

SLOVENSKI STANDARD
SIST EN 1057:1998**01-april-1998**

Baker in bakrove zlitine - Nevarjene (narejene iz celega) bakrene cevi z okroglim prerezom za vodo in plin, ki se uporabljajo za sanitarne in ogrevalne namene

Copper and copper alloys - Seamless, round copper tubes for water and gas in sanitary and heating applications

Kupfer und Kupferlegierungen - Nahtlose Rundrohre aus Kupfer für Wasser- und Gasleitungen für Sanitärinstallationen und Heizungsanlagen

Cuivre et alliages de cuivre - Tubes ronds sans soudure en cuivre pour l'eau et le gaz dans les applications sanitaires et de chauffage

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ICS:

23.040.15	Cevi iz neželeznih kovin	Non-ferrous metal pipes
77.150.30	Bakreni izdelki	Copper products

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EUROPEAN STANDARD

EN 1057

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 1996

ICS 23.040.15

Descriptors: copper, copper alloys, copper tube, seamless tubes, water pipes, gas pipes, sanitary appliances, heating, designation, chemical composition, mechanical properties, dimensions, dimensional tolerances, tests, defects, marking, conditioning

English version

**Copper and copper alloys - Seamless, round
copper tubes for water and gas in sanitary and
heating applications**

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Cuivre et alliages de cuivre - Tubes ronds sans
soudure en cuivre pour l'eau et le gaz dans les
applications sanitaires et de chauffage

Kupfer und Kupferlegierungen - Nahtlose
Rundrohre aus Kupfer für Wasser- und
Gasleitungen für Sanitärinstallationen und
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This European Standard was approved by CEN on 1996-02-25. 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 Central Secretariat or to any CEN member.

The European Standards exist 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 Central Secretariat has the same status as the official versions.

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

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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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.

Within its programme of work, Technical Committee CEN/TC 133 requested CEN/TC 133/WG 3.1 "Copper tubes" to prepare the following standard:

EN 1057 Copper and copper alloys – Seamless round copper tubes for water and gas in sanitary and heating applications

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 1996, and conflicting standards shall be withdrawn at the latest by October 1996.

The attention of the user of this standard is drawn to the fact that national or local regulations or practices might restrict the choice of dimensions and tempers in the application of products conforming to this standard.

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

-*)
Copper and copper alloys – Seamless, round tubes for general purposes (WI: 00133008)
-*)
Copper and copper alloys – Seamless, round tubes for heat exchangers (WI: 00133009)
-*)
Copper and copper alloys – Rolled, finned, seamless tubes for heat exchangers (WI: 00133011)
-*)
Copper and copper alloys – Seamless, round copper tubes for air conditioning and refrigeration – Part 1: Tubes for piping systems (WI: 00133031)
-*)
Copper and copper alloys – Seamless, round copper tubes for air conditioning and refrigeration – Part 2: Tubes for equipment (WI: 00133037)
-*)
Copper and copper alloys – Seamless, round copper tubes for medical gases (WI: 00133032)
-*)
Copper and copper alloys – Seamless, round copper capillary tubes (WI: 00133034)
-*)
Copper and copper alloys – Pre-insulated copper tubes – Part 1: Tubes with solid covering (WI: 00133044)
-*)
Copper and copper alloys – Pre-insulated copper tubes – Part 2: Tubes with expanded covering (WI: 00133050)
-*)
Copper and copper alloys – Seamless copper tubes for electrical purposes (WI: 00133023)

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

*) In course of preparation

Introduction

It is recommended that tubes manufactured to this standard are certified as conforming to the requirements of this standard based on third party testing and continuing surveillance which should be coupled with an assessment of a supplier's quality system against the appropriate standard, i. e. EN ISO 9001, EN ISO 9002 or EN ISO 9003.

Tubes having an outside diameter of not more than 108 mm are suitable for capillary soldering, brazing or assembling by mechanical compression or collared fittings. For tubes having an outside diameter of more than 108 mm, assembly should preferably be performed by welding or braze welding.

