



SLOVENSKI STANDARD
kSIST-TS FprCEN/TS 13388:2019
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Baker in bakrove zlitine - Zbirka kemijskih sestav in izdelkov

Copper and copper alloys - Compendium of compositions and products

Kupfer und Kupferlegierungen - Übersicht über Zusammensetzungen und Produkte

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

Ta slovenski standard je istoveten z: FprCEN/TS 13388

ICS:

77.120.30	Baker in bakrove zlitine	Copper and copper alloys
77.150.30	Bakreni izdelki	Copper products

kSIST-TS FprCEN/TS 13388:2019 **en,fr,de**

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ICS 77.120.30; 77.150.30

Will supersede CEN/TS 13388:2015

English Version

**Copper and copper alloys - Compendium of compositions
and products**

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

Kupfer und Kupferlegierungen - Übersicht über
Zusammensetzungen und Produkte

This draft Technical Specification is submitted to CEN members for Vote. It has been drawn up by the Technical Committee CEN/TC 133.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a Technical Specification. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a Technical Specification.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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FprCEN/TS 13388:2019 (E)**European foreword**

This document (FprCEN/TS 13388:2019) has been prepared by Technical Committee CEN/TC 133 “Copper and copper alloys”, the secretariat of which is held by DIN.

This document is currently submitted to the Vote on TS.

This document will supersede CEN/TS 13388:2015.

In comparison with CEN/TS 13388:2015, the following changes were made:

- a) modifications regarding materials and compositions from EN 1982:2017, EN 12164:2016, EN 12165:2016, EN 12167:2016, EN 12168:2016, EN 12449:2016, EN 12735-1:2016 and EN 12861:2018 considered.

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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.

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FprCEN/TS 13388:2019 (E)

1 Scope

This document 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 are referred to in the text in such a way that some or all of their content constitutes requirements of this document. 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 1982:2017, *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 1981:2017 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 1982:2017 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-zinc-aluminium alloys — Composition and casting processes

Table 12.4 — Ingots and castings — Copper-zinc-lead alloys — Composition and casting processes

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

Table 12.6 — Ingots and castings — Other copper-zinc alloys — Composition and casting processes

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

Table 12.8 — Ingots and castings — Copper-tin-zinc-lead alloys — Composition and casting processes

Table 12.9 — Ingots and castings — Copper-tin-lead alloys — Composition and casting processes

Table 12.10 — Ingots and castings — Copper-aluminium alloys — Composition and casting processes

Table 12.11 — Ingots and castings — Copper-manganese alloys — Composition and casting processes

Table 12.12 — Ingots and castings — Copper-nickel alloys — Composition and casting processes

Table 12.13 — Ingots and castings — Copper-silicon-zinc 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 12861:2018 are given in Table 13.

FprCEN/TS 13388:2019 (E)**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 12.13.

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.

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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)																				Sum of elements listed in this table other than copper
		Element	Cu	Ag	As	Bi	Cd	Co	Cr	Fe	Mn	Ni	P	Pb	S	Sb	Se	Si	Sn	Te	Zn	
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	—	—	—	—	—	—	—	—
<p>a (As + Cd + Cr + Mn + P + Sb) maximum 0,001 5 %.</p> <p>b (Bi + Se + Te) maximum 0,000 3 %, of which (Se + Te) maximum 0,000 30 %.</p> <p>c (Co + Fe + Ni + Si + Sn + Zn) maximum 0,002 0 %.</p> <p>d The sulfur content shall be determined on a cast sample.</p> <p>e Including silver up to a maximum of 0,015 %.</p>																						

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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)										Elements listed in this table other than copper	
Symbol	Number		Element	S	Sb	Se	Si	Sn	Te	Zn			total	excluding
	unwrought copper	wrought copper												
Cu-ETP1	CR003A	CW003A	min. max.	— 0,001 5	— 0,000 4 a	— 0,000 20 b	— — c	— — c	— 0,000 20 b	— — c	— — c	— — c	— 0,006 5	0
Cu-OF1	CR007A	CW007A	min. max.	— 0,001 5	— 0,000 4 a	— 0,000 20 b	— — c	— — c	— 0,000 20 b	— — c	— — c	— — c	— 0,006 5	0
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.

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