



BSI Standards Publication

Copper and copper alloys — Compendium of compositions and products

National foreword

This Published Document is the UK implementation of CEN/TS 13388:2015. It supersedes PD CEN/TS 13388:2013 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee NFE/34, Copper and copper alloys.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

Copper and copper alloys - Compendium of compositions and products

Cuivre et alliages de cuivre - Inventaire des compositions et des produits

Kupfer und Kupferlegierungen - Übersicht über Zusammensetzungen und Produkte

This Technical Specification (CEN/TS) was approved by CEN on 21 March 2015 for provisional application.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (CEN/TS 13388:2015) has been prepared by Technical Committee CEN/TC 133 “Copper and copper alloys”, the secretariat of which is held by DIN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN/TS 13388:2013.

In comparison with CEN/TS 13388:2013, the following changes were made:

- a) modifications regarding materials and compositions from EN 12420:2014, EN 13600:2013, EN 13601:2013 and EN 13602:2013 considered;
- b) last paragraph of the “Scope” deleted;
- c) 3.5 “Composition of filler metals” deleted;
- d) 4.4 “Filler metals” deleted;
- e) Clause 5 “Copper and copper alloys standardised by other CEN Technical Committees” deleted;
- f) Clause 6 “Copper and copper alloys registered by CEN/TC 133” deleted.

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Introduction

CEN/TC 133 "Copper and copper alloys" was established in 1988 to prepare and maintain standards in the field of unwrought, wrought and cast products made from copper and copper alloys. Its responsibilities included developing, defining, specifying and giving guidance on, as appropriate, material compositions, designations, terminology, dimensions and tolerances, mechanical and physical characteristics, conditions of delivery and methods of testing peculiar to copper and copper alloys.

During the development of standards for copper and copper alloy products, the experts realized the necessity and seized the opportunity:

- a) to coordinate and in some cases also to rationalize the composition limits which already existed for the various product forms;
- b) to establish unique, new and identifiably European designations for copper and copper alloys, including a numerical option to be particularly convenient for computerized handling;
- c) to confirm, clarify and redefine where necessary, the terminology which already existed in common usage, at the international level or in customs nomenclature.

CEN/TC 133 decided, in view of the new form of presentation and new parameters for the description and provision of information on copper and copper alloy products, to prepare and publish the present consolidation and summary of essential details.

1 Scope

This Technical Specification provides a summary of material designations, compositions and the product forms in which they are available, for coppers and copper alloys standardized in European Standards by CEN/TC 133 “Copper and copper alloys”.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1976, *Copper and copper alloys — Cast unwrought copper products*

EN 1982:2008, *Copper and copper alloys — Ingots and castings*

3 Compositions of coppers and copper alloys standardised by CEN/TC 133

3.1 Composition of coppers

The symbol and number designations and compositions of copper grades are given in the following tables:

- Table 1.1 — Composition of copper cathodes according to EN 1978:1998, Cu-CATH-1 (CR001A) and Cu-CATH-2 (CR002A)
- Table 1.2 — Composition of unalloyed copper grades made from Cu-CATH-1 (CR001A) according to EN 1978
- Table 1.3 — Composition of unalloyed copper grades, other than those made from Cu-CATH-1 (CR001A) according to EN 1978
- Table 1.4 — Composition of phosphorus-containing copper grades
- Table 1.5 — Composition of silver-containing copper grades (silver-bearing coppers)

3.2 Composition of copper alloys

The symbol and number designations and compositions of copper alloys are given in the following tables:

- Table 2 — Composition of copper alloys, low alloyed (less than 5 % alloying elements)
- Table 3 — Composition of copper-aluminium alloys
- Table 4 — Composition of copper-nickel alloys
- Table 5 — Composition of copper-nickel-zinc alloys
- Table 6 — Composition of copper-tin alloys
- Table 7 — Composition of copper-zinc alloys, binary
- Table 8 — Composition of copper-zinc-lead alloys
- Table 9 — Composition of copper-zinc alloys, complex

3.3 Composition of master alloys

The symbol and number designations and compositions of master alloys in accordance with EN 1981:2003 are given in Table 11.

3.4 Composition of ingots and castings

The symbol and number designations and compositions of ingots and castings in accordance with EN 1982:2008 are given in the following tables:

- Table 12.1 — Ingots and castings — Copper and copper-chromium alloys — Compositions and casting processes
- Table 12.2 — Ingots and castings — Copper-zinc alloys — Composition and casting processes
- Table 12.3 — Ingots and castings — Copper-tin alloys — Composition and casting processes
- Table 12.4 — Ingots and castings — Copper-tin-lead alloys — Composition and casting processes
- Table 12.5 — Ingots and castings — Copper-aluminium alloys — Composition and casting processes
- Table 12.6 — Ingots and castings — Copper-manganese-aluminium alloys — Composition and casting processes
- Table 12.7 — Ingots and castings — Copper-nickel alloys — Composition and casting processes

3.5 Composition of copper and copper alloy scrap

The symbol and number designations and compositions of copper and copper alloy scrap in accordance with EN 12861:1999 are given in Table 13.

4 Available product forms of copper and copper alloys

4.1 Wrought coppers and copper alloys

The product forms and applicable standards are given in Table 10.

4.2 Master alloys

The product forms are given in Table 11.

4.3 Ingots and castings

The product forms are given in Tables 12.1 to 12.7.

4.4 Scrap

The product forms are given in Table 13.

4.5 Copper and copper alloy grooved contact wires

The product forms are given in Table 14.

Table 1.1 — Composition of copper cathodes according to EN 1978:1998, Cu-CATH-1 (CR001A) and Cu-CATH-2 (CR002A)

Material designation		Composition in % (mass fraction)																				
		Element	Cu	Ag	As	Bi	Cd	Co	Cr	Fe	Mn	Ni	P	Pb	S	Sb	Se	Si	Sn	Te	Zn	Sum of elements listed in this table other than copper
Symbol	Number																					
Cu-CATH-1	CR001A	min.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		max.	—	0,002 5	0,000 5 ^a	0,000 20 ^b	— ^a	— ^c	— ^a	0,001 0 ^c	— ^a	— ^c	— ^a	0,000 5	0,001 5 ^d	0,000 4 ^a	0,000 20 ^b	— ^c	— ^c	0,000 20 ^b	— ^c	0,006 5
Cu-CATH-2	CR002A	min.	99,90 ^e	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		max.	—	—	—	0,000 5	—	—	—	—	—	—	—	0,005	—	—	—	—	—	—	—	0,03 excluding Ag
^a (As + Cd + Cr + Mn + P + Sb) maximum 0,001 5 %.																						
^b (Bi + Se + Te) maximum 0,000 3 %, of which (Se + Te) maximum 0,000 30 %.																						
^c (Co + Fe + Ni + Si + Sn + Zn) maximum 0,002 0 %.																						
^d The sulfur content shall be determined on a cast sample.																						
^e Including silver up to a maximum of 0,015 %.																						

Table 1.2 — Composition of unalloyed copper grades made from Cu-CATH-1 (CR001A) according to EN 1978

Material designation			Composition in % (mass fraction)													
Symbol	Number		Element	Cu	Ag	As	Bi	Cd	Co	Cr	Fe	Mn	Ni	O	P	Pb
	unwrought copper	wrought copper														
Cu-ETP1	CR003A	CW003A	min. max.	— —	— 0,002 5	— 0,000 5 ^a	— 0,000 20 ^b	— — ^a	— — ^c	— — ^a	— 0,001 0 ^c	— — ^a	— — ^c	— 0,040	— — ^a	— 0,000 5
Cu-OF1	CR007A	CW007A	min. max.	— —	— 0,002 5	— 0,000 5 ^a	— 0,000 20 ^b	— — ^a	— — ^c	— — ^a	— 0,001 0 ^c	— — ^a	— — ^c	— — ^d	— — ^a	— 0,000 5
Cu-OFE	CR009A	CW009A	min. max.	99,99 —	— 0,002 5	— 0,000 5	— 0,000 20	— 0,000 1	— —	— —	— 0,001 0	— 0,000 5	— 0,001 0	— — ^d	— 0,000 3	— 0,000 5
Cu-PHCE	CR022A	CW022A	min. max.	99,99 —	— 0,002 5	— 0,000 5	— 0,000 20	— 0,000 1	— —	— —	— 0,001 0	— 0,000 5	— 0,001 0	— — ^d	0,001 0,006	— 0,000 5

Material designation			Composition in % (mass fraction)									
Symbol	Number		Element	S	Sb	Se	Si	Sn	Te	Zn	Elements listed in this table other than copper	
	unwrought copper	wrought copper									total	excluding
Cu-ETP1	CR003A	CW003A	min. max.	— 0,001 5	— 0,000 4 ^a	— 0,000 20 ^b	— — ^c	— — ^c	— 0,000 20 ^b	— — ^c	— 0,006 5	O
Cu-OF1	CR007A	CW007A	min. max.	— 0,001 5	— 0,000 4 ^a	— 0,000 20 ^b	— — ^c	— — ^c	— 0,000 20 ^b	— — ^c	— 0,006 5	O
Cu-OFE	CR009A	CW009A	min. max.	— 0,001 5	— 0,000 4	— 0,000 20	— —	— 0,000 2	— 0,000 20	— 0,000 1	— —	—
Cu-PHCE	CR022A	CW022A	min. max.	— 0,001 5	— 0,000 4	— 0,000 20	— —	— 0,000 2	— 0,000 20	— 0,000 1	— —	—

^a (As + Cd + Cr + Mn + P + Sb) max. 0,001 5 %.

^b (Bi + Se + Te) max. 0,000 3 %, of which (Se + Te) max. 0,000 30 %.

^c (Co + Fe + Ni + Si + Sn + Zn) max. 0,002 0 %.

^d The oxygen content shall be controlled by the manufacturer so that the material conforms to the hydrogen embrittlement requirements of EN 1976.

**Table 1.3 — Composition of unalloyed copper grades,
other than those made from Cu-CATH-1 (CR001A) according to EN 1978**

Material designation			Composition in % (mass fraction)						
Symbol	Number		Element	Cu ^a	Bi	O	Pb	Other elements (see note)	
	unwrought copper	wrought copper						total	excluding
Cu-ETP	CR004A	CW004A	min. max.	99,90 —	— 0,000 5	— 0,040 ^b	— 0,005	— 0,03	Ag, O
Cu-FRHC	CR005A	CW005A	min. max.	99,90 —	— —	— 0,040 ^b	— —	— 0,06 ^d	Ag, O
Cu-FRTP	CR006A	CW006A	min. max.	99,90 —	— —	— 0,100	— —	— 0,05	Ag, Ni, O
Cu-OF	CR008A	CW008A	min. max.	99,95 —	— 0,000 5	— — ^c	— 0,005	— 0,03	Ag
NOTE The total of other elements (than copper) is defined as the sum of Ag, As, Bi, Cd, Co, Cr, Fe, Mn, Ni, O, P, Pb, S, Sb, Se, Si, Sn, Te and Zn, subject to the exclusion of any individual elements indicated.									
^a Including silver, up to a maximum of 0,015 %.									
^b Oxygen content up to 0,060 % is permitted, subject to agreement between the purchaser and the supplier.									
^c The oxygen content shall be controlled by the manufacturer so that the material conforms to the hydrogen embrittlement requirements of EN 1976.									
^d Higher total impurities content is permitted, subject to agreement between the purchaser and the supplier.									

Table 1.4 — Composition of phosphorus-containing copper grades

Material designation			Composition in % (mass fraction)						
Symbol	Number		Element	Cu ^a	Bi	P	Pb	Other elements (see note)	
	unwrought copper	wrought copper						total	excluding
Cu-PHC	CR020A	CW020A	min. max.	99,95 —	— 0,000 5	0,001 0,006	— 0,005	— 0,03 ^b	Ag, P
Cu-HCP	CR021A	CW021A	min. max.	99,95 —	— 0,000 5	0,002 0,007	— 0,005	— 0,03 ^b	Ag, P
Cu-DLP	CR023A	CW023A	min. max.	99,90 —	— 0,000 5	0,005 0,013	— 0,005	— 0,03	Ag, Ni, P
Cu-DHP	CR024A	CW024A	min. max.	99,90 —	— —	0,015 0,040	— —	— — ^c	—
Cu-DXP	CR025A	—	min. max.	99,90 —	— 0,000 5	0,04 0,06	— 0,005	— 0,03	Ag, Ni, P
NOTE The total of other elements (than copper) is defined as the sum of Ag, As, Bi, Cd, Co, Cr, Fe, Mn, Ni, O, P, Pb, S, Sb, Se, Si, Sn, Te and Zn, subject to the exclusion of any individual elements indicated.									
^a Including silver, up to a maximum of 0,015 %.									
^b The oxygen content shall be controlled by the manufacturer so that the material conforms to the hydrogen embrittlement requirements of EN 1976.									
^c If required, the permitted total of elements, other than silver and phosphorus, should be agreed between the purchaser and the supplier.									

