BS EN 12164:2016

BSI Standards Publication

Copper and copper alloys — Rod for free machining purposes

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National foreword

This British Standard is the UK implementation of EN 12164:2016. It supersedes BS EN 12164:2011 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee NFE/34, Copper and copper alloys.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Copper and copper alloys - Rod for free machining purposes

Cuivre et alliages de cuivre - Barres pour décolletage

Kupfer und Kupferlegierungen - Stangen für die spanende Bearbeitung

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European foreword

This document (EN 12164:2016) 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of an identical text or by endorsement, at the latest by January 2017, and conflicting national standards shall be withdrawn at the latest by January 2017.

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 EN 12164:2011.

Within its programme of work, Technical Committee CEN/TC 133 requested CEN/TC 133/WG 4 "Extruded and drawn products, forgings and scrap" to revise the following standard:

— EN 12164:2011, *Copper and copper alloys — Rod for free machining purposes.*

This document is one of a series of European Standards for the copper and copper alloy products rod, wire, profile and forgings. Other products are specified as follows:

— EN 12163, *Copper and copper alloys — Rod for general 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 bars for general purposes*;

— EN 12168, *Copper and copper alloys — Hollow rod for free machining purposes*;

— EN 13601, *Copper and copper alloys — Copper rod, bar and wire for general electrical purposes*;

— EN 13602, *Copper and copper alloys — Drawn, round copper wire for the manufacture of electrical conductors*;

— EN 13605, *Copper and copper alloys — Copper profiles and profiled wire for electrical purposes*.

In comparison with EN 12164:2011, the following significant technical changes were made:

a) addition of four new materials: CuZn37Pb1 (CW605N), CuZn35Pb1,5AlAs (CW625N), CuZn33Pb1,5AlAs (CW626N) and CuZn33Pb1AlSiAs (CW725R) due to the market requirements on restriction of lead and modification of the chemical composition for CuZn39Pb1 (CW611N);

b) introduction of an optional procedure how to refer to restrictions to the chemical composition imposed by the 4 MS Common Composition List for materials used for products accepted for contact with drinking water;

c) requirements and test methods for resistance of dezincification modified;

d) provisions for surface quality added;

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e) mechanical properties for CuZn21Si3P (CW724R) modified.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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Introduction

The European Committee for Standardization (CEN) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning the alloy CuZn21Si3P (CW724R) and CuZn33Pb1AlSiAs (CW725R) given in 6.1.

CEN takes no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has ensured the CEN that he is willing to negotiate licenses either free of charge or under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with CEN.

— For CuZn21Si3P (CW724R) information may be obtained from:

  Wieland-Werke AG
  Graf Arco Straße 36
  D-89079 Ulm
  GERMANY

— For CuZn33Pb1AlSiAs (CW725R) information may be obtained from:

  Diehl Metall Messing
  Heinrich-Diehl-Straße 9
  D-90552 Röthenbach/Pegnitz
  GERMANY

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. CEN shall not be held responsible for identifying any or all such patent rights.

CEN and CENELEC maintain online lists of patents relevant to their standards. Users are encouraged to consult the lists for the most up to date information concerning patents (ftp://ftp.cencenelec.eu/EN/IPR/Patents/IPRdeclaration.pdf).

Due to developing legislation, the composition of a material may be restricted to the composition specified in this European Standard with respect to individual uses (e.g. for the use in contact with drinking water in some Member States of the European Union). These individual restrictions are not part of this European Standard. Nevertheless, for materials for which traditional and major uses are affected, these restrictions are indicated. The absence of an indication, however, does not imply that the material can be used in any application without any legal restriction.

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1 Scope

This European Standard specifies the composition, property requirements and dimensional tolerances for copper alloy rod, in the shape of circles, squares, hexagons or octagons, finally produced by drawing or extruding, especially intended for free machining purposes.

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

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2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1173, *Copper and copper alloys - Material condition designation*

EN 1412, *Copper and copper alloys - European numbering system*

EN 1655, *Copper and copper alloys - Declarations of conformity*

EN 10204, *Metallic products - Types of inspection documents*

EN 14977, *Copper and copper alloys - Detection of tensile stress - 5 % ammonia test*

EN ISO 6506-1, *Metallic materials - Brinell hardness test - Part 1: Test method (ISO 6506-1)*

EN ISO 6509-1, *Corrosion of metals and alloys - Determination of dezincification resistance of copper alloys with zinc - Part 1: Test method (ISO 6509-1)*

EN ISO 6892-1, *Metallic materials - Tensile testing - Part 1: Method of test at room temperature (ISO 6892-1)*

ISO 1190-1, *Copper and copper alloys — Code of designation — Part 1: Designation of materials*

ISO 6957, *Copper alloys — Ammonia test for stress corrosion resistance*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
rod
straight product of uniform cross-section along its whole length

[SOURCE: EN 12163:2016, 3.1]

3.2
deviation from circular form
difference between the maximum and the minimum diameters measured at any one cross-section of a round product

[SOURCE: EN 12163:2016, 3.2]

4 Designations

4.1 Material

4.1.1 General

The material is designated either by symbol or by number (see Tables 2 to 7).

