ICS 23.040.15, 77.120.30 SLOVENSKÁ TECHNICKÁ NORMA Apríl 2020

STN	**Meď a zliatiny medi** **Bezšvové okrúhle rúry na všeobecné použitie**	**STN** **EN 12449+A1** 42 1314

Copper and copper alloys - Seamless, round tubes for general purposes

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 03/20

Obsahuje: EN 12449:2016+A1:2019

Oznámením tejto normy sa ruší
STN EN 12449 (42 1314) z novembra 2016

130376

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12449:2016+A1

October 2019

ICS 23.040.15; 77.120.30 Supersedes EN 12449:2016

English Version

Copper and copper alloys - Seamless, round tubes for general purposes

Cuivre et alliages de cuivre - Tubes ronds sans soudure pour usages généraux

Kupfer und Kupferlegierungen - Nahtlose Rundrohre zur allgemeinen Verwendung

This European Standard was approved by CEN on 28 February 2016 and includes Amendment 1 approved by CEN on 7 August 2019.

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

Ref. No. EN 12449:2016+A1:2019 E

Contents

Page

European foreword ... 4
Introduction ... 6
1 Scope ... 7
2 Normative references ... 7
3 Terms and definitions ... 8
4 Designations ... 8
4.1 Material ... 8
4.1.1 General ... 8
4.1.2 Symbol ... 8
4.1.3 Number ... 8
4.2 Material condition ... 8
4.3 Product ... 9
5 Ordering information ... 10
6 Requirements ... 11
6.1 Composition ... 11
6.2 Mechanical properties ... 11
6.3 Dimensions and tolerances ... 11
6.3.1 General ... 11
6.3.2 Outside or inside diameter ... 11
6.3.3 Wall thickness ... 12
6.3.4 Fixed lengths ... 12
6.3.5 Tolerances on form ... 12
6.4 Surface quality ... 12
6.5 Technological requirements ... 12
6.5.1 Drift expanding ... 12
6.5.2 Residual stress level ... 12
6.5.3 Grain size ... 13
6.5.4 Freedom from defects ... 13
7 Sampling ... 13
7.1 General ... 13
7.2 Analysis ... 13
7.3 Mechanical tests and stress corrosion resistance test ... 13
8 Test methods ... 13
8.1 Analysis ... 13
8.2 Tensile test ... 14
8.3 Hardness test ... 14
8.4 Technological tests ... 14
8.4.1 Drift expanding test ... 14
8.4.2 Stress corrosion resistance test ... 14

8.4.3 Average grain size determination 14
8.5 Freedom from defects tests 14
8.6 Retests 14
8.6.1 Analysis, tensile, hardness, drift expanding and grain size tests 14
8.6.2 Stress corrosion resistance test 15
8.7 Rounding of results 15
9 Declaration of conformity and inspection documentation 15
9.1 Declaration of conformity 15
9.2 Inspection documentation 15
10 Marking, packaging, labelling 15
Bibliography 49
Figures
Figure 1 — Measurement of straightness 47
Tables
Table 1 — Composition of copper 16
Table 2 — Composition of low alloyed copper alloys 17
Table 3 — Composition of copper-nickel alloys 17
Table 4 — Composition of copper-nickel-zinc alloys 18
Table 5 — Composition of copper-tin alloys 18
Table 6 — Composition of binary copper-zinc alloys 19
Table 7 — Composition of copper-zinc-lead alloys 20
Table 8 — Composition of complex copper-zinc alloys 21
Table 9 — Mechanical properties of copper and low alloyed copper alloys 22
Table 10 — Mechanical properties of copper-nickel alloys 26
Table 11 — Mechanical properties of copper-nickel-zinc alloys 27
Table 12 — Mechanical properties of copper-tin alloys 28
Table 13 — Mechanical properties of binary copper-zinc alloys 31
Table 14 — Mechanical properties of copper-zinc-lead alloys 36
Table 15 — Mechanical properties of complex copper-zinc alloys 40
Table 16 — Minimal elongation values for R250 (half hard) material condition tubes 45
Table 17 — Tolerances on diameter 45
Table 18 — Tolerances on wall thickness 46
Table 19 — Tolerances on fixed lengths, tubes in straight lengths 46
Table 20 — Tolerances on fixed lengths, tube in coils (not level wound) 46
Table 21 — Tolerances on diameter including deviation from circular form, tube in coils 47
Table 22 — Tolerances on straightness 47
Table 23 — Sampling rate 48

European foreword

This document (EN 12449:2016+A1:2019) 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 April 2020 and conflicting national standards shall be withdrawn at the latest by April 2020.

