

Copper and copper alloys — Seamless copper tubes for electrical purposes

The European Standard EN 13600:2002 has the status of a British Standard

ICS 77.150.30

National foreword

This British Standard is the official English language version of EN 13600:2002. It supersedes BS 1977:1976 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee NFE/34, Copper and copper alloys, to Subcommittee NFE/34/1, Wrought and unwrought copper and copper alloys, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

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This British Standard, having been prepared under the direction of the Engineering Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 20 September 2002

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English version

Copper and copper alloys - Seamless copper tubes for electrical purposes

Cuivre et alliages de cuivre - Tubes sans soudure en cuivre
pour usages électriques

Kupfer und Kupferlegierungen - Nahtlose Rohre aus Kupfer
für die Anwendung in der Elektrotechnik

This European Standard was approved by CEN on 22 February 2002.

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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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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Foreword

This document EN 13600:2002 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 September 2002, and conflicting national standards shall be withdrawn at the latest by September 2002.

Within its programme of work, Technical Committee CEN/TC 133 requested CEN/TC 133/WG 5 "Copper for electrical purposes" to prepare the following standard:

EN 13600, *Copper and copper alloys — Seamless copper tubes for electrical purposes.*

The products specified in this European Standard are those which are especially suitable for electrical purposes, i.e. with specified electrical properties. Copper tubes for general purposes are specified in EN 12449.

Annex A (informative) gives guidance on the characteristics of coppers for electrical purposes.

This is one of a series of European Standards for copper products for electrical purposes. Other copper products are specified as follows:

EN 13599, *Copper and copper alloys — Copper plate, sheet and strip for electrical 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 13604, *Copper and copper alloys — Products of high conductivity copper for electronic tubes, semiconductor devices and vacuum applications.*

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

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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This European Standard specifies the composition, property requirements including electrical properties, and tolerances on dimensions and form for seamless drawn copper tubes for electrical purposes, delivered in straight lengths with the cross-sections and size ranges below:

- for round tubes with outside diameters from 5 mm up to and including 150 mm and wall thicknesses from 0,5 mm up to and including 20 mm;
- for square and rectangular tubes with major outside dimension from 5 mm up to and including 150 mm and wall thicknesses from 0,5 mm up to and including 10 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 (including amendments).

EN 1655, *Copper and copper alloys — Declarations of conformity.*

EN 1976, *Copper and copper alloys — Cast unwrought copper products.*

EN 10002-1, *Metallic materials — Tensile testing — Part 1: Method of test (at ambient temperature).*

EN 10204, *Metallic products — Types of inspection documents.*

EN ISO 2626, *Copper — Hydrogen embrittlement test (ISO 2626:1973).*

EN ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method (ISO 6506-1:1999).*

EN ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method (ISO 6507-1:1997).*

EN ISO 7438, *Metallic materials — Bend test (ISO 7438:1985).*

ISO 1811-2, *Copper and copper alloys — Selection and preparation of samples for chemical analysis — Part 2: Sampling of wrought products and castings.*

ISO 8491, *Metallic materials — Tube (in full section) — Bend test.*

NOTE Informative references to documents used in the preparation of this standard, and cited at the appropriate places in the text, are listed in the Bibliography.

3 Terms and definitions

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

3.1

seamless tube

hollow semi-finished product, circular, square or rectangular in cross-section, having a uniform wall thickness, which at all stages of production has a continuous periphery. Tubes with a square or rectangular cross-section may have corners rounded along their whole length

3.2

mean diameter

arithmetical mean of any two diameters normal to each other at the same cross-section of the tube

3.3

deviation from circular form

difference between the maximum and minimum outside diameters measured at any one cross-section of the tube

4 Designations

4.1 Material

4.1.1 General

The material is designated either by symbol or number (see Table 1).

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 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:

D Material condition for the product as cold worked without specified mechanical properties;

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

R... Material condition designated by the minimum value of tensile strength requirement for the product with mandatory tensile strength, 0,2% proof strength and elongation requirements.

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

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

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.

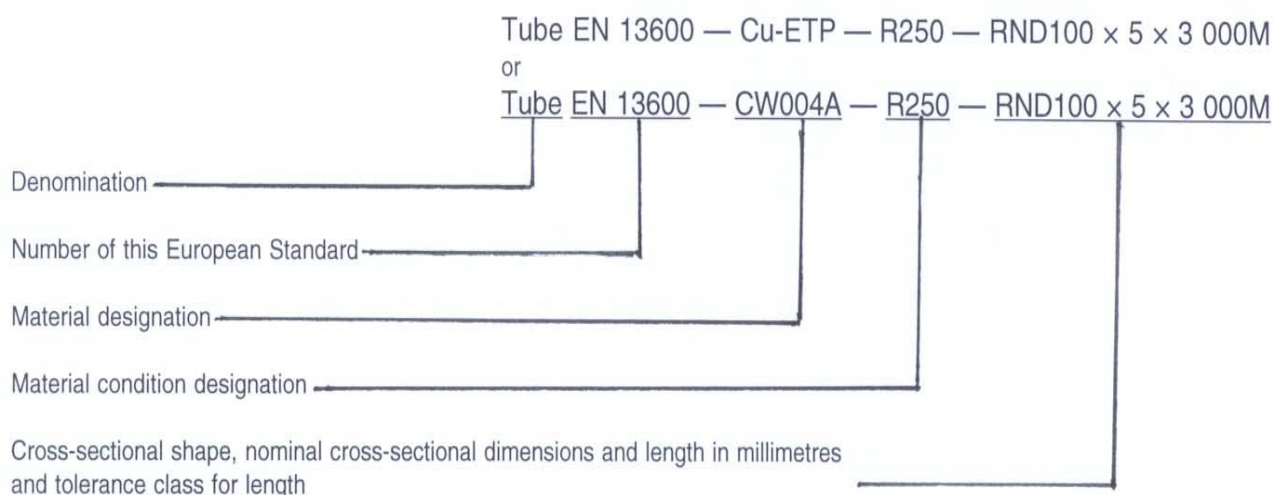
EN 13600:2002 (E)

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

- denomination (Tube);
- number of this European Standard (EN 13600);
- material designation, either symbol or number (see Table 1);
- material condition designation (see Table 2);
- cross-sectional shape (the following designations shall be used, as appropriate: RND for round, SQR for square, RCT for rectangular);
- nominal dimensions;
 - round tube: outside diameter × wall thickness × length [either "as manufactured" (M) or "fixed" (F) length (see 6.5.4)];
 - square or rectangular tube: across-flats dimension(s) × wall thickness × length [either "as manufactured" (M) or "fixed" (F) length (see 6.5.4)].

The derivation of a product designation is shown in example 1 and other typical product designations are shown in examples 2 and 3.

EXAMPLE 1 Tube for electrical purposes conforming to this standard, in material designated either Cu-ETP or CW004A, in material condition R250, round, nominal outside diameter 100 mm, nominal wall thickness 5 mm, as manufactured length 3 000 mm, shall be designated as follows:



EXAMPLE 2 Tube for electrical purposes conforming to this standard, in material designated either Cu-OF or CW008A, in material condition H065, square, nominal width across-flats 120 mm, nominal wall thickness 10 mm, fixed length 4 500 mm, shall be designated as follows:

Tube EN 13600 — Cu-OF — H065 — SQR120 × 10 × 4 500F
or
Tube EN 13600 — CW008A — H065 — SQR120 × 10 × 4 500F