Table 1.5 — Composition of silver-containing copper grades (silver-bearing coppers)

Material designation			Composition in % (mass fraction)							
Symbol	Number		Element	Cu	Ag	Bi	O	P	Other elements (see note)	
	unwrought copper	wrought copper							total	excluding
CuAg0,04	CR011A	CW011A	min. max.	Rem. —	0,03 0,05	— 0,000 5	— 0,040	— —	— 0,03	Ag, O
CuAg0,07	CR012A	CW012A	min. max.	Rem. —	0,06 0,08	— 0,000 5	— 0,040	— —	— 0,03	Ag, O
CuAg0,10	CR013A	CW013A	min. max.	Rem. —	0,08 0,12	— 0,000 5	— 0,040	— —	— 0,03	Ag, O
CuAg0,04P	CR014A	CW014A	min. max.	Rem. —	0,03 0,05	— 0,000 5	— — ^a	0,001 0,007	— 0,03	Ag, P
CuAg0,07P	CR015A	CW015A	min. max.	Rem. —	0,06 0,08	— 0,000 5	— — ^a	0,001 0,007	— 0,03	Ag, P
CuAg0,10P	CR016A	CW016A	min. max.	Rem. —	0,08 0,12	— 0,000 5	— — ^a	0,001 0,007	— 0,03	Ag, P
CuAg0,04(OF)	CR017A	CW017A	min. max.	Rem. —	0,03 0,05	— 0,000 5	— — ^a	— —	— 0,006 5	Ag, O
CuAg0,07(OF)	CR018A	CW018A	min. max.	Rem. —	0,06 0,08	— 0,000 5	— — ^a	— —	— 0,006 5	Ag, O
CuAg0,10(OF)	CR019A	CW019A	min. max.	Rem. —	0,08 0,12	— 0,000 5	— — ^a	— —	— 0,006 5	Ag, O
NOTE The total of other elements (than copper) is defined as the sum of Ag, As, Bi, Cd, Co, Cr, Fe, Mn, Ni, O, P, Pb, S, Sb, Se, Si, Sn, Te and Zn, subject to the exclusion of any individual elements indicated.										
^a The oxygen content shall be controlled by the manufacturer so that the material conforms to the hydrogen embrittlement requirements of EN 1976.										

Table 2 — Composition of copper alloys, low alloyed (less than 5 % alloying elements) (1 of 2)

Material designation		Composition in % (mass fraction)																		Density ^a g/cm ³ approx.
Symbol	Number	Element	Cu	Al	Be	Co	Cr	Fe	Mn	Ni	P	Pb	S	Si	Sn	Te	Zn	Zr	Others total	
CuBe1,7	CW100C	min. max.	Rem. —	— —	1,6 1,8	— 0,3	— —	— 0,2	— —	— 0,3	— —	— —	— —	— —	— —	— —	— —	— —	— 0,5	8,3
CuBe2	CW101C	min. max.	Rem. —	— —	1,8 2,1	— 0,3	— —	— 0,2	— —	— 0,3	— —	— —	— —	— —	— —	— —	— —	— —	— 0,5	8,3
CuBe2Pb	CW102C	min. max.	Rem. —	— —	1,8 2,0	— 0,3	— —	— 0,2	— —	— 0,3	— —	0,2 0,6	— —	— —	— —	— —	— —	— —	— 0,5	8,3
CuCo1Ni1Be	CW103C	min. max.	Rem. —	— —	0,4 0,7	0,8 1,3	— —	— 0,2	— —	0,8 1,3	— —	— —	— —	— —	— —	— —	— —	— —	— 0,5	8,8
CuCo2Be	CW104C	min. max.	Rem. —	— —	0,4 0,7	2,0 2,8	— —	— 0,2	— —	— 0,3	— —	— —	— —	— —	— —	— —	— —	— —	— 0,5	8,8
CuCr1	CW105C	min. max.	Rem. —	— —	— —	— —	0,5 1,2	— 0,08	— —	— —	— —	— —	— —	— 0,1	— —	— —	— —	— —	— 0,2	8,9
CuCr1Zr	CW106C	min. max.	Rem. —	— —	— —	— —	0,5 1,2	— 0,08	— —	— —	— —	— —	— —	— 0,1	— —	— —	— —	0,03 0,3	— 0,2	8,9
CuFe2P	CW107C	min. max.	Rem. —	— —	— —	— —	— —	2,1 2,6	— —	— —	0,015 0,15	— 0,03	— —	— —	— —	— —	0,05 0,20	— —	— 0,2	8,8
CuNi1P	CW108C	min. max.	Rem. —	— —	— —	— —	— —	— —	— —	0,8 1,2	0,15 0,25	— —	— —	— —	— —	— —	— —	— —	— 0,1	8,9
CuNi1Si	CW109C	min. max.	Rem. —	— —	— —	— —	— —	— 0,2	— 0,1	1,0 1,6	— —	— 0,02	— —	0,4 0,7	— —	— —	— —	— —	— 0,3	8,8
CuNi2Be	CW110C	min. max.	Rem. —	— —	0,2 0,6	— 0,3	— —	— 0,2	— —	1,4 2,4	— —	— —	— —	— —	— —	— —	— —	— —	— 0,5	8,8
CuNi2Si	CW111C	min. max.	Rem. —	— —	— —	— —	— —	— 0,2	— 0,1	1,6 2,5	— —	— 0,02	— —	0,4 0,8	— —	— —	— —	— —	— 0,3	8,8

Table 2 (2 of 2)

Material designation		Composition in % (mass fraction)																		Density ^a g/cm ³ approx.
Symbol	Number	Element	Cu	Al	Be	Co	Cr	Fe	Mn	Ni	P	Pb	S	Si	Sn	Te	Zn	Zr	Others total	
CuNi3Si1	CW112C	min. max.	Rem. —	— —	— —	— —	— —	— 0,2	— 0,1	2,6 4,5	— —	— 0,02	— —	0,8 1,3	— —	— —	— —	— —	— 0,5	8,8
CuPb1P	CW113C	min. max.	Rem. —	— —	— —	— —	— —	— —	— —	— —	0,003 0,012	0,7 1,5	— —	— —	— —	— —	— —	— —	— 0,1	8,9
CuSP	CW114C	min. max.	Rem. —	— —	— —	— —	— —	— —	— —	— —	0,003 0,012	— —	0,2 0,7	— —	— —	— —	— —	— —	— 0,1	8,9
CuSi1	CW115C	min. max.	Rem. —	— 0,02	— —	— —	— —	— 0,8	— 0,7	— —	— 0,02	— 0,05	— —	0,8 2,0	— —	— —	— 1,5	— —	— 0,5	8,8
CuSi3Mn1	CW116C	min. max.	Rem. —	— 0,05	— —	— —	— —	— 0,2	0,7 1,3	— —	— 0,05	— 0,05	— —	2,7 3,2	— —	— —	— 0,4	— —	— 0,5	8,8
CuSn0,15	CW117C	min. max.	Rem. —	— —	— —	— —	— —	— 0,02	— —	— 0,02	— 0,015	— —	— —	— —	0,10 0,15	— —	— 0,10	— —	— 0,10	8,9
CuTeP	CW118C	min. max.	Rem. —	— —	— —	— —	— —	— —	— —	— —	0,003 0,012	— —	— —	— —	— —	0,4 0,7	— —	— —	— 0,1	8,9
CuZn0,5	CW119C	min. max.	Rem. —	— —	— —	— —	— —	— —	— —	— —	— 0,02	— —	— —	— —	— —	— —	0,1 1,0	— —	— 0,1	8,9
CuZr	CW120C	min. max.	Rem. —	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	0,1 0,2	— 0,1	8,9
CuSi3Zn2P	CW121C	min. max.	Rem. —	— —	— —	— —	— —	— —	— 0,20	— 0,20	0,01 0,20	— 0,10	— —	2,5 3,5	— —	— —	1,0 3,0	— —	— 0,2	8,6

^a For information only.

Table 3 — Composition of copper-aluminium alloys

Material designation		Composition in % (mass fraction)													Density ^a g/cm ³ approx.
Symbol	Number	Element	Cu	Al	As	Fe	Mn	Ni	P	Pb	Si	Sn	Zn	Others total	
CuAl5As	CW300G	min. max.	Rem. —	4,0 6,5	0,1 0,4	— 0,2	— 0,2	— 0,2	— —	— 0,02	— —	— 0,05	— 0,3	— 0,3	8,2
CuAl6Si2Fe	CW301G	min. max.	Rem. —	6,0 6,4	— —	0,5 0,7	— 0,1	— 0,1	— —	— 0,05	2,0 2,4	— 0,1	— 0,4	— 0,2	7,7
CuAl7Si2	CW302G	min. max.	Rem. —	6,3 7,6	— —	— 0,3	— 0,2	— 0,2	— —	— 0,05	1,5 2,2	— 0,2	— 0,5	— 0,2	7,7
CuAl8Fe3	CW303G	min. max.	Rem. —	6,5 8,5	— —	1,5 3,5	— 1,0	— 1,0	— —	— 0,05	— 0,2	— 0,1	— 0,5	— 0,2	7,7
CuAl9Ni3Fe2	CW304G	min. max.	Rem. —	8,0 9,5	— —	1,0 3,0	— 2,5	2,0 4,0	— —	— 0,05	— 0,1	— 0,1	— 0,2	— 0,3	7,4
CuAl10Fe1	CW305G	min. max.	Rem. —	9,0 10,0	— —	0,5 1,5	— 0,5	— 1,0	— —	— 0,02	— 0,2	— 0,1	— 0,5	— 0,2	7,6
CuAl10Fe3Mn2	CW306G	min. max.	Rem. —	9,0 11,0	— —	2,0 4,0	1,5 3,5	— 1,0	— —	— 0,05	— 0,2	— 0,1	— 0,5	— 0,2	7,6
CuAl10Ni5Fe4	CW307G	min. max.	Rem. —	8,5 11,0	— —	3,0 5,0	— 1,0	4,0 6,0	— —	— 0,05	— 0,2	— 0,1	— 0,4	— 0,2	7,6
CuAl11Fe6Ni6	CW308G	min. max.	Rem. —	10,5 12,5	— —	5,0 7,0	— 1,5	5,0 7,0	— —	— 0,05	— 0,2	— 0,1	— 0,5	— 0,2	7,4
CuAl5Zn5Sn1	CW309G	min. max.	Rem. —	4,0 6,0	— —	0,15 —	— —	— —	— 0,05	— —	— —	0,3 1,5	4,0 6,0	— 0,5	8,2

^a For information only.

Table 4 — Composition of copper-nickel alloys

Material designation		Composition in % (mass fraction)													Density ^a g/cm ³ approx.
Symbol	Number	Element	Cu	C	Co	Fe	Mn	Ni	P	Pb	S	Sn	Zn	Others total	
CuNi25	CW350H	min. max.	Rem. —	— 0,05	— 0,1	— 0,3	— 0,5	24,0 26,0	— —	— 0,02	— 0,05	— 0,03	— 0,5	— 0,1	8,9
CuNi9Sn2	CW351H	min. max.	Rem. —	— —	— —	— 0,3	— 0,3	8,5 10,5	— —	— 0,03	— —	1,8 2,8	— 0,1	— 0,1	8,9
CuNi10Fe1Mn	CW352H	min. max.	Rem. —	— 0,05	— 0,1 ^b	1,0 2,0	0,5 1,0	9,0 11,0	— 0,02	— 0,02	— 0,05	— 0,03	— 0,5	— 0,2	8,9
CuNi30Fe2Mn2	CW353H	min. max.	Rem. —	— 0,05	— 0,1 ^b	1,5 2,5	1,5 2,5	29,0 32,0	— 0,02	— 0,02	— 0,05	— 0,05	— 0,5	— 0,2	8,9
CuNi30Mn1Fe	CW354H	min. max.	Rem. —	— 0,05	— 0,1 ^b	0,4 1,0	0,5 1,5	30,0 32,0	— 0,02	— 0,02	— 0,05	— 0,05	— 0,5	— 0,2	8,9

^a For information only.

^b Co max. 0,1 % is counted as Ni.

Table 5 — Composition of copper-nickel-zinc alloys

Material designation		Composition in % (mass fraction)									Density ^a g/cm ³ approx.
		Element	Cu	Fe	Mn	Ni	Pb	Sn	Zn	Others total	
CuNi7Zn39Pb3Mn2	CW400J	min. max.	47,0 50,0	— 0,3	1,5 3,0	6,0 8,0	2,3 3,3	— 0,2	Rem. —	— 0,2	8,5
CuNi10Zn27	CW401J	min. max.	61,0 64,0	— 0,3	— 0,5	9,0 11,0	— 0,05	— —	Rem. —	— 0,2	8,6
CuNi10Zn42Pb2	CW402J	min. max.	45,0 48,0	— 0,3	— 0,5	9,0 11,0	1,0 2,5	— 0,2	Rem. —	— 0,2	8,4
CuNi12Zn24	CW403J	min. max.	63,0 66,0	— 0,3	— 0,5	11,0 13,0	— 0,03	— 0,03	Rem. —	— 0,2	8,7
CuNi12Zn25Pb1	CW404J	min. max.	60,0 63,0	— 0,3	— 0,5	11,0 13,0	0,5 1,5	— 0,2	Rem. —	— 0,2	8,7
CuNi12Zn29	CW405J	min. max.	57,0 60,0	— 0,3	— 0,5	11,0 13,5	— 0,03	— 0,03	Rem. —	— 0,2	8,6
CuNi12Zn30Pb1	CW406J	min. max.	56,0 58,0	— 0,3	— 0,5	11,0 13,0	0,5 1,5	— 0,2	Rem. —	— 0,2	8,6
CuNi12Zn38Mn5Pb2	CW407J	min. max.	42,0 45,0	— 0,3	4,5 6,0	11,0 13,0	1,0 2,5	— 0,2	Rem. —	— 0,2	8,4
CuNi18Zn19Pb1	CW408J	min. max.	59,5 62,5	— 0,3	— 0,7	17,0 19,0	0,5 1,5	— 0,2	Rem. —	— 0,2	8,7
CuNi18Zn20	CW409J	min. max.	60,0 63,0	— 0,3	— 0,5	17,0 19,0	— 0,03	— 0,03	Rem. —	— 0,2	8,7
CuNi18Zn27	CW410J	min. max.	53,0 56,0	— 0,3	— 0,5	17,0 19,0	— 0,03	— 0,03	Rem. —	— 0,2	8,7
^a For information only.											