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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;

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

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 Clause 5, list entry l), list entry m) 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 can be 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 12164);

— material designation, either symbol or number (see Tables 2 to 7);

— DW for compliance in the chemical composition according to the 4 MS Common Composition List. This information is mandatory in the case in which the product is used for drinking water applications according to the 4 MS Common Composition List and not to be given in other cases;

— material condition designation (see Tables 8 to 13);

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— 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 dimension (diameter or width across-flats);

— for round rod, the tolerance class (see Table 14);

— for square, hexagonal or octagonal rod, the corner shape (the following designations shall be used as appropriate: SH for sharp, RD for rounded) (see Table 18).

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

EXAMPLE 1 Rod for free machining purposes conforming to this standard, in material designated either CuZn40Pb2 or CW617N, for standard applications, in material condition R430, round cross-section, nominal diameter 30 mm, tolerance Class A, will be designated as follows:

Rod EN 12164 — CuZn40Pb2 — R430 — RND30A

or

Rod EN 12164 — CW617N — R430 — RND30A

Denomination

Number of this European Standard

Material designation

Material condition designation

Cross-sectional shape, nominal cross-sectional dimension in millimetres, tolerance class

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EXAMPLE 2 Rod for free machining purposes conforming to this standard, in material designated either CuZn40Pb2 or CW617N, for drinking water applications according to the 4 MS Common Composition List, in material condition R430, round cross-section, nominal diameter 30 mm, tolerance Class A, will be designated as follows:

Rod EN 12164 — CuZn40Pb2 — DW — R430 — RND30A

or

Rod EN 12164 — CW617N — DW — R430 — RND30A

Denomination

Number of this European Standard

Material designation

For the use in contact with drinking water according to 4 MS Common Composition List, (restriction in chemical composition)

Material condition designation

Cross-sectional shape, nominal cross-sectional dimension in millimetres, tolerance class

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) mass of product required;

b) denomination (Rod);

c) number of this European Standard (EN 12164);

d) material designation (see Tables 2 to 7);

e) material condition designation (see 4.2 and Tables 8 to 13) if it is other than M;

f) DW for compliance in the chemical composition according to the 4 MS Common Composition List. This information is mandatory in the case in which the product is used for drinking water applications according to the 4 MS Common Composition List and not to be given in other cases;

g) cross-sectional shape;

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

i) for round rod up to and including 30 mm diameter, whether Class A or Class B tolerances are required, unless the tolerance class shall be left to the discretion of the supplier (see Table 14);

j) for rod with square, hexagonal and octagonal cross-section, whether “sharp” or “rounded” corners are required unless the corner radii of the rod shall be left to the discretion of the supplier (see 6.5.5 and Table 18);

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k) length of product required. Normally rod is supplied to "nominal length" tolerances (see Table 17). If "fixed lengths" are required, the length and tolerance shall be stated (see 6.5.4).

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

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

l) whether the products are required to pass a stress corrosion resistance test. If so which test method shall 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 shall be selected;

m) whether the products shall be supplied in a thermally stress relieved material condition;

n) whether the products shall be supplied with shaped ends which are different from those specified in 6.5.7;

o) whether special surface quality is required (see 6.6);

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

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

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

EXAMPLE Ordering details for 500 kg rod for free machining purposes conforming to EN 12164, in material designated either CuZn40Pb2 or CW617N, for drinking water application according to the 4 MS Common Composition List, in material condition R430, round cross-section, nominal diameter 30 mm, tolerance Class A, nominal length 3 000 mm:

500 kg **Rod** **— CuZn40Pb2 — DW — R430 — RND30A**
EN 12164

— nominal length 3 000 mm

or

500 kg **Rod** **— CW617N — DW — R430 — RND30A**
EN 12164

— nominal length 3 000 mm

6 Requirements

6.1 Composition

The composition shall conform to the requirements for the appropriate material given in Tables 2 to 7.

Due to developing legislation, specific applications (see 4.3) may require restrictions in the chemical composition. In this case the limitations shall be specified in the ordering information (see Clause 5 list entry f)).

6.2 Mechanical properties

The tensile or the hardness properties shall conform to the appropriate requirements given in Tables 8 to 13. The tests shall be carried out in accordance with 8.2 or 8.3.

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