

Copper and copper alloys — Profiles and rectangular bar for general purposes

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ICS 77.150.30

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Summary of pages

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English version

Copper and copper alloys — Profiles and rectangular bar for general purposes

Cuivre et alliages de cuivre — Profilés et barres
rectangulaires pour usages généraux

Kupfer und Kupferlegierungen — Profile und
Rechteckstangen zur allgemeinen Verwendung

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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of an identical text or by endorsement, at the latest by July 1998, and conflicting national standards shall be withdrawn at the latest by July 1998.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 12167, *Copper and copper alloys — Profiles and rectangular bar 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 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 12166, *Copper and copper alloys — Wire for general purposes*.

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

.....*) , *Copper and copper alloys — Copper rod, bar and wire for general electrical purposes* (WI:00133024).

.....*) , *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.

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1 Scope

This European Standard specifies the composition, property requirements and dimensional tolerances for copper and copper alloy profiles and rectangular bars supplied in straight lengths. This standard applies to rectangular bar with thicknesses from 3 mm up to and including 60 mm and with widths from 6 mm up to and including 120 mm.

The sampling procedures, the methods of test for verification of conformity to the requirements of this standard, and the delivery conditions 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 4739, *Wrought copper and copper alloy products — Selection and preparation of specimens and test pieces for mechanical testing.*
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

profile

wrought product of uniform cross-section along its whole length, with a cross-section other than rod, hollow rod, bar, rectangle, tube, sheet or strip, supplied in straight lengths

3.2

rectangular bar

wrought product of uniform rectangular cross-section along its whole length, supplied in straight lengths

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 strength requirement.
H...	Material condition designated by the minimum value of hardness requirement for the product with mandatory hardness requirement.
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 5j), 5k) 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 (profile or rectangular bar);
- number of this European Standard (EN 12167);
- material designation, either symbol or number (see Tables 1 to 8);
- material condition designation (see Tables 9 to 16);
- for profiles, the number of the profile or a fully dimensioned and toleranced drawing;
- for rectangular bar, the nominal cross-sectional dimensions;
- for rectangular bar, the tolerance class (see Table 17);
- for rectangular bar, the corner type (the following designations shall be used as appropriate: SH for sharp, RD for rounded) (see Table 21).

The derivation of a product designation is shown in example 1 and another typical product designation is shown in example 2.

EXAMPLE 1

Rectangular bar conforming to this standard, in material designated either CuZn38Pb2 or CW608N, in material condition H105, nominal cross-sectional dimensions 30 mm × 10 mm, tolerance class B, with sharp corners, shall be designated as follows:

Rectangular EN 12167 – CuZn38Pb2 – H105 – 30 × 10 – B – SH
bar

or

Rectangular EN 12167 – CW608N – H105 – 30 × 10 – B – SH
bar

Denomination	
Number of European standard	
Material designation	
Material condition designation	
Nominal cross-sectional dimensions in millimetres	
Tolerance class	
Corner type	

EXAMPLE 2

Profile conforming to this standard, in material designated either CuZn43Pb2Al or CW624N, in material condition M, drawing number S123, shall be designated as follows:

Profile EN 12167 — CuZn43Pb2Al — M — S123

or

Profile EN 12167 — CW624N — M — S123.

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 (profile or rectangular bar);
- c) number of this European Standard (EN 12167);
- d) material designation (see Tables 1 to 8);
- e) for rectangular bar, the 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) size and shape required:
 - for profiles, by fully dimensioned and toleranced drawing, which shall include any specific requirements for straightness and twist and, if appropriate, for flatness;
 - for rectangular bar, by dimensions and tolerance class (i.e. class A, B or C — see Tables 17, 19, 20 and 6.5.3.2), and whether sharp or rounded corners (see Table 21) are required, unless the choices of tolerance class and corner radii are to be left to the discretion of the supplier;
- g) length of product required:
 - for profiles, the length and the tolerance on length, unless the lengths supplied are to be left to the discretion of the supplier;
 - for rectangular bar, the nominal length (see Table 18).

NOTE 1 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:

- h) for products in alloy CuZn36Pb2As (CW602N), whether the dezincification resistance acceptance criterion required is other than grade A (see 6.3);
- i) 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;
- j) 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;

- k) whether the products are to be supplied in a thermally stress relieved condition;
- l) for profiles, whether any additional properties or requirements, not specified within the standard, are required;
- NOTE 2 Details of any mechanical property requirements for profiles, together with the location in the profile from which the test piece should be machined, should be agreed between the purchaser and the supplier (see 6.2.1).
- m) whether a declaration of conformity is required (see 9.1);
- n) whether an inspection document is required, and if so, which type (see 9.2);
- o) whether there are any special requirements for marking, labelling or packaging (see clause 10).

