

**Brass Forgings, Stampings and Hot Pressings —Compositions, Properties and Standards**

EN Number	EN Symbol	Nearest Old BS Equiv.	Cu %	Al %	Fe %	Mn %	Pb %	Others %	Zn %	0.2% Proof Strength (N/mm <sup>2</sup> )	Tensile Strength (N/mm <sup>2</sup> )	Elongation %	Hardness (HB)	Remarks
CW508L	CuZn37	CZ108	62.0-64.0	0.05	0.1		0.1	0.3 Ni 0.1 Sn	Rem.	100	300	20	70	Good hot working and excellent cold working capacity. Machinable with slow speeds and feeds. Uses include brass fitting and decorative components via general copper smithing work.
CW509L	CuZn40	CZ109	59.0-61.5	0.05	0.2		0.2	0.3 Ni 0.2 Sn	Rem.	100	300	20	100	Excellent hot formability and good cold working CW509L is fully-compliant with Californian drinking regulation AB1953 and perfectly matching with the UNS C27450. Ideal for drinking water fittings and architectural metalwork. Approved for drinking water contact under 4MS.
CW510L	CuZn42		57.0-59.0	0.05	0.3		0.2	0.3 Ni 0.3 Sn	Rem.	140	350	15	95	Offers a good machinability, index 50% with a very low lead content <0.2%. This makes it suitable for drinking water applications in the USA under AB1953 and fully meets the UNS C27450. It also offers excellent hot workability making it ideal for fittings, valves and valve bodies for both water and gas. Approved for drinking water contact under 4MS.
CW511L	CuZn38As		61.5-63.5	0.05	0.1		0.2	0.02-0.15 As 0.3 Ni 0.1 Sn	Rem.	120	280	20	70	Offers a good machinability, index 50% with a very low lead content <0.2%, an excellent resistance to stress corrosion cracking and can also offer a resistance to dezincification (subject to heat treatment). It is fully compliant with the Californian drinking water regulations AB1953, as well as with the NSF/ANSI Standard 14 with reference to dezincification and stress corrosion resistance. Approved for drinking water contact under 4MS.
CW602N	CuZn36Pb2As	CZ132	61.0-63.0	0.05	0.1	0.1	1.7-2.8	0.02-0.15 As 0.3 Ni 0.1 Sn	Rem.	120	280	20	75	The traditional dezincification resistant brass is a duplex brass that can be hot worked and machined. A simple heat treatment gives a very high level of dezincification resistance and is traditionally utilised for components in water or fluid handling systems.
CW607N	CuZn38Pb1		60.0-61.0	0.05	0.2		0.8-1.6	0.3 Ni 0.2 Sn	Rem.	140	350	15	70	A duplex brass offering a combination of excellent hot workability, very good machinability, index 85% and a good cold formability so is ideal for use for applications where 2 or more operations are required.
CW608N	CuZn38Pb2	CZ128	60.0-61.0	0.05	0.2		1.6-2.5	0.3 Ni 0.2 Sn	Rem.	140	350	15	100	A leaded brass alloy sometimes referred to as engraving brass due to its excellent machinability. Similar to the CW612N it offers very good hot formability and often finds use in applications such as plaques, nameplates, clock and instrument cases, watch parts, gears, cams and decorative metalwork where precision machining is essential.
CW610N	CuZn39Pb0.5	CZ137	59.0-60.5	0.05	0.2		0.2-0.8	0.3 Ni 0.2 Sn	Rem.	Not given	Not given	Not given	70-100	A leaded Muntz Metal this grade offers a good hot formability and has a small addition of lead to improve machinability levels. Often used for condenser and heat exchanger tube plates, and decorative brassware.
CW611N	CuZn39Pb1	CZ129	59.0-60.0	0.05	0.2		0.8-1.6	0.3 Ni 0.2 Sn	Rem.	Not given	Not given	Not given	70-100	A leaded Brass with a medium lead content that retains a very good machinability and an excellent hot workability but also offers a good cold formability. Sometimes referred to as bending brass this grade is often used where both forming and machining is required for the finished component.
