

This document is a preview generated by EVS

Copper and copper alloys - Seamless copper tubes for electrical purposes

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN 13600:2021 sisaldab Euroopa standardi EN 13600:2021 ingliskeelset teksti.	This Estonian standard EVS-EN 13600:2021 consists of the English text of the European standard EN 13600:2021.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 07.04.2021.	Date of Availability of the European standard is 07.04.2021.
Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile [standardiosakond@evs.ee](mailto:standardiosakond@evs.ee).

ICS 77.150.30

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardimis- ja Akrediteerimiskeskusele. Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardimis- ja Akrediteerimiskeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardimis- ja Akrediteerimiskeskusega: Koduleht [www.evs.ee](http://www.evs.ee); telefon 605 5050; e-post [info@evs.ee](mailto:info@evs.ee)

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation and Accreditation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation and Accreditation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation and Accreditation:

Homepage [www.evs.ee](http://www.evs.ee); phone +372 605 5050; e-mail [info@evs.ee](mailto:info@evs.ee)

EUROPEAN STANDARD

**EN 13600**

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2021

ICS 77.150.30

Supersedes EN 13600:2013

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 5 March 2021.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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

## European foreword

This document (EN 13600:2021) 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 October 2021, and conflicting national standards shall be withdrawn at the latest by October 2021.

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 13600:2013.

In comparison with EN 13600:2013, the following changes were made:

- a) modification of tolerances on wall thicknesses;
- b) update of normative references.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## 1 Scope

This document 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 up to and including 10 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 up to and including 10 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 document are also specified.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 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 can have corners rounded along their whole length.