EXAMPLE 1

Ordering details for 500 kg rectangular bar conforming to EN 12167, in material designated either CuZn38Pb2 or CW608N, in material condition H105, nominal cross-sectional dimensions 30 mm × 10 mm, tolerance class B, with sharp corners, nominal length 3 000 mm.

500 kg Rectangular bar EN 12167 — CuZn38Pb2 — H105 — 30 × 10 — B — SH
— nominal length 3 000 mm

or

500 kg Rectangular bar EN 12167 — CW608N — H105 — 30 × 10 — B — SH
— nominal length 3 000 mm

EXAMPLE 2

Ordering details for 1 000 kg profiles conforming to EN 12167, in material designated either CuZn43Pb2Al or CW624N, in material condition M, to drawing number S123, nominal length 3 000 mm.

1 000 kg Profile EN 12167 — CuZn43Pb2Al — M — S123
— nominal length 3 000 mm

or

1 000 kg Profile EN 12167 — CW624N — M — S123
— nominal length 3 000 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

6.2.1 Profiles

Mechanical properties of profiles, for any given alloy, will depend on the shape and dimensions of the profile. In view of this, mechanical property requirements for profiles are not specified in this standard but, if needed, are subject to agreement between the purchaser and the supplier [see 5l)].

6.2.2 Rectangular bar

Rectangular bar in the R... or H... condition shall conform to the appropriate tensile or hardness requirements given in Tables 9 to 16. The tests shall be carried out in accordance with 8.2 or 8.3. For H... condition rectangular bar, the hardness test method (Brinell or Vickers) to be used shall be stated by the purchaser in the order [see 5i)] unless the choice is to be left to the discretion of the supplier.

6.3 Resistance to dezincification

The depth of dezincification of CuZn36Pb2As (CW602N) products shall be:

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

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 450 °C to 550 °C during manufacture. If the user needs to heat the material above 530 °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 Cross-sectional dimensions

6.5.1.1 Profiles

The cross-sectional dimensions of the profile shall conform to the tolerances specified in the drawing supplied by the purchaser and agreed with the supplier at the time of the enquiry and/or order [see 5f)].

6.5.1.2 Rectangular bar

The width and thickness of rectangular bar shall conform to the tolerances given in Table 17 for the appropriate alloy and tolerance class [see 5f)].

6.5.2 Length

6.5.2.1 Profiles

The length of the profiles shall conform to the tolerances specified by the purchaser [see 5g)].

6.5.2.2 Rectangular bar

The length of rectangular bar shall conform to the tolerances given in Table 18.

NOTE Subject to agreement between the purchaser and the supplier, an agreed proportion of underlength profiles or rectangular bar may be included in a consignment.

6.5.3 Flatness

6.5.3.1 Profiles

If appropriate, the maximum deviation from flatness shall be agreed between the purchaser and the supplier and stated on the order/drawing [see 5f)].

6.5.3.2 Rectangular bar

The maximum deviation from flatness ("e" in Figure 1) of rectangular bar (thickness *a*, width *b*) is dependent on the tolerance class [see 5f)] and shall be:

- class A: 0,4 mm;
- class B: 0,3 mm;
- class C: 0,2 mm.

6.5.4 Straightness

6.5.4.1 Profiles

The tolerance on straightness shall be agreed between the purchaser and the supplier and stated on the order/drawing, [see 5f].

6.5.4.2 Rectangular bar

For widths 10 mm and over, and lengths 1 000 mm and 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 19 for the appropriate tolerance class [see 5f].

6.5.5 Twist

6.5.5.1 Profiles

The tolerance on twist shall be agreed between the purchaser and the supplier and stated on the order/drawing [see 5f].

6.5.5.2 Rectangular bar

The maximum permitted twist V (see Figure 2) of rectangular bar (thickness a , width b), as measured between two cross-sections along the bar, shall conform to Table 20 for the appropriate tolerance class [see 5f].

6.5.6 Corner radii of rectangular bar

The corner radii of rectangular bar shall conform to Table 21 [see 5f].

NOTE 1 If a purchaser requires the corners to have larger radii than those specified in Table 21, then the product is effectively a profile and the dimensions and tolerances of the corner radii required should be stated on the order/drawing.

NOTE 2 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.