Table 6 — Composition of copper-tin alloys

Material designation		Composition in % (mass fraction)										Density ^a g/cm ³ approx.
		Element	Cu	Fe	Ni	P	Pb	Sn	Te	Zn	Others total	
CuSn4	CW450K	min. max.	Rem. —	— 0,1	— 0,2	0,01 0,4	— 0,02	3,5 4,5	— —	— 0,2	— 0,2	8,9
CuSn5	CW451K	min. max.	Rem. —	— 0,1	— 0,2	0,01 0,4	— 0,02	4,5 5,5	— —	— 0,2	— 0,2	8,9
CuSn6	CW452K	min. max.	Rem. —	— 0,1	— 0,2	0,01 0,4	— 0,02	5,5 7,0	— —	— 0,2	— 0,2	8,8
CuSn8	CW453K	min. max.	Rem. —	— 0,1	— 0,2	0,01 0,4	— 0,02	7,5 8,5	— —	— 0,2	— 0,2	8,8
CuSn3Zn9	CW454K	min. max.	Rem. —	— 0,1	— 0,2	— 0,2	— 0,1	1,5 3,5	— —	7,5 10,0	— 0,2	8,8
CuSn4Pb2P	CW455K	min. max.	Rem. —	— 0,1	— 0,2	0,2 0,4	1,5 2,5	3,5 4,5	— —	— 0,3	— 0,2	8,9
CuSn4Pb4Zn4	CW456K	min. max.	Rem. —	— 0,1	— 0,2	0,01 0,4	3,5 4,5	3,5 4,5	— 0,2	3,5 4,5	— 0,2	8,9
CuSn4Te1P	CW457K	min. max.	Rem. —	— 0,1	— 0,2	0,1 0,4	— —	4,0 5,0	0,5 1,0	— 0,3	— 0,2	8,9
CuSn5Pb1	CW458K	min. max.	Rem. —	— 0,1	— 0,2	0,01 0,4	0,5 1,5	3,5 5,5	— —	— 0,3	— 0,2	8,8
CuSn8P	CW459K	min. max.	Rem. —	— 0,1	— 0,3	0,2 0,4	— 0,05	7,5 8,5	— —	— 0,3	— 0,2	8,8
CuSn8PbP	CW460K	min. max.	Rem. —	— 0,1	— 0,3	0,2 0,4	0,1 0,5	7,5 9,0	— —	— 0,3	— 0,2	8,8

^a For information only.

Table 7 — Composition of copper-zinc alloys, binary

Material designation		Composition in % (mass fraction)										Density ^a g/cm ³ approx.
Symbol	Number	Element	Cu	As	Al	Fe	Ni	Pb	Sn	Zn	Others total	
CuZn5	CW500L	min. max.	94,0 96,0	— —	— 0,02	— 0,05	— 0,3	— 0,05	— 0,1	Rem. —	— 0,1	8,9
CuZn10	CW501L	min. max.	89,0 91,0	— —	— 0,02	— 0,05	— 0,3	— 0,05	— 0,1	Rem. —	— 0,1	8,8
CuZn15	CW502L	min. max.	84,0 86,0	— —	— 0,02	— 0,05	— 0,3	— 0,05	— 0,1	Rem. —	— 0,1	8,8
CuZn20	CW503L	min. max.	79,0 81,0	— —	— 0,02	— 0,05	— 0,3	— 0,05	— 0,1	Rem. —	— 0,1	8,7
CuZn28	CW504L	min. max.	71,0 73,0	— —	— 0,02	— 0,05	— 0,3	— 0,05	— 0,1	Rem. —	— 0,1	8,6
CuZn30	CW505L	min. max.	69,0 71,0	— —	— 0,02	— 0,05	— 0,3	— 0,05	— 0,1	Rem. —	— 0,1	8,5
CuZn33	CW506L	min. max.	66,0 68,0	— —	— 0,02	— 0,05	— 0,3	— 0,05	— 0,1	Rem. —	— 0,1	8,5
CuZn36	CW507L	min. max.	63,5 65,5	— —	— 0,02	— 0,05	— 0,3	— 0,05	— 0,1	Rem. —	— 0,1	8,4
CuZn37	CW508L	min. max.	62,0 64,0	— —	— 0,05	— 0,1	— 0,3	— 0,1	— 0,1	Rem. —	— 0,1	8,4
CuZn40	CW509L	min. max.	59,0 61,5	— —	— 0,05	— 0,2	— 0,3	— 0,2	— 0,2	Rem. —	— 0,2	8,4
CuZn42	CW510L	min. max.	57,0 59,0	— —	— 0,05	— 0,3	— 0,3	— 0,2	— 0,3	Rem. —	— 0,2	8,4
CuZn38As	CW511L	min. max.	61,5 63,5	0,02 0,15	— 0,05	— 0,1	— 0,3	— 0,2	— 0,1	Rem. —	— 0,2	8,4
^a For information only.												

Table 8 — Composition of copper-zinc-lead alloys (1 of 2)

Material designation		Composition in % (mass fraction)											Density ^a g/cm ³ approx.
Symbol	Number	Element	Cu	Al	As	Fe	Mn	Ni	Pb	Sn	Zn	Others total	
CuZn35Pb1	CW600N	min. max.	62,5 64,0	— 0,05	— —	— 0,1	— —	— 0,3	0,8 1,6	— 0,1	Rem. —	— 0,1	8,5
CuZn35Pb2	CW601N	min. max.	62,0 63,5	— 0,05	— —	— 0,1	— —	— 0,3	1,6 2,5	— 0,1	Rem. —	— 0,1	8,5
CuZn36Pb2As	CW602N	min. max.	61,0 63,0	— 0,05	0,02 0,15	— 0,1	— 0,1	— 0,3	1,7 2,8	— 0,1	Rem. —	— 0,2	8,4
CuZn36Pb3	CW603N	min. max.	60,0 62,0	— 0,05	— —	— 0,3	— —	— 0,3	2,5 3,5	— 0,2	Rem. —	— 0,2	8,5
CuZn37Pb0,5	CW604N	min. max.	62,0 64,0	— 0,05	— —	— 0,1	— —	— 0,3	0,1 0,8	— 0,2	Rem. —	— 0,2	8,4
CuZn37Pb1	CW605N	min. max.	61,0 62,0	— 0,05	— —	— 0,2	— —	— 0,3	0,8 1,6	— 0,2	Rem. —	— 0,2	8,4
CuZn37Pb2	CW606N	min. max.	61,0 62,0	— 0,05	— —	— 0,2	— —	— 0,3	1,6 2,5	— 0,2	Rem. —	— 0,2	8,4
CuZn38Pb1	CW607N	min. max.	60,0 61,0	— 0,05	— —	— 0,2	— —	— 0,3	0,8 1,6	— 0,2	Rem. —	— 0,2	8,4
CuZn38Pb2	CW608N	min. max.	60,0 61,0	— 0,05	— —	— 0,2	— —	— 0,3	1,6 2,5	— 0,2	Rem. —	— 0,2	8,4
CuZn38Pb4	CW609N	min. max.	57,0 59,0	— 0,05	— —	— 0,3	— —	— 0,3	3,5 4,2	— 0,3	Rem. —	— 0,2	8,4
CuZn39Pb0,5	CW610N	min. max.	59,0 60,5	— 0,05	— —	— 0,2	— —	— 0,3	0,2 0,8	— 0,2	Rem. —	— 0,2	8,4
CuZn39Pb1	CW611N	min. max.	59,0 60,0	— 0,05	— —	— 0,2	— —	— 0,3	0,8 1,6	— 0,2	Rem. —	— 0,2	8,4
CuZn39Pb2	CW612N	min. max.	59,0 60,0	— 0,05	— —	— 0,3	— —	— 0,3	1,6 2,5	— 0,3	Rem. —	— 0,2	8,4
CuZn39Pb2Sn	CW613N	min. max.	59,0 60,0	— 0,1	— —	— 0,4	— —	— 0,3	1,6 2,5	0,2 0,5	Rem. —	— 0,2	8,4
CuZn39Pb3	CW614N	min. max.	57,0 59,0	— 0,05	— —	— 0,3	— —	— 0,3	2,5 3,5	— 0,3	Rem. —	— 0,2	8,4
CuZn39Pb3Sn	CW615N	min. max.	57,0 59,0	— 0,1	— —	— 0,4	— —	— 0,3	2,5 3,5	0,2 0,5	Rem. —	— 0,2	8,4
CuZn40Pb1Al	CW616N	min. max.	57,0 59,0	0,05 0,30	— —	— 0,2	— —	— 0,2	1,0 2,0	— 0,2	Rem. —	— 0,2	8,3
CuZn40Pb2	CW617N	min. max.	57,0 59,0	— 0,05	— —	— 0,3	— —	— 0,3	1,6 2,5	— 0,3	Rem. —	— 0,2	8,4
CuZn40Pb2Al	CW618N	min. max.	57,0 59,0	0,05 0,5	— —	— 0,3	— —	— 0,3	1,6 3,0	— 0,3	Rem. —	— 0,2	8,3

Table 8 (2 of 2)

Material designation		Composition in % (mass fraction)											Density ^a g/cm ³ approx.
Symbol	Number	Element	Cu	Al	As	Fe	Mn	Ni	Pb	Sn	Zn	Others total	
CuZn40Pb2Sn	CW619N	min. max.	57,0 59,0	— 0,1	— —	— 0,4	— —	— 0,3	1,6 2,5	0,2 0,5	Rem. —	— 0,2	8,4
CuZn41Pb1Al	CW620N	min. max.	57,0 59,0	0,05 0,5	— —	— 0,3	— —	— 0,3	0,8 1,6	— 0,3	Rem. —	— 0,2	8,3
CuZn42PbAl	CW621N	min. max.	57,0 59,0	0,05 0,5	— —	— 0,3	— —	— 0,3	0,2 0,8	— 0,3	Rem. —	— 0,2	8,3
CuZn43Pb1Al	CW622N	min. max.	55,0 57,0	0,05 0,5	— —	— 0,3	— —	— 0,3	0,8 1,6	— 0,3	Rem. —	— 0,2	8,3
CuZn43Pb2	CW623N	min. max.	55,0 57,0	— 0,05	— —	— 0,3	— —	— 0,3	1,6 3,0	— 0,3	Rem. —	— 0,2	8,4
CuZn43Pb2Al	CW624N	min. max.	55,0 57,0	0,05 0,5	— —	— 0,3	— —	— 0,3	1,6 3,0	— 0,3	Rem. —	— 0,2	8,4
CuZn35Pb1,5AlAs	CW625N	min. max.	62,0 64,0	0,5 0,7	0,02 0,15	— 0,3	— 0,1	— 0,2	1,2 1,6	— 0,3	Rem. —	— 0,2	8,4
CuZn33Pb1,5AlAs	CW626N	min. max.	64,0 66,0	0,8 1,0	0,02 0,15	— 0,3	— 0,1	— 0,2	1,2 1,7	— 0,3	Rem. —	— 0,2	8,4

^a For information only.

Table 9 — Composition of copper-zinc alloys, complex (1 of 2)

Material designation		Composition in % (mass fraction)														Density ^a g/cm ³ approx.
Symbol	Number	Element	Cu	Al	As	Co	Fe	Mn	Ni	P	Pb	Si	Sn	Zn	Others total	
CuZn13Al1Ni1Si1	CW700R	min. max.	81,0 84,0	0,7 1,2	— —	— —	— 0,25	— 0,1	0,8 1,4	— —	— 0,05	0,8 1,3	— 0,1	Rem. —	— 0,5	8,5
CuZn19Sn	CW701R	min. max.	80,0 82,0	— —	— —	— —	— 0,05	— —	— 0,3	— —	— 0,05	— —	0,2 0,5	Rem. —	— 0,2	8,6
CuZn20Al2As	CW702R	min. max.	76,0 79,0	1,8 2,3	0,02 0,06	— —	— 0,07	— 0,1	— 0,1	— 0,01	— 0,05	— —	— —	Rem. —	— 0,3	8,4
CuZn23Al3Co	CW703R	min. max.	72,0 75,0	3,0 3,8	— —	0,25 0,55	— 0,05	— —	— 0,3	— —	— 0,05	— —	— 0,1	Rem. —	— 0,1	8,2
CuZn23Al6Mn4Fe3Pb	CW704R	min. max.	63,0 65,0	5,0 6,0	— —	— —	2,0 3,5	3,5 5,0	— 0,5	— —	0,2 0,8	— 0,2	— 0,2	Rem. —	— 0,2	8,2
CuZn25Al5Fe2Mn2Pb	CW705R	min. max.	65,0 68,0	4,0 5,0	— —	— —	0,5 3,0	0,5 3,0	— 1,0	— —	0,2 0,8	— —	— 0,2	Rem. —	— 0,3	8,2
CuZn28Sn1As	CW706R	min. max.	70,0 72,5	— —	0,02 0,06	— —	— 0,07	— 0,1	— 0,1	— 0,01	— 0,05	— —	0,9 1,3	Rem. —	— 0,3	8,5
CuZn30As	CW707R	min. max.	69,0 71,0	— 0,02	0,02 0,06	— —	— 0,05	— 0,1	— —	— 0,01	— 0,07	— —	— 0,05	Rem. —	— 0,3	8,5
CuZn31Si1	CW708R	min. max.	66,0 70,0	— —	— —	— —	— 0,4	— —	— 0,5	— —	— 0,8	0,7 1,3	— —	Rem. —	— 0,5	8,4
CuZn32Pb2AsFeSi	CW709R	min. max.	64,0 66,5	— 0,05	0,03 0,08	— —	0,1 0,2	— —	— 0,3	— —	1,5 2,2	0,45 0,8	— 0,3	Rem. —	— 0,2	8,4
CuZn35Ni3Mn2AlPb	CW710R	min. max.	58,0 60,0	0,3 1,3	— —	— —	— 0,5	1,5 2,5	2,0 3,0	— —	0,2 0,8	— 0,1	— 0,5	Rem. —	— 0,3	8,3
CuZn36Pb2Sn1	CW711R	min. max.	59,5 61,5	— —	— —	— —	— 0,1	— —	— 0,3	— —	1,3 2,2	— —	0,5 1,0	Rem. —	— 0,2	8,5
CuZn36Sn1Pb	CW712R	min. max.	61,0 63,0	— —	— —	— —	— 0,1	— —	— 0,2	— —	0,2 0,6	— —	1,0 1,5	Rem. —	— 0,2	8,3

