



SLOVENSKI STANDARD SIST-TS CEN/TS 13388:2026

01-november-2026

Nadomešča:

SIST-TS CEN/TS 13388:2020/AC:2020

Baker in bakrove zlitine - Zbirka 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: CEN/TS 13388:2026

get full document from standards.iteh.ai

ICS:

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

SIST-TS CEN/TS 13388:2026

en,fr,de

Sample Document

get full document from standards.iteh.ai

TECHNICAL SPECIFICATION
SPÉCIFICATION TECHNIQUE
TECHNISCHE SPEZIFIKATION

CEN/TS 13388

September 2026

ICS 77.120.30; 77.150.30

Supersedes CEN/TS 13388:2020

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 17 August 2026 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

get full document from standards.iteh.ai



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

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

© 2026 CEN All rights of exploitation in any form and by any means reserved
worldwide for CEN national Members.

Ref. No. CEN/TS 13388:2026 E

Contents	Page
European foreword	5
Introduction	6
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions.....	7
4 Compositions of coppers and copper alloys standardized by CEN/TC 133	7
4.1 Composition of coppers	7
4.2 Composition of copper alloys	7
4.3 Composition of master alloys	8
4.4 Composition of ingots and castings.....	8
4.5 Composition of copper and copper alloy scrap.....	8
5 Available product forms of copper and copper alloys.....	8
5.1 Wrought coppers and copper alloys	8
5.2 Scrap	8
6 Composition of copper alloys according to EN 50149:2012	9
Bibliography	66

get full document from standards.iteh.ai

Tables

Table 1 — Composition of copper cathodes according to EN 1978:2022, Cu-CATH-1 (CR001A) and Cu-CATH-2 (CR002A)	10
Table 2 — Composition of unalloyed copper grades made from Cu-CATH-1 (CR001A) according to EN 1978:2022, Part A	11
Table 3 — Composition of unalloyed copper grades made from Cu-CATH-1 (CR001A) according to EN 1978:2022, Part B	12
Table 4 — Composition of unalloyed copper grades, other than those made from Cu-CATH-1 (CR001A) according to EN 1978:2022	13
Table 5 — Composition of phosphorus-containing copper grades.....	14
Table 6 — Composition of silver-containing copper grades (silver-bearing coppers)	15
Table 7 — Composition of copper alloys, low alloyed (less than 5 % alloying elements).....	16
Table 8 — Composition of miscellaneous copper alloys (5 % or more alloying elements).....	19
Table 9 — Composition of copper-aluminium alloys.....	20

Table 10 — Composition of copper-nickel alloys.....	21
Table 11 — Composition of copper-nickel-zinc alloys.....	22
Table 12 — Composition of copper-tin alloys	23
Table 13 — Composition of copper-zinc alloys, binary.....	24
Table 14 — Composition of copper-zinc-lead alloys.....	25
Table 15 — Composition of copper-zinc alloys, complex.....	27
Table 16 — Wrought coppers and copper alloys specified in European product Standards prepared by CEN/TC 133.....	30
Table 17 — Master alloys — Composition	40
Table 18 — Ingots and castings — Copper and copper-chromium alloys — Compositions and casting processes.....	44
Table 19 — Ingots and castings — Copper-zinc alloys — Composition and casting processes.....	45
Table 20 — Ingots and castings — Copper-zinc-aluminium alloys — Composition and casting processes	46
Table 21 — Ingots and castings — Copper-zinc-lead alloys — Composition and casting processes.....	47
Table 22 — Ingots and castings — Copper-zinc-silicon alloys — Composition and casting processes.....	50
Table 23 — Ingots and castings — Other copper-zinc alloys — Composition and casting processes.....	51
Table 24 — Ingots and castings — Copper-tin alloys — Composition and casting processes	52
Table 25 — Ingots and castings — Copper-tin-zinc-lead alloys — Composition and casting processes.....	54
Table 26 — Ingots and castings — Copper-tin-zinc-phosphorous-sulfur alloys — Composition and casting processes.....	55
Table 27 — Ingots and castings — Copper-tin-lead alloys — Composition and casting processes.....	56
Table 28 — Ingots and castings — Copper-aluminium alloys — Composition and casting processes.....	57
Table 29 — Ingots and castings — Copper-manganese alloys — Composition and casting processes.....	58
Table 30 — Ingots and castings — Copper-nickel alloys — Composition and casting processes.....	59

CEN/TS 13388:2026 (E)

Table 31 — Ingots and castings — Copper-silicon-zinc alloys — Composition and casting processes.....	60
Table 32 — Scrap — Composition.....	61
Table 33 — Composition of copper alloys according to EN 50149:2012	65

Sample Document

get full document from standards.iteh.ai

European foreword

This document (CEN/TS 13388:2026) 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 shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN/TS 13388:2020+AC:2020.

In comparison with CEN/TS 13388:2020+AC:2020, the following changes were made:

- a) modifications regarding materials and compositions from EN 1982:2024, EN 12163:2024, EN 12164:2024, EN 12165:2024, EN 12166:2024, EN 12167:2024, EN 12168:2024, EN 12449:2023 and EN 12420:2024 have been considered.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Sample Document

get full document from standards.iteh.ai

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.

