



# SLOVENSKI STANDARD

## SIST EN 1982:1999

01-november-1999

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### Baker in bakrove zlitine - Bloki za pretaljevanje in ulitki

Copper and copper alloys - Ingots and castings

Kupfer und Kupferlegierungen - Blockmetalle und Gußstücke

Cuivre et alliages de cuivre - Lingots et pieces moulées

**Ta slovenski standard je istoveten z: EN 1982:1998**

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#### ICS:

77.150.30

Bakreni izdelki

Copper products

**SIST EN 1982:1999**

**en**

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Descriptors: copper, copper alloys, ingots, castings, designation, chemical composition, mechanical properties, microstructures, dimesions, tests, invitation of tenders, orders, sales, marking

English version

Copper and copper alloys - Ingots and castings

Cuivre et alliages de cuivre - Lingots et pièces moulées

Kupfer und Kupferlegierungen - Blockmetalle und Gußstücke

This European Standard was approved by CEN on 14 October 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.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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**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.

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of an identical text or by endorsement, at the latest by May 1999, and conflicting national standards shall be withdrawn at the latest by May 1999.

Within its programme of work, Technical Committee CEN/TC 133 requested CEN/TC 133/WG 7 "Ingots and castings" to prepare the following standard:

EN 1982  
Copper and copper alloys - Ingots and castings

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

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.

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## Introduction

This European Standard for copper alloy ingots, and copper and copper alloy castings is based on previous national standards and harmonizes the compositions and mechanical properties required.

This standard does not include copper refinery shapes which are intended for working into wrought products and are the subject of EN 1976. Neither does it include master alloys intended for the manufacture of copper alloys which are the subject of EN 1981.

The essential information relevant to correct ordering, given in clause 5 of the standard, is supplemented by annex A, which is based upon the recommended practice for the ordering and supply of castings given in EN 1559-1. Its purpose is to assist the purchaser in providing full information to the supplier to ensure that he supplies castings to the purchaser's intended requirements. It is recommended that full consultation takes place between the purchaser and the supplier at the stages of enquiry and ordering.

Sampling and testing rates, where applicable, are specified in clause 7. For certain applications, more rigorous inspection procedures may be required. Annex B gives a range of supplementary inspection procedures which may be invoked, at the option of the purchaser [see 5 p)].

## 1 Scope

This European Standard specifies the composition, mechanical properties and other relevant characteristics of the materials. The sampling procedures and test methods for the verification of conformity to the requirements of this standard are also specified.

This standard is applicable to:

- a) copper alloy ingots intended to be remelted for the production of castings; and
- b) copper and copper alloy castings which are intended for use without subsequent working other than machining. The castings may be manufactured by the sand, permanent mould, centrifugal, continuous or pressure die casting process.

Recommended practice for the ordering and supply of castings is included in annex A. Optional supplementary inspection procedures for ingots and castings are included in annex B.

## 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.

- EN 1655  
Copper and copper alloys – Declarations of conformity  
[SIST EN 1982:1999](https://standards.iteh.ai/catalog/standards/sist/en-1982-1999)
- EN 10002-1  
<https://standards.iteh.ai/catalog/standards/sist/9e1d2c21-94a5-4d2d-80d0-82b4b31205e8/sist-en-1982-1999>  
Metallic materials – Tensile testing – Part 1: Method of test (at ambient temperature)
- EN 10003-1  
Metallic materials – Brinell Hardness test – Part 1: Test method
- EN 10204  
Metallic products – Types of inspection documents
- EN ISO 2624  
Copper and copper alloys – Estimation of average grain size (ISO 2624 : 1990)

EN ISO 6509  
Corrosion of metals and alloys – Determination of dezincification resistance of brass (ISO 6509 : 1981)

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 following definitions apply:

3.1 cast

Any of the following:

- a) product of one furnace melt; or
- b) product of one crucible melt; or
- c) product of a number of furnace or crucible melts where these are aggregated and mixed prior to sampling; or
- d) production corresponding to the intervals between additions to a holding furnace of new furnace or crucible melts (for example in permanent mould casting or pressure die casting); or
- e) product from a number of consecutive melts of the same alloy through a die, in the case of continuous casting.

3.2 batch

Any of the following:

- a) number of ingots taken from a single cast; or
- b) number of castings of the same design produced from a single cast; or
- c) portion of the output of a continuous caster during a cast.

4 Designations

4.1 Material

4.1.1 General

The material is designated either by symbol or number (see tables 1 to 40).

4.1.2 Symbol

The material symbol designation is based on the designation system given in ISO 1190-1. A suffix -B is added to the designation to identify material in the form of ingots and a suffix -C is added to the designation to identify material in the form of castings (for example CuSn5Zn5Pb5-C). These suffixes also serve to avoid confusion with wrought products of a similar alloy.

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

The material number designation is in accordance with the system given in EN 1412 (for example CuSn5Zn5Pb5-C is CC491K).

