



SLOVENSKI STANDARD
SIST EN 12735-2:2002
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Baker in bakrove zlitine - Nevarjene okrogle bakrene cevi za hladilno in klimatsko tehniko - 2. del: Cevi za naprave in aparate

Copper and copper alloys - Seamless, round copper tubes for air conditioning and refrigeration - Part 2: Tubes for equipment

Kupfer und Kupferlegierungen - Nahtlose Rundrohre aus Kupfer für die Kälte- und Klimatechnik - Teil 2: Rohre für Apparate

iTeh STANDARD PREVIEW

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Cuivre et alliages de cuivre - Tubes ronds sans soudure en cuivre pour l'air conditionné et la réfrigération - Partie 2: Tubes pour le matériel

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ICS 23.040.15

English version

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This European Standard was approved by CEN on 6 March 2001.

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

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

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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.

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of an identical text or by endorsement, at the latest by October 2001, and conflicting national standards shall be withdrawn at the latest by October 2001.

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

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

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 are specified as follows:

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

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

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 copper tubes for air conditioning and refrigeration — Part 1: Tubes for piping systems.*

prEN 13348, *Copper and copper alloys — Seamless, round copper tubes for medical gases.*

prEN 13349, *Copper and copper alloys — Pre-insulated copper tubes with solid covering.*

prEN 13600, *Copper and copper alloys — Seamless copper tubes 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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

It is recommended that tubes manufactured to this standard are certified as conforming to the requirements of this standard based on continuing surveillance which should be coupled with an assessment of a supplier's quality management system against EN ISO 9001.

1 Scope

This European Standard specifies the requirements, sampling, test methods and conditions of delivery for seamless round copper tubes, smooth or inner grooved, used for heat exchangers and their internal connecting pipes in the manufacturing of refrigeration and air conditioning equipment.

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

EN 10234, *Metallic materials — Tube — Drift expanding test.*

EN ISO 2624, *Copper and copper alloys — Estimation of average grain size (ISO 2624 : 1990).*

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 standard, the following terms and definitions apply:

3.1

seamless round copper tube

hollow semi-finished product, circular in cross-section, made of copper, having a uniform wall thickness, which at all stages of production has a continuous periphery

NOTE The inner surface of the tube may be enhanced, for example by grooves.

3.2

level wound coil (LWC)

coil in which the turns are wound into layers parallel to the axis of the coil such that successive turns in a given layer are next to one another

3.3

mean diameter

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

3.4

deviation from circular form

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

3.5

deviation from concentricity

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

3.6

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.

NOTE Although the material symbol designation used in this standard might be the same as that in other standards using the designation system given 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 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):

Y... Temper designated by the minimum value of 0,2% proof strength requirement for the product with mandatory 0,2% proof strength, tensile strength, elongation and grain size 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.

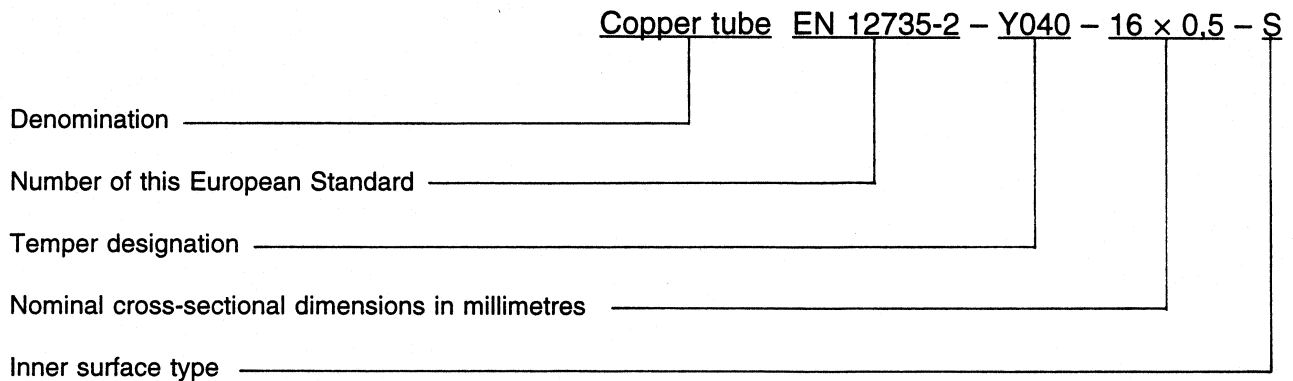
The product designation is no substitute for the full content of the standard.

