

COPPER-110

Typical Analysis (Ave. values %)	Cu	Electrolytic Tough Pitch Copper (ETP Copper)		
	>99.90%	Oxygen by agreement, usually 0.04%		
NEAREST STANDARD	UNS	BS	JIS	ISO
	C11000	C101	C1100	Cu-ETP

PRODUCT SPECIFICATIONS	AS 1566	Rolled flat products
	AS 1567	Wrought rods, bars and sections
	AS 1568	Forged stock and forgings
	AS 1569	Seamless tubes for heat exchangers
	AS 1571	Seamless tubes for air conditioning & refrigeration.
	AS 1572	Seamless tubes for engineering purposes.

DESCRIPTION	Electrolytic Tough Pitch Copper (ETP), alloy110, has excellent ductility and high electrical and thermal conductivity, higher than for any other copper metal except oxygen free grades such as C10200. The electrical conductivity is at least 100%IACS (0.5800 microhm-1.cm-1) and is often as high as 101.5% IACS.
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APPLICATIONS	The dominant use of this alloy is in electrical conductors, and is widely used for gaskets, switches, terminals and connectors, transformers, electronic parts, ball floats, drawn and spun hollowware. Electrical and heat exchangers.
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MECHANICAL PROPERTIES		Tensile strength MPa	Elongation %	Hardness HV
	Annealed	210	40	55 max
	Half hard	245	10	75-90
	Hard	310	7	90-115
Finish: - Annealed or cold rolled to temper.				

FABRICATION PROPERTIES	Cold working capacity	Excellent
	Hot working capacity	Excellent
	Hot forging rating	65% of forging brass
	Hot working temperature	750-875°C

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	Annealing temperature	375-650°C
	Machinability rate	20% of free cutting brass
	Finishing	Excellent

JOINING PROPERTIES	Soldering	Excellent
	Brazing	Good
	Oxy Acetylene Welding	Not recommended
	Carbon Arc Welding	Fair
	Gas Shielded Arc Welding	Fair
	Coated Electrode Welding	Not recommended
	Resistance Welding	Not recommended

PHYSICAL PROPERTIES	Density	8.89 (kg/dm ³)
	Melting point (Liquidus)	1083°C
	Melting point (Solidus, Eutectic)	1065°C
	Coefficient of thermal expansion	17.7·10 ⁻⁶ m/(m.K)
	Thermal conductivity	388-W/(m.K)
	Thermal capacity	385-J/(kg.K)
	Electrical resistivity	1.724-Ohm.mm ² /m
	Electrical conductivity	0.58-0.59 Ohm.mm ² /m
	Modulus of Elasticity (tension)	115GPa
	Modulus of Elasticity (shear)	44GPa
	Poissons ratio	0.33

CORROSION RESISTANCE	C11000 has excellent corrosion resistance to weathering and very good resistance to many chemicals. It is often used specifically for corrosion resistance. It is suitable for use with most waters and can be used underground because it resists soil corrosion. It resists non-oxidising mineral and organic acids, caustic and saline solutions	
	Acids	Resists:-Hydrochloric, Sulphuric, Acetic, Carbolic, Citric, Formic, Oxalic, Tartaric and fatty acids.
	Alkalies	Fused sodium and potassium hydroxide. Caustic solutions.
	Salt solutions	Aluminium chloride, Aluminium sulphate, Calcium chloride, Copper sulphate, Sodium carbonate, Sodium nitrate, Sodium sulphate, Zinc sulphate.
	Waters	Industrial and mine waters, sea water and brackish water.
Other media	Corrosion resistance is not adequate for Ammonia, amines and ammonia salts; oxidising acids such as chromic & nitric and their salts; ferric chloride, persulphates and perchlorates; mercury and mercury salts. Copper may also corrode in aerated non oxidising acid such as sulphuric and acetic acids, although it is practically immune	

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		from these acids if air is excluded. Copper is not suited for use with acetylene, which can react to form acetylide which is explosive. C11000 is considered to be immune to stress corrosion cracking in ammonia and the similar media which cause cracking in brass and other copper alloys.
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WELDING	C11000 contains approx. 0.04% oxygen as cuprous oxide. This intentional residue reduces the adverse effect on electrical conductivity of traces of impurity metals. The internal oxide renders the alloy subject to hydrogen embrittlement if heated in reducing atmospheres above 370°C. C11000 is therefore unsuitable for gas welding and high temperature brazing. Oxygen free copper, C10200 or the deoxidised alloy C12200 is preferred where welding is required.
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SIZE RANGE	Round	4.76 to 57.15 mm
	Flat	25.4 x 3.18 to 101.6 x 38.1 mm

Sizes normally stocked in Australia. Some branches may not hold the entire range.
Other sizes available on request.

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