Table 9 (2 of 2)

Material designation		Composition in % (mass fraction)														Density ^a g/cm ³ approx.
Symbol	Number	Element	Cu	Al	As	Co	Fe	Mn	Ni	P	Pb	Si	Sn	Zn	Others total	
CuZn37Mn3Al2PbSi	CW713R	min. max.	57,0 59,0	1,3 2,3	— —	— —	— 1,0	1,5 3,0	— 1,0	— —	0,2 0,8	0,3 1,3	— 0,4	Rem. —	— 0,3	8,1
CuZn37Pb1Sn1	CW714R	min. max.	59,0 61,0	— —	— —	— —	— 0,1	— —	— 0,3	— —	0,4 1,0	— —	0,5 1,0	Rem. —	— 0,2	8,4
CuZn38AlFeNiPbSn	CW715R	min. max.	59,0 60,7	0,1 0,5	— 0,05	— —	0,1 0,4	— —	0,2 0,5	— —	0,3 0,7	— —	0,3 0,6	Rem. —	— 0,2	8,3
CuZn38Mn1Al	CW716R	min. max.	59,0 61,5	0,3 1,3	— —	— —	— 1,0	0,6 1,8	— 0,6	— —	— 1,0	— 0,5	— 0,3	Rem. —	— 0,3	8,3
CuZn38Sn1As	CW717R	min. max.	59,0 62,0	— —	0,02 0,06	— —	— 0,1	— —	— 0,2	— —	— 0,2	— —	0,5 1,0	Rem. —	— 0,2	8,4
CuZn39Mn1AlPbSi	CW718R	min. max.	57,0 59,0	0,3 1,3	— —	— —	— 0,5	0,8 1,8	— 0,5	— —	0,2 0,8	0,2 0,8	— 0,5	Rem. —	— 0,3	8,2
CuZn39Sn1	CW719R	min. max.	59,0 61,0	— —	— —	— —	— 0,1	— —	— 0,2	— —	— 0,2	— —	0,5 1,0	Rem. —	— 0,2	8,4
CuZn40Mn1Pb1	CW720R	min. max.	57,0 59,0	— 0,2	— —	— —	— 0,3	0,5 1,5	— 0,6	— —	1,0 2,0	— 0,1	— 0,3	Rem. —	— 0,3	8,3
CuZn40Mn1Pb1AlFeSn	CW721R	min. max.	57,0 59,0	0,3 1,3	— —	— —	0,2 1,2	0,8 1,8	— 0,3	— —	0,8 1,6	— —	0,2 1,0	Rem. —	— 0,3	8,3
CuZn40Mn1Pb1FeSn	CW722R	min. max.	56,5 58,5	— 0,1	— —	— —	0,2 1,2	0,8 1,8	— 0,3	— —	0,8 1,6	— —	0,2 1,0	Rem. —	— 0,3	8,3
CuZn40Mn2Fe1	CW723R	min. max.	56,5 58,5	— 0,1	— —	— —	0,5 1,5	1,0 2,0	— 0,6	— —	— 0,5	— 0,1	— 0,3	Rem. —	— 0,4	8,3
CuZn21Si3P	CW724R	min. max.	75,0 77,0	— 0,05	— —	— —	— 0,3	— 0,05	— 0,2	0,02 0,10	— 0,10	2,7 3,5	— 0,3	Rem. —	— 0,2	8,3
CuZn33Pb1AlSiAs	CW725R	min. max.	64,0 67,0	0,1 0,4	0,05 0,08	— —	— 0,3	— 0,1	— 0,2	— 0,02	0,4 0,9	0,1 0,3	— 0,3	Rem. —	— 0,2	8,5

^a For information only.

Table 10 — Wrought coppers and copper alloys specified in European product Standards prepared by CEN/TC 133 (1 of 12)

Material designation		Product forms and available materials																														
		rolled flat products								tubes								rod/bar, profiles, wire								forging stock and forgings		c				
Symbol ^a	Number ^b	EN 1172:2011	EN 1652:1997	EN 1653:1997	EN 1654:1997	EN 1758:1997	EN 13148:2010	EN 13599:2014	EN 14436:2004	EN 1057:2006+A1:2010	EN 12449:2012	EN 12450:2012	EN 12451:2012	EN 12452:2012	EN 12735–1:2010	EN 12735–2:2010	EN 13348:2008	EN 13349:2002	EN 13600:2013	EN 1977:2013	EN 12163:2011	EN 12164:2011	EN 12166:2011	EN 12167:2011	EN 12168:2011	EN 13601:2013	EN 13602:2013		EN 13605:2013	EN 12165:2011	EN 12420:2014	EN 13604:2013
Coppers (see Tables 1.1 to 1.4)																																
Cu-ETP1	CW003A																			X							X	X				
Cu-ETP	CW004A		X				X	X	X		X									X	X						X	X	X	X	X	
Cu-FRHC	CW005A							X			X								X	X						X	X	X				
Cu-FRTP	CW006A		X																													
Cu-OF1	CW007A																			X							X	X				
Cu-OF	CW008A		X				X	X	X		X									X	X						X	X	X	X	X	
Cu-OFE	CW009A																		X	X						X		X				X
CuAg0,04	CW011A																			X						X		X				
CuAg0,07	CW012A																			X						X		X				
CuAg0,10	CW013A							X											X	X						X		X				
CuAg0,04P	CW014A																			X						X		X				
CuAg0,07P	CW015A																			X						X		X				

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Material designation		Product forms and available materials																															
		rolled flat products								tubes										rod/bar, profiles, wire										forging stock and forgings			
Symbol ^a	Number ^b	EN 1172:2011	EN 1652:1997	EN 1653:1997	EN 1654:1997	EN 1758:1997	EN 13148:2010	EN 13599:2014	EN 14436:2004	EN 1057:2006+A1:2010	EN 12449:2012	EN 12450:2012	EN 12451:2012	EN 12452:2012	EN 12735–1:2010	EN 12735–2:2010	EN 13348:2008	EN 13349:2002	EN 13600:2013	EN 1977:2013	EN 12163:2011	EN 12164:2011	EN 12166:2011	EN 12167:2011	EN 12168:2011	EN 13601:2013	EN 13602:2013	EN 13605:2013	EN 12165:2011	EN 12420:2014	EN 13604:2013		
CuAg0,10P	CW016A							X											X	X							X		X				
CuAg0,04(OF)	CW017A																				X						X		X				
CuAg0,07(OF)	CW018A																				X						X		X				
CuAg0,10(OF)	CW019A							X											X	X							X		X				
Cu-PHC	CW020A						X	X	X		X								X	X							X		X				
Cu-HCP	CW021A							X			X								X	X							X		X	X	X		
Cu-PHCE	CW022A																		X	X							X		X			X	
Cu-DLP	CW023A		X	X		X	X		X																								
Cu-DHP	CW024A	X	X	X			X		X	X	X	X	X	X	X	X	X	X													X	X	
Copper alloys, low alloyed (see Table 2)																																	
CuBe1,7	CW100C				X		X		X													X		X	X					X	X		
CuBe2	CW101C		X		X		X		X													X		X	X					X	X		
CuBe2Pb	CW102C																						X	X									

Table 10 (3 of 12)

Material designation		Product forms and available materials																														
		rolled flat products									tubes										rod/bar, profiles, wire									forging stock and forgings		c
Symbol ^a	Number ^b	EN 1172:2011	EN 1652:1997	EN 1653:1997	EN 1654:1997	EN 1758:1997	EN 13148:2010	EN 13599:2014	EN 14436:2004	EN 1057:2006+A1:2010	EN 12449:2012	EN 12450:2012	EN 12451:2012	EN 12452:2012	EN 12735–1:2010	EN 12735–2:2010	EN 13348:2008	EN 13349:2002	EN 13600:2013	EN 1977:2013	EN 12163:2011	EN 12164:2011	EN 12166:2011	EN 12167:2011	EN 12168:2011	EN 13601:2013	EN 13602:2013	EN 13605:2013	EN 12165:2011	EN 12420:2014	EN 13604:2013	
CuCo1Ni1Be	CW103C		X																			X		X	X					X	X	
CuCo2Be	CW104C		X		X		X		X													X		X	X					X		
CuCr1	CW105C																														X	
CuCr1Zr	CW106C																					X		X	X					X	X	
CuFe2P	CW107C				X	X	X		X		X													X								
CuNi1P	CW108C																															
CuNi1Si	CW109C																					X		X	X					X	X	
CuNi2Be	CW110C		X		X		X		X													X			X							
CuNi2Si	CW111C		X		X		X		X		X											X		X	X					X	X	
CuNi3Si1	CW112C																															
CuPb1P	CW113C																						X									
CuSP	CW114C																						X	X		X						
CuSi1	CW115C																															

Table 10 (4 of 12)

Material designation		Product forms and available materials																													
		rolled flat products								tubes								rod/bar, profiles, wire								forging stock and forgings ^c					
Symbol ^a	Number ^b	EN 1172:2011	EN 1652:1997	EN 1653:1997	EN 1654:1997	EN 1758:1997	EN 13148:2010	EN 13599:2014	EN 14436:2004	EN 1057:2006+A1:2010	EN 12449:2012	EN 12450:2012	EN 12451:2012	EN 12452:2012	EN 12735–1:2010	EN 12735–2:2010	EN 13348:2008	EN 13349:2002	EN 13600:2013	EN 1977:2013	EN 12163:2011	EN 12164:2011	EN 12166:2011	EN 12167:2011	EN 12168:2011	EN 13601:2013	EN 13602:2013	EN 13605:2013	EN 12165:2011	EN 12420:2014	EN 13604:2013
CuSi3Mn1	CW116C																														
CuSn0,15	CW117C	X				X	X		X																						
CuTeP	CW118C																						X	X		X					
CuZn0,5	CW119C	X	X				X		X																						
CuZr	CW120C																					X		X	X					X	X
CuSi3Zn2P	CW121C										X																				
Copper-aluminium alloys (see Table 3)																															
CuAl5As	CW300G												X																		
CuAl6Si2Fe	CW301G																														
CuAl7Si2	CW302G																														
CuAl8Fe3	CW303G		X	X																										X	X
CuAl9Ni3Fe2	CW304G			X																											
CuAl10Fe1	CW305G																					X			X					X	X
CuAl10Fe3Mn2	CW306G																													X	X

Table 10 (5 of 12)

Material designation		Product forms and available materials																														
		rolled flat products									tubes									rod/bar, profiles, wire									forging stock and forgings			
Symbol ^a	Number ^b	EN 1172:2011	EN 1652:1997	EN 1653:1997	EN 1654:1997	EN 1758:1997	EN 13148:2010	EN 13599:2014	EN 14436:2004	EN 1057:2006+A1:2010	EN 12449:2012	EN 12450:2012	EN 12451:2012	EN 12452:2012	EN 12735–1:2010	EN 12735–2:2010	EN 13348:2008	EN 13349:2002	EN 13600:2013	EN 1977:2013	EN 12163:2011	EN 12164:2011	EN 12166:2011	EN 12167:2011	EN 12168:2011	EN 13601:2013	EN 13602:2013	EN 13605:2013	EN 12165:2011	EN 12420:2014	EN 13604:2013	
CuAl10Ni5Fe4	CW307G			X																		X			X					X	X	
CuAl11Fe6Ni6	CW308G																					X			X					X	X	
CuAl5Zn5Sn1	CW309G	X																														
Copper-nickel alloys (see Table 4)																																
CuNi25	CW350H		X																													
CuNi9Sn2	CW351H		X		X		X		X																							
CuNi10Fe1Mn	CW352H		X	X							X		X	X								X								X	X	
CuNi30Fe2Mn2	CW353H												X																			
CuNi30Mn1Fe	CW354H		X	X							X		X	X								X								X	X	
Copper-nickel-zinc alloys (see Table 5)																																
CuNi7Zn39Pb3Mn2	CW400J																						X	X	X					X	X	
CuNi10Zn27	CW401J		X																													
CuNi10Zn42Pb2	CW402J																															
CuNi12Zn24	CW403J		X		X						X											X		X	X							

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Material designation		Product forms and available materials																													
		rolled flat products									tubes										rod/bar, profiles, wire								forging stock and forgings ^c		
Symbol ^a	Number ^b	EN 1172:2011	EN 1652:1997	EN 1653:1997	EN 1654:1997	EN 1758:1997	EN 13148:2010	EN 13599:2014	EN 14436:2004	EN 1057:2006+A1:2010	EN 12449:2012	EN 12450:2012	EN 12451:2012	EN 12452:2012	EN 12735–1:2010	EN 12735–2:2010	EN 13348:2008	EN 13349:2002	EN 13600:2013	EN 1977:2013	EN 12163:2011	EN 12164:2011	EN 12166:2011	EN 12167:2011	EN 12168:2011	EN 13601:2013	EN 13602:2013	EN 13605:2013	EN 12165:2011	EN 12420:2014	EN 13604:2013
CuNi12Zn25Pb1	CW404J		X																												
CuNi12Zn29	CW405J				X																										
CuNi12Zn30Pb1	CW406J																					X	X								
CuNi12Zn38Mn5Pb2	CW407J																														
CuNi18Zn19Pb1	CW408J																					X	X	X							
CuNi18Zn20	CW409J		X		X						X											X		X	X						
CuNi18Zn27	CW410J		X		X																										
Copper-tin alloys (see Table 6)																															
CuSn4	CW450K	X	X		X		X		X														X								
CuSn5	CW451K		X		X		X		X																						
CuSn6	CW452K		X		X		X		X		X											X		X	X						
CuSn8	CW453K		X		X		X		X		X											X		X	X						
CuSn3Zn9	CW454K		X		X		X		X																						