Reference may be made to this standard for tubes intended for other applications or for the transportation of other fluids. In such cases special requirements (for specifications, conditioning or delivery conditions) may be agreed between the purchaser and the supplier.

NOTE: Appropriate precautions should be taken if applying insulating material because it could be detrimental to the copper tube.

1 Scope

This European Standard specifies the requirements, sampling, test methods and conditions of delivery for copper tubes.

It is applicable to seamless round copper tubes having an outside diameter from 6 mm up to and including 267 mm for:

- distributing networks for hot water and cold water;
- hot water heating systems, including underfloor heating systems;
- domestic gas and liquid fuel distribution;
- waste water sanitation.

It is also applicable to seamless round copper tubes intended to be pre-insulated before use for any of the above purposes.

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.

prEN 723

Copper and copper alloys – Combustion method for determination of carbon on the inner surface of copper tubes or fittings

prEN 1971

Copper and copper alloys – Eddy current test for tubes

EN 10002-1

Metallic materials – Tensile testing – Part 1: Method of test (at ambient temperature)

EN 10232

Metallic materials – Tube (in full section) – Bend test

EN 10234

Metallic materials – Tube – Drift expanding test

EN 10235

Metallic materials – Tube – Flanging test

ISO 6507-1

Metallic materials – Hardness test – Vickers test – Part 1: HV 5 to HV 100

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 D.

3 Definitions

For the purposes of this standard the following definitions apply:

3.1 seamless round copper tube

Hollow semi-finished product, circular in cross-section, made of copper, having a uniform nominal wall thickness, which at all stages of production has a continuous periphery, supplied in straight lengths or in coils.

3.2 soldering and brazing¹⁾

Operations in which metal parts are joined by means of capillary action of a filler metal in the liquid state with a melting temperature lower than that of the parts to be joined and wetting the parent metal(s), which does (do) not participate in the making of the joint.

3.2.1 soldering; soft soldering¹⁾

Joining by means of capillary action of a filler metal having a melting (liquidus) temperature lower than 450 °C.

3.2.2 brazing; hard soldering¹⁾

Joining by means of capillary action of a filler metal having a melting (liquidus) temperature higher than 450 °C.

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3.3 welding²⁾

Union of two or more parts by heat or pressure or a combination of both, such that the materials form a continuity.

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A filler material having a melting point similar to that of the materials to be welded may be used.

3.4 braze welding¹⁾

Operation in which a joint of the open type is obtained step by step by an operating technique similar to fusion welding, the melting temperature of the filler metal being higher than 450 °C.

3.5 mean diameter

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

3.6 deviation from circular form

Difference between the maximum and minimum outside diameters measured at any cross-section of the tube.

¹⁾ Based upon the definitions in ISO 857

²⁾ Adopted from the International Institute of Welding (IIW)

3.7 deviation from concentricity

Half of the difference between the maximum and minimum wall thicknesses at the same cross-section of the tube.

3.8 production batch

Definite quantity of products of the same form, the same temper and the same cross-sectional dimensions manufactured during the same production sequence under uniform conditions.

4 Designations

4.1 Material

4.1.1 General

The material is designated either by symbol or number (see 6.1).

4.1.2 Symbol

The material symbol designation is based on the designation system given in ISO 1190-1.

4.1.3 Number

The material number designation is in accordance with the system given in EN 1412.

4.2 Material temper

For the purposes of this standard, the following designation, which is in accordance with the system given in EN 1173, applies for the material temper (see table 1):

R... Temper designated by the minimum value of tensile strength requirement for the product with mandatory tensile strength and elongation requirements.

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.

