

**Copper and Copper Alloy Ingots and Castings—Properties, Processes and Uses (BS EN 1982)**

Description	EN Number for Castings	EN Symbol for Castings	Nearest Equiv. in Old BS 1400	0.2% Proof Strength (N/mm <sup>2</sup> )	Tensile Strength (N/mm <sup>2</sup> )	Elongation (%)	Hardness (HB)	GM Die Casting	GS Sand	GZ Centrifugal	GP Pressure Die	GC Continuous	Characteristics and Uses
Copper	CC040A	Cu-C	HCC1	40	150	25	40	Yes	Yes	-	-	-	Electrical and thermal applications. Additionally specified by minimum conductivity requirements, e.g. 93-99% IACS
Copper Alloys, Low Alloyed	CC140C	CuCr1-C	CC1-TF	250	350	10	95	Yes	Yes	-	-	-	Electrical and thermal applications. Additionally specified by minimum conductivity requirements, e.g. 93-99% IACS
Miscellaneous Copper Alloys	CC212E	CuMn11Al8Fe3Ni3-C	CMA1	275	630	18	150	-	Yes	-	-	-	Seawater handling components, propellers.
Miscellaneous Copper Alloys	CC245E	CuSi4Zn4MnP-C	-	100	280	18	75	-	Yes	-	-	Yes	Approved for drinking water contact under 4MS. Water fittings and valves.
Miscellaneous Copper Alloys	CC246E	CuSi4Zn9MnP-C	-	120	300	16	80	-	Yes	-	-	Yes	Approved for drinking water contact under 4MS. Water fittings and valves.
Copper-aluminium Alloys (Aluminium Bronze)	CC330G	CuAl9-C	-	170	470	15	100	Yes	-	Yes	-	-	Resists tarnishing. Building and decorative components.
Copper-aluminium Alloys (Aluminium Bronze)	CC331G	CuAl10Fe2-C	AB1	200	550	18	130	Yes	Yes	Yes	-	Yes	Strong, corrosion resistant. Seawater-pumps, bearings, propellers, heat exchangers, pipework
Copper-aluminium Alloys (Aluminium Bronze)	CC332G	CuAl10Ni3Fe2-C	-	220	550	20	120	Yes	Yes	Yes	-	Yes	Strong, corrosion resistant. Seawater-pumps, bearings, propellers, heat exchangers, pipework
Copper-aluminium Alloys (Aluminium Bronze)	CC333G	CuAl10Fe5Ni5-C	AB2	280	650	12	150	Yes	Yes	Yes	-	Yes	Strong, corrosion resistant. Seawater-pumps, bearings, propellers, heat exchangers, pipework
Copper-aluminium Alloys (Aluminium Bronze)	CC334G	CuAl11Fe6Ni6-C	-	380	750	5	185	Yes	Yes	Yes	-	-	Strong, corrosion resistant. Seawater-pumps, bearings, propellers, heat exchangers, pipework
Copper-nickel Alloys	CC380H	CuNi10Fe1Mn1-C	-	100	280	25	70	-	Yes	Yes	-	Yes	High strength and corrosion resistance for the most arduous marine applications. Pipe fittings and flanges in chemical engineering.
Copper-nickel Alloys	CC381H	CuNi30Fe1Mn1-C	-	120	340	18	80	-	Yes	Yes	-	-	High strength and corrosion resistance for the most arduous marine applications. Pipe fittings and flanges in chemical engineering.
Copper-nickel Alloys	CC382H	CuNi30Cr2FeMnSi-C	CN1	250	440	18	115	-	Yes	-	-	-	High strength and corrosion resistance for the most arduous marine applications. Pipe fittings and flanges in chemical engineering.
Copper-nickel Alloys	CC383H	CuNi30Fe1Mn1NbSi-C	CN2	230	440	18	115	-	Yes	-	-	-	High strength and corrosion resistance for the most arduous marine applications. Pipe fittings and flanges in chemical engineering.
Copper-tin Alloys (Gunmetal, Phosphor Bronze and Leaded Bronze)	CC480K	CuSn10-C	CT1	160	270	10	80	Yes	Yes	Yes	-	Yes	Gears and general bearing applications offering higher corrosion/erosion resistance than gunmetals.
Copper-tin Alloys (Gunmetal, Phosphor Bronze and Leaded Bronze)	CC481K	CuSn11P-C	PB1	170	310	4	85	Yes	Yes	Yes	-	Yes	Gears and general bearing applications offering higher corrosion/erosion resistance than gunmetals.