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Material designation		Product forms and available materials																													
		rolled flat products									tubes									rod/bar, profiles, wire									forging stock and forgings ^c		
Symbol ^a	Number ^b	EN 1172:2011	EN 1652:1997	EN 1653:1997	EN 1654:1997	EN 1758:1997	EN 13148:2010	EN 13599:2014	EN 14436:2004	EN 1057:2006+A1:2010	EN 12449:2012	EN 12450:2012	EN 12451:2012	EN 12452:2012	EN 12735–1:2010	EN 12735–2:2010	EN 13348:2008	EN 13349:2002	EN 13600:2013	EN 1977:2013	EN 12163:2011	EN 12164:2011	EN 12166:2011	EN 12167:2011	EN 12168:2011	EN 13601:2013	EN 13602:2013	EN 13605:2013	EN 12165:2011	EN 12420:2014	EN 13604:2013
CuSn4Pb2P	CW455K										X																				
CuSn4Pb4Zn4	CW456K																						X								
CuSn4Te1P	CW457K																														
CuSn5Pb1	CW458K																						X								
CuSn8P	CW459K										X											X									
CuSn8PbP	CW460K										X																				
Copper-zinc alloys, binary (see Table 7)																															
CuZn5	CW500L		X				X		X		X																				
CuZn10	CW501L		X				X		X		X											X		X							
CuZn15	CW502L	X	X		X		X		X		X											X		X							
CuZn20	CW503L		X				X		X		X											X		X							
CuZn28	CW504L																														
CuZn30	CW505L		X		X		X		X		X											X		X							

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Material designation		Product forms and available materials																													
		rolled flat products									tubes									rod/bar, profiles, wire									forging stock and forgings		
Symbol ^a	Number ^b	EN 1172:2011	EN 1652:1997	EN 1653:1997	EN 1654:1997	EN 1758:1997	EN 13148:2010	EN 13599:2014	EN 14436:2004	EN 1057:2006+A1:2010	EN 12449:2012	EN 12450:2012	EN 12451:2012	EN 12452:2012	EN 12735–1:2010	EN 12735–2:2010	EN 13348:2008	EN 13349:2002	EN 13600:2013	EN 1977:2013	EN 12163:2011	EN 12164:2011	EN 12166:2011	EN 12167:2011	EN 12168:2011	EN 13601:2013	EN 13602:2013	EN 13605:2013	EN 12165:2011	EN 12420:2014	EN 13604:2013
CuZn33	CW506L		X				X		X																						
CuZn36	CW507L		X		X		X		X		X											X		X	X						
CuZn37	CW508L		X				X		X		X											X		X	X					X	X
CuZn40	CW509L		X								X											X	X	X	X	X				X	X
CuZn42	CW510L																					X	X	X	X	X				X	X
CuZn38As	CW511L																					X	X		X	X				X	X
Copper-zinc-lead alloys (see Table 8)																															
CuZn35Pb1	CW600N		X								X												X	X	X						
CuZn35Pb2	CW601N										X												X	X	X	X					
CuZn36Pb2As	CW602N										X												X		X	X				X	X
CuZn36Pb3	CW603N										X												X	X	X	X					
CuZn37Pb0,5	CW604N		X								X																				
CuZn37Pb1	CW605N										X																				
CuZn37Pb2	CW606N		X																				X	X	X	X					
CuZn38Pb1	CW607N										X												X		X	X				X	X

Table 10 (9 of 12)

Material designation		Product forms and available materials																														
		rolled flat products								tubes								rod/bar, profiles, wire								forging stock and forgings						
Symbol ^a	Number ^b	EN 1172:2011	EN 1652:1997	EN 1653:1997	EN 1654:1997	EN 1758:1997	EN 13148:2010	EN 13599:2014	EN 14436:2004	EN 1057:2006+A1:2010	EN 12449:2012	EN 12450:2012	EN 12451:2012	EN 12452:2012	EN 12735—1:2010	EN 12735—2:2010	EN 13348:2008	EN 13349:2002	EN 13600:2013	EN 1977:2013	EN 12163:2011	EN 12164:2011	EN 12166:2011	EN 12167:2011	EN 12168:2011	EN 13601:2013	EN 13602:2013	EN 13605:2013	EN 12165:2011	EN 12420:2014	EN 13604:2013	
CuZn38Pb2	CW608N		X								X												X	X	X	X				X	X	
CuZn38Pb4	CW609N																															
CuZn39Pb0,5	CW610N		X	X																			X	X	X					X		
CuZn39Pb1	CW611N																						X		X	X				X	X	
CuZn39Pb2	CW612N		X																				X	X	X	X				X	X	
CuZn39Pb2Sn	CW613N																								X					X	X	
CuZn39Pb3	CW614N										X												X	X	X	X				X	X	
CuZn39Pb3Sn	CW615N																															
CuZn40Pb1Al	CW616N																													X	X	
CuZn40Pb2	CW617N										X												X	X	X	X				X	X	
CuZn40Pb2Al	CW618N																															
CuZn40Pb2Sn	CW619N																															
CuZn41Pb1Al	CW620N																								X							

Table 10 (10 of 12)[illegible]

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Material designation		Product forms and available materials																														
		rolled flat products									tubes									rod/bar, profiles, wire									forging stock and forgings	c		
Symbol ^a	Number ^b	EN 1172:2011	EN 1652:1997	EN 1653:1997	EN 1654:1997	EN 1758:1997	EN 13148:2010	EN 13599:2014	EN 14436:2004	EN 1057:2006+A1:2010	EN 12449:2012	EN 12450:2012	EN 12451:2012	EN 12452:2012	EN 12735–1:2010	EN 12735–2:2010	EN 13348:2008	EN 13349:2002	EN 13600:2013	EN 1977:2013	EN 12163:2011	EN 12164:2011	EN 12166:2011	EN 12167:2011	EN 12168:2011	EN 13601:2013	EN 13602:2013	EN 13605:2013	EN 12165:2011		EN 12420:2014	EN 13604:2013
CuZn31Si1	CW708R										X											X										
CuZn32Pb2AsFeSi	CW709R																						X			X				X		
CuZn35Ni3Mn2AlPb	CW710R										X											X			X					X	X	
CuZn36Pb2Sn1	CW711R																															
CuZn36Sn1Pb	CW712R																					X		X	X					X	X	
CuZn37Mn3Al2PbSi	CW713R										X												X		X	X				X	X	
CuZn37Pb1Sn1	CW714R																															
CuZn38AlFeNiPbSn	CW715R			X																												
CuZn38Mn1Al	CW716R										X																					
CuZn38Sn1As	CW717R			X																												
CuZn39Mn1AlPbSi	CW718R										X																					
CuZn39Sn1	CW719R			X																		X			X					X	X	
CuZn40Mn1Pb1	CW720R																						X	X	X	X				X	X	

Table 10 (12 of 12)

Material designation		Product forms and available materials																														
		rolled flat products								tubes										rod/bar, profiles, wire								forging stock and forgings				
Symbol ^a	Number ^b	EN 1172:2011	EN 1652:1997	EN 1653:1997	EN 1654:1997	EN 1758:1997	EN 13148:2010	EN 13599:2014	EN 14436:2004	EN 1057:2006+A1:2010	EN 12449:2012	EN 12450:2012	EN 12451:2012	EN 12452:2012	EN 12735–1:2010	EN 12735–2:2010	EN 13348:2008	EN 13349:2002	EN 13600:2013	EN 1977:2013	EN 12163:2011	EN 12164:2011	EN 12166:2011	EN 12167:2011	EN 12168:2011	EN 13601:2013	EN 13602:2013	EN 13605:2013	EN 12165:2011	EN 12420:2014	EN 13604:2013	
CuZn40Mn1Pb1AlFeSn	CW721R																						X		X	X				X	X	
CuZn40Mn1Pb1FeSn	CW722R																						X		X	X				X	X	
CuZn40Mn2Fe1	CW723R										X																					
CuZn21Si3P	CW724R										X											X	X	X	X	X				X	X	
CuZn33Pb1AlSiAs	CW725R																														X	

^a Although material symbol designations used in European Standards might be the same as those in other standards using the designation system given in ISO 1190-1, the detailed composition requirements are not necessarily the same.

^b The material number designation is in accordance with the system given in EN 1412.

^c Plate, sheet, strip, seamless tube, rod, bar, wire and profiles for electronic tubes, semiconductor devices and vacuum applications.

Table 11 — Master alloys — Composition (1 of 3)

Material designation		Composition in % (mass fraction)																		
		Major elements	Maximum impurities																	
			Al	As	Bi	C	Fe	Mn	Ni	P	Pb	Sb	Se	Si	Sn	Te	Zn	Further elements	Other elements	
Symbol	Number		Al	As	Bi	C	Fe	Mn	Ni	P	Pb	Sb	Se	Si	Sn	Te	Zn		each	total
CuAl50(A)	CM344G	Cu Rem. Al 48,5 to 51,5	a	—	—	—	0,25	0,1	0,1	0,05	0,05	—	—	0,15	0,05	—	0,1	Ti 0,01	0,05	0,3
CuAl50(B)	CM345G	Cu Rem. Al 48 to 52	a	—	—	—	0,5	0,2	0,1	0,05	0,1	—	—	0,25	0,1	—	0,2	—	0,1	0,5
CuAs30	CM200E	Cu Rem. As 28,5 to 31,5	0,05	a	0,05	—	0,2	0,2	0,2	0,05	0,10	0,20	0,03	0,10	0,1	0,03	0,3	Cr 0,10	0,1	0,5
CuB2	CM121C	Cu Rem. B 1,6 to 2,0	0,10	—	—	—	0,10	—	—	—	0,02	—	—	0,15	0,02	—	—	—	0,05	0,3
CuBe4	CM122C	Cu Rem. Be 3,5 to 4,5	0,17	—	—	—	0,17	—	0,1	—	0,02	—	—	0,17	0,03	—	—	Co 0,1 Cr 0,05	0,05	0,3
CuCo10	CM237E	Cu Rem. Co 9,0 to 11,0	—	—	—	—	0,10	—	0,20	0,05	0,05	—	—	—	0,05	—	—	—	0,05	0,3
CuCo15	CM201E	Cu Rem. Co 14,0 to 16,0	—	0,01	0,005	—	0,10	—	0,20	0,10	0,05	0,01	0,005	0,05	0,05	0,005	0,20	—	0,05	0,3
CuCr10	CM202E	Cu Rem. Cr 9,0 to 11,0 b	0,02	0,01	0,005	—	0,08	0,03	0,02	0,005	0,02	0,01	0,005	0,02	0,02	0,005	0,10	—	0,05	0,3
CuFe10(A)	CM203E	Cu Rem. Fe 9,0 to 11,0	0,02	0,01	0,005	0,05	a	0,1	0,15	0,05	0,03	0,01	0,005	0,05	0,10	0,005	0,1	—	0,05	0,3
CuFe10(B)	CM204E	Cu Rem. Fe 9,0 to 11,0	—	—	—	—	a	0,2	0,2	—	0,1	—	—	0,1	0,1	—	0,1	—	0,1	0,5
CuFe15	CM213E	Cu Rem. Fe 14,0 to 16,0	—	—	—	—	a	0,15	0,15	—	0,05	—	—	0,10	0,10	—	0,1	—	0,05	0,3
CuFe20(A)	CM205E	Cu Rem. Fe 19,0 to 21,0	0,02	0,01	0,005	0,05	a	0,1	0,15	0,05	0,05	0,01	0,005	0,05	0,10	0,005	0,1	—	0,05	0,3
CuFe20(B)	CM206E	Cu Rem. Fe 19,0 to 21,0	—	—	—	—	a	0,2	0,2	—	0,1	—	—	0,1	0,1	—	0,1	—	0,1	0,5

Table 11 (2 of 3)

