

Table 11: Wrought Copper-zinc-lead Alloys (Leaded Brasses) – Compositions, Uses, Typical Properties, Relevant Standards and Machinability

Material Designation		Composition, %, Range or Max.							Nearest Old BS Equivalent	Characteristics and Uses	Typical Mechanical Properties				Inclusion in the following EN Standards with Indicated Material Conditions (1)						Machinability Index (%)		
Symbol	Number	Cu	Al	As	Pb	Sn	Zn	Others Total			0.2% Proof Strength (N/mm ²)	Tensile Strength (N/mm ²)	Elongation (%)	Hardness (HV)	1652	12164	12165	12166	12167	12168		12449	
															Plate, Strip, Sheet, Circles(2)	Free Machining Rod	Forging Stock	Wire	Profiles, Rectangular Bar	Free Machining Hollow Rod		Tubes (2)	
CuZn36Pb3	CW603N	60.0 - 62.0			2.5 - 3.5		Rem.	0.2	CZ124	These alloys have excellent machinability but very limited cold workability. Alloy CW614N is rated as a standard against which other materials are compared. Alloy CW617N is the standard hot forging brass.	160-450	340-580	35-5	90-150		MR	MRH	MRH	MH	MRH	95		
CuZn39Pb3	CW614N	57.0 - 59.0			2.5 - 3.5		Rem.	0.2	CZ121Pb3		150-420	360-580	25-5	100-160		MR	MH	MRH	MRH	MH	MRH	100	
CuZn40Pb2	CW617N	57.0 - 59.0			1.6 - 2.5		Rem.	0.2	CZ122		150-420	360-580	25-5	100-160		MR	MH	MRH	MRH	MH	MRH	90	
CuZn37Pb2	CW606N	61.0 - 62.0			1.6 - 2.5		Rem.	0.2	CZ119, CZ131	These alloys have good machinability and some cold workability for limited bending and riveting.	160-450	300-580	45-5	90-150	RH	MR		MRH	MRH	MH		70	
CuZn38Pb2	CW608N	60.0 - 61.0			1.6 - 2.5		Rem.	0.2	CZ120, CZ128		150-450	360-580	40-5	90-150	RH	MR	MH	MRH	MRH	MH	MRH	75	
CuZn39Pb2	CW612N	59.0 - 60.0			1.6 - 2.5		Rem.	0.2	CZ120, CZ128		150-450	360-580	40-5	90-160	RH	MR	MH	MRH	MRH	MH		80	
CuZn35Pb1	CW600N	62.5 - 64.0			0.8 - 1.6		Rem.	0.1	CZ118	These alloys are machinable and have good to very good cold workability. This group contains the standard alloys for bending, CW610N, and extreme riveting, CW601N.	150-450	300-580	45-10	90-150	RH	MR		MRH	MRH			MRH	50
CuZn35Pb2	CW601N	62.0 - 63.5			1.6 - 2.5		Rem.	0.1	CZ119, CZ131		150-350	330-470	30-10	90-130		MR		MRH	MRH	MH	MRH	65	
CuZn38Pb1	CW607N	60.0 - 61.0			0.8 - 1.6		Rem.	0.2	–		150-420	360-580	30-5	90-150		MR			MRH	MH	MRH	55	
CuZn39Pb0.5	CW610N	59.0 - 60.5			0.2 - 0.8		Rem.	0.2	CZ123, CZ137		150-450	360-580	40-5	90-150	RH	MR	MH	MRH	MRH			50	
CuZn39Pb1	CW611N	59.0 - 60.0			0.8 - 1.6		Rem.	0.2	CZ129		150-420	360-580	30-5	90-150		MR	MH		MRH	MH		60	
CuZn36Pb2As	CW602N	61.0 - 63.0		0.02 - 0.15	1.7 - 2.8		Rem.	0.2	CZ132	Dezincification resistant brass with good machinability and moderate hot and cold workability.	120-200	280-450	40-20	80-140		MR	MH		MRH	MH	MRH	70	
CuZn39Pb2Sn	CW613N	59.0 - 60.0			1.6 - 2.5	0.2 - 0.5	Rem.	0.2	–	These alloys have good machinability and limited cold workability.	150-420	360-580	30-5	90-150				MH		MRH		75	
CuZn40Pb2Sn	CW619N	57.0 - 59.0			1.6 - 2.5	0.2 - 0.5	Rem.	0.2	–		150-420	360-580	25-5	100-160				MH		MRH		85	
CuZn39Pb3Sn	CW615N	57.0 - 59.0			2.5 - 3.5	0.2 - 0.5	Rem.	0.2	–	These alloys are designed for hot forging.	130-160	340-380	20-12	85-95				MH				95	
CuZn40Pb1Al	CW616N	57.0 - 59.0	0.05 - 0.30		1.0 - 2.0		Rem.	0.2	–		130-160	340-380	20-12	85-95				MH				60	
CuZn40Pb2Al	CW618N	57.0 - 59.0	0.05 - 0.5		1.6 - 3.0		Rem.	0.2	–	This group of alloys is used for production of profiles by hot extrusion. Aluminium imparts a golden lustre, avoiding need for further polishing. The alloys with more than 1.6% Pb have very good machinability.	–	–	–	–						M		90	
CuZn41Pb1Al	CW620N	57.0 - 59.0	0.05 - 0.5		0.8 - 1.6		Rem.	0.2	–		–	–	–	–						M		85	
CuZn42PbAl	CW621N	57.0 - 59.0	0.05 - 0.5		0.2 - 0.8		Rem.	0.2	–		–	–	–	–						M		55	
CuZn43Pb1Al	CW622N	55.0 - 57.0	0.05 - 0.5		0.8 - 1.6		Rem.	0.2	–		–	–	–	–						M		60	
CuZn43Pb2Al	CW624N	55.0 - 57.0	0.05 - 0.5		1.6 - 3.0		Rem.	0.2	CZ130		–	–	–	–						M		95	
CuZn43Pb2	CW623N	55.0 - 57.0			1.6 - 3.0		Rem.	0.2	CZ130		150-220	350-420	30-20	100-130						MRH		95	
CuZn37Pb0.5	CW604N	62.0 - 64.0			0.1 - 0.8		Rem.	0.2	–	For manufacture of plate and tube.	160-450	300-580	45-10	80-150	RH						MRH	45	
CuZn37Pb1	CW605N	61.0 - 62.0			0.8 - 1.6		Rem.	0.2	–	For manufacture of tube and hollow rod.	160-340	340-440	35-10	80-130						MH	MRH	50	

Notes:

- (1) M – as manufactured
R – mandatory tensile strength
H – mandatory hardness
- (2) For general purposes