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Austral Bronze Crane Copper Limited
ACN 008 466 840

PRODUCT DATA SHEET

Phosphorus Deoxidised Copper, High Residual Phosphorus Alloy 122 UNS C12200

Copper Alloys

Also known as Phosphorus Deoxidised Copper

Composition, AS2738.2-1984

Copper, including silver >99.90%, Phosphorus 0.015 – 0.040%.

Equivalent Alloy Specifications

Specification	Designation
UNS	C12200
BSI	C106
ISO	Cu-DHP
JIS	C1220

Australian Product Specifications

Specification	Product Form
AS1432	Copper tubes for water, gas & sanitation
AS1566	Rolled flat products
AS1567	Wrought bars & sections
AS1572	Seamless tube for engineering purposes

ASTM Product Specifications

Specification	Title
B5	High Conductivity Tough-Pitch Copper Refinery Shapes
B42	Seamless Copper Pipe, Standard Sizes
B68	Seamless Copper Tube, Bright Annealed
B75	Seamless Copper Tube
B88	Seamless Copper Water Tube
B111	Copper and Copper-Alloy Seamless Condenser Tubes and Ferrule Stock
B152	Copper Sheet, Strip, Plate, and Rolled Bar
B187	Copper Bar, Bus Bar, Rod and Shapes
B280	Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
B302	Threadless Copper Pipe
B306	Copper Drainage Tube (DWV)
B359	Copper and Copper-Alloy Seamless Condenser and Heat Exchanger Tubes With Integral Fins
B360	Hard-Drawn Copper Capillary Tube for Restrictor Applications
B379	Phosphorized Coppers-Refinery Shapes
B395	U-Bend Seamless Copper and Copper Alloy Heat Exchanger and Condenser Tubes
B447	Welded Copper Tube
B543	Welded Copper and Copper-Alloy Heat Exchanger Tube
B577	Detection of Cuprous Oxide (Hydrogen Embrittlement Susceptibility) in Copper
B640	Welded Copper and Copper Alloy Tube for Air Conditioning and Refrigeration Service
B698	Seamless Copper and Copper Alloy Plumbing Pipe and Tube
B743	Seamless Copper Tube in Coils
B837	Seamless Copper Tube for Natural Gas and Liquefied Petroleum (LP) Gas Fuel Distribution Systems

Mechanical Properties (AS1566, Rolled flat products, and AS1567, Wrought rods, bars and sections)

Product	Temper	Thickness	Grain size	Tensile Strength minimum	Elongation minimum	Hardness maximum
		mm	mm	MPa	%	HV
Plate & rolled bar	Annealed, M or O	3.2 – 60.0	–	210	35	50*
	Hard	3.2 – 12.0	–	280	15	85*
Sheet, strip & foil	Annealed, O4	0.15 – 3.2	0.025 – 0.045	220*	45*	60
	½ hard	0.15 – 3.2	–	245	10	75 – 90
	Hard	0.15 – 3.2	–	310	7	90 – 115

* - typical

Available Forms

Austral Wright Metals can supply this alloy as sheet, strip, foil and tube.

General Description **C12200, Phosphorus deoxidised copper**, has been made weldable and brazeable by deoxidising with phosphorus. It is widely used as flat products and tubing, especially where it is to be welded or brazed. Phosphorus significantly reduces the conductivity, which may go as low as 70% IACS, but also raises the softening temperature when work hardened and promotes fine grain size.

C12200 has almost exactly the same mechanical properties as the high purity copper alloys such as C11000. It has excellent deep drawing characteristics and resistance to pitting corrosion when exposed to severe weather and water environments.

Typical Applications Tubes for hot & cold water, gas & heating installations, soil & waste pipes, storage tanks, cisterns & cylinders, rainwater goods, roofing, fascias, building facades, evaporators, heat exchangers, stills, vats, chemical equipment, anodes for electroplating baths.

PHYSICAL PROPERTIES

Property	Metric Units	Imperial Units
Melting Point (Liquidus)	1083°C	1981°F
Melting Point (Solidus)	1083°C	1981°F
Density	8.90 gm/cm ³ @ 20°C	0.321 lb/in ³ @ 68°F
Specific Gravity	8.90	8.90
Coefficient of Thermal Expansion	17.7 x 10 ⁻⁶ /°K (20 - 300°C)	9.83 x 10 ⁻⁵ /°F (68 - 572°F)
Thermal Conductivity	293 - 364 W/m.°K @ 20°C	169 - 211 BTU/ft ³ /ft/hr/°F @ 68°F
Thermal Capacity (Specific Heat)	385 J/kg.°K @ 20°C	0.092 BTU/lb/°F @ 68°F
Electrical Resistivity (Annealed)	2.5 – 1.9 microhm.cm @ 20°C	15 - 12 ohms (circ mil/ft) @ 68°F
Electrical Conductivity (Annealed)	0.41 – 0.52 microhm ⁻¹ .cm ⁻¹ @ 20°C	70 – 90 % IACS @ 68°F
Modulus of Elasticity (tension)	115 GPa	17 x 10 ⁶ psi
Modulus of Rigidity (shear)	44 GPa	6.4 x 10 ⁶ psi
Poisson's Ratio	0.33	0.33

FABRICATING PROPERTIES

Cold Working Capacity	Excellent
Hot Working Capacity	Good
Hot Working Temperature	750 – 950°C
Annealing Temperature	250 – 650°C
Stress Relieving Temperature	200 – 250°C
Machinability Rating	20% of free cutting brass (C36000)
Polishing/electroplating finishing	Excellent

JOINING PROPERTIES

Soldering	Excellent
Brazing	Excellent
Oxy-Acetylene Welding	Good
Gas Shielded Arc Welding (GTAW/TIG, GMAW/MIG)	Good
Coated Metal Arc Welding (Manual electrodes)	Not recommended
Resistance Welding	- Spot Fair - Seam Fair

Corrosion Resistance

C12200 has similar corrosion resistance to C11000. It gives excellent 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 solutions and saline solutions.

Depending on concentration and specific conditions of exposure, copper generally resists:

Acids: mineral acids such as hydrochloric and sulphuric acids; organic acids such as acetic acid (including acetates and vinegar), carbonic, citric, formic, oxalic, tartaric and fatty acids; acidic solutions containing sulphur, such as the sulphurous acid and sulphite solutions used in pulp mills.

Alkalies: fused sodium and potassium hydroxide; concentrated and dilute caustic solutions.

Salt solutions: aluminium chloride, aluminium sulphate, calcium chloride, copper sulphate, sodium carbonate, sodium nitrate, sodium sulphate, zinc sulphate.

Waters: all potable waters, many industrial and mine waters, seawater and brackish water.

Other media: The corrosion resistance of C12200 is not adequate for: ammonia, amines and ammonium salts; oxidizing acids such as chromic and nitric acids and their salts; ferric chloride; persulphates and perchlorates; mercury and mercury salts. Copper may also corrode in aerated non oxidising acids such as sulphuric and acetic acids, although it is practically immune from these acids if air is completely excluded. Copper is not suitable for use with acetylene, which can react to form an acetylide which is explosive.

Consult Austral Wright Metals for your specific application.