#### 4.2 Casting process

The designations used to indicate the casting processes referred to in this standard are based on those given in ISO 1190-1, as follows:

- GS sand casting;
- GM permanent mould casting;
- GZ centrifugal casting;
- GC continuous casting;
- GP pressure die casting.

#### 4.3 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 (Ingot or Castings);
- number of this European Standard (EN 1982);
- material designation, either symbol or number (see tables 1 to 40);
- for castings, the casting process designation (see 4.2);
- for castings, the pattern, die or drawing number, as appropriate.

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

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**EXAMPLE 1:**  
Castings conforming to this standard, in material designated either CuAl10Fe5Ni5-C or CC333G, sand cast, pattern number XXXX, shall be designated as follows:

Castings EN 1982 – CuAl10Fe5Ni5-C – GS – XXXX

or

	Castings	EN 1982 –	CC333G	– GS –	XXXX
Denomination					
Number of this European Standard					
Material designation					
Casting process					
Pattern number					

**EXAMPLE 2:**  
Ingots conforming to this standard, in material designated either CuAl10Fe5Ni5-B or CB333G, shall be designated as follows:

Ingot EN 1982 – CuAl10Fe5Ni5-B

or

Ingot EN 1982 – CB333G

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 or number of castings);
- b) denomination (Ingot or Castings);
- c) number of this European Standard (EN 1982);
- d) material designation (see tables 1 to 40);
- e) for castings, the casting process to be used (see 4.2 and tables 1 to 40);
- f) for castings, full details of the casting(s), i.e. a fully dimensioned drawing, or identification of the casting by, for instance, reference to a pattern, die or drawing number (see annex A);
- g) for copper castings and for copper-chromium castings (see tables 1 and 2), whether the electrical conductivity is to be determined, and if so the agreed test details and sampling rate (see note to 8.3) and for copper sand castings, whether grade A, B or C electrical conductivity is required (see table 1);
- h) for ingots in the alloy in table 3, and for ingots and castings in the alloys in tables 7, 18, 32, 33, 34 and 35, details of any compositional deviations for special applications (see notes to tables 3, 7, 18, 32, 33, 34 and 35);
- i) for ingots in CuZn35Pb2Al-B (CB752S) and CuZn39Pb1Al-B (CB754S), whether they are to be supplied grain refined (see 6.4 and tables 5 and 7);
- j) for castings in alloys in tables 4 and 5, whether grade A or grade B dezincification resistance acceptance

criterion is required (see 6.5);

- k) for castings in CuZn35Mn2Al1Fe1-C (CC765S), whether a minimum alpha-phase content of 15 % is required (see 6.4 and table 14);
- l) for ingots in the alloys in tables 36, 39 and 40, the compositional requirements to which the ingots are to conform (see notes to tables 36, 39 and 40);
- m) for centrifugal castings, whether the samples for mechanical testing are to be taken from the castings, or separately cast (see 8.2.2);

NOTE: It is recommended that the product designation, as described in 4.3 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:

- n) whether analysis is required, or limits are to be agreed, for elements additional to those listed in the composition tables 3 to 40 (see notes 1 and 2 of 6.1);
- o) whether mechanical properties, other than those printed in bold typeface in the mechanical properties tables, are to be determined (see note 3 of 6.2 and tables 1 to 40);
- p) whether any of the optional supplementary inspection procedures given in annex B are required, and if so, the full details of the agreed test parameters and acceptance criteria for each inspection option invoked;
- q) in the case of castings, whether a declaration of conformity is required (see 9.2.1);
- r) in the case of castings, whether an inspection document is required, and if so, which type (see 9.2.2).

EXAMPLE 1:

Ordering details for 1 500 kg of castings conforming to EN 1982, in material designated either CuAl10Fe5Ni5-C or CC333G, sand cast, pattern number XXXX, without any additional requirements:

**1 500 kg Castings EN 1982 – CuAl10Fe5Ni5-C – GS – XXXX**  
or  
**1 500 kg Castings EN 1982 – CC333G – GS – XXXX**

EXAMPLE 2:

Ordering details for 500 castings conforming to EN 1982, in material designated either CuAl10Fe5Ni5-C or CC333G, sand cast, pattern number XXXX, without any additional requirements:

**500 pieces Castings EN 1982 – CuAl10Fe5Ni5-C – GS – XXXX**  
or  
**500 pieces Castings EN 1982 – CC333G – GS – XXXX**

6 Requirements

6.1 Composition

The composition of ingots and castings shall conform to the requirements for the appropriate material given in tables 1 to 40. The analysis shall be carried out in accordance with 8.1. In the case of ingot casts of more than 2 t, both samples selected in accordance with 7.2.2 b) shall conform to the composition requirements.

