

# Phosphor Bronze

**PB102 / CW451K / C51000 • PB103 / CW452K  
PB104 / CW453K / BSB24 • C54400**



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Phosphor bronzes are a major group of engineering alloys noted for their strength and toughness coupled with high corrosion resistance and excellent spring and plating properties. They are alloys of copper with 3.5-10% tin and a phosphorus content of up to 0.4%, which is added as a deoxidising agent during the melting process.

Phosphor bronze alloys are used extensively for electrical and electronic components, connectors, marine hardware, fasteners, valve spindles, pump and drive shafts, bearing bushes, gears, instrumentation components and many other critical applications where the particular blend of mechanical properties, spring properties, oxidation and corrosion resistance, low magnetic permeability and wear resistance can be used to full advantage.



Columbia Metals stocks several of the leading grades of phosphor bronze in round bar, hexagon, sheet and square.

### **PB102 / CW451K / C51000**

PB102 is the standard grade of wrought phosphor bronze, containing additions of around 5% tin and up to 0.4% phosphorus. It is used for general purpose applications, particularly when cold formability combined with good mechanical properties is required, and has excellent soldering, brazing and butt welding capability. PB102 is often used as a fastener material and for pump and valve spindles, shafts, flanges, springs and masonry fittings.

### **PB103 / CW452K**

Primarily a sheet grade, PB103 offers good strength, wear and corrosion resistance. The alloy is used for mechanical and electrical springs and for decorative purposes such as bar tops, counters and other architectural metalwork including name plates and masonry fittings. PB103 is renowned for its excellent tarnish resistance and can be used in a wide range of waters and chemicals such as paper and textile manufacturing plants.

Stocked sizes of phosphor bronze	
PB102	<ul style="list-style-type: none"> <li>● 3/32" – 5" dia</li> <li>● 3/8" – 2.3/8" A/F</li> </ul>
PB103	■ 10g – 20g
PB104	● 1/4" – 2.1/2" dia
COLPHOS 90	<ul style="list-style-type: none"> <li>● 1/8" – 2.1/2" dia</li> <li>● 5/32" – 1.1/4" A/F</li> <li>■ 10g – 16g</li> </ul>
■ Square also available	

### **PB104 / COLBRONZE / CW453K / C52100 / BS B24**

With a greater tin content (8%) than PB102, PB104 is ideal for higher strength and more exacting applications. It offers exceptional bearing, wear and spring properties combined with excellent fatigue performance and corrosion fatigue resistance in marine and other corrosive environments. PB104 is especially suitable for high performance gears, bearing components, shafts and spindles.

### **COLPHOS 90 / C54400**

Often described as the machinist's friend, this grade of material is a resounding success story in the history of phosphor bronze. COLPHOS 90 has machining characteristics almost indistinguishable from CZ121 brass -

the benchmark for free machinability in copper-based materials. This makes COLPHOS 90 the ideal phosphor bronze grade for intricate components. The material's strength and corrosion resistance are similar to PB102. The addition of 4% lead, dispersed throughout the matrix, enables excellent self-lubrication which makes the alloy highly suitable for bearing bushes and many applications where full lubrication cannot be assured.

**PLEASE CONTACT US FOR AN IMMEDIATE QUOTATION OR TECHNICAL ADVICE**

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# Phosphor Bronze



## Technical Data

### Nominal Composition (%)

	Cu	Sn	P	Pb	Zn
<b>PB102</b>	Rem	5.0	0.2	-	-
<b>PB103</b>	Rem	7.0	0.2	-	-
<b>PB104</b>	Rem	8.0	0.2	-	-
<b>COLPHOS 90</b>	Rem	5.0	0.2	4.0	3.0

### Typical Mechanical Properties

	PB102	PB103	PB104	COLPHOS 90
<b>Ultimate Tensile Strength (N/mm<sup>2</sup>)</b>	350 - 500	460 - 500	450 - 600	350 - 450
<b>0.2% Proof Strength (N/mm<sup>2</sup>)</b>	280 - 420	380 - 420	320 - 450	250 - 350
<b>Elongation (%)</b>	12 - 25	12 - 18	15 - 20	10 - 15
<b>Machinability Rating</b>	20	20	20	90

### 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
0.094	0.01	0.04	20mm	0.83	2.73	2.250	6.80	22.32			
0.125	0.02	0.07	0.875	1.03	3.38	2.500	8.40	27.55			
0.156	0.03	0.11	1.000	1.34	4.41	2.625	9.26	30.37			
0.188	0.05	0.16	1.125	1.70	5.58	2.750	10.16	33.34			
0.250	0.08	0.28	1.250	2.10	6.89	3.000	12.09	39.67			
0.313	0.13	0.43	1.375	2.54	8.33	3.250	14.19	46.56			
0.375	0.19	0.62	1.500	3.02	9.92	3.500	16.46	54.00			
0.438	0.26	0.84	1.625	3.55	11.64	3.750	18.89	61.99			
0.500	0.34	1.10	1.750	4.12	13.50	4.000	21.50	70.53			
0.625	0.54	1.72	1.875	4.72	15.50	4.500	27.21	89.26			
0.688	0.64	2.08	2.000	5.37	17.63	5.000	33.59	110.20			
0.750	0.76	2.48	2.125	6.07	19.91	130mm	35.20	115.47			

NB Weight data for guidance only