Sample Document

get full document from standards.iteh.ai

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 1982:2024, *Copper and copper alloys — Ingots and castings*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp/>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Compositions of coppers and copper alloys standardized by CEN/TC 133

4.1 Composition of coppers

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

Table 1 — Composition of copper cathodes according to EN 1978:2022, Cu-CATH-1 (CR001A) and Cu-CATH-2 (CR002A)

Table 2 — Composition of unalloyed copper grades made from Cu-CATH-1 (CR001A) according to EN 1978:2022, Part A

Table 3 — Composition of unalloyed copper grades made from Cu-CATH-1 (CR001A) according to EN 1978:2022, Part B

Table 4 — Composition of unalloyed copper grades, other than those made from Cu-CATH-1 (CR001A) according to EN 1978:2022

Table 5 — Composition of phosphorus-containing copper grades

Table 6 — Composition of silver-containing copper grades (silver-bearing coppers)

4.2 Composition of copper alloys

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

Table 7 — Composition of copper alloys, low alloyed (less than 5 % alloying elements)

Table 8 — Composition of miscellaneous copper alloys (5 % or more alloying elements)

Table 9 — Composition of copper-aluminium alloys

Table 10 — Composition of copper-nickel alloys

CEN/TS 13388:2026 (E)

Table 11 — Composition of copper-nickel-zinc alloys

Table 12 — Composition of copper-tin alloys

Table 13 — Composition of copper-zinc alloys, binary

Table 14 — Composition of copper-zinc-lead alloys

Table 15 — Composition of copper-zinc alloys, complex

4.3 Composition of master alloys

The symbol and number designations and compositions of master alloys in accordance with EN 1981:2003 are given in Table 17.

4.4 Composition of ingots and castings

The symbol and number designations and compositions of ingots and castings in accordance with EN 1982:2024 are given in the following tables:

Table 18 — Ingots and castings — Copper and copper-chromium alloys — Compositions and casting processes

Table 19 — Ingots and castings — Copper-zinc alloys — Composition and casting processes

Table 20 — Ingots and castings — Copper-zinc-aluminium alloys — Composition and casting processes

Table 21 — Ingots and castings — Copper-zinc-lead alloys — Composition and casting processes

Table 22 — Ingots and castings — Copper-zinc-silicon alloys — Composition and casting processes

Table 23 — Ingots and castings — Other copper-zinc alloys — Composition and casting processes

Table 24 — Ingots and castings — Copper-tin alloys — Composition and casting processes

Table 25 — Ingots and castings — Copper-tin-zinc-lead alloys — Composition and casting processes

Table 26 — Ingots and castings — Copper-tin-zinc-phosphorous-sulfur alloys — Composition and casting processes

Table 27 — Ingots and castings — Copper-tin-lead alloys — Composition and casting processes

Table 28 — Ingots and castings — Copper-aluminium alloys — Composition and casting processes

Table 29 — Ingots and castings — Copper-manganese alloys — Composition and casting processes

Table 30 — Ingots and castings — Copper-nickel alloys — Composition and casting processes

Table 31 — Ingots and castings — Copper-silicon-zinc alloys — Composition and casting processes

4.5 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 32.

5 Available product forms of copper and copper alloys**5.1 Wrought coppers and copper alloys**

The product forms and applicable standards are given in Table 16.

5.2 Scrap

The product forms are given in Table 32.

6 Composition of copper alloys according to EN 50149:2012

The symbol and number designations and compositions copper alloys for grooved contact wires in accordance with EN 50149:2012 are given in Table 33.

Sample Document

get full document from standards.iteh.ai

CEN/TS 13388:2026 (E)

Table 1 — Composition of copper cathodes according to EN 1978:2022, Cu-CATH-1 (CR001A) and Cu-CATH-2 (CR002A)

Material designation		Composition in % (mass fraction)																				
Symbol	Number	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
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 2 — Composition of unalloyed copper grades made from Cu-CATH-1 (CR001A) according to EN 1978:2022, Part A

Material designation			Composition in % (mass fraction)															
			Symbol	Number		Element	Cu	Ag	As	Bi	Cd	Co	Cr	Fe	Mn	Ni	O	P
	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.	99,99	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			max.	—	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.	99,99	—	—	—	—	—	—	—	—	—	—	—	0,001	—	—
			max.	—	0,002 5	0,000 5	0,000 20	0,000 1	—	—	0,001 0	0,000 5	0,001 0	— ^d	0,006	0,000 5		
^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 such that the material conforms to the hydrogen embrittlement requirements of EN 1976. The specific requirements for the hydrogen embrittlement may differ in individual standards.																		

CEN/TS 13388:2026 (E)

Table 3 — Composition of unalloyed copper grades made from Cu-CATH-1 (CR001A) according to EN 1978:2022, Part B

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	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	— 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 %.												

Table 4 — Composition of unalloyed copper grades, other than those made from Cu-CATH-1 (CR001A) according to EN 1978:2022

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 such that the material conforms to the hydrogen embrittlement requirements of EN 1976. The specific requirements for the hydrogen embrittlement may differ in individual standards. ^d Higher total impurities content is permitted, subject to agreement between the purchaser and the supplier.									

get full document from standards.iteh.ai