CW612N	CuZn39Pb2	CZ128	59.0-60.0	0.05	0.3		1.6-2.5	0.3 Ni 0.3 Sn	Rem.	140	350	15	100	Similar to the CW608N this grade is also referred to as engraving brass due to its lead content and excellent machinability. It also offers very good hot formability and the slightly increased tin content can improve corrosion resistances. Used for engraving applications, clock and instrument cases, watch parts, gears, cams and decorative metalwork where precision machining is essential. Cannot be acid etched due to Duplex microstructure. Approved for drinking water contact under 4MS.
CW613N	CuZn39Pb2Sn		59.0-60.0	0.1	0.4		1.6-2.5	0.3 Ni 0.2-0.5 Sn	Rem.	140	350	15	70	Similar to the CW612N, but the CW613N allows higher impurity levels which can reduce the material machining speeds slightly. Still has a very high machinability, a good hot formability and good corrosion resistance. Often used for decorative metalwork and builders hardware
CW614N	CuZn39Pb3	CZ121-Pb3	57.0-59.0	0.05	0.3		2.5-3.5	0.3 Ni 0.3 Sn	Rem.	140	350	15	100	A leaded brass know as Free Machining Brass. This is the brass against which the machinability of all other copper based alloys are compared. Having the highest machinability rating of 100% this is utilised for many components including bushings, bearings and extruded sections. Hot formability is fair but cold working is not recommended. Approved for drinking water contact under 4MS.
CW616N	CuZn40Pb1Al		57.0-59.0	0.05-0.30	0.2		1.0-2.0	0.2 Ni 0.2 Sn	Rem.	140	350	15	70	A forging or hot stamping brass with a small addition of aluminium to improve die forging and give a brighter more attractive golden brass colour. As its name suggests an excellent hot workable grade with a very good machinability, index 95%. Often used for builders hardware and architectural applications.
CW617N	CuZn40Pb2	CZ122	57.0-59.0	0.05	0.3		1.6-2.5	0.3 Ni 0.3 Sn	Rem.	140	350	15	100	Often referred to as stamping brass due to its excellent hot formability this grade also offers a very high machinability rating thanks to its lead content. Commonly utilized for the production of complex hot pressed components, valves bodies and fittings. Approved for drinking water contact under 4MS.
CW625N	CuZn35Pb1.5AlAs		62.0-64.0	0.5-0.7	0.3	0.1	1.2-1.6	0.02-0.15 As 0.2 Ni 0.3 Sn	Rem.	120	280	20	70	When suitably heat treated these dezincification resistant brasses can be used as an alternative to CW602N. They offer a good machinability and good hot and cold working properties and are used for components in contact with water intended for human consumption. Both are approved by the 4MS Standard for drinking water and also meet ISO 6509 requirements for the dezincification resistance. Approved for drinking water contact under 4MS.
CW626N	CuZn33Pb1.5AlAs		64.0-66.0	0.8-1.0	0.3	0.1	1.2-1.7	0.02-0.15 As 0.2 Ni 0.3 Sn	Rem.	120	280	20	70	When suitably heat treated these dezincification resistant brasses can be used as an alternative to CW602N. They offer a good machinability and good hot and cold working properties and are used for components in contact with water intended for human consumption. Both are approved by the 4MS Standard for drinking water and also meet ISO 6509 requirements for the dezincification resistance. Approved for drinking water contact under 4MS.
CW704R	CuZn23Al6Mn4Fe3Pb		63.0-65.0	5.0-6.0	2.0-3.5	3.5-5.0	0.2-0.8	0.5 Ni 0.2 Sn	Rem.	500	700	5	190	A high tensile brass with additions of aluminium (far in excess of standard high tensile brasses) manganese and iron to give higher hardness and increased corrosion resistance levels. Good hot workability and machinability with uses including heat pump and valve trim, heavy duty bearing bushes. No tensile properties shown in EN 12165 and no hardness property shown in EN 12420.
CW709R	CuZn32Pb2AsFeSi		64.0-66.5	0.05	0.1-0.2		1.5-2.2	0.03-0.08 As 0.3 Ni 0.45-0.8 Si 0.3 Sn	Rem.	160	350	15	70	A hot workable duplex brass that offers free machining. It also has an arsenic content that can offer very good dezincification resistance making it suitable for components within marine applications or those which come into contact with water.

