SLOVENSKI STANDARD
SIST EN 12163:1998

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Baker in bakrove zlitine - Palice za splošno uporabo

Copper and copper alloys - Rod for general purposes

Kupfer und Kupferlegierungen - Stangen zur allgemeinen Verwendung

Cuivre et alliages de cuivre - Barres pour usages généraux

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English version

Copper and copper alloys - Rod for general purposes

Cuivre et alliages de cuivre - Barres pour usages généraux

Kupfer und Kupferlegierungen - Stangen zur allgemeinen Verwendung

This European Standard was approved by CEN on 26 December 1997.

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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
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Contents

Page

Foreword

1 Scope 5

2 Normative references 5

3 Definitions 6
3.1 rod 6
3.2 circularity (round rod) 6

4 Designations 6
4.1 Material 6
4.2 Material condition 6
4.3 Product 7

5 Ordering information 8

6 Requirements 10
6.1 Composition 10
6.2 Mechanical properties 10
6.3 Resistance to dezincification 10
6.4 Residual stress level 10
6.5 Dimensions and tolerances 11

7 Sampling 12
7.1 General 12
7.2 Analysis 12
7.3 Mechanical tests 13
7.4 Dezincification resistance and stress corrosion resistance tests 13

8 Test methods 13
8.1 Analysis 13
8.2 Tensile test 13
8.3 Hardness test 14
8.4 Dezincification resistance test 15
8.5 Stresss corrosion resistance test 15
8.6 Retests 15
8.7 Rounding of results 16

9 Declaration of conformity and inspection documentation 16
9.1 Declaration of conformity 16
9.2 Inspection documentation 16

10 Marking, labelling, packaging 16

Table 1:	Composition of copper	17
Table 2:	Composition of low alloyed copper alloys	18
Table 3:	Composition of copper-zinc alloys	19
Table 4:	Composition of complex copper-zinc alloys	20
Table 5:	Composition of copper-nickel alloys	21
Table 6:	Composition of copper-nickel-zinc alloys	21
Table 7:	Composition of copper-tin alloys	21
Table 8:	Composition of copper-aluminium alloys	22
Table 9:	Mechanical properties of copper	23
Table 10:	Mechanical properties of low alloyed copper alloys	24
Table 11:	Mechanical properties of copper-zinc alloys	31
Table 12:	Mechanical properties of complex copper-zinc alloys	34
Table 13:	Mechanical properties of copper-nickel alloys	37
Table 14:	Mechanical properties of copper-nickel-zinc alloys	38
Table 15:	Mechanical properties of copper-tin alloys	39
Table 16:	Mechanical properties of copper-aluminium alloys	41
Table 17:	Dimensional tolerances for rod	43
Table 18:	Tolerances on straightness of rod	43
Table 19:	Corner radii for square and polygonal rod	43
Table 20:	Maximum twist of square and polygonal rod	43
Table 21:	Sampling rate	44

Annex A (informative) Bibliography 45

Annex B (normative) Determination of mean depth of dezincification 46

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 July 1998, and conflicting national standards shall be withdrawn at the latest by July 1998.

Within its programme of work, Technical Committee CEN/TC 133 requested CEN/TC 133/WG 4 'Rod/bar, wire, profiles' to prepare the following standard:

EN 12163 Copper and copper alloys - Rod for general purposes

This is one of a series of European Standards for copper and copper alloy products in rod, wire and profile form. Other products are, or will be, specified as follows:

EN 12164	Copper and copper alloys - Rod for free machining purposes
EN 12165	Copper and copper alloys - Wrought and unwrought forging stock
EN 12166	Copper and copper alloys - Wire for general purposes
EN 12167	Copper and copper alloys - Profiles and rectangular bar for general purposes
EN 12168	Copper and copper alloys - Hollow rod for free machining purposes
.....*)	Copper and copper alloys- Rod and wire for welding and brazewelding (WI: 00133021)
.....*)	Copper and copper alloys - Copper rod, bar and wire for general electrical purposes (WI: 00133025)
.....*)	Copper and copper alloys - Drawn round copper wire for the manufacture of electrical conductors (WI: 00133025)
.....*)	Copper and copper alloys - Copper profiles for electrical purposes (WI: 00133056)

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.

*) In course of preparation

1 Scope

This European Standard specifies the composition, property requirements and dimensional tolerances for copper and copper alloy rod supplied in straight lengths, intended for general purposes.

The sampling procedures and the methods of test for verification of conformity to the requirements of this standard are also specified.

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
EN 10002-1	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 196	Wrought copper and copper alloys - Detection of residual stress - Mercury (I) nitrate test (ISO 196: 1978)
EN ISO 6509: 1995	Corrosion of metals and alloys - Determination of dezincification resistance of brass (ISO 6509: 1981)
ISO 1811-2	Copper and copper alloys - Selection and preparation of samples for chemical analysis - Part 2: Sampling of wrought products and castings
ISO 6507-1	Metallic materials - Hardness test - Vickers test - Part 1: HV 5 to HV 100
ISO 6957	Copper alloys - Ammonia test for stress corrosion resistance

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 A.