Material designation		Composition in % (mass fraction)																			
		Major elements	Maximum impurities																	Further elements	
			Al	As	Bi	C	Fe	Mn	Ni	P	Pb	Sb	Se	Si	Sn	Te	Zn	Other elements			
Symbol	Number																		each	total	
CuLi2	CM123C	Cu Rem. Li 1,6 to 2,2	—	—	—	—	—	—	—	—	—	—	—	0,10	—	—	—	—	0,03	0,2	
CuMg10	CM238E	Cu Rem. Mg 9,0 to 11,0	0,05	0,01	0,005	0,05	0,10	—	0,20	0,02	0,03	0,01	0,005	0,05	0,05	0,005	0,10	—	0,05	0,3	
CuMg20	CM207E	Cu Rem. Mg 18,0 to 22,0	0,05	0,01	0,005	0,05	0,10	—	0,20	0,02	0,05	0,01	0,005	0,10	0,05	0,005	0,10	—	0,05	0,3	
CuMn30(A)	CM209E	Cu Rem. Mn 29,0 to 31,0	0,05	0,02	0,005	0,05	0,20	a	0,20	0,02	0,05	0,02	0,005	0,05	0,05	0,005	0,20	Mg 0,05	0,05	0,3	
CuMn30(B)	CM210E	Cu Rem. Mn 29 to 31	—	—	—	—	0,5	a	0,2	0,05	0,2	—	—	0,2	0,2	—	0,2	—	0,1	0,5	
CuMn50	CM211E	Cu Rem. Mn 48,0 to 52,0	—	—	—	—	0,5	a	0,2	0,05	0,2	—	—	0,2	0,2	—	0,2	—	0,1	0,5	
CuNi30	CM390H	Cu Rem. Ni 29,0 to 31,0	0,05	—	—	0,03	0,8	0,2	a	0,02	0,05	—	—	0,05	0,05	—	0,1	—	0,05	0,3	
CuNi50	CM239E	Cu Rem. Ni 48,5 to 51,5	0,05	—	—	0,05	0,3	0,2	a	0,03	0,05	—	—	0,05	0,05	—	0,1	—	0,05	0,3	
CuP10(A)	CM215E	Cu Rem. P 9,5 to 11,0	0,02	0,01	0,005	—	0,10	0,10	0,10	a	0,03	0,01	0,005	0,05	0,05	0,005	0,05	—	0,05	0,3	
CuP10(B)	CM216E	Cu Rem. P 9,5 to 11,0	—	—	—	—	0,20	—	0,20	a	0,20	—	—	—	0,2	—	0,2	—	0,1	0,5	
CuP15(A)	CM217E	Cu Rem. P 13,5 to 15,0	0,02	0,01	0,005	—	0,10	0,10	0,10	a	0,03	0,01	0,005	0,05	0,05	0,005	0,05	—	0,05	0,3	
CuP15(B)	CM218E	Cu Rem. P 13,5 to 15,0	—	—	—	—	0,10	—	0,10	a	0,10	—	—	—	0,1	—	0,1	—	0,10	0,4	
CuP15(C)	CM219E	Cu Rem. P 13,5 to 15,0	—	—	—	—	0,20	—	0,20	a	0,20	—	—	—	0,2	—	0,2	—	0,1	0,5	

Table 11 (3 of 3)

Material designation		Composition in % (mass fraction)																		
		Major elements	Maximum impurities																	
			Al	As	Bi	C	Fe	Mn	Ni	P	Pb	Sb	Se	Si	Sn	Te	Zn	Further elements	Other elements	
Symbol	Number																		each	total
CuS20	CM230E	Cu Rem. ^c S 18 to 22	—	—	—	—	0,02	—	—	—	0,02	—	—	—	0,20	—	0,02	—	0,05	0,3
CuSi10(A)	CM231E	Cu Rem. Si 9,0 to 11,0	0,03	0,01	0,005	—	0,20	0,10	0,1	0,05	0,05	0,01	0,005 ^a	0,05	0,005	0,10	—	0,05	0,3	
CuSi10(B)	CM232E	Cu Rem. Si 9 to 11	0,05	—	—	—	0,5	0,2	0,2	—	0,20	—	—	^a	0,2	—	0,1	—	0,1	0,5
CuSi20(A)	CM233E	Cu Rem. Si 19,0 to 21,0	0,05	0,02	0,01	—	0,4	0,2	0,2	0,05	0,1	0,02	0,01	^a	0,1	0,01	0,1	—	0,05	0,3
CuSi20(B)	CM234E	Cu Rem. Si 19 to 21	0,05	—	—	—	0,6	0,2	0,2	—	0,2	—	—	^a	0,2	—	0,1	—	0,1	0,5
CuSi30(A)	CM240E	Cu Rem. Si 28,5 to 31,5	0,05	0,03	0,015	—	0,60	0,2	0,2	0,05	0,1	0,02	0,01	^a	0,1	0,01	0,1	—	0,05	0,3
CuSi30(B)	CM241E	Cu Rem. Si 28,0 to 32,0	0,10	—	—	—	0,7	0,2	0,2	—	0,2	—	—	^a	0,2	—	0,2	—	0,1	0,5
CuTi30	CM244E	Cu Rem. Ti 28,5 to 31,5	0,10	—	0,005	—	0,1	—	—	—	0,05	—	—	0,05	0,05	0,005	0,05	—	0,05	0,3
CuZr50(A)	CM236E	Cu Rem. Zr 49,0 to 53,0	0,05	—	0,005	—	0,1	—	—	—	0,05	—	—	0,05	0,20	0,005	—	Hf 2,5	0,1	0,5
CuZr50(B)	CM242E	Cu Rem. Zr 49,0 to 53,0	0,05	—	0,005	—	0,1	—	—	—	0,05	—	—	0,05	0,20	0,005	—	Nb 2,0	0,1	0,5
CuZr50(C)	CM243E	Cu Rem. Zr 49,0 to 53,0	0,05	—	0,005	—	0,20	—	—	—	0,05	—	—	0,05	0,8	0,005	—	—	0,1	0,5
NOTE A dash (—) indicates “not specified” but is included in other elements. Only specified elements should be determined unless otherwise agreed between the supplier and the customer.																				
^a See major elements column.																				
^b Cr ₂ O ₃ max. 0,5 %.																				
^c Free copper max. 5,0 %.																				

**Table 12.1 — Ingots and castings — Copper and copper-chromium alloys —
Compositions and casting processes**

Material designation		Composition in % (mass fraction)			Casting process and designation	
Symbol	Number	Element	Cr	Cu	permanent mould GM	sand GS
Cu-C^{a, b}	CC040A^{a, b}	min. max.	— —	— —	X	X
CuCr1-C^{a, c}	CC140C^{a, c}	min. max.	0,4 1,2	Rem. —	X	X
^a Ingots in this material are not specified. ^b The composition of this copper grade is not specified. ^c The sum of Cu + Cr shall be ≥ 99,5 %.						

Table 12.2 — Ingots and castings — Copper-zinc alloys — Composition and casting processes (1 of 3)

Material designation		Composition in % (mass fraction)													Casting process and designation				
Symbol	Number	Element	Al	As	Cu	Fe	Mn	Ni	P	Pb	Sb	Si	Sn	Zn	continuous GC	permanent mould GM	pressure die cast GP	sand GS	centrifugal GZ
CuZn33Pb2-B	CB750S	min. max.	— 0,1 ^a	— —	63,0 66,0 ^b	— 0,7	— 0,2	— 1,0	— 0,02	1,0 2,8	— —	— 0,04	— 1,5	Rem. —				X	X
CuZn33Pb2-C	CC750S	min. max.	— 0,1	— —	63,0 67,0 ^b	— 0,8	— 0,2	— 1,0	— 0,05	1,0 3,0	— —	— 0,05	— 1,5	Rem. —					
CuZn33Pb2Si-B	CB751S	min. max.	— 0,10	— —	63,5 65,5 ^b	0,25 0,50	— 0,1	— 0,80	— —	0,8 2,0	— 0,05	0,70 1,0	— 0,80	Rem. —			X		
CuZn33Pb2Si-C^c	CC751S^c	min. max.	— 0,10	— —	63,5 66,0 ^b	0,25 0,5	— 0,15	— 0,8	— —	0,8 2,2	— 0,05	0,65 1,1	— 0,8	Rem. —					
CuZn35Pb2Al-B^{d, e}	CB752S^{d, e}	min. max.	0,3 0,7	0,04 0,12	61,5 65,0	— 0,3	— 0,1	— 0,2	— —	1,5 2,1	0,04 0,12	— 0,02	— 0,3	Rem. —		X	X		
CuZn35Pb2Al-C^{c, e}	CC752S^{c, e}	min. max.	0,3 0,70	0,04 0,14 ^f	61,5 64,5	— 0,3	— 0,1	— 0,2	— —	1,5 2,2	— 0,14 ^{f, g}	— 0,02	— 0,3	Rem. —					
CuZn37Pb2Ni1AlFe-B^h	CB753S^h	min. max.	0,4 0,8	— —	58,0 60,0 ^b	0,5 0,8	— 0,20	0,5 1,2	— 0,02	1,8 2,50	— 0,05	— 0,05	— 0,8	Rem. —		X			
CuZn37Pb2Ni1AlFe-C	CC753S	min. max.	0,4 0,8	— —	58,0 61,0 ^b	0,5 0,8	— 0,20	0,5 1,2	— 0,02	1,8 2,50	— 0,05	— 0,05	— 0,8	Rem. —					
CuZn39Pb1Al-B^d	CB754S^d	min. max.	0,10 0,8 ⁱ	— —	58,0 62,0 ^b	— 0,7	— 0,5	— 1,0	— 0,02	0,5 2,4	— —	— 0,05	— 1,0	Rem. —		X	X	X	X
CuZn39Pb1Al-C	CC754S	min. max.	— 0,8	— —	58,0 63,0 ^b	— 0,7	— 0,5	— 1,0	— 0,02	0,5 2,5	— —	— 0,05 ^k	— 1,0	Rem. —					
CuZn39Pb1AlB-B^{l, e}	CB755S^{l, e}	min. max.	0,4 0,65	— —	59,0 60,5	0,05 0,2	— 0,05	— 0,2	— —	1,2 1,7	— —	— 0,03	— 0,3	Rem. —		X	X		
CuZn39Pb1AlB-C^e	CC755S^e	min. max.	0,4 0,7	— —	59,5 61,0	0,05 0,2	— 0,05	— 0,2	— —	1,2 1,7	— —	— 0,05	— 0,3	Rem. —					

Table 12.2 (2 of 3)

Material designation		Composition in % (mass fraction)													Casting process and designation				
		Element	Al	As	Cu	Fe	Mn	Ni	P	Pb	Sb	Si	Sn	Zn	continuous GC	permanent mould GM	pressure die cast GP	sand GS	centrifugal GZ
CuZn15As-B	CB760S	min. max.	— 0,01	0,06 0,15	83,0 87,5	— 0,15	— 0,1	— 0,1	— —	— 0,5	— —	— 0,02	— 0,3	Rem. —				X	
CuZn15As-C	CC760S	min. max.	— 0,01	0,05 0,15	83,0 88,0	— 0,15	— 0,1	— 0,1	— —	— 0,5	— —	— 0,02	— 0,3	Rem. —					
CuZn16Si4-B	CB761S	min. max.	— 0,10	— —	78,5 82,0	— 0,5	— 0,2	— 1,0	— 0,02	— 0,6	— 0,05	3,0 5,0	— 0,25	Rem. —		X	X	X	X
CuZn16Si4-C	CC761S	min. max.	— 0,1	— —	78,0 83,0	— 0,6	— 0,2	— 1,0	— 0,03	— 0,8	— 0,05	3,0 5,0	— 0,3	Rem. —					
CuZn25Al5Mn4Fe3-B	CB762S	min. max.	4,0 7,0	— —	60,0 66,0 ^b	1,5 3,5	3,0 5,0	— 2,7	— 0,02	— 0,20	— 0,03	— 0,08	— 0,20	Rem. —	X	X		X	X
CuZn25Al5Mn4Fe3-C	CC762S	min. max.	3,0 7,0	— —	60,0 67,0 ^b	1,5 4,0	2,5 5,0	— 3,0	— 0,03	— 0,2	— 0,03	— 0,1	— 0,2	Rem. —					
CuZn32Al2Mn2Fe1-B	CB763S	min. max.	1,0 2,5	— —	59,0 67,0 ^b	0,5 2,0	1,0 3,5	— 2,5	— —	— 1,5	— 0,08	— 1,0	— 1,0	Rem. —			X	X	
CuZn32Al2Mn2Fe1-C	CC763S	min. max.	1,0 2,5	— —	59,0 67,0 ^b	0,5 2,0	1,0 3,5	— 2,5	— —	— 1,5	— 0,08	— 1,0	— 1,0	Rem. —					
CuZn34Mn3Al2Fe1-B	CB764S	min. max.	1,5 3,0	— —	55,0 65,0 ^b	0,8 2,0	1,0 ^m 3,5	— 2,7	— 0,02	— 0,2	— 0,05	— 0,08	— 0,3	Rem. —		X		X	X
CuZn34Mn3Al2Fe1-C	CC764S	min. max.	1,0 3,0	— —	55,0 66,0 ^b	0,5 2,5	1,0 ^m 4,0	— 3,0	— 0,03	— 0,3	— 0,05	— 0,1	— 0,3	Rem. —					
CuZn35Mn2Al1Fe1-B	CB765S	min. max.	0,7 2,2	— —	56,0 64,0 ^b	0,5 1,8	0,5 ^m 2,5	— 6,0	— 0,02	— 0,5	— 0,08	— 0,10	— 0,8	Rem. —	X	X		X	X
CuZn35Mn2Al1Fe1-Cⁿ	CC765Sⁿ	min. max.	0,5 2,5	— —	57,0 65,0 ^b	0,5 2,0	0,5 ^m 3,0	— 6,0	— 0,03	— 0,5	— 0,08	— 0,1	— 1,0	Rem. —					

Table 12.2 (3 of 3)

Material designation		Composition in % (mass fraction)													Casting process and designation				
		Element	Al	As	Cu	Fe	Mn	Ni	P	Pb	Sb	Si	Sn	Zn	continuous GC	permanent mould GM	pressure die cast GP	sand GS	centrifugal GZ
Symbol	Number																		
CuZn37Al1-B	CB766S	min. max.	0,6 1,8	— —	60,0 63,0 ^b	— 0,4	— 0,4	— 1,8	— 0,02	— 0,4	— 0,05	— 0,5	— 0,4	Rem. —		X			
CuZn37Al1-C	CC766S	min. max.	0,3 1,8	— —	60,0 64,0 ^b	— 0,5	— 0,5	— 2,0	— —	— 0,50	— 0,1	— 0,6	— 0,50	Rem. —					
CuZn38Al-B	CB767S	min. max.	0,1 0,8	— —	59,0 64,0 ^b	— 0,4	— 0,4	— 0,8	— 0,05	— 0,1	— —	— 0,05	— 0,1	Rem. —		X			
CuZn38Al-C	CC767S	min. max.	0,1 0,8	— —	59,0 64,0 ^b	— 0,5	— 0,5	— 1,0	— —	— 0,1	— —	— 0,2	— 0,1	Rem. —					
a b c d e f g h i k l m n For ingots intended for the manufacture of pressure-tight sand castings and centrifugal castings, aluminium shall be restricted to 0,02 % maximum. Including nickel. Castings in this alloy shall conform to the dezincification resistance requirements given in EN 1982:2008, 6.5. For special applications requiring fine-grained castings, the ingots may be ordered and supplied grain refined to a maximum average grain diameter of 0,150 mm [see EN 1982:2008, Clause 5 i) and 6.4]. For drinking water applications, no other single element should be more than 0,02 %. The sum of these single elements should not exceed 0,25 %. In castings for non-drinking water applications, Sb can be used as alternative inhibitor of dezincification. If Sb is added as the inhibitor, then the As content shall be 0,04 % maximum. (Sb + As) shall be 0,14 % maximum. For drinking water applications, Sb shall be ≤ 0,02 %. Unless it is agreed between the purchaser and the supplier that other grain refining agents may be used, ingots in this alloy shall be grain refined, using zirconium, to have a maximum average grain diameter of 0,300 mm. For ingots for the manufacture of sand castings or centrifugal castings the aluminium content shall be restricted to 0,02 % maximum. For pressure die castings the silicon shall be increased to 0,30 % maximum. Unless it is agreed between the purchaser and the supplier that other grain refining agents may be used, ingots in this alloy shall be grain refined, using boron, to have a maximum average grain diameter of 0,100 mm. For permanent mould castings, the minimum manganese content shall be 0,3 % for ingots and castings. For certain applications a minimum proportion of alpha-phase in the microstructure of castings is required, see EN 1982:2008, 6.4.																			

