BS EN 12166:2016

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Copper and copper alloys — Wire for general purposes

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National foreword

This British Standard is the UK implementation of EN 12166:2016. It supersedes BS EN 12166:2011 which is withdrawn.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 - Wire for general purposes

Cuivre et alliages de cuivre - Fils pour usages généraux

Kupfer und Kupferlegierungen - Drähte zur allgemeinen Verwendung

This European Standard was approved by CEN on 9 April 2016.

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European foreword

This document (EN 12166:2016) 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of an identical text or by endorsement, at the latest by January 2017, and conflicting national standards shall be withdrawn at the latest by January 2017.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 12166:2011.

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 12166:2011, *Copper and copper alloys — Wire for general 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 12164, *Copper and copper alloys — Rod for free machining purposes*;

— EN 12165, *Copper and copper alloys — Wrought and unwrought forging stock*;

— 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 12166:2011, the following significant technical changes were made:

a) 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;

b) provisions for surface quality added.

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,

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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) 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. Information may be obtained from:

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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 wire, finally produced by drawing, rolling or extruding, intended for general purposes, spring and fastener manufacturing applications.

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

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 ISO 2624, *Copper and copper alloys - Estimation of average grain size (ISO 2624)*

EN ISO 6507-1, *Metallic materials - Vickers hardness test - Part 1: Test method (ISO 6507-1)*

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*

3 Terms and definitions

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

3.1
wire
wound product of uniform cross-section along its whole length

Note 1 to entry: Rectangles may have round or sharp corners.

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]

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4 Designation

4.1 Material

4.1.1 General

The material is designated either by symbol or by number (see Tables 1 to 6).

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 Vickers hardness requirement for the product with mandatory hardness requirements;

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

G... material condition designated by the mid-range value of grain size requirement for the product with mandatory grain size requirements (Table 13).

NOTE The G... material condition is normally applicable only to round wires in the soft material condition made from alloys given in Tables 3, 4 and non-leaded alloys given in Table 2.

Exact conversion between material conditions designated R..., H... and G... 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 (Wire);

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— number of this European Standard (EN 12166);

— material designation, either symbol or number (see Tables 1 to 6);

— 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 4.2 and Tables 7 to 13);

— cross-sectional shape (the following designations shall be used as appropriate: RND for round, SQR for square, RCT for rectangular, HEX for hexagonal, OCT for octagonal, PFL for profile);

— nominal cross-sectional dimension(s) (or the number of the profile or a fully dimensioned and toleranced drawing);

— tolerance class for round, square or polygonal wire, (see Tables 14 and 15);

— for square, rectangular or polygonal wire, the corner shape (the following designations shall be used as appropriate: SH for sharp, RD for rounded), (see Table 17).

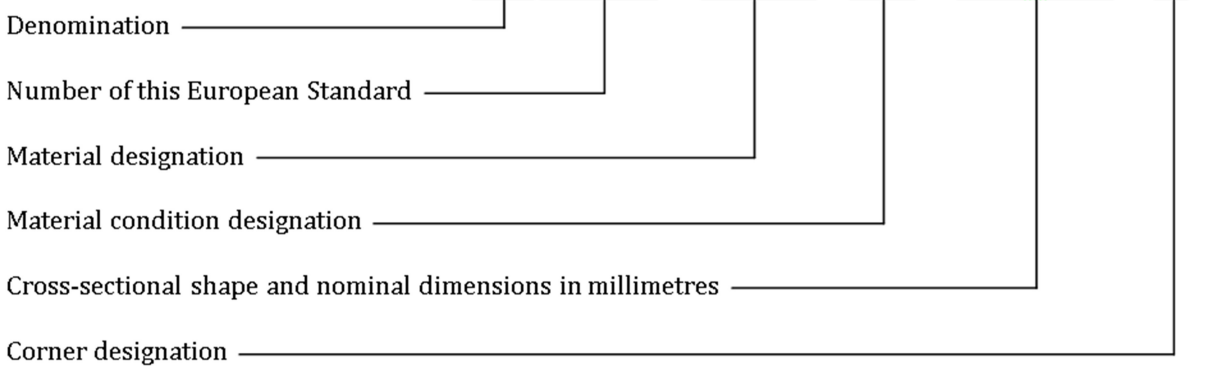
The derivation of a product designation is shown in the following examples.

EXAMPLE 1 Wire conforming to this standard, in material designated either CuZn40Pb2 or CW617N, for standard applications in material condition H115, rectangular, nominal cross-sectional dimensions 6,0 mm × 5,0 mm, with sharp corners, will be designated as follows:

Wire EN 12166 — CuZn40Pb2 — H115 — RCT6,0 × 5,0 — SH

or

Wire EN 12166 — CW617N — H115 — RCT6,0 × 5,0 — SH



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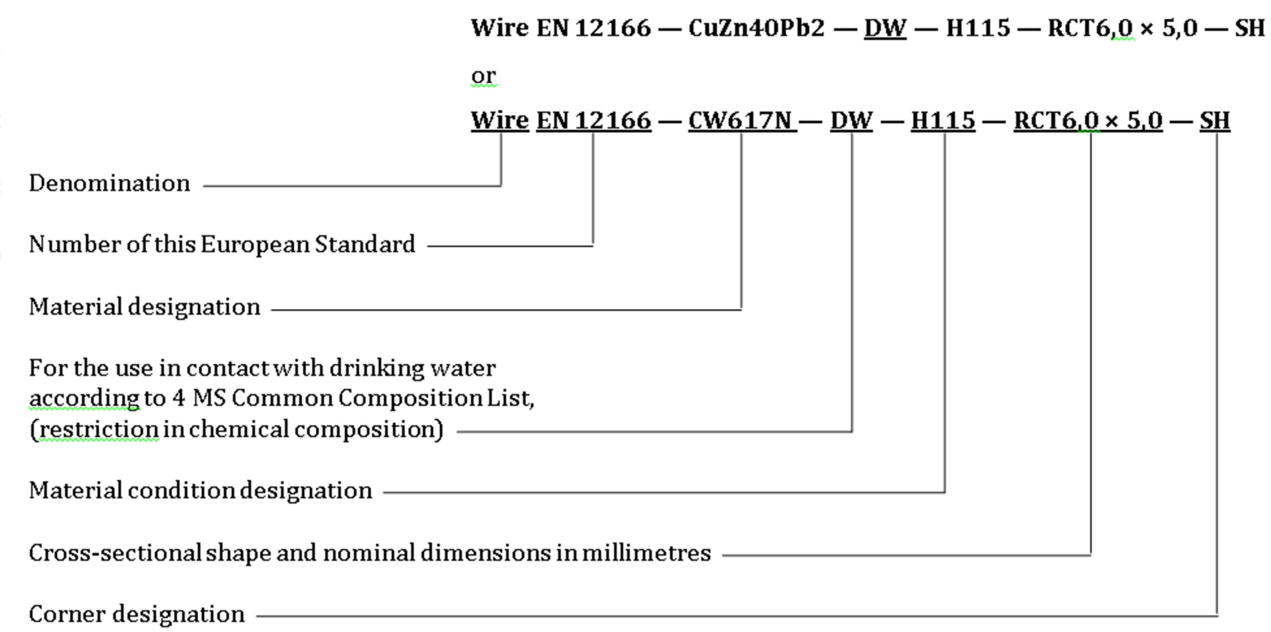
EXAMPLE 2 Wire conforming to this standard, in material designated either CuZn40Pb2 or CW617N, for drinking water applications according to the 4 MS Common Composition List, in material condition H115, rectangular, nominal cross-sectional dimensions 6,0 mm × 5,0 mm, with sharp corners, will be designated as follows:



EXAMPLE 3 Wire conforming to this standard, in material designated either CuZn39Pb3 or CW614N, for standard applications in material condition R430, round, nominal diameter 6,0 mm, tolerance class B, will be designated as follows:

Wire EN 12166 — **CuZn39Pb3** — **R430** — **RND6,0B**

or

Wire EN 12166 — CW614**N** — **R430** — **RND6,0B**

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 (Wire);

c) number of this European Standard (EN 12166);

d) material designation (see Tables 1 to 6);

e) material condition designation (see 4.2 and Tables 7 to 13) if 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;

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g) cross-sectional shape;

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

i) for round, square and regular polygonal wire, the tolerance class required, unless the tolerance class shall be left to the discretion of the supplier (see Tables 14 and 15); for profiles, the tolerances required (or a drawing with dimensions and tolerances);

j) for square or rectangular wire, whether 'sharp' or 'rounded' corners are required, unless the corner radii shall be left to the discretion of the supplier (see Table 17);

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

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

k) for profiles, if the shape is such that the position of the cross-section within the coil, reel, spool or drum is of importance to the purchaser, this should be stated on the drawing (see Annex A for illustration);

l) for profiles, whether mechanical properties are required; if so, the method of test and the level of properties shall be agreed between the purchaser and the supplier;

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

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

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 including, if necessary, any limitation on dimensions or mass of coils, spools, reels or drums (see Clause 10).

EXAMPLE 1 Ordering details for 1 000 kg wire for general purposes conforming to EN 12166, in material designated either CuZn39Pb3 or CW614N, in material condition H115, rectangular, nominal cross-sectional dimensions 6,0 mm × 5,0 mm, with sharp corners, in 25 kg coils:

1 000 kg **Wire** **— CuZn39Pb3 — H115 — RCT 6,0 × 5,0 — SH**
EN 12166

— 25 kg coils

or

1 000 kg **Wire** **— CW614N — H115 — RCT 6,0 × 5,0 — SH**
EN 12166

— 25 kg coils

EXAMPLE 2 Ordering details for 5 000 kg wire for general purposes conforming to EN 12166, in material designated either CuZn40Pb2 or CW617N, for drinking water application according to the 4 MS Common Composition List, in material condition R430, round, nominal diameter 6,0 mm, tolerance class B, on 1 000 kg spools:

5 000 kg **Wire** **— CuZn40Pb2 — DW — R430 — RND6,0B**
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— 1 000 kg spools

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or

5 000 kg EN 12166	**Wire**	**— CW617N — DW — R430 — RND6,0B** **— 1 000 kg spools**

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