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1 rod

Solid wrought product of uniform cross-section along its whole length, supplied in straight lengths. The cross-sections are in the shape of circles or regular polygons. Products with a polygonal cross-section may have corners rounded along their whole length.

3.2 circularity (round rod)

Difference between the maximum and the minimum diameters measured at any one cross-section of a round rod.

4 Designations

4.1 Material

4.1.1 *General*

The material is designated either by symbol or number (see tables 1 to 8).

4.1.2 *Symbol*

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

> 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.

4.2 Material condition

For the purposes of this standard, the following designations, which are in accordance with the system given in EN 1173, apply for the material condition:

M	Material condition for the product as manufactured without specified mechanical properties;
R...	Material condition designated by the minimum value of tensile strength requirement for the product with mandatory tensile property requirements;

H... Material condition designated by the minimum value of hardness requirement for the product with mandatory hardness requirements;

NOTE 1: Products in the H... condition may be specified to Brinell or Vickers hardness. The material condition designation H... is the same for both hardness test methods.

S (suffix) Material condition for a product which is stress relieved.

NOTE 2: Products in the M, R... or H... condition may be specially processed (i.e. mechanically or thermally stress relieved) in order to lower the residual stress level to improve the resistance to stress corrosion and the dimensional stability on machining [see 5 m), 5 n) and 8.5].

Exact conversion between material conditions designated R... and H... is not possible.

Except when the suffix S is used, material condition is designated by only one of the above designations.

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.

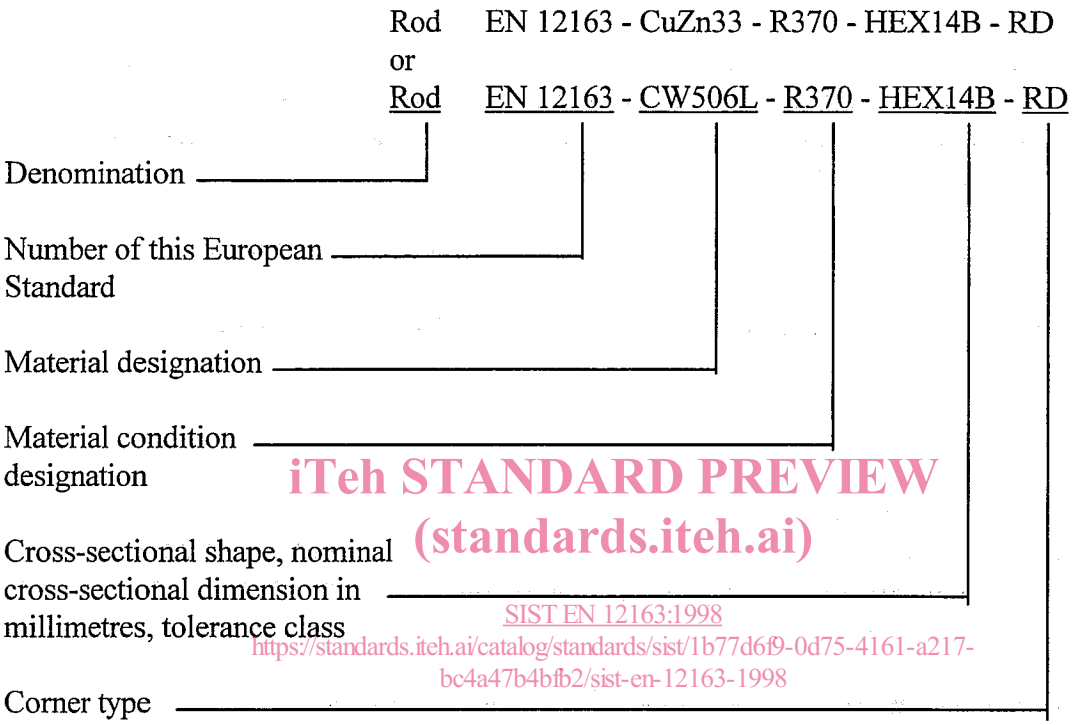
The product designation for products to this standard shall consist of:

- denomination (Rod);
- number of this European Standard (EN 12163);
- material designation, either symbol or number (see tables 1 to 8);
- material condition designation (see tables 9 to 16);
- cross-sectional shape (the following designations shall be used as appropriate: RND for round, SQR for square, HEX for hexagonal, OCT for octagonal);
- nominal cross-sectional dimensions (diameter or width across-flats);
- tolerance class (see table 17);
- corner type for polygonal rod (the following designations shall be used as appropriate: SH for sharp, RD for rounded), (see table 19).