Table 12.3 — Ingots and castings — Copper-tin alloys — Composition and casting processes

Material designation		Composition in % (mass fraction)													Casting process and designation			
Symbol	Number	Element	Al	Cu	Fe	Mn	Ni	P	Pb	S	Sb	Si	Sn	Zn	continuous GC	permanent mould GM	sand GS	centrifugal GZ
CuSn10-B	CB480K	min. max.	— 0,01	88,5 90,5 ^a	— 0,15	— 0,10	— 1,8	— 0,05	— 0,8	— 0,04	— 0,15	— 0,01	9,3 11,0	— 0,5	X	X	X	X
CuSn10-C	CC480K	min. max.	— 0,01	88,0 90,0 ^a	— 0,2	— 0,10	— 2,0	— 0,2	— 1,0	— 0,05	— 0,2	— 0,02	9,0 11,0	— 0,5				
CuSn11P-B	CB481K	min. max.	— 0,01	87,0 89,3	— 0,10	— 0,05	— 0,10	0,6 1,0	— 0,25	— 0,05	— 0,05	— 0,01	10,2 11,5	— 0,05	X	X	X	X
CuSn11P-C	CC481K	min. max.	— 0,01	87,0 89,5	— 0,10	— 0,05	— 0,10	0,5 1,0 ^b	— 0,25	— 0,05	— 0,05	— 0,01	10,0 11,5	— 0,05				
CuSn11Pb2-B	CB482K	min. max.	— 0,01	83,5 86,5	— 0,15	— 0,2	— 2,0	— 0,05	0,7 2,5	— 0,08	— 0,20	— 0,01	10,7 12,5	— 2,0	X		X	X
CuSn11Pb2-C	CC482K	min. max.	— 0,01	83,5 87,0	— 0,20	— 0,2	— 2,0	— 0,40	0,7 2,5	— 0,08	— 0,2	— 0,01	10,5 12,5	— 2,0				
CuSn12-B	CB483K	min. max.	— 0,01	85,5 88,5 ^c	— 0,15	— 0,2	— 2,0	— 0,20	— 0,6	— 0,05	— 0,15	— 0,01	11,2 ^c 13,0	— 0,4	X	X	X	X
CuSn12-C	CC483K	min. max.	— 0,01	85,0 88,5 ^c	— 0,2	— 0,2	— 2,0	— 0,60	— 0,7	— 0,05	— 0,15	— 0,01	11,0 ^c 13,0	— 0,5				
CuSn12Ni2-B	CB484K	min. max.	— 0,01	84,0 87,0	— 0,15	— 0,10	1,5 2,4	— 0,05	— 0,2	— 0,04	— 0,05	— 0,01	11,3 13,0	— 0,3	X		X	X
CuSn12Ni2-C	CC484K	min. max.	— 0,01	84,5 87,5	— 0,20	— 0,2	1,5 2,5	0,05 0,40	— 0,3	— 0,05	— 0,1	— 0,01	11,0 13,0	— 0,4				

^a Including nickel.

^b For sand castings for non-bearing applications the phosphorus may be restricted to 0,15 % max. [see EN 1982:2008, Clause 5 h)].

^c For continuous castings and centrifugal castings, the minimum tin content for ingots shall be 10,7 % and for castings 10,5 % and the maximum copper content for ingots and castings shall be 89,0 %.

Table 12.4 — Ingots and castings — Copper-tin-lead alloys — Composition and casting processes (1 of 2)

Material designation		Composition in % (mass fraction)													Casting process and designation			
		Element	Al	Cu ^a	Fe	Mn	Ni	P	Pb	S	Sb	Si	Sn	Zn	continuous GC	permanent mould GM	sand GS	centrifugal GZ
CuSn3Zn8Pb5-B	CB490K	min. max.	— 0,01	81,0 85,5	— 0,50	— —	— 2,0	— 0,03	3,5 5,8	— 0,08	— 0,25	— 0,01	2,2 3,5	7,5 10,0	X		X	X
CuSn3Zn8Pb5-C	CC490K	min. max.	— 0,01	81,0 86,0	— 0,5	— —	— 2,0	— 0,05	3,0 6,0	— 0,10	— 0,30	— 0,01	2,0 3,5	7,0 9,5				
CuSn5Zn5Pb2-B^{b, c}	CB499K^{b, c}	min. max.	— 0,01	84,0 87,5	— 0,30	— —	— 0,60	— 0,03	— 3,0	— 0,04	— 0,10	— 0,01	4,2 6,0	4,5 6,5	X	X	X	X
CuSn5Zn5Pb2-C^{b, c}	CC499K^{b, c}	min. max.	— 0,01	84,0 88,0	— 0,30	— —	— 0,60	— 0,04	— 3,0	— 0,04	— 0,10	— 0,01	4,0 6,0	4,0 6,0				
CuSn5Zn5Pb5-B	CB491K	min. max.	— 0,01	83,0 86,5	— 0,25	— —	— 2,0	— 0,03	4,2 5,8	— 0,08	— 0,25	— 0,01	4,2 6,0	4,5 6,5	X	X	X	X
CuSn5Zn5Pb5-C	CC491K	min. max.	— 0,01	83,0 87,0	— 0,3	— —	— 2,0	— 0,10	4,0 6,0	— 0,10	— 0,25	— 0,01	4,0 6,0	4,0 6,0				
CuSn7Zn2Pb3-B	CB492K	min. max.	— 0,01	85,0 88,5	— 0,20	— —	— 2,0 ^d	— 0,03	2,7 3,5	— 0,08	— 0,25	— 0,01	6,2 8,0 ^d	1,7 3,2	X	X	X	X
CuSn7Zn2Pb3-C	CC492K	min. max.	— 0,01	85,0 89,0	— 0,2	— —	— 2,0 ^d	— 0,10	2,5 3,5	— 0,10	— 0,25	— 0,01	6,0 8,0 ^d	1,5 3,0				
CuSn7Zn4Pb7-B	CB493K	min. max.	— 0,01	81,0 84,5 ^e	— 0,20	— —	— 2,0	— 0,03	5,2 8,0	— 0,08	— 0,30	— 0,01	6,2 ^e 8,0	2,3 5,0	X	X	X	X
CuSn7Zn4Pb7-C	CC493K	min. max.	— 0,01	81,0 85,0 ^e	— 0,2	— —	— 2,0	— 0,10	5,0 8,0	— 0,10	— 0,3	— 0,01	6,0 ^e 8,0	2,0 5,0				
CuSn6Zn4Pb2-B	CB498K	min. max.	— 0,01	86,0 89,5	— 0,25	— —	— 1,0	— 0,03	1,2 2,0	— 0,08	— 0,25	— 0,01	5,7 6,5	3,2 5,0	X	X	X	X
CuSn6Zn4Pb2-C	CC498K	min. max.	— 0,01	86,0 90,0	— 0,25	— —	— 1,0	— 0,05	1,0 2,0	— 0,10	— 0,25	— 0,01	5,5 6,5	3,0 5,0				
CuSn5Pb9-B	CB494K	min. max.	— 0,01	80,0 86,5	— 0,20	— 0,2	— 2,0	— 0,10	8,2 10,0	— 0,08	— 0,5	— 0,01	4,2 6,0	— 2,0	X	X	X	X
CuSn5Pb9-C	CC494K	min. max.	— 0,01	80,0 87,0	— 0,25	— 0,2	— 2,0	— 0,10	8,0 10,0	— 0,10	— 0,5	— 0,01	4,0 6,0	— 2,0				

Table 12.4 (2 of 2)

Material designation		Composition in % (mass fraction)													Casting process and designation			
		Element	Al	Cu ^a	Fe	Mn	Ni	P	Pb	S	Sb	Si	Sn	Zn	continuous GC	permanent mould GM	sand GS	centrifuga GZ
Symbol	Number																	
CuSn10Pb10-B	CB495K	min. max.	— 0,01	78,0 81,5	— 0,20	— 0,2	— 2,0	— 0,10	8,2 10,5	— 0,08	— 0,5	— 0,01	9,2 11,0	— 2,0	X	X	X	X
CuSn10Pb10-C	CC495K	min. max.	— 0,01	78,0 82,0	— 0,25	— 0,2	— 2,0	— 0,10	8,0 11,0	— 0,10	— 0,5	— 0,01	9,0 11,0	— 2,0				
CuSn7Pb15-B	CB496K	min. max.	— 0,01	74,0 79,5	— 0,20	— 0,20	0,5 2,0	— 0,10	13,2 17,0	— 0,08	— 0,5	— 0,01	6,2 8,0	— 2,0	X		X	X
CuSn7Pb15-C	CC496K	min. max.	— 0,01	74,0 80,0	— 0,25	— 0,20	0,5 2,0	— 0,10	13,0 17,0	— 0,10	— 0,5	— 0,01	6,0 8,0	— 2,0				
CuSn5Pb20-B	CB497K	min. max.	— 0,01	70,0 77,5	— 0,20	— 0,20	0,5 2,5	— 0,10	19,0 23,0	— 0,08	— 0,75	— 0,01	4,2 6,0	— 2,0	X		X	X
CuSn5Pb20-C	CC497K	min. max.	— 0,01	70,0 78,0	— 0,25	— 0,20	0,5 2,5	— 0,10	18,0 23,0	— 0,10	— 0,75	— 0,01	4,0 6,0	— 2,0				
^a Including nickel.																		
^b For drinking water applications no other single element should be more than 0,02 %. The sum of these single elements should not exceed 0,25 %.																		
^c Other elements in % max.: As 0,03, Bi 0,02, Cd 0,02, Cr 0,02.																		
^d (Tin + ½ nickel) content shall be in the range 7,0 % to 8,0 %.																		
^e For continuous castings and centrifugal castings, the minimum tin content for ingots shall be 5,4 % and for castings 5,2 % and the maximum copper content for ingots shall be 85,0 % and for castings 86,0 %.																		

Table 12.5 — Ingots and castings — Copper-aluminium alloys — Composition and casting processes

Material designation		Composition in % (mass fraction)													Casting process and designation			
		Element	Al	Bi	Cr	Cu	Fe	Mg	Mn	Ni	Pb	Si	Sn	Zn	continuous GC	permanent mould GM	sand GS	centrifugal GZ
CuAl9-B	CB330G	min. max.	8,2 10,5	— —	— —	88,0 91,5 ^a	— 1,0	— —	— 0,50	— 1,0	— 0,25	— 0,15	— 0,25	— 0,40		X		X
CuAl9-C	CC330G	min. max.	8,0 10,5	— —	— —	88,0 92,0 ^a	— 1,2	— —	— 0,50	— 1,0	— 0,30	— 0,20	— 0,30	— 0,50				
CuAl10Fe2-B	CB331G	min. max.	8,7 10,5	— —	— —	83,0 89,0	1,5 3,3	— 0,05	— 1,0	— 1,5	— 0,03	— 0,15	— 0,20	— 0,50	X	X	X	X
CuAl10Fe2-C	CC331G	min. max.	8,5 10,5	— —	— —	83,0 89,5	1,5 3,5	— 0,05	— 1,0	— 1,5	— 0,10 ^b	— 0,2	— 0,20	— 0,50				
CuAl10Ni3Fe2-B	CB332G	min. max.	8,7 10,5 ^c	— —	— —	80,0 85,5 ^f	1,0 2,8	— 0,05	— 2,0	1,5 4,0 ^c	— 0,03	— 0,15	— 0,20	— 0,50	X	X	X	X
CuAl10Ni3Fe2-C	CC332G	min. max.	8,5 10,5 ^c	— —	— —	80,0 86,0 ^f	1,0 3,0	— 0,05	— 2,0	1,5 4,0 ^c	— 0,10 ^b	— 0,2	— 0,20	— 0,50				
CuAl10Fe5Ni5-B	CB333G	min. max.	8,8 10,0	— 0,01	— 0,05	76,0 82,5	4,0 5,3 ^d	— 0,05	— 2,5	4,0 5,5 ^d	— 0,03	— 0,10	— 0,1	— 0,40	X	X	X	X
CuAl10Fe5Ni5-C	CC333G	min. max.	8,5 10,5	— 0,01	— 0,05	76,0 83,0	4,0 5,5 ^d	— 0,05	— 3,0	4,0 6,0 ^d	— 0,03	— 0,1	— 0,1	— 0,50				
CuAl11Fe6Ni6-B	CB334G	min. max.	10,3 12,0 ^e	— —	— —	72,0 81,5 ^e	4,2 7,0 ^e	— 0,05	— 2,5	4,3 7,5	— 0,04	— 0,10	— 0,20	— 0,40		X	X	X
CuAl11Fe6Ni6-C	CC334G	min. max.	10,0 12,0 ^e	— —	— —	72,0 82,5 ^e	4,0 7,0 ^e	— 0,05	— 2,5	4,0 7,5	— 0,05	— 0,1	— 0,2	— 0,50				

^a Including nickel.