Copper-tin Alloys (Gunmetal, Phosphor Bronze and Leaded Bronze)	CC482K	CuSn11Pb2-C	-	150	280	5	90	-	Yes	Yes	-	Yes	Gears and general bearing applications offering higher corrosion/erosion resistance than gunmetals. Lead gives improved machinability.
Copper-tin Alloys (Gunmetal, Phosphor Bronze and Leaded Bronze)	CC483K	CuSn12-C	PB2	150	270	5	85	Yes	Yes	Yes	-	Yes	Gears and general bearing applications offering higher corrosion/erosion resistance than gunmetals.
Copper-tin Alloys (Gunmetal, Phosphor Bronze and Leaded Bronze)	CC484K	CuSn12Ni2-C	CT2	180	300	10	95	-	Yes	Yes	-	Yes	Gears and general bearing applications offering higher corrosion/erosion resistance than gunmetals. Nickel increases strength and hardness.
Copper-tin Alloys (Gunmetal, Phosphor Bronze and Leaded Bronze)	CC490K	CuSn3Zn8Pb5-C	LG1	100	220	12	70	-	Yes	Yes	-	Yes	Leaded gunmetals giving good corrosion resistance with moderate strength and good castability. Applications include pumps, valves and bearings.
Copper-tin Alloys (Gunmetal, Phosphor Bronze and Leaded Bronze)	CC491K	CuSn5Zn5Pb5-C	LG2	110	230	10	65	Yes	Yes	Yes	-	Yes	Leaded gunmetals giving good corrosion resistance with moderate strength and good castability. Applications include pumps, valves and bearings.
Copper-tin Alloys (Gunmetal, Phosphor Bronze and Leaded Bronze)	CC492K	CuSn7Zn2Pb3-C	LG4	130	240	12	70	Yes	Yes	Yes	-	Yes	Leaded gunmetals giving good corrosion resistance with moderate strength and good castability. Applications include pumps, valves and bearings.
Copper-tin Alloys (Gunmetal, Phosphor Bronze and Leaded Bronze)	CC493K	CuSn7Zn4Pb7-C	-	120	240	12	70	Yes	Yes	Yes	-	Yes	Leaded gunmetals giving good corrosion resistance with moderate strength and good castability. Applications include pumps, valves and bearings.
Copper-tin Alloys (Gunmetal, Phosphor Bronze and Leaded Bronze)	CC494K	CuSn5Pb9-C	LB4	80	200	6	60	Yes	Yes	Yes	-	Yes	Leaded tin bronzes whose plasticity increases with lead content.
Copper-tin Alloys (Gunmetal, Phosphor Bronze and Leaded Bronze)	CC495K	CuSn10Pb10-C	LB2	110	220	5	65	Yes	Yes	Yes	-	Yes	Leaded tin bronzes whose plasticity increases with lead content.
Copper-tin Alloys (Gunmetal, Phosphor Bronze and Leaded Bronze)	CC496K	CuSn7Pb15-C	LB1	90	200	8	65	-	Yes	Yes	-	Yes	Leaded tin bronzes whose plasticity increases with lead content.
Copper-tin Alloys (Gunmetal, Phosphor Bronze and Leaded Bronze)	CC497K	CuSn5Pb20-C	LB5	75	175	6	50	-	Yes	Yes	-	Yes	Leaded tin bronzes whose plasticity increases with lead content.
Copper-tin Alloys (Gunmetal, Phosphor Bronze and Leaded Bronze)	CC498K	CuSn6Zn4Pb2-C	-	110	220	12	70	Yes	Yes	Yes	-	Yes	Approved for drinking water contact under 4MS. Water fittings and valves.
Copper-tin Alloys (Gunmetal, Phosphor Bronze and Leaded Bronze)	CC499K	CuSn5Zn5Pb2-C	-	110	220	13	65	Yes	Yes	Yes	-	Yes	Approved for drinking water contact under 4MS. Water fittings and valves.
Copper-zinc Alloys, (Complex Brasses)	CC750S	CuZn33Pb2-C	SCB3	70	180	12	45	-	Yes	Yes	-	-	General purpose applications, including electrical. Conductivity IACS 20%
Copper-zinc Alloys, (Complex Brasses)	CC751S	CuZn33Pb2Si-C	DZR2	280	400	5	110	-	-	-	Yes	-	Dezincification resistant. Water fittings for aggressive waters (not approved for drinking water contact under 4MS)
Copper-zinc Alloys, (Complex Brasses)	CC752S	CuZn35Pb2Al-C	DZR1	120	280	10	70	Yes	-	Yes	-	-	Dezincification resistant. Water fittings for aggressive waters (not approved for drinking water contact under 4MS)
Copper-zinc Alloys, (Complex Brasses)	CC753S	CuZn37Pb2Ni1AlFe-C	-	150	300	15	90	Yes	-	-	-	-	Fine grained, freely machinable.
