



**NSAI**  
Standards

Irish Standard  
I.S. EN 13600:2013

# Copper and copper alloys - Seamless copper tubes for electrical purposes

## I.S. EN 13600:2013

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation - recommendation based on the consensus of an expert panel and subject to public consultation.

SWIFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

*This document replaces:*  
EN 13600:2002

*This document is based on:* EN 13600:2013  
*Published:* 26 June, 2013

This document was published under the authority of the NSAI and comes into effect on:  
26 June, 2013

**ICS number:**  
77.150.30

**NSAI**  
1 Swift Square,  
Northwood, Santry  
Dublin 9

T +353 1 807 3800  
F +353 1 807 3838  
E standards@nsai.ie  
W NSAI.ie

**Sales:**  
T +353 1 857 6730  
F +353 1 857 6729  
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

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 25 April 2013.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

<b>Contents</b>	<b>Page</b>
Foreword.....	3
<b>1 Scope .....</b>	<b>5</b>
<b>2 Normative references .....</b>	<b>5</b>
<b>3 Terms and definitions .....</b>	<b>5</b>
<b>4 Designations .....</b>	<b>6</b>
<b>4.1 Material .....</b>	<b>6</b>
<b>4.1.1 General.....</b>	<b>6</b>
<b>4.1.2 Symbol .....</b>	<b>6</b>
<b>4.1.3 Number .....</b>	<b>6</b>
<b>4.2 Material condition .....</b>	<b>6</b>
<b>4.3 Product .....</b>	<b>6</b>
<b>5 Ordering information .....</b>	<b>8</b>
<b>6 Requirements .....</b>	<b>9</b>
<b>6.1 Composition .....</b>	<b>9</b>
<b>6.2 Mechanical properties .....</b>	<b>9</b>
<b>6.3 Electrical properties .....</b>	<b>9</b>
<b>6.4 Freedom from hydrogen embrittlement .....</b>	<b>9</b>
<b>6.5 Dimensions and tolerances .....</b>	<b>9</b>
<b>6.5.1 Outside dimensions.....</b>	<b>9</b>
<b>6.5.2 Corner radii.....</b>	<b>9</b>
<b>6.5.3 Wall thickness .....</b>	<b>9</b>
<b>6.5.4 Length .....</b>	<b>9</b>
<b>6.5.5 Form tolerances .....</b>	<b>10</b>
<b>6.6 Mass tolerances .....</b>	<b>11</b>
<b>6.7 Surface condition.....</b>	<b>11</b>
<b>7 Sampling .....</b>	<b>11</b>
<b>7.1 General.....</b>	<b>11</b>
<b>7.2 Analysis .....</b>	<b>12</b>
<b>7.3 Mechanical and electrical tests .....</b>	<b>12</b>
<b>8 Test methods.....</b>	<b>12</b>
<b>8.1 Analysis .....</b>	<b>12</b>
<b>8.2 Tensile test .....</b>	<b>12</b>
<b>8.3 Hardness test .....</b>	<b>12</b>
<b>8.4 Electrical resistivity test.....</b>	<b>12</b>
<b>8.5 Hydrogen embrittlement test.....</b>	<b>13</b>
<b>8.6 Retests .....</b>	<b>13</b>
<b>8.7 Rounding of results .....</b>	<b>13</b>
<b>9 Declaration of conformity and inspection documentation.....</b>	<b>13</b>
<b>9.1 Declaration of conformity .....</b>	<b>13</b>
<b>9.2 Inspection documentation .....</b>	<b>14</b>
<b>10 Marking, packaging, labelling.....</b>	<b>14</b>
<b>Annex A (informative) Characteristics of coppers for electrical purposes.....</b>	<b>23</b>
<b>Bibliography .....</b>	<b>25</b>

## Foreword

This document (EN 13600:2013) 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 December 2013, and conflicting national standards shall be withdrawn at the latest by December 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13600:2002.

In comparison with EN 13600:2002, the following significant technical changes have been made:

- The Scope has been expanded.
- The outside diameters have been expanded.
- The wall thickness has been expanded.
- Cu-OFE (CW009A) and Cu-PHCE (CW022A) have been added.
- Tolerance on the outside diameter of round tubes and on wall thicknesses has been completely revised.

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

EN 13600:2002, *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 — Semiconductor devices, electronic and vacuum products made from high conductivity copper*
- EN 13605, *Copper and copper alloys — Copper profiles and profiled wire for electrical purposes*

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,

**I.S. EN 13600:2013**

**EN 13600:2013 (E)**

Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the 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 or alternatively in level wound coils with the cross-sections and size ranges below:

- for round tubes in straight lengths with outside diameters from 3 mm up to and including 450 mm and wall thicknesses from 0,3 mm;
- for round tubes in level wound coils with outside diameters from 3 mm up to and including 30 mm and wall thicknesses from 0,3 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 and test methods for verification of conformity to the requirements of this 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 1655, *Copper and copper alloys — Declarations of conformity*

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

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

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

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

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)*

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

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

## 3 Terms and definitions

For the purposes of this document, 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

Note 1 to entry: 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

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- 
- [Looking for additional Standards? Visit Intertek Inform Infostore](#)
  - [Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation](#)
-