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 includes Amendment 1 approved by CEN on 7 August 2019.

This document supersedes ▌A1⟩ EN 12449:2016 ⟨A1▌.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ▌A1⟩ ⟨A1▌.

In comparison with EN 12449:2012, the following significant technical changes were made:

a) Addition of the new material CuFe0,1Sn0,1P (CW125C);

b) Modification of the elongation values for Cu-DHP (CW024A) in material condition R250 including new Table 16;

c) Modification of iron and tin content for CuZn37Pb1 (CW605N) from 0,2 % to 0,3 % in Table 7;

d) Replacement of the material number CW121C by CW124C for CuSi3Zn2P.

Within its programme of work, Technical Committee CEN/TC 133 requested CEN/TC 133/WG 3 "Copper tubes (installation and industrial)" to revise the following standard:

— EN 12449:2012, *Copper and copper alloys — Seamless, round copper tubes for general purposes*.

This is one of a series of European Standards for copper and copper alloy tubes. Other products are specified as follows:

— EN 1057, *Copper and copper alloys — Seamless, round copper tubes for water and gas in sanitary and heating applications*;

— EN 12450, *Copper and copper alloys — Seamless, round copper capillary tubes*;

— EN 12451, *Copper and copper alloys — Seamless, round tubes for heat exchangers*;

— EN 12452, *Copper and copper alloys — Rolled, finned, seamless tubes for heat exchangers*;

— EN 12735-1, *Copper and copper alloys — Seamless, round tubes for air conditioning and refrigeration — Part 1: Tubes for piping systems*;

— EN 12735-2, *Copper and copper alloys — Seamless, round tubes for air conditioning and refrigeration — Part 2: Tubes for equipment*;

— EN 13348, *Copper and copper alloys — Seamless, round copper tubes for medical gases or vacuum*;

— EN 13349, *Copper and copper alloys — Pre-insulated copper tubes with solid covering*;

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

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 CuSi3Zn2P (CW124C) and 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 assured the CEN that he is willing to negotiate licenses under reasonable and not-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.

— For CuSi3Zn2P (CW124C) information may be obtained from:

VIEGA GmbH & Co. KG

Ennester Weg 9

57439 Attendorn

GERMANY

— For CuZn21Si3P (CW724R) information may be obtained from:

Wieland-Werke AG

Graf-Arco-Straße 36

89079 Ulm

GERMANY

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. CEN shall not be held responsible for identifying any or all such patent rights.

CEN and CENELEC (http://www.cencenelec.eu/ipr/Patents/PatentDeclaration/Pages/default.aspx) maintain on-line lists of patents relevant to their standards. Users are encouraged to consult the lists for the most up to date information concerning patents.

1 Scope

This European Standard specifies the composition, property requirements and tolerances on dimensions and form for seamless round drawn copper and copper alloy tubes for general purposes supplied in the size range from 3 mm up to and including 450 mm outside diameter and from 0,3 mm up to and including 20 mm wall thickness.

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

NOTE Tubes having an outside diameter less than 80 mm and/or a wall thickness greater than 2 mm in certain alloys are most frequently used for free machining purposes which are specified in EN 12168.

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 1971-1, *Copper and copper alloys - Eddy current test for measuring defects on seamless round copper and copper alloy tubes - Part 1: Test with an encircling test coil on the outer surface*

EN 1971-2, *Copper and copper alloys - Eddy current test for measuring defects on seamless round copper and copper alloy tubes - Part 2: Test with an internal probe on the inner surface*

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

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

EN 16090, *Copper and copper alloys - Estimation of average grain size by ultrasound*

EN ISO 196, *Wrought copper and copper alloys - Detection of residual stress - Mercury(I) nitrate test (ISO 196)*

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

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 8493, *Metallic materials - Tube - Drift-expanding test (ISO 8493)*

ISO 6957, *Copper alloys - Ammonia test for stress corrosion resistance*