

Table 6a: Unwrought (1) and Wrought Coppers – Compositions, Uses and Typical Properties

Material Designation			Composition, %, Range or Max		Nearest Old BS Equivalent		Characteristics and Uses	Electrical Properties at 20°C (Annealed)		Typical Mechanical Properties							
Symbol	Number		Cu (incl. 0.015 max Ag)	Max of 19 listed elements (2), other than Cu	Unwrought (BS 6017)	Wrought		Max. Mass Resistivity (Ω g/m²)	Nominal Min. Conductivity (% IACS)	0.2% Proof Strength (N/mm²)	Tensile Strength (N/mm²)	Elongation (%)	Hardness (HV)				
	Unwrought	Wrought															
Copper Cathode																	
Cu-CATH-1	CR001A	–	Rem.	0.0065 excl. O 0.04 max O	Cu-CATH-1	–	Flat products for remelting made by electrolytic deposition.	0.15176	101.0	–	–	–	–				
Cu-CATH-2	CR002A	–	99.90 min.	0.03 excl. Ag, O	Cu-CATH-2	–		0.15328	100.0	–	–	–	–				
Coppers ex Cu-CATH-1																	
Cu-ETP1	CR003A	CW003A	Rem.	0.0065 excl. O 0.04 max O	Cu-ETP1	C100	For re-draw to wire; suitable for high speed annealing and enamelling.	0.15176	101.0	Properties similar to those for Cu-ETP							
Cu-OF1	CR007A	CW007A	Rem.	0.0065 excl. O	Cu-OF	C103	Oxygen-free version of ETP1 for use in reducing atmospheres.	0.15176	101.0								
Cu-OFE	CR009A	CW009A	99.99 min.	15 elements listed individually	Cu-OFE	C110	Oxygen-free and low phosphorus coppers, suitable for use in electronic vacuum devices.	0.15176	101.0								
Cu-PHCE	CR022A	CW022A	99.99 min.	P 0.001-0.006 plus 14 elements listed individually	–	–	0.15328	100.0									
Other Unalloyed Coppers																	
Cu-ETP	CR004A	CW004A	99.90 min.	0.03 excl. Ag, O	Cu-ETP-2	C101	Suitable for conductors and fabricated electrical components but not in reducing atmospheres.	0.15328	100.0	50-340	200-400	50-5	40-120				
Cu-FRHC	CR005A	CW005A	99.90 min.	0.04 excl. Ag, O	Cu-FRHC	C102		0.15328	100.0	Properties similar to those for Cu-ETP							
Cu-OF	CR008A	CW008A	99.95 min.	0.03 excl. Ag	Cu-OF	C103	Oxygen-free version of Cu-ETP for use in reducing atmospheres.	0.15328	100.0	50-340	200-400	50-5	40-120				
Cu-FRTP	CR006A	CW006A	99.90 min.	0.05 excl. Ag, Ni, O	Cu-FRTP	C104	General engineering and building applications - not in reducing atmospheres.	–	–	50-340	200-400	50-5	40-120				
Phosphorus-containing Coppers																	
Cu-PHC	CR020A	CW020A	99.95 min.	0.03 excl. Ag & P (P 0.001-0.006)	–	–	Phosphorus deoxidised coppers for general and chemical engineering applications, particularly when brazing or welding is involved. PHC & HCP are suited to electrical applications. Cu-DXP is used for anodes for electroplating.	0.15328	100.0	Properties similar to those for Cu-DLP							
Cu-HCP	CR021A	CW021A	99.95 min.	0.03 excl. Ag & P (P 0.002-0.007)	–	–		0.15596	98.3	50	200	30	45				
Cu-DLP	CR023A	CW023A	99.90 min.	0.03 excl. Ag, Ni & P (P 0.005-0.013)	–	–		–	–	50-340	200-400	50-5	40-120				
Cu-DHP	CR024A	CW024A	99.90 min.	P 0.015-0.040	Cu-DHP	C106		–	–	50-340	200-400	50-5	40-120				
Cu-DXP	CR025A	–	99.90 min.	0.03 excl. Ag, Ni & P (P 0.04-0.06)	–	–		–	–	Properties similar to those for Cu-DLP							
Silver-bearing Coppers																	
Tough Pitch																	
Cu-Ag 0.04	CR011A	CW011A	Rem.	0.03 excl. Ag & O (Ag 0.03-0.05) 0.04 max	Cu-Ag-2	C101	Increasing additions of silver give increase in creep strength and resistance to softening in elevated service temperatures. Good creep resistance to 250°C (short times at 350°C).	0.15328	100.0	Properties similar to those for Cu-ETP at ambient temperatures							
Cu-Ag 0.04	CR012A	CW012A	Rem.	0.03 excl. Ag & O (Ag 0.06-0.08) 0.04 max	Cu-Ag-3	C101		0.15328	100.0								
Cu-Ag 0.10	CR013A	CW013A	Rem.	0.03 excl. Ag & O (Ag 0.08-0.012) 0.04 max	Cu-Ag-4	C101		0.15328	100.0								
Phosphorus Deoxidised																	
Cu-Ag 0.04P	CR014A	CW014A	Rem.	0.03 excl. Ag & P (Ag 0.03-0.05) P 0.001-0.007	–	–		0.15596	98.3								
Cu-Ag 0.07P	CR015A	CW015A	Rem.	0.03 excl. Ag & P (Ag 0.06-0.08) P 0.001-0.007	–	–		0.15596	98.3								
Cu-Ag 0.10P	CR016A	CW016A	Rem.	0.03 excl. Ag & P (Ag 0.08-0.12) P 0.001-0.007	–	–		0.15596	98.3								
Oxygen Free																	
Cu-Ag 0.04(OF)	CR017A	CW017A	Rem.	0.0065 excl. Ag & O (Ag 0.03-0.05)	Cu-Ag-OF2	C103		0.15328	100.0								
Cu-Ag 0.07(OF)	CR018A	CW018A	Rem.	0.0065 excl. Ag & O (Ag 0.06-0.08)	–	–		0.15328	100.0								
Cu-Ag 0.10(OF)	CR019A	CW019A	Rem.	0.0065 excl. Ag & O (Ag 0.08-0.12)	Cu-Ag-OF4	C103	0.15328	100.0									

Notes:

- (1) Unwrought coppers in EN 1976 – Cast Unwrought Copper Products and EN 1978 - Copper Cathodes
- (2) Ag, As, Bi, Cd, Co, Cr, Fe, Mn, Ni, O, P, Pb, S, Sb, Se, Si, Sn, Te, Zn