- NOTE 1: In tables 3 to 40, elements with known harmful effects are shown separately, below the line, from alloying elements. Maximum limits for these harmful elements are specified.
- NOTE 2: Small amounts of residual elements other than those listed in the composition tables 3 to 40, for example As, Bi, Cd, Co, Cr, Mg, Ti, may be present in amounts which generally have no deleterious effects. If requested at the time of placing the order, the analytical determination of any of these elements, or of any other residual element not included in the composition tables, together with limiting values, should be agreed

between the purchaser and the supplier.

Usually such elements (excluding oxygen) will not exceed 0,05 % individually in ingots or 0,06 % in castings, and the total of such elements will not usually exceed 0,20 % in ingots or 0,25 % in castings.

NOTE 3: In all tables of composition the "Remainder" is the balance between the sum of the elements determined and 100 %. It is not determined by analysis.

## 6.2 Mechanical properties

The mechanical properties of castings shall conform to all the requirements for the appropriate material and casting process given in tables 1 to 40. The test(s) shall be carried out in accordance with 8.2.

NOTE 1: No mechanical properties are specified for ingots.

NOTE 2: The mechanical properties specified in this standard relate to separately cast test bars unless otherwise stated. Separately cast test bars have a valuable function as a check on the quality of the material and also on the foundry technology. It is emphasized that the mechanical properties obtained when testing a casting may differ from those obtained from a separately cast test bar(s) because of possible differences in structure between the test bars and the castings, arising mainly from variations in section thickness.

NOTE 3: All the mechanical properties given for castings in tables 1 to 40 are mandatory requirements (but see note 4). However, only those mechanical properties printed in bold typeface are normally determined on a routine basis. Determination of the other properties should be specifically requested, if required [see 5 o)].

NOTE 4: Because of the dependence of the properties of pressure die castings on the injection parameters, the mechanical properties given in tables 4, 5, 7, 8, 10 and 12 are given for information only.

## 6.3 Electrical properties

The electrical conductivity of Cu-C (CC040A) castings shall conform to the appropriate requirements given in table 1. The electrical conductivity of CuCr1-C (CC140C) castings shall conform to the requirements given in table 2. The test shall be carried out in accordance with 8.3.

NOTE: 0,58 MS/m is equivalent to 1 % IACS.

## 6.4 Microstructure and grain size

For marine and other applications requiring high resistance to corrosion, the microstructure of CuZn35Mn2Al1Fe1-C (CC765S) castings shall reveal a minimum of 15 % alpha-phase when tested and examined as described in 8.4.1 [see 5 k)].

Ingots in certain alloys shall have maximum average grain diameters, as follows:

- 0,150 mm for material CuZn35Pb2Al-B (CB752S) (see table 5) and CuZn39Pb1Al-B (CB754S) (see table 7), when specifically ordered in the grain refined condition [see 5 i)];
- 0,100 mm for material CuZn39Pb1Al-B (CB755S) (see table 8);
- 0,300 mm for material CuZn37Pb2Ni1AlFe-B (CB753S) (see table 6).

The tests shall be carried out in accordance with 8.4.2.

6.5 Dezincification resistance

The depth of dezincification after the test, in any section of a casting in CuZn33Pb2Si-C (CC751S) and CuZn35Pb2Al-C (CC752S) (see tables 4 and 5), produced by permanent mould or pressure die casting, shall be:

- for grade A: maximum 200 µm;
- for grade B: mean not to exceed 200 µm and maximum 400 µm.

The test shall be carried out in accordance with 8.5.

6.6 Freedom from defects

6.6.1 Ingots

Ingots shall be free from dirt, dross, slag and residual moisture.

6.6.2 Castings

The castings shall be supplied fettled unless otherwise agreed between the purchaser and the supplier at the time of ordering [see 5 p)]. Gates and feeders shall be removed and residues of moulds shall be removed from accessible surfaces.

7 Sampling and testing rates

7.1 General

Except where a foundry operates a certified quality system conforming to EN ISO 9001, EN ISO 9002 or EN ISO 9003, and as a consequence a different sampling regime has been agreed, the minimum sampling and testing rates for verifying conformity to the requirements of this standard for composition, mechanical properties, microstructure and dezincification resistance shall be as given in 7.2 to 7.5. The procedures for retesting in the event of a test piece failing the analysis, mechanical properties test or dezincification resistance test shall be as given in 8.6.

7.2 Analysis

7.2.1 General

Samples shall be taken from the melt they represent and poured into a clean chill mould, which is designed to give analysis samples of a shape and size appropriate to the analytical technique to be employed.

7.2.2 Ingots

Samples shall be taken from the melt to represent each cast, as follows:

- a) for casts of 2 t or less, one sample shall be taken,
- b) for casts of more than 2 t, two samples shall be taken, one at the beginning of the cast and one at the end of the cast.

7.2.3 Castings

7.2.3.1 Casting from a holding furnace

Samples shall be taken from the holding furnace at a rate of one per cast [see definition of cast in 3.1 d)].