

Trojan

Related specifications: C70250 / CW112C

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Trojan is the ultimate high strength precipitation hardening copper nickel silicon alloy. Based on the same alloying system as its sister alloy Colsibro®, Trojan has been specially developed as a higher strength material with a similar blend of physical properties. The exceptional mechanical strength of Trojan, combined with its high thermal and electrical conductivity, excellent wear resistance and a good corrosion resistance has opened up markets in safety critical engineering fields where beryllium copper was once the only option. The additional strength has also widened the application areas served by traditional copper nickel silicon alloys.



Trojan is a high copper alloy with small additions of nickel and silicon that combine to increase the strength, hardness and wear resistance of the material, while retaining many of the physical benefits of copper itself. As with other copper nickel silicon alloys, Trojan derives its superb strength characteristics through a combination of cold work and a finely dispersed Ni₂Si precipitate that hardens the metal matrix. Columbia Metals stocks Trojan in the fully heat treated condition to maximise the mechanical strength of the material. This enables Trojan to offer strength levels comparable with many bolting, alloy and stainless steels. The proof strength is around 90% that of the UTS, while retaining a good ductility and high hardness level. These attributes, combined with high anti-friction properties and excellent wear resistance, provide very good bearing properties under high loading.

Trojan offers a corrosion resistance that is classed as very good in both of marine and industrial environments. Like Colsibro®, it offers a high corrosion resistance in fresh water and sea water, an excellent resistance to wet sulphurous atmospheres and a freedom from hydrogen embrittlement. Combined with its low magnetic permeability and excellent cryogenic properties, this makes Trojan an excellent choice for more demanding industrial and marine applications including subsea connectors and non-magnetic instrumentation both above and below the waterline.

- EXCELLENT MECHANICAL STRENGTH
- PROOF STRENGTH 90% OF UTS
- VERY HIGH WEAR RESISTANCE
- GOOD ELECTRICAL CONDUCTIVITY
- HIGH CORROSION RESISTANCE
- LOW MAGNETIC PERMEABILITY
- HIGH THERMAL CONDUCTIVITY
- READILY MACHINABLE
- SPARK RESISTANT

Trojan has approximately 1% more nickel than Colsibro® but its high copper content is enough to ensure that it maintains an impressive thermal and electrical conductivity value. The high thermal conductivity combined with a resistance to softening up to ~300°C, its inherent wear resistance and excellent mechanical strength levels ensure Trojan is the perfect selection for demanding engine bearings along with traditional uses such as valve guides, valve seats and gears. The high strength and conductivity values are also essential for the specification of Trojan in other components such as slip rings, electrical connectors contact blades and other current-carrying components, rotary contacts, plugs and sockets, springs, heavy duty switchgear and many other electrical accessories.

Trojan can be readily fabricated by machining and hot or cold forming. It can be soldered, brazed and welded by conventional MIG and TIG methods and is also resistance weldable. This excellent combination of properties ensures Trojan remains the superior choice, not only technically but also economically, compared with many alternative materials. Successful application areas include slip rings, bearing cages, bushes, high strength fasteners, thrust pads, mechanical seals, valve bodies, short circuit rings, resistance welding wheels and electrodes, flash butt welding dies, masonry fixings and spark-resistant safety tools.

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Nominal Composition (%)

Cu	Ni	Si
Rem	2.6 - 4.5	0.8 - 1.3

Mechanical Properties (specification minima)

	≤30mm dia	30 ≤ 60mm dia	60 ≤ 80mm dia
Ultimate Tensile Strength (N/mm ²)	800	690	690
0.2% Proof Strength (N/mm ²)	750	570	570
Elongation (%)	10	10	10
Hardness (HB)	200	200	190

Typical Physical Properties

Density (g/cm ³)	8.8
Melting Range (°C)	1060 - 1085
Thermal conductivity (20°C; W/m°K)	159
Coeff. Thermal Exp. (0-400°C; m/m°K x 10 ⁻⁶)	16.0
Electrical Conductivity (IACS)	30
Magnetic Permeability	~1.001

Round Bar Weight and Stock Sizes

Diameter ins	Weight		Diameter ins	Weight		Diameter ins	Weight	
	kg/ft	kg/m		kg/ft	kg/m		kg/ft	kg/m
2mm	0.01	0.03	0.625	0.52	1.70	1.500	2.99	9.81
0.125	0.02	0.07	0.750	0.75	2.45	1.625	3.51	11.51
0.250	0.08	0.27	0.875	1.02	3.34	1.750	4.07	13.35
0.375	0.19	0.61	1.000	1.33	4.36	2.000	5.32	17.44
10mm	0.21	0.68	1.125	1.68	5.52	2.250	6.73	22.07
0.500	0.33	1.09	1.250	2.08	6.81	2.500	8.30	27.24
0.563	0.42	1.38	1.375	2.51	8.24	65mm	8.70	28.55

NB Weight data for guidance only