	330
0.2% Proof Strength (N/mm ²)	125
Elongation (%)	30

Typical Physical Properties

Density (g/cm ³)	8.95
Specific Heat (J/kg°C)	377
Thermal Conductivity (W/m°C)	29
Coeff. Thermal Exp. (per °C)	0.000016
Modulus of Elasticity (N/mm ²)	152,000
Modulus of Rigidity (N/mm ²)	56,000
Electrical Conductivity (% IACS)	5
Electrical Resistivity (microhm m)	0.34

Round Bar Weight and Stock Sizes

Diameter		Weight		Diameter		Weight		Diameter		Weight	
ins	kg/ft	kg/m	ins	kg/ft	kg/m	ins	kg/ft	kg/m	ins	kg/ft	kg/m
0.250	0.08	0.27	1.500	3.02	9.92	3.500	16.46	54.01			
0.375	0.19	0.62	1.625	3.55	11.64	3.750	18.90	62.00			
0.500	0.34	1.10	1.750	4.12	13.50	4.000	21.50	70.54			
0.625	0.53	1.72	2.000	5.38	17.64	4.250	24.27	79.64			
0.750	0.76	2.48	2.250	6.80	22.32	4.500	27.21	89.28			
0.875	1.03	3.38	2.375	7.58	24.87	5.000	33.60	110.22			
1.000	1.34	4.41	2.500	8.40	27.56	5.500	40.65	133.37			
1.125	1.70	5.58	2.750	10.16	33.34	6.000	48.38	158.72			
1.250	2.10	6.89	3.000	12.10	39.68	7.000	65.78	215.83			
1.375	2.54	8.34	3.250	14.19	46.57	8.000	86.01	282.17			

NB Weight data for guidance only