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

EXAMPLE:

Rod for general purposes conforming to this standard, in material designated either CuZn33 or CW506L, in material condition R370, hexagonal, nominal width across-flats 14 mm, tolerance class B, rounded corners, shall be designated as follows:



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 (Rod);

c) number of this European Standard (EN 12163);

d) material designation (see tables 1 to 8);

e) material condition designation (see 4.2 and tables 9 to 16) if it is other than M. The purchaser may request, and it shall then be subject to agreement between the supplier and the purchaser, that the informative values of 0,2 % proof strength become mandatory, in which case the specified tensile strength values become informative;

f) cross-sectional shape;

g) nominal cross-sectional dimension (diameter or width across-flats);

h) whether other than class A tolerances are required (see table 17);

i) for polygonal rod: whether 'sharp' or 'rounded' corners are required unless the corner radii are to be left to the discretion of the supplier (see 6.5.5 and table 19);

j) length and length tolerance (see 6.5.4).

NOTE. It is recommended that the product designation, as described in 4.3, is used for items b) to i).

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

k) for products in alloy CuZn32Pb2AsFeSi (CW709R): whether the dezincification resistance acceptance criterion required is other than grade A (see 6.3);

l) test method to be used for measurement of hardness, i.e. Brinell or Vickers (see 8.3) unless the test method is to be left to the discretion of the supplier;

m) whether the products are required to pass a stress corrosion resistance test. If so, which test method is to be used (see 8.5) if the choice is not to be left to the discretion of the supplier. If the purchaser chooses ISO 6957, the pH value for the test solution is to be selected;

n) whether the products are to be supplied in a thermally stress relieved condition;

o) whether a declaration of conformity is required (see 9.1);

p) whether an inspection document is required, and if so, which type (see 9.2);

q) whether there are any special requirements for marking, labelling or packaging (see clause 10).

EXAMPLE:

Ordering details for 500 kg rod for general purposes conforming to EN 12163, in material designated either CuZn33 or CW506L, in material condition R370, hexagonal, nominal width across-flats 14 mm, tolerance class B, rounded corners, length 3 000 mm ± 100 mm:

500 kg Rod EN 12163 - CuZn33 - R370 - HEX14B - RD
- length 3 000 mm ± 100 mm

or

500 kg Rod EN 12163 - CW506L - R370 - HEX14B - RD
- length 3 000 mm ± 100 mm

6 Requirements

6.1 Composition

The composition shall conform to the requirements for the appropriate material given in tables 1 to 8.

6.2 Mechanical properties

The tensile or the hardness properties shall conform to the appropriate requirements given in tables 9 to 16. The tests shall be carried out in accordance with 8.2 or 8.3.

6.3 Resistance to dezincification

The depth of dezincification of CuZn32Pb2AsFeSi (CW709R) products shall be:

- for grade A: maximum 200 µm;

- for grade B: mean not to exceed 200 µm and maximum 400 µm [see 5 k)].

The test shall be carried out in accordance with 8.4.

NOTE: Products in this alloy may be subjected to heat treatment in the range 525 °C to 575 °C during manufacture. If the user needs to heat the material above 550 °C during subsequent processing then advice should be sought from the supplier.

6.4 Residual stress level

Products ordered and supplied in the stress relieved condition (see note 2 to 4.2) shall show no evidence of cracking when tested. The tests shall be carried out in accordance with 8.5.

6.5 Dimensions and tolerances

6.5.1 *Diameter or width across-flats*

The diameter or width across-flats shall conform to the tolerances given in table 17.

NOTE: The diameter of round rod is calculated as the mean of one or more pairs of measurements taken at right angles at the same cross-section of the rod.

6.5.2 *Shape tolerances*

6.5.2.1 *Round rod*

The deviation from circularity shall not exceed half the range of the tolerance on diameter given in table 17.

6.5.2.2 *Polygonal rod*

The width across-flats, measured at the centre of the faces at any one cross-section, shall not differ by more than half the range of the tolerance given for the size in table 17.

6.5.3 *Straightness*

For rod of diameter, or width across-flats, from 10 mm up to and including 50 mm, and of length 1 000 mm or over, the deviation from straightness, defined as the curvature (depth of arc) against a datum line when the product is lying flat in a horizontal plane, shall conform to the tolerances given in table 18.

NOTE: Outside this range, the deviation from straightness is subject to agreement between the purchaser and the supplier.

6.5.4 *Length*

The length and length tolerance shall conform to the requirements stated on the enquiry and order [see 5 j)].

6.5.5 *Corner radii*

The corner radii of polygonal rod shall conform to table 19 [see 5 i)].

NOTE: Except in cases of dispute, the corners should be measured directly, either by use of a gauge or an optical projector. In cases of dispute, the method by optical projector should be used.

6.5.6 *Twist of polygonal rod*

The maximum permitted twist V (see figure 1) of polygonal rod, as measured between two cross-sections along the rod, shall conform to table 20.