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**PRODUCT DATA
SHEET**

**5% Phosphor Bronze
UNS C51800**

Copper Alloy

Composition, AS1572-1998

Copper	Tin		Phosphorus		Aluminium	Lead
	min	max	min	max	min	max
Remainder ~95%	4.0%	6.0%	0.10%	0.35%	0.01%	0.02%

**Equivalent Alloy
Specifications**

Specification	Designation
UNS	C51800
ISO	Cu Sn5
BSI	PB102
JIS	-

Specification

Product Form

AS1566	Rolled flat products
AS1567	Wrought rods, bars & sections

**Australian
Product
Specifications**

**Mechanical
Properties**

Product	Thickness mm	Temper	0.2% Proof Stress MPa, min	Tensile Strength MPa, min	Elongation %, min	Hardness, HV	
AS1566, Rolled flat products, & AS1567, Wrought rods, bars & sections.	Sheet & Flats	All	Ann, O2	365	50	85 – 95	
	Sheet & Flats	0.15 – 3.2	¼ hard	360	35	110 – 160	
AS1567, Wrought rods, bars & sections.	Sheet & Flats		½ hard	500	10	160 – 180	
	Sheet & Flats		Hard	590	4	180 – 200	
	Sheet & Flats	0.15 – 2.0	EH	650	–	200 – 220	
	Sheet & Flats	0.15 – 3.2	SH	700	–	> 220	
	Rod & square bar	6 – 20	M	350	460	12	–
	Rod & square bar	21 – 40	M	320	430	12	–
	Rod & square bar	41 – 70	M	280	380	16	–
	Rod & square bar	71 – 120	M	240	310	20	–
Rod & square bar	> 120	M	80	270	24	–	

Austral Wright Metals can supply this alloy as coil, sheet and round rod.

C51800 is the most widely used of the wrought phosphor bronzes, particularly in spring applications where the excellent resistance and fatigue endurance of various work-hardened tempers are major advantages of the alloy.

It also has a low coefficient of friction running against steel, combined with high strength. This makes it a popular choice for wear resistant guide strips and similar bearing applications involving boundary lubrication conditions.

Austral Wright Metals can also supply alloy C51000, a very similar alloy with 4.2-5.8% tin, 0.03-0.35% phosphorus without an aluminium addition, which has very similar properties and uses. Most material made to C51000 meets the specification requirements for C51800, and vice versa.

Japanese equipment often makes use of JIS C5191. This has 5.5-7.0% tin, and properties similar to C51800.

Typical Applications: Engineering: bridge bearing plates, clutch discs, lock washers.
Electrical: fuse clips, terminal connectors, contacts, switch parts, springs.
Hardware: lock springs, fasteners.
Industrial: diaphragms, sleeve bushings, bellows, press tools.

PHYSICAL PROPERTIES

Property	Metric Units	Imperial Units
Melting Point (Liquidus)	930°C	1705°F
Melting Point (Solidus) (eutectic)	1060°C	1940°F
Density	8.85 gm/cm ³ @ 20°C	0.320 lb/in ³ @ 68°F
Specific Gravity	8.85	8.85
Coefficient of Thermal Expansion	18.0 x 10 ⁻⁶ /°K (20 - 300°C)	10.0 x 10 ⁻⁶ /°F (68 - 572°F)
Thermal Conductivity	63-96 W/m.°K @ 20°C	35-56 BTU/ft ³ /ft/hr/°F @ 68°F
Thermal Capacity (Specific Heat)	377 J/kg.°K @ 20°C	0.09 BTU/lb/°F @ 68°F
Electrical Resistivity (Annealed)	13.0-9.6 microhm.cm @ 20°C	80-58 ohms (circ mil/ft) @ 68°F
Electrical Conductivity (Annealed)	0.077-0.104 microhm ⁻¹ .cm ⁻¹ @ 20°C	13 - 18% IACS
Temperature Coefficient of Electrical Resistance (Annealed)	0.0009 / °C @ 0 - 100°C	0.0005 / °F @ 32 - 212 °F
Modulus of Elasticity (tension)	121 GPa @ 20°C	17.6 x 10 ⁶ psi @ 68°F
Modulus of Rigidity (torsion)	44.8 GPa @ 20°C	6.5 x 10 ⁶ psi @ 68°F
Poisson's Ratio	0.35	0.35

FABRICATING PROPERTIES

Cold Working Capacity	Excellent
Hot Working Capacity	Limited
Hot Working Temperature	650 - 750°C
Annealing Temperature	500 - 700°C
Stress Relieving Temperature	200 - 350°C
Machinability Rating	20% of free cutting brass
Polishing/Electroplating Finish	Good

JOINING PROPERTIES

Soldering	Excellent
Brazing	Excellent
Oxy-Acetylene Welding	Fair
Gas Shielded Arc Welding (GTAW/TIG, GMAW/MIG)	Good
Coated Metal Arc Welding (Manual electrodes)	Fair
Resistance Welding	- Spot Good - Seam Fair - Butt Excellent

Phase diagram for copper tin alloys - bronzes

Corrosion Resistance

The corrosion resistance of 5% phosphor bronze is at least equal to copper, but the tin addition gives advantages in salt water and similar aggressive moist conditions where it is superior to copper.

Like copper, it does not suffer from dezincification and is seldom involved in stress corrosion failures unless there is a combination of very hard rolled material and specific chemicals such as mercury and ammonia compounds.

Please consult Austral Wright Metals for advice on your specific application.