^b For castings intended to be welded, the maximum lead content shall be 0,03 %.

^c For castings for seawater applications, the aluminium content shall be such that Al % < (8,2 + 0,5 Ni %).

^d For permanent mould castings, the minimum iron content of ingots and castings shall be 3,0 % and the minimum nickel content shall be 3,7 %.

^e For permanent mould castings, the minimum iron content of ingots and castings shall be 3,0 % and the minimum aluminium content shall be 9,0 %. In this case, the maximum copper content shall be 84,5 %.

^f For permanent mould castings, the maximum copper content of ingots and castings shall be 88,5 %.

Table 12.6 — Ingots and castings — Copper-manganese-aluminium alloys — Composition and casting processes

Material designation		Composition in % (mass fraction)											Casting process and designation
Symbol	Number	Element	Al	Cu	Fe	Mg	Mn	Ni	Pb	Si	Sn	Zn	
CuMn11Al8Fe3Ni3-C^a	CC212E^a	min. max.	7,0 9,0	68,0 77,0	2,0 4,0	— 0,05	8,0 15,0	1,5 4,5	— 0,05	— 0,1	— 0,5	— 1,0	X

^a Ingot properties for producing castings conforming to CuMn11Al8Fe3Ni3-C (CC212E) are not specified in EN 1982. The composition limits for ingots are at the discretion of the purchaser and shall be stated on the enquiry and order [see EN 1982:2008, Clause 5 I)].

Table 12.7 — Ingots and castings — Copper-nickel alloys — Composition and casting processes

Material designation		Composition in % (mass fraction)																						Casting process and designation		
Symbol	Number	Element	Al	B	Bi	C	Cd	Cr	Cu	Fe	Mg	Mn	Nb	Ni	P	Pb	S	Se	Si	Te	Ti	Zn	Zr	continuous GC	sand GS	centrifugal GZ
CuNi10Fe1Mn1-B	CB380H	min. max.	— 0,01	— —	— —	— 0,10	— —	— —	84,5 —	1,2 1,8	— —	1,2 1,5	— 1,0	9,2 11,0	— —	— 0,03	— —	— —	— 0,10	— —	— —	— 0,50	— —	X	X	X
CuNi10Fe1Mn1-C	CC380H	min. max.	— 0,01	— —	— —	— 0,10	— —	— —	84,5 —	1,0 1,8	— —	1,0 1,5	— 1,0	9,0 11,0	— —	— 0,03	— —	— —	— 0,10	— —	— —	— 0,5	— —			
CuNi30Fe1Mn1-B	CB381H	min. max.	— 0,01	— —	— —	— 0,02	— —	— —	64,5 —	0,5 1,5	— —	0,7 1,2	— —	29,2 31,0	— 0,01	— 0,03	— 0,01	— —	— 0,10	— —	— —	— 0,50	— —	X	X	X
CuNi30Fe1Mn1-C	CC381H	min. max.	— 0,01	— —	— —	— 0,03	— —	— —	64,5 —	0,5 1,5	— —	0,6 1,2	— —	29,0 31,0	— 0,01	— 0,03	— 0,01	— —	— 0,1	— —	— —	— 0,5	— —			
CuNi30Cr2FeMnSi-C^a	CC382H^a	min. max.	— 0,01	— 0,01	— 0,002	— 0,03	— —	1,5 2,0	Rem. —	0,5 1,0	— 0,01	0,5 1,0	— —	29,0 32,0	— 0,01	— 0,005	— 0,01	— 0,005	0,15 0,50	— 0,005	— 0,25	— 0,2	— 0,15		X	
CuNi30Fe1Mn1NbSi-C^a	CC383H^a	min. max.	— 0,01	— 0,01	— 0,01	— 0,03	— 0,02	— —	Rem. —	0,5 1,5	— 0,01	0,6 1,2	0,5 1,0	29,0 31,0	— 0,01	— 0,01	— 0,01	— 0,01	0,3 0,7	— 0,01	— —	— 0,50	— —		X	

^a Ingot properties for producing these castings are not specified in EN 1982. The composition limits for ingots are at the discretion of the purchaser and shall be stated on the enquiry and order [see EN 1982:2008, Clause 5 I)].

Table 13 — Scrap — Composition (1 of 4)

Material designation		Composition in % (mass fraction)												Characteristics
		Element	Cu	Al	As	Bi	Fe	Ni	P	Pb	Sn	Zn	Others total	
S-Cu-1	CS026A	min. max.	99,90 ^a —	— —	— —	— 0,000 5	— —	— —	— 0,001	— 0,005	— —	— —	— —	Production electrolytic copper scrap consisting of scrap from processing (wire), extrusion discards and discarded material from electrical lines (connection bars, wire, cable, etc.)
S-Cu-2	CS027A	min. max.	99,90 ^a —	— —	— —	— 0,000 5	— —	— —	— 0,001	— 0,005	— —	— —	— —	Old electrolytic copper scrap consisting of wire (not burned) and connection bars.
S-Cu-3	CS028A	min. max.	99,90 ^a —	— —	— —	— 0,000 5	— —	— —	— 0,001	— 0,005	— —	— —	— —	Production copper scrap consisting of enamelled wire.
S-Cu-4	CS029A	min. max.	99,90 ^a —	— —	— —	— —	— —	— —	— 0,06	— 0,005	— —	— —	— —	Production copper scrap consisting of tubes, strips, plates, discs and extrusion discards.
S-Cu-5	CS030A	min. max.	99,90 ^a —	— —	— —	— —	— —	— —	— 0,06	— 0,005	— —	— —	— —	Old copper scrap consisting of tubes, strips, plates, discs and extrusion discards.
S-Cu-6	CS051B	min. max.	99,7 ^b —	— 0,02	— —	— 0,000 5	— 0,04	— 0,01	— 0,001	— 0,04	— 0,04	— 0,04	— —	Old copper scrap consisting of burned but not brittle wire and cuttings.

Table 13 (2 of 4)

Material designation		Composition in % (mass fraction)												Characteristics
		Element	Cu	Al	As	Bi	Fe	Ni	P	Pb	Sn	Zn	Others total	
S-Cu-7	CS052B	min. max.	99,5 ^b —	— 0,05	— 0,005	— —	— 0,05	— 0,02	— 0,06	— 0,1	— 0,06	— 0,05	— —	Old copper scrap consisting of tubes, punchings, cuttings, shearings of strip, plates, discs, copper ware and burned but not brittle wire.
S-Cu-8	CS053B	min. max.	98 ^c —	— 0,05	— —	— —	— 0,30	— 0,10	— —	— 0,50	— 0,25	— 0,50	— 0,05	Old copper scrap consisting of burned but not brittle wire, cuttings, shearings of strip, plate, discs or tube and copper ware.
S-Cu-9	CS054B	min. max.	96 ^c —	— 0,20	— —	— —	— 0,50	— 0,20	— —	— 1,50	— 0,50	— 1,50	— 0,1	Old copper scrap consisting of wire, either brittle or not, plate, copper ware and other forms, unclassifiable in any of the other types defined [S-Cu-1 (CS026A) to S-Cu-8 (CS053B)] because of excessive metallic impurities.
S-Cu-10A	CS031A	min. max.	99,90 ^b —	— 0,002	— —	— 0,000 5	— 0,002	— 0,002	— 0,001	— 0,005	— 0,002	— 0,002	— —	Copper wire, either coated or uncoated, that has been granulated.
S-Cu-10B	CS055B	min. max.	99,8 ^b —	— 0,02	— —	— 0,000 5	— 0,02	— 0,02	— 0,002	— 0,02	— 0,02	— 0,02	— —	
S-Cu-10C	CS056B	min. max.	98,5 ^b —	— 0,05	— —	— 0,002	— 0,1	— 0,1	— 0,002	— 0,8	— 0,25	— 0,15	— —	
S-Cu-10D	CS057B	min. max.	97,5 —	— 0,1	— —	— 0,002	— 0,2	— 0,2	— 0,002	— 1,0	— 0,5	— 0,3	— —	

Table 13 (3 of 4)

Material designation		Composition in % (mass fraction)												Characteristics
		Element	Cu	Al	As	Bi	Fe	Ni	P	Pb	Sn	Zn	Others total	
S-CuZn-1A	CS510L	min. max.	63,5 —	— 0,02	— —	— —	— 0,05	— 0,3	— —	— 0,05	— 0,1	Rem. —	— 0,1	Production brass scrap. Scrap may be from individual wrought materials or combinations.
S-CuZn-1B	CS511L	min. max.	62 —	— 0,05	— —	— —	— 0,1	— 0,3	— —	— 0,1	— 0,1	Rem. —	— 0,1	
S-CuZn-1C	CS512L	min. max.	59,5 —	— 0,05	— —	— —	— 0,2	— 0,3	— —	— 0,3	— 0,2	Rem. —	— 0,2	
S-CuZn-2	CS513L	min. max.	69 —	— 0,02	— —	— —	— 0,05	— 0,3	— —	— 0,05	— 0,1	Rem. —	— 0,1	Brass scrap in the form of shell cases.
S-CuZn-3	CS514L	min. max.	69 —	— 0,02	— —	— —	— 0,05	— 0,3	— —	— 0,05	— 0,1	Rem. —	— 0,1	Brass scrap in the form of cartridge cases.
S-CuZn-4A	CS625N	min. max.	57 —	— 0,05	— —	— —	— 0,3	— 0,3	— —	— 3,5 ^d	— 0,3	Rem. —	— 0,2	Leaded brass scrap consisting of rods, extrusion discards and cuttings or from cold- or hot-forming processes (not casting).
S-CuZn-4B	CS626N	min. max.	57 —	— 0,1	— —	— —	— 0,4	— 0,3	— —	— 3,5 ^d	— 0,5	Rem. —	— 0,2	
S-CuZn-5A	CS627N	min. max.	57 —	— 0,05	— —	— —	— 0,3	— 0,3	— —	— 3,5 ^d	— 0,3	Rem. —	— 0,2	Leaded brass turnings, no filings and grindings.
S-CuZn-5B	CS628N	min. max.	57 —	— 0,1	— —	— —	— 0,4	— 0,3	— —	— 3,5 ^d	— 0,5	Rem. —	— 0,2	
S-CuZn-6	CS629N	min. max.	57 —	— 0,4 ^e	— —	— —	— 0,6 ^e	— 0,5 ^e	— —	— 3,5 ^d	— 0,6 ^e	Rem. —	— 0,4 ^e	Mixed brass valves and taps.
S-CuZn-7	CS630N	min. max.	57 —	— 0,3 ^e	— —	— —	— 0,6 ^e	— 0,5 ^e	— —	— 3,5 ^d	— 0,7 ^e	Rem. —	— 0,2 ^e	Brass scrap from various sources including brass castings, rolled brass, brass rod including plated material.

Table 13 (4 of 4)

Material designation		Composition in % (mass fraction)											Characteristics
		Element	Cu	Al	As	Bi	Fe	Ni	P	Pb	Sn	Zn	
Symbol	Number												
S-CuNi10Fe1Mn	CS352H	Permitted materials, see composition Tables 4 and 9					CuNi10Fe1Mn (CW352H)					Open ended condenser tube scrap of a single composition.	
S-CuNi30Fe2Mn2	CS353H						CuNi30Fe2Mn2 (CW353H)						
S-CuNi30Mn1Fe	CS354H						CuNi30Mn1Fe (CW354H)						
S-CuZn20Al2As	CS702R						CuZn20Al2As (CW702R)						
S-CuZn28Sn1As	CS706R						CuZn28Sn1As (CW706R)						
S-CuZn30As	CS707R						CuZn30As (CW707R)						
NOTE For detailed characteristics, condition and moisture content see EN 12861:1999.													
a Including Ag up to 0,015 %. Other elements shall not exceed 0,002 % each.													
b Including Ag up to 0,015 % and O up to 0,06 %. Other elements shall not exceed 0,002 % each.													
c Including Ag up to 0,015 % and O up to 0,06 %.													
d In the case of CuZn38Pb4 (CW609N) Pb max. 4,2 %.													
e Sum of Al + Fe + Ni + Sn + others total = max. 1,7 %.													

Table 14 — Composition of copper alloy according to EN 50149:2012

Material designation		Composition in % (mass fraction)						
Symbol	Number	Element	Cu	Cd	Mg	P	Sn	Others total
CuMg0,2	CW127C	min.	Rem.	—	0,1	—	—	0,1
		max.	—	—	0,3	0,01	—	
CuMg0,5	CW128C	min.	Rem.	—	0,4	—	—	0,1
		max.	—	—	0,7	0,01	—	
CuSn0,2	CW129C	min.	Rem.	—	—	—	0,15	0,1
		max.	—	—	—	—	0,55	
CuCd0,7	CW130C	min.	Rem.	0,5	—	—	—	0,1
		max.	—	0,8	—	—	—	
CuCd1,0	CW131C	min.	Rem.	0,8	—	—	—	0,1
		max.	—	1,2	—	—	—	

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- [4] EN 1652:1997, *Copper and copper alloys — Plate, sheet, strip and circles for general purposes*
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