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CW710R	CuZn35Ni3Mn2AlPb		58.0-60.0	0.3-1.3	0.5	1.5-2.5	0.2-0.8	2.0-3.0 Ni 0.5 Sn	Rem.	180	440	10	120-160	A high tensile brass with additions of aluminium, nickel and manganese The CW710R offers a good machinability, is hot formable and also offers a fair cold formability. The material also offers a good overall corrosion and wear resistance and is utilised for highly loaded bearings, slide- & wear-plates, valve guides and piston parts.
CW712R	CuZn36Sn1Pb	CZ112	61.0-63.0		0.1		0.2-0.6	0.2 Ni 1.0-1.5 Sn	Rem.	160	350	15	110	Often referred to as Naval brass CW712R is a duplex brass with 1% addition of tin to give an improved corrosion resistance in marine applications. Good hot formability and machinability this grade lends itself to many marine, and offshore applications together with more exposed architectural metalwork.
CW713R	CuZn37Mn3Al2PbSi	CZ135	57.0-59.0	1.3-2.3	1	1.5-3.0	0.2-0.8	1.0 Ni 0.3-1.3 Si 0.4 Sn	Rem.	200	550	8	150	A high tensile brass which is alloyed with aluminium, manganese and silicon. This grade has a good corrosion and erosion resistance and an excellent wear resistance. Can be readily hot stamped and offers a good machinability. Used for high strength bearings, slide- & wear-plates, components in gear boxes
CW719R	CuZn39Sn1		59.0-61.0		0.1		0.2	0.2 Ni 0.5-1.0 Sn	Rem.	160	350	15	70	A low lead naval brass with good hot workability, reasonable cold formability but a lower level of machinability to the CW712R. With very good corrosion resistance levels similar to that of the CW712R this grade can be utilised for components in heat exchangers, valves and condensers.
CW720R	CuZn40Mn1Pb1	CZ136	57.0-59.0	0.2	0.3	0.5-1.5	1.0-2.0	0.6 Ni 0.3 Sn	Rem.	160	350	15	90	A Manganese bronze that is used primarily for architectural applications as the manganese leads to the formation of an attractive chocolate brown colouration. It offers a very good hot formability and machinability but is not as high in strength as some of the other manganese bronzes due to lower alloying additions
CW721R	CuZn40Mn1Pb1AlFeSn	CZ114	57.0-59.0	0.3-1.3	0.2-1.2	0.8-1.8	0.8-1.6	0.3 Ni 0.2-1.0 Sn	Rem.	180	440	10	110	A high tensile brass or manganese bronze the CW721R has additions of aluminium, iron, tin and manganese to improve strength and corrosion resistances. It has a very good hot working capacity and a good machinability rating. Often used for valves and fittings, pump trim, gears, transmission components, marine hardware and decorative metalwork.
CW722R	CuZn40Mn1Pb1FeSn	CZ115	56.5-58.5	0.1	0.2-1.2	0.8-1.8	0.8-1.6	0.3 Ni 0.2-1.0 Sn	Rem.	180	440	10	110	A high tensile brass similar in nature to the CW721R but with a restricted aluminium content to allow for better joining properties.
CW724R	CuZn21Si3P		75.0-77.0	0.05	0.3	0.05	0.1 0	0.2 Ni 0.02-0.10 P 2.7-3.5 Si 0.3 Sn	Rem.	250	500	15	110	A free machining brass without the addition of lead. This alloy offers a very good machinability and a good hot formability. The CW724 Alloy also meets the ISO 6509 requirements regarding dezincification resistance and complies with UBA Hygienic list. Approved for drinking water contact under 4MS.
CW725R	CuZn33Pb1AlSiAs		64.0-67.0	0.1-0.4	0.3	0.1	0.4-0.9	0.05-0.08 As 0.2 Ni 0.1-0.3 Si 0.3 Sn	Rem.	120	280	20	70	A dezincification resistant brass developed to meet 4MS drinking water requirements. The material offers very good machinability and an ability to be hot worked and stamped. With mechanical properties and the machinability comparable to CW602N it is also dezincification resistant to ISO 6509 after heat treatment. Approved for drinking water contact under 4MS.

#### About this table

Compositions given are the EN materials appropriate to designation number. Composition ranges may be outside those of previous BS specifications, therefore compliance should be checked before assuming suitability for applications. The compositions are shown as either a range or maximum for individual elements. Note that not all elements listed as impurities are shown here. For the full chemical composition you should refer to the standard or the Copper and copper alloys. Compendium of compositions and products PD CEN/TS 13388.

This table includes brasses previously included in BS 2872 'Specification for copper and copper alloy forging stock and forgings'.

These brasses are now included in the following EN standards for individual product forms:

EN 12420 'Copper and copper alloys—Forgings'  
EN 12165 'Copper and copper alloys—Wrought and unwrought forging stock'

#### Table notes

Compositions are given as either a range or a maximum.

Mechanical properties are taken from EN 12420. Tensile properties are for information only. Hardness values in EN 12165 may be slightly different and are given as ranges.

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