

Table 9: Wrought Copper-aluminium, Copper-nickel and Copper-nickel-zinc Alloys – Compositions, Uses, Typical Properties, Relevant Standards and Machinability

Material Designation		Composition, %, Range or Max								Nearest Old BS Equivalent	Characteristics and Uses	Typical Mechanical Properties				Shows Inclusion In the following EN Standards with Indicated Material Conditions (1)								Machinability Index (%)					
		Symbol	Number	Cu	Al	Fe	Mn	Ni	Pb			Si	Others and Total Impurities	0.2% Proof Strength (N/mm ²)	Tensile Strength (N/mm ²)	Elongation (%)	Hardness (HV)	1652 Plate, Strip, Sheet, Circles (2)	1653 Plate, Sheet, Circles (3)	1654 Strip for Springs, Connectors	12163 Rod (2)	12165 Forging Stock	12166 Wire		12167 Profiles, Rectangular Bar	12449 Tubes (2)	12451 Tubes for Heat Exchangers	12452 Finned Tubes for Heat Exchangers	
Copper-aluminium (Aluminium Bronze)																													
CuAl5As	CW300G	Rem.	4.0 - 6.5						0.1 - 0.4 As 0.3	-	An alpha phase alloy for tube manufacture. May be heavily cold worked.	130	380	55	85											RH		20	
CuAl6Si2Fe	CW301G	Rem.	6.0 - 6.4	0.5 - 0.7				2.0 - 2.4	0.2	CA107	Medium strength alloys, readily hot worked and moderately cold workable. With machinability of 40-50%, the alloys are suitable for manufacture of items of chemical plant, machine parts, tools and instruments when good corrosion resistance is required.	250-350	500-650	25-10	125-160				MRH	MH		MRH						50	
CuAl7Si2	CW302G	Rem.	7.3 - 7.6					1.5 - 2.2	0.2	-		250-350	500-650	25-10	125-160				MRH	MH		MRH						50	
CuAl8Fe3	CW303G	Rem.	6.5 - 8.5	1.5 - 3.5					0.2	CA106		180-210	460-500	30	125-135	RH	R			MH								20	
CuAl9Ni3Fe2	CW304G	Rem.	8.0 - 9.5	1.0 - 3.0			2.0 - 4.0		0.2	CA105		180	500	30	125		R			MH								20	
CuAl10Fe1	CW305G	Rem.	9.0 - 10.0	0.5 - 1.5					0.3	-		210-480	420-670	22-5	110-205				MRH	MH		MRH						20	
CuAl10Fe3Mn2	CW306G	Rem.	9.0 - 11.0	2.0 - 4.0	1.5 - 3.5				0.2	-	High strength alloys for use in aggressive media when wear resistance and good impact strength are required.	330-510	600-720	15-5	130-210				MRH	MH		MRH						30	
CuAl10Ni5Fe4	CW307G	Rem.	8.5 - 11.0	3.0 - 5.0			4.0 - 6.0		0.2	CA104		400-530	600-760	15-5	170-220		R		MRH	MH		MRH						30	
CuAl11Fe6Ni6	CW308G	Rem.	10.5 - 12.5	5.0 - 7.0			5.0 - 7.0		0.2	-		500-680	750-850	10-5	200-260				MRH	MH		MRH						30	
Copper-nickel																													
CuNi25	CW350H	Rem.				24.0 - 26.0			0.1	CN105	UK "silver" coinage alloy.	120	300	-	85	RH													20
CuNi9Sn2	CW351H	Rem.				8.5 - 10.5			1.8 - 2.8 Sn 0.1	-	Good elastic properties for electrical contacts.	200-550	350-620	45-2	80-220	RH		RHB											20
CuNi10Fe1Mn	CW352H	Rem.		1.0 - 2.0	0.5 - 1.0	9.0 - 11.0			0.2	CN102	Excellent sea-water corrosion resistance. The alloys with 30% nickel have good resistance to erosion.	100-420	290-520	35-8	80-160	RH	R			MRH	MH				RH	RH	RH	20	
CuNi30Fe2Mn2	CW353H	Rem.		1.5 - 2.5	1.5 - 2.5	29.0 - 32.0			0.2	CN108		175	450	35	110											RH		20	
CuNi30Mn1Fe	CW354H	Rem.		0.4 - 1.0	0.5 - 1.5	30.0 - 32.0			0.2	CN107		130-330	350-520	35-12	90-130	RH	R			MRH	MH				RH	RH	RH	20	
Copper-nickel-zinc (Nickel Silver)																													
CuNi10Zn27	CW401J	61.0 - 64.0				9.0 - 11.0			Zn Rem. 0.2	NS103	Alpha phase alloys with good corrosion resistance. Colour becomes whiter as nickel content increases. Lead, when present, improves machinability. Applications include tableware, telecommunication components, decorative building features and general mechanical and food manufacturing equipment.	180-880	360-880	50-2	80-210	RHG					MRHG								30
CuNi12Zn24	CW403J	63.0 - 66.0				11.0 - 13.0			Zn Rem. 0.2	NS104		180-800	360-880	50-2	80-210	RHG		RH	MRH		MRHG	MRH	RH						30
CuNi12Zn25Pb1	CW404J	60.0 - 63.0				11.0 - 13.0	0.5 - 1.5		Zn Rem. 0.2	NS111		260-650	380-730	20-2	110-210	RH													75
CuNi12Zn29	CW405J	57.0 - 60.0				11.0 - 13.5			Zn Rem. 0.2	-		450-720	520-820	4-2	170-240			RH											30
CuNi12Zn30Pb1	CW406J	56.0 - 58.0				11.0 - 13.0	0.5 - 1.5		Zn Rem. 0.2	-		300-440	410-550	15-2	110-190					MRH	MRH								80
CuNi18Zn19Pb1	CW408J	59.5 - 62.5				17.0 - 19.0	0.5 - 1.5		Zn Rem. 0.2	NS113		320-460	450-600	15-2	120-200					MRH	MRH								75
CuNi18Zn20	CW409J	60.0 - 63.0				17.0 - 19.0			Zn Rem. 0.2	NS106		200-800	380-900	40-2	85-230	RHG		RHB	MRH		MRHG	MRH	RH						30
CuNi18Zn27	CW410J	53.0 - 56.0				17.0 - 19.0			Zn Rem. 0.2	NS107	280-680	400-820	45-2	90-230	RH		RH											30	
CuNi7Zn39Pb3Mn2	CW400J	47.0 - 50.0		1.5 - 3.0		6.0 - 8.0	2.3 - 3.3		Zn Rem. 0.2	-	Two-phase, alpha-beta alloys for similar applications to those above but for use when hot formability is required for production of forgings or hot extruded architectural profiles.	250-620	460-720	20-2	120-220					MH	MRH	MRH						90	
CuNi10Zn42Pb2	CW402J	45.0 - 48.0				9.0 - 11.0	1.0 - 2.5		Zn Rem. 0.2	NS101	250-500	460-660	15-2	120-220					MH	MRH	MRH							90	
CuNi12Zn38Mn5Pb2	CW407J	42.0 - 45.0			4.5 - 6.0	11.0 - 13.0	1.0 - 2.5		Zn Rem. 0.2	-	400-450	600-660	8	165-190							MRH							80	

- Notes:**
- (1) M - as manufactured
 - R - mandatory tensile strength
 - H - mandatory hardness
 - G - mandatory grain size
 - B - mandatory spring bending limit
 - (2) For general purposes
 - (3) For boilers, pressure vessels and hot water storage units