Copper-zinc Alloys, (Complex Brasses)	CC754S	CuZn39Pb1Al-C	DCB3	120	280	10	70	Yes	Yes	Yes	Yes	-	Conductivity IACS 20%. General & electrical purposes.
Copper-zinc Alloys, (Complex Brasses)	CC755S	CuZn39Pb1AlB-C	-	180	350	10	90	Yes	-	-	Yes	-	Conductivity IACS 20%. Boron is used for grain refining, to give added strength for thin sections. General & electrical purposes.
Copper-zinc Alloys, (Complex Brasses)	CC757S	CuZn39Pb1AlB-C	-	140	310	15	90	Yes	Yes	-	Yes	Yes	Approved for drinking water contact under 4MS. Water fittings and valves.
Copper-zinc Alloys, (Complex Brasses)	CC760S	CuZn15As-C	SCB6	70	160	20	45	-	Yes	-	-	-	Brazable. Good corrosion resistance.
Copper-zinc Alloys, (Complex Brasses)	CC761S	CuZn16Si4-C	-	300	500	8	130	Yes	Yes	-	Yes	-	Silicon brass for valves and water fittings (not approved for drinking water contact under 4MS)
Copper-zinc Alloys, (Complex Brasses)	CC762S	CuZn25Al5Mn4Fe3-C	HTB3	480	750	5	190	Yes	Yes	Yes	-	Yes	High tensile brasses.
Copper-zinc Alloys, (Complex Brasses)	CC763S	CuZn32Al2Mn2Fe1-C	-	200	430	8	110	-	Yes	-	Yes	-	High tensile brasses.
Copper-zinc Alloys, (Complex Brasses)	CC764S	CuZn34Mn3Al2Fe1-C	-	260	600	12	140	Yes	Yes	Yes	-	-	High tensile brasses.
Copper-zinc Alloys, (Complex Brasses)	CC765S	CuZn35Mn2Al1Fe1-C	HTB1	200	480	18	110	Yes	Yes	Yes	-	Yes	High tensile brasses. Conductivity IACS 20%
Copper-zinc Alloys, (Complex Brasses)	CC766S	CuZn37Al1-C	-	170	450	25	105	Yes	-	-	-	-	General purpose, high quality engineering applications.
Copper-zinc Alloys, (Complex Brasses)	CC767S	CuZn38Al-C	DCB1	130	380	30	75	Yes	-	-	-	-	General purpose, high quality engineering applications.
Copper-zinc Alloys, (Complex Brasses)	CC768S	CuZn21Si3P-C	-	140	420	20	80	Yes	Yes	-	-	Yes	Lead free, machinability 80%. Approved for drinking water contact under 4MS. Water fittings and valves.
Copper-zinc Alloys, (Complex Brasses)	CC770S	CuZn36Pb-C	-	110	280	5	70	Yes	-	-	Yes	-	Dezincification resistant. Approved for drinking water contact under 4MS. Water fittings and valves.
Copper-zinc Alloys, (Complex Brasses)	CC771S	CuZn36AlAsSb-C	-	130	310	5	70	-	-	-	-	Yes	Approved for drinking water contact under 4MS. Water fittings and valves.
Copper-zinc Alloys, (Complex Brasses)	CC772S	CuZn36Pb1AlAsSb-C	-	150	380	30	80	-	-	-	-	Yes	Approved for drinking water contact under 4MS. Water fittings and valves.
Copper-zinc Alloys, (Complex Brasses)	CC773S	CuZn42Al-C	-	120	300	15	80	Yes	-	-	-	-	Approved for drinking water contact under 4MS. Water fittings and valves.

**About this table**

Copper and copper alloy ingots and castings are specified according to BS EN 1982. Typical minimum mechanical properties, applicable casting processes, characteristics and uses are given.

The EN designations for castings begin 'CC' and the EN symbols end in '-C'. For ingots, the EN designations begin 'CB' and the EN symbols end in '-B'.

Where alloys are approved for drinking water contact (see full list of 4MS copper and copper alloy materials), this is indicated in the characteristics and uses column. For more detail, the appropriate standard(s) should be consulted.

**Table notes**

Symbol finishes 'B' for material in ingot form  
Number begins 'CB' for material in ingot form  
Ingots are not specified for high conductivity coppers  
1N/mm<sup>2</sup> = 1MPa

GC – continuous casting  
GM – permanent mould casting  
GP – pressure die casting  
GS – sand casting  
GZ – centrifugal casting

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