



# SLOVENSKI STANDARD

## kSIST-TS FprCEN/TS 13388:2026

01-julij-2026

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### 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: FprCEN/TS 13388

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#### ICS:

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

**kSIST-TS FprCEN/TS 13388:2026**      **en,fr,de**

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TECHNICAL SPECIFICATION  
SPÉCIFICATION TECHNIQUE  
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**FINAL DRAFT**  
**FprCEN/TS 13388**

April 2026

ICS 77.120.30; 77.150.30

Will supersede 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 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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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Ref. No. FprCEN/TS 13388:2026 E

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## European foreword

This document (FprCEN/TS 13388:2026) 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.

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 will supersede 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.

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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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## 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

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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.

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## FprCEN/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 <sup>a</sup> | 0,000 20 <sub>b</sub> | — <sup>a</sup> | — <sup>c</sup> | — <sup>a</sup> | 0,001 0 <sub>c</sub> | — <sup>a</sup> | — <sup>c</sup> | — <sup>a</sup> | 0,000 5 | 0,001 5 <sup>d</sup> | 0,000 4 <sup>a</sup> | 0,000 20 <sub>b</sub> | — <sup>c</sup> | — <sup>c</sup> | 0,000 20 <sub>b</sub> | — <sup>c</sup> | 0,006 5                                                |
| Cu-CATH-2                                                                             | CR002A | min.                             | 99,90 <sub>e</sub> | —       | —                    | —                     | —              | —              | —              | —                    | —              | —              | —              | —       | —                    | —                    | —                     | —              | —              | —                     | —              | —                                                      |
|                                                                                       |        | max.                             | —                  | —       | —                    | 0,000 5               | —              | —              | —              | —                    | —              | —              | —              | 0,005   | —                    | —                    | —                     | —              | —              | —                     | —              | 0,03 excluding Ag                                      |
| <sup>a</sup> (As + Cd + Cr + Mn + P + Sb) maximum 0,001 5 %.                          |        |                                  |                    |         |                      |                       |                |                |                |                      |                |                |                |         |                      |                      |                       |                |                |                       |                |                                                        |
| <sup>b</sup> (Bi + Se + Te) maximum 0,000 3 %, of which (Se + Te) maximum 0,000 30 %. |        |                                  |                    |         |                      |                       |                |                |                |                      |                |                |                |         |                      |                      |                       |                |                |                       |                |                                                        |
| <sup>c</sup> (Co + Fe + Ni + Si + Sn + Zn) maximum 0,002 0 %.                         |        |                                  |                    |         |                      |                       |                |                |                |                      |                |                |                |         |                      |                      |                       |                |                |                       |                |                                                        |
| <sup>d</sup> The sulfur content shall be determined on a cast sample.                 |        |                                  |                    |         |                      |                       |                |                |                |                      |                |                |                |         |                      |                      |                       |                |                |                       |                |                                                        |
| <sup>e</sup> 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 <sup>a</sup> | 0,000 20 <sup>b</sup> | — <sup>a</sup> | — <sup>c</sup> | — <sup>a</sup> | 0,001 0 <sup>c</sup> | — <sup>a</sup> | — <sup>c</sup> | 0,040          | — <sup>a</sup> | 0,000 5 |   |   |
| Cu-OF1                                                                                                                                                                                                                       | CR007A           | CW007A         | min.                             | —      | —       | —                    | —                     | —              | —              | —              | —                    | —              | —              | —              | —              | —       | — | — |
|                                                                                                                                                                                                                              |                  |                | max.                             | —      | 0,002 5 | 0,000 5 <sup>a</sup> | 0,000 20 <sup>b</sup> | — <sup>a</sup> | — <sup>c</sup> | — <sup>a</sup> | 0,001 0 <sup>c</sup> | — <sup>a</sup> | — <sup>c</sup> | — <sup>d</sup> | — <sup>a</sup> | 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        | — <sup>d</sup> | 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        | — <sup>d</sup> | 0,006          | 0,000 5 |   |   |
| <sup>a</sup> (As + Cd + Cr + Mn + P + Sb) max. 0,001 5 %.                                                                                                                                                                    |                  |                |                                  |        |         |                      |                       |                |                |                |                      |                |                |                |                |         |   |   |
| <sup>b</sup> (Bi + Se + Te) max. 0,000 3 %, of which (Se + Te) max. 0,000 30 %.                                                                                                                                              |                  |                |                                  |        |         |                      |                       |                |                |                |                      |                |                |                |                |         |   |   |
| <sup>c</sup> (Co + Fe + Ni + Si + Sn + Zn) max. 0,002 0 %.                                                                                                                                                                   |                  |                |                                  |        |         |                      |                       |                |                |                |                      |                |                |                |                |         |   |   |
| <sup>d</sup> 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. |                  |                |                                  |        |         |                      |                       |                |                |                |                      |                |                |                |                |         |   |   |

