



**SLOVENSKI STANDARD**  
**SIST EN 1976:1999**  
**01-november-1999**

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**Baker in bakrove zlitine - Uliti negneteni polizdelki iz bakra**

Copper and copper alloys - Cast unwrought copper products

Kupfer und Kupferlegierungen - Gegossene Rohformen aus Kupfer

Cuivre et alliages de cuivre - Formes brutes de coulée en cuivre

**Ta slovenski standard je istoveten z: EN 1976:1998**

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**ICS:**

77.150.30      Bakreni izdelki      Copper products

**SIST EN 1976:1999**      **en**

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EUROPEAN STANDARD  
 NORME EUROPÉENNE  
 EUROPÄISCHE NORM

EN 1976

March 1998

ICS

Descriptors: copper, copper alloys, unwrought products, designation, chemical composition, grades : quality, electrical properties, dimensions, dimensional tolerances, sampling, tests, marking

English version

Copper and copper alloys - Cast unwrought copper products

Cuivre et alliages de cuivre - Formes brutes de coulée en  
 cuivre

Kupfer und Kupferlegierungen - Gegossene Rohformen aus  
 Kupfer

This European Standard was approved by CEN on 28 February 1998.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

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AGENCIJA REPUBLIKE SLOVENIJE  
ZA VARNOST IN KVALITETO  
MERE  
INSTRUMENTARNA  
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ZA VARNOST IN KVALITETO

## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 133 "Copper and copper alloys" the secretariat of which is held by DIN.

Within its programme of work, Technical Committee CEN/TC 133 requested CEN/TC 133/WG 1 "Unwrought copper products" to prepare the following standard:

EN 1976      Copper and copper alloys - Cast unwrought copper products

This is one of a series of European Standards for products manufactured from refined copper grades. Other products are specified as follows:

EN 1977      Copper and copper alloys - Copper drawing stock (wire rod)

EN 1978      Copper and copper alloys - Copper cathodes

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 1998, and conflicting national standards shall be withdrawn at the latest by September 1998.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom

## 1 Scope

This European Standard specifies the composition and physical properties of cast unwrought copper products (refinery shapes) in thirteen grades of copper and nine silver-bearing copper grades. The refinery shapes included are horizontally, vertically and continuously cast wire bars, cakes, billets and ingots. Wire bars, cakes and billets are intended for fabricating into wrought products; ingots are intended for alloying in wrought and cast copper alloys.

A table indicating the refinery shapes in which each copper grade is normally available is given in annex A (informative). Annex B (informative) gives information on the relationships between electrical resistivity and conductivity of copper.

## 2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

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EN 1655	Copper and copper alloys - Declarations of conformity
EN 10204	<a href="https://standards.iteh.ai/catalog/standards/sist/e54c0a0f-43c0-4a53-a7b1-3a010491703d/en-10204-2004">https://standards.iteh.ai/catalog/standards/sist/e54c0a0f-43c0-4a53-a7b1-3a010491703d/en-10204-2004</a> Metallic products - Types of inspection documents
EN ISO 2626	Copper - Hydrogen embrittlement test (ISO 2626: 1973)
IEC 468	Methods of measurement of resistivity of metallic materials
ISO 197-2	Copper and copper alloys - Terms and definitions - Part 2 : Unwrought products (refinery shapes)
ISO 4746	Oxygen-free copper - Scale adhesion test

NOTE: Informative references to documents used in the preparation of this standard, and cited at the appropriate places in the text, are listed in a bibliography, see annex C.

### 3 Definitions

For the purposes of this standard, the definitions for the various refinery shapes given in ISO 197-2 apply.

### 4 Designations

#### 4.1 Material

##### 4.1.1 *General*

The material is designated either by symbol or number (see tables 1 to 4).

##### 4.1.2 *Symbol*

The material symbol designation is based on the designation system given in ISO 1190-1.

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NOTE: Although material symbol designations used in this standard 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.

##### 4.1.3 *Number*

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

#### 4.2 Product

The product designation provides a standardized pattern of designation from which a rapid and unequivocal description of a product is conveyed in communication. It provides mutual comprehension at the international level with regard to products which meet the requirements of the relevant European Standard.

The product designation is no substitute for the full content of the standard.

The product designation for products to this standard shall consist of:

- denomination (Billet, Wire bar, Cake or Ingot);
- number of this European Standard (EN 1976);

- material designation, either symbol or number (see tables 1 to 4);
- cross-sectional shape (the following designations shall be used as appropriate: RND for round, SQR for square, RCT for rectangular);
- nominal dimensions (diameter, or width x thickness, and length);
- nominal unit mass, (if appropriate).

The derivation of a product designation is shown in the following example.