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

- denomination (Copper tube);
- number of this European Standard (EN 12735-2);
- temper designation (see Table 1);
- nominal cross-sectional dimensions: outside diameter × wall thickness (see Tables 2 and 7);
- inner surface type (the following designations shall be used as appropriate: S for smooth, G for inner grooved).

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

EXAMPLE Copper tube conforming to this standard, in temper Y040 (light annealed), nominal outside diameter 16 mm, nominal wall thickness 0,5 mm, smooth inner surface, 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 product required (length, mass);
- b) denomination (Copper tube);
- c) number of this European Standard (EN 12735-2);
- d) temper designation (see 4.2 and Table 1);
- e) nominal cross-sectional dimensions,
– for smooth tubes: outside diameter \times wall thickness (see Table 2);
– for inner grooved tubes: outside diameter (see Table 7) \times wall thickness at groove root and groove depth, which shall be agreed between the purchaser and the supplier together with any other groove parameters agreed as necessary.
- f) inner surface type (smooth or grooved);
- g) form of delivery (see 10.2).

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

In addition, the purchaser shall also state on the enquiry and order any special requirements, if required.

EXAMPLE 1 Ordering details for 300 m copper tube conforming to EN 12735-2, in temper Y040 (light annealed), nominal outside diameter 16 mm, nominal wall thickness 0,5 mm, smooth inner surface, nominal length 3 m, straight lengths:

**300 m Copper tube EN 12735-2 – Y040 – 16 x 0,5 – S
– 3 m straight lengths**

EXAMPLE 2 Ordering details for 17 tonnes copper tube conforming to EN 12735-2, in temper Y040 (light annealed), nominal outside diameter 9 mm, nominal wall thickness 0,28 mm, inner grooved, 130 kg level wound coils:

**17 tonnes Copper tube EN 12735-2 – Y040 – 9 x 0,28 – G
– 130 kg LWC**

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 and grain size

The 0,2% proof strength, tensile strength, elongation and grain size shall conform to the requirements given in Table 1. The tests shall be carried out in accordance with 8.2 and 8.3.

Table 1 — Mechanical properties and grain size

Temper		0,2% proof strength		Tensile strength	Elongation	Grain size	
Designation in accordance with EN 1173	Common term	$R_{p0,2}$		R_m	A^a	μm	
		MPa		MPa	%	min.	max.
		min.	max.	min.	min.		
Y080 ^b	Skin hard	80	140	220	40	15	40
Y040	Light annealed	40	90	220	40	15	40
Y035 ^c	Soft annealed	35	80	210	40	30	60
NOTE 1 MPa is equivalent to 10 N/mm ² .							
^a The original gauge length (L_0) is calculated proportionally using the formula $L_0 = k \sqrt{\text{original cross-sectional area of the test piece } (S_0)}$ where k has the value 5,65, except that the minimum gauge length used shall be 30 mm.							
^b Straight lengths only							
^c Nominal wall thickness $e \geq 0,6$ mm							

6.3 Dimensions and tolerances for smooth tubes

6.3.1 General

The geometrical properties of the tubes are defined by outside diameter, wall thickness and for straight lengths, also by length.

NOTE For reference purposes, if DN designation of size for components of a pipework system is required, it can be calculated for tubes to this standard by:

Nominal outside diameter (d) – 2 × nominal wall thickness (e)

DN is defined as a dimensionless whole number which is indirectly related to the physical size, in millimetres, of the bore or outside diameter of the end connections.

In cases of dispute, the dimensions shall be measured at a temperature of (23 ± 5) °C.