**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 |
| <b>Cu-ETP1</b>                                                                                                                                                                                             | <b>CR003A</b>    | <b>CW003A</b>  | min.<br>max.                     | —<br>0,001 5 | —<br>0,000 4 <sup>a</sup> | —<br>0,000 20 <sup>b</sup> | —<br>— <sup>c</sup> | —<br>— <sup>c</sup> | —<br>0,000 20 <sup>b</sup> | —<br>— <sup>c</sup> | —<br>0,006 5                                    | 0         |
| <b>Cu-OF1</b>                                                                                                                                                                                              | <b>CR007A</b>    | <b>CW007A</b>  | min.<br>max.                     | —<br>0,001 5 | —<br>0,000 4 <sup>a</sup> | —<br>0,000 20 <sup>b</sup> | —<br>— <sup>c</sup> | —<br>— <sup>c</sup> | —<br>0,000 20 <sup>b</sup> | —<br>— <sup>c</sup> | —<br>0,006 5                                    | 0         |
| <b>Cu-OFE</b>                                                                                                                                                                                              | <b>CR009A</b>    | <b>CW009A</b>  | min.<br>max.                     | —<br>0,001 5 | —<br>0,000 4              | —<br>0,000 20              | —<br>—              | —<br>0,000 2        | —<br>0,000 20              | —<br>0,000 1        | —<br>—                                          | —         |
| <b>Cu-PHCE</b>                                                                                                                                                                                             | <b>CR022A</b>    | <b>CW022A</b>  | min.<br>max.                     | —<br>0,001 5 | —<br>0,000 4              | —<br>0,000 20              | —<br>—              | —<br>0,000 2        | —<br>0,000 20              | —<br>0,000 1        | —<br>—                                          | —         |
| <sup>a</sup> (As + Cd + Cr + Mn + P + Sb) max. 0,001 5 %.<br><sup>b</sup> (Bi + Se + Te) max. 0,000 3 %, of which (Se + Te) max. 0,000 30 %.<br><sup>c</sup> (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) |                 |              |                         |            |                           |           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------|----------------------------------|-----------------|--------------|-------------------------|------------|---------------------------|-----------|
|                                                                                                                                                                                                                              |                  |                | Element                          | Cu <sup>a</sup> | Bi           | O                       | Pb         | Other elements (see note) |           |
| Symbol                                                                                                                                                                                                                       | Number           |                |                                  |                 |              |                         |            | total                     | excluding |
|                                                                                                                                                                                                                              | unwrought copper | wrought copper |                                  |                 |              |                         |            |                           |           |
| Cu-ETP                                                                                                                                                                                                                       | CR004A           | CW004A         | min.<br>max.                     | 99,90<br>—      | —<br>0,000 5 | —<br>0,040 <sup>b</sup> | —<br>0,005 | —<br>0,03                 | Ag, O     |
| Cu-FRHC                                                                                                                                                                                                                      | CR005A           | CW005A         | min.<br>max.                     | 99,90<br>—      | —<br>—       | —<br>0,040 <sup>b</sup> | —<br>—     | —<br>0,06 <sup>d</sup>    | Ag, O     |
| Cu-FRTP                                                                                                                                                                                                                      | CR006A           | CW006A         | min.<br>max.                     | 99,90<br>—      | —<br>—       | —<br>0,100              | —<br>—     | —<br>0,05                 | Ag, Ni, O |
| Cu-OF                                                                                                                                                                                                                        | CR008A           | CW008A         | min.<br>max.                     | 99,95<br>—      | —<br>0,000 5 | —<br>— <sup>c</sup>     | —<br>0,005 | —<br>0,03                 | Ag        |
| NOTThe 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.             |                  |                |                                  |                 |              |                         |            |                           |           |
| <sup>a</sup> Including silver, up to a maximum of 0,015 %.                                                                                                                                                                   |                  |                |                                  |                 |              |                         |            |                           |           |
| <sup>b</sup> Oxygen content up to 0,060 % is permitted, subject to agreement between the purchaser and the supplier.                                                                                                         |                  |                |                                  |                 |              |                         |            |                           |           |
| <sup>c</sup> 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. |                  |                |                                  |                 |              |                         |            |                           |           |
| <sup>d</sup> Higher total impurities content is permitted, subject to agreement between the purchaser and the supplier.                                                                                                      |                  |                |                                  |                 |              |                         |            |                           |           |

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