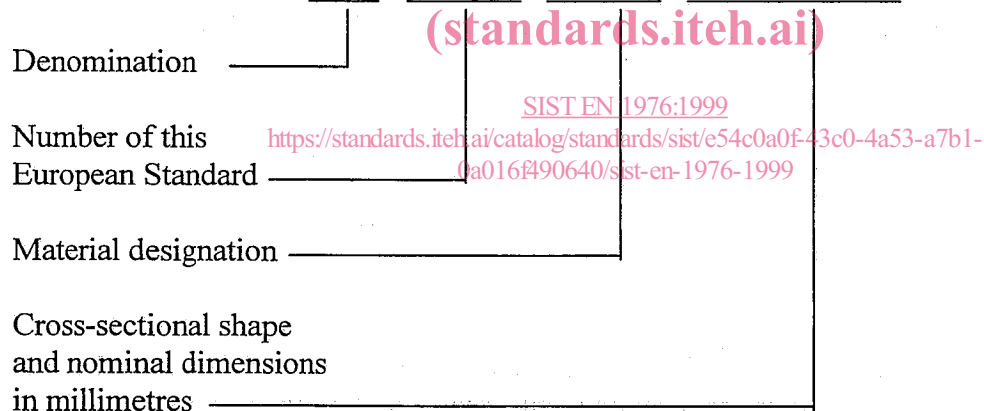
EXAMPLE:

Billets conforming to this standard, in material designated either Cu-ETP or CR004A, round cross-section, nominal diameter 250 mm x nominal length 1 000 mm, shall be designated as follows:

Billet EN 1976 - Cu-ETP - RND250 x 1 000

or

Billet EN 1976 - CR004A - RND250 x 1 000





## 5 Ordering information

In order to facilitate the enquiry, order and confirmation of order procedures between the purchaser and the supplier, the purchaser shall state on his enquiry and order the following information:

- a) quantity of product required (mass);
- b) denomination (Billet, Wire bar, Cake or Ingot);
- c) number of this European Standard (EN 1976);
- d) material designation (see tables 1 to 4);
- e) cross-sectional shape required;
- f) nominal dimensions (i.e. diameter, or width x thickness, and length) and nominal mass, where appropriate (see table 7 for wire bar dimensions).

NOTE: It is recommended that the product designation, as described in 4.2, is used for items b) to f).

In addition, the purchaser shall also state on the enquiry and order any of the following, if required:

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- g) for ingots only, whether they are to be marked with a furnace charge mark;
- h) the tests, if any, which the purchaser requires to be carried out by the manufacturer on the material, selected from the tests appropriate to each copper grade given in table 6;
- i) whether a declaration of conformity is required (see 9.1);
- j) whether an inspection document is required, and if so, which type (see 9.2).

## 6 Requirements

### 6.1 Composition

The composition of the refinery shapes shall conform to the requirements for the appropriate grade given in tables 1 to 4.

### 6.2 Electrical properties

The maximum mass resistivity at 20 °C of each refinery shape shall conform to the appropriate requirements given in table 5. The test shall be carried out in accordance with 8.2.

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Table 1: Composition of unalloyed copper grades made from Cu-CATH-1 (CR001A)

Material designation		Element	Composition in % (m/m)																Elements listed in this table other than copper					
			Cu	Ag	As	Bi	Cd	Co	Cr	Fe	Mn	Ni	O	P	Pb	S	Sb	Se	Si	Sn	Te	Zn	Total	Excl.
J-ETPI	CR003A	min.	-	-	0,000 5 <sup>1)</sup>	-	0,000 20 <sup>2)</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		max.	-	0,002 5	-	-	-	-	0,001 0 <sup>3)</sup>	-	0,040	-	0,000 5	-	0,000 5	0,001 5	0,000 4 <sup>1)</sup>	0,000 20 <sup>3)</sup>	-	-	0,000 20 <sup>2)</sup>	-	0,006 5	0
J-OFI	CR007A	min.	-	-	0,000 5 <sup>1)</sup>	-	0,000 20 <sup>2)</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		max.	-	0,002 5	-	-	-	-	0,001 0 <sup>3)</sup>	-	0,040	-	0,000 5	-	0,000 5	0,001 5	0,000 4 <sup>1)</sup>	0,000 20 <sup>3)</sup>	-	-	0,000 20 <sup>2)</sup>	-	0,006 5	0
J-OFE	CR009A	min.	99,99	-	0,000 5	-	0,000 20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		max.	-	0,002 5	-	-	0,000 1	-	-	0,001 0	-	0,001 0	-	0,000 5	-	0,001 5	0,000 4	0,000 20	-	-	0,000 20	0,000 2	-	-
J-PHCE	CR022A	min.	99,99	-	0,000 5	-	0,000 20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		max.	-	0,002 5	-	-	0,000 1	-	-	0,001 0	-	0,001 0	-	0,000 5	-	0,001 5	0,000 4	0,000 20	-	-	0,000 20	0,000 2	-	-

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(As + Cd + Cr + Mn + P + Sb) maximum 0,001 5 %  
(Bi + Se + Te) maximum 0,000 3 % of which (Se + Te) maximum 0,000 30 %  
(Co + Fe + Ni + Si + Sn + Zn) maximum 0,002 0 %  
The oxygen content shall be controlled by the manufacturer so that the material conforms to the hydrogen embrittlement requirements.