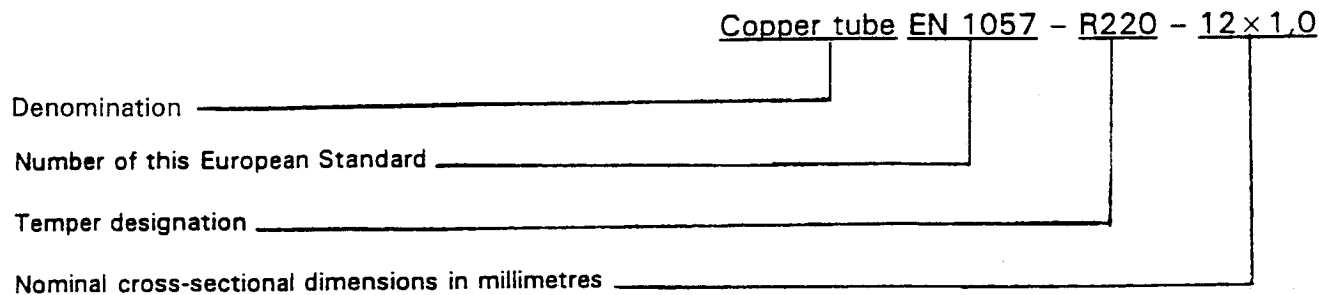
The product designation for products to this standard shall consist of:

- denomination (Copper tube);
- number of this European Standard (EN 1057);
- material temper (see table 1);
- nominal cross-sectional dimensions in millimetres: outside diameter x wall thickness.

The derivation of a product designation is shown in the following example.

EXAMPLE:

Copper tube conforming to this standard, temper R220 (annealed), nominal outside diameter 12 mm, nominal wall thickness 1,0 mm, shall be designated as follows:

**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 material required (in metres);
- b) denomination (Copper tube);
- c) number of this European Standard (EN 1057);
- d) temper designation (see 4.2 and table 1);
- e) nominal cross-sectional dimensions: outside diameter x wall thickness (see table 3 and annex A);
- f) length (see 9.2);
- g) form of delivery (see 9.2).

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NOTE: It is recommended that the product designation as described in 4.3, is used for items b) to e).

EXAMPLE:

Ordering details for 500 m copper tube conforming to EN 1057, in temper R220 (annealed), nominal outside diameter 12 mm, nominal wall thickness 1,0 mm, in 50 m coils:

500 m Copper tube EN 1057 - R220 - 12 x 1,0 - 50 m coils

6 Requirements**6.1 Composition**

The composition shall conform to the following requirements:

Cu + Ag: min. 99,90 %

0,015 % ≤ P ≤ 0,040 %

This copper grade is designated either Cu-DHP or CW024A.

6.2 Mechanical properties

The tensile strength and elongation shall conform to the requirements given in table 1. The test shall be carried out in accordance with 8.2.

Table 1: Mechanical properties

Material temper		Nominal outside diameter <i>d</i> mm		Tensile strength <i>R_m</i> MPa	Elongation <i>A</i> %	Hardness (indicative) HV 5
R220	annealed	6	54	220	40	(40 to 70)
R250 ¹⁾	half hard ¹⁾	6	66,7	250	30 ¹⁾	(75 to 100)
		6	159		20 ¹⁾	
R290	hard	6	267	290	3	(min. 100)

¹⁾ See table 2 for relationship between tube dimensions and elongation for R250 (half hard) tubes.

NOTE 1: Hardness figures in parentheses are not requirements of this standard but are given for guidance purposes only.

NOTE 2: 1 MPa is equivalent to 1 N/mm²

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The size range for values of elongation of R250 (half hard) tube is dependent on the relationship between diameter and wall thickness as shown in table 2.

Table 2: Minimal elongation values for R250 (half hard) temper tubes

Nominal outside diameter d mm	Nominal wall thickness e mm											
	0,5	0,6	0,7	0,8	0,9	1,0	1,1	1,2	1,5	2,0	2,5	3,0
6												
8												
10												
12												
14												
15												
16												
18												
22												
25												
28												
35												
40												
42												
54												
64												
66,7												
70												
76,1												
80												
88,9												
108												
133												
159												

Elongation $\geq 30\%$ when $d \leq 66,7$ mm; and either $e < 1$ mm or $\frac{d}{e^2} > 24$;

Elongation $\geq 20\%$ when $d > 66,7$ mm; or $e \geq 1$ mm and also $\frac{d}{e^2} \leq 24$.

Where:

d is the nominal outside diameter in millimetres;

e is the nominal wall thickness in millimetres.