



**SLOVENSKI STANDARD**  
**oSIST prEN 12735-2:2009**  
**01-marec-2009**

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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

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

**Ta slovenski standard je istoveten z: prEN 12735-2**

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**ICS:**

23.040.15      Cevi iz neželeznih kovin      Non-ferrous metal pipes

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 12735-2**

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ICS 23.040.15

Will supersede EN 12735-2:2001

English Version

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

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

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

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 133.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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## Foreword

This document (prEN 12735-2:2008) has been prepared by Technical Committee CEN/TC 133 "Copper and copper alloys", the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12735-2:2001.

This document has been prepared under a mandate given to CEN by the European Commission and the Free Trade Association, and supports essential requirements of the EU Pressure Equipment Directive (PED) 97/23/EC, see informative Annex ZA which is an integral part of this document.

For relation with EU Directives, see informative Annex ZA, which is an integral part of this document.

Within its programme of work, Technical Committee CEN/TC 133 has, in cooperation with CEN/TC 133/WG 3 "Copper tubes (installation and industrial)", prepared the following standard:

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

In comparison with the first edition of EN 12735-2:2001, the following technical changes were made:

- a) The size range of the outer diameter for smooth tubes has been increased from (7 to up to and including 64) mm to (6 to up to and including 133) mm;
- b) wall thickness, addition of tow steps (2,50 and 3,00) mm;
- c) the term "temper" replaced by "material condition" (only in the English wording);
- d) the material conditions R250 and R290 have been additionally incorporated;
- e) EN 10234 has been replaced by EN ISO 8493.

This is one of a series of European Standards for tubes of copper and copper alloy. 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*

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*

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## 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.

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

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SIST EN 12735-2:2010

<https://standards.iteh.ai/catalog/standards/sist/0d02ac6e-5e40-4e32-ad35-49b92d3e29df/sist-en-12735-2-2010>

## 1 Scope

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

It is applicable to tubes with an outer diameter from 6 mm up to and including 133 mm.

The tubes are supplied in straight length in the material conditions hard or half-hard or as coils in the material condition annealed (soft).

## 2 Normative references

The following referenced documents are indispensable for the application 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 723, *Copper and copper alloys — Combustion method for determination of the carbon content on the inner surface of copper tubes or fittings*

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 ISO 2624, *Copper and copper alloys — Estimation of average grain size*

EN ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method*

EN ISO 8493, *Metallic materials — Tube — Drift expanding test*

ISO 1553, *Unalloyed copper containing not less than 99,90 % of copper — Determination of copper content — Electrolytic method*

ISO 4741, *Copper and copper alloys — Determination of phosphorus content — Molybdovanadate spectrometric method*

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 document, the following terms and definitions apply.

### 3.1

#### **seamless round copper tube**

hollow semi-finished product of copper, circular in cross-section, 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 fins.

**prEN 12735-2:2008 (E)****3.2****coil**

winding in which the turns are wound into layers parallel to its axis such that successive turns in a given layer are next to one another (LWC) or are spirally wound (SWC)

**3.3****mean diameter**

arithmetical mean of the maximum and minimum outside diameters through 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 material condition and the same cross-sectional dimensions manufactured during the same production sequence under uniform conditions

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**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 condition**

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

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

Y... Material condition 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.

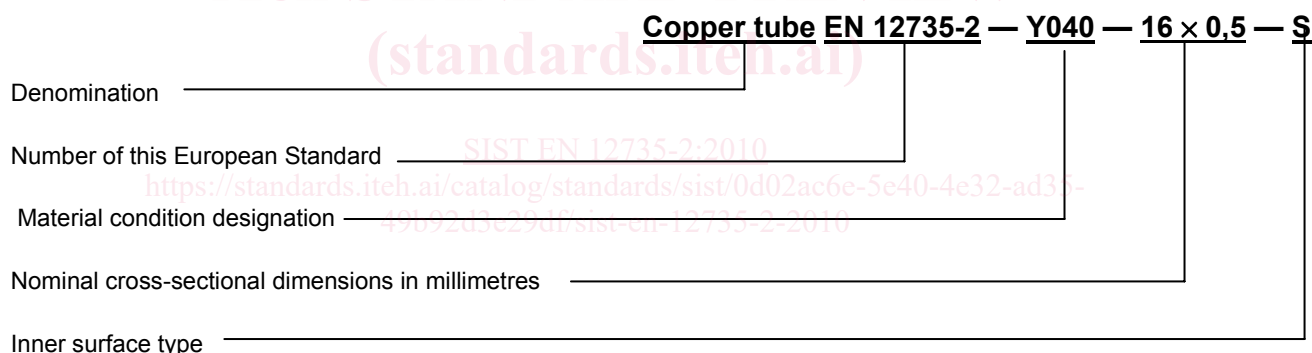
The product designation is no substitute for the full content of the standard.

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

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

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

EXAMPLE Copper tube conforming to this standard, in material condition Y040 (light annealed), nominal outside diameter 16 mm, nominal wall thickness 0,5 mm, smooth inner surface (S), 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) material condition designation (see 4.2 and Table 1);
- e) nominal cross-sectional dimensions,
  - for smooth tubes: outside diameter x wall thickness (see Table 2);

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— for inner finned tubes: outside diameter (see Table 7) × wall thickness at fin root and fin height, which shall be agreed between the purchaser and the supplier together with any other fin parameters agreed as necessary.

- f) inner surface type (smooth or finned);
- g) form of delivery, straight lengths, coil (LWC or SWC) (see 10.2).

In addition, the purchaser shall also state on the enquiry and order the following, if required:

- h) whether an other form of delivery than g) is required;
- i) whether a declaration of conformity is required (see 9.1);
- j) whether an inspection document is required, and if so, which type (see 9.2).

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 material condition Y040 (light annealed), nominal outside diameter 16 mm, nominal wall thickness 0,5 mm, smooth inner surface (S), nominal length 3 m, straight lengths:

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

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

**17 tonnes Copper tube EN 12735-2 — Y040 — 9 × 0,28 — F  
— 130 kg LWC**

## 6 Requirements

### 6.1 Composition

The composition shall conform to the following requirements:

Cu + Ag: min. 99,90 %;

$0,015 \% \leq P \leq 0,040 \%$ .

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, 8.3 and 8.4.

Table 1 — Mechanical properties and grain size

Material condition		0,2% proof strength		Tensile strength	Elongation	Hardness (indicative)	Grain size	
designation in accordance with EN 1173	common term	$R_{p0,2}$		$R_m$	$A$	HV 5	$\mu\text{m}$	
		MPa		MPa	%		min.	max.
		min.	max.	min.	min.		min.	max.
R250 <sup>a</sup>	half hard	—	—	250	30	(75 to 100)	—	—
R290 <sup>a</sup>	hard	—	—	290	3	(min. 100)	—	—
Y080 <sup>a</sup>	skin hard	80	140	220	40		15	40
Y040	light annealed	40	90	220	40		15	40
Y035 <sup>b</sup>	soft annealed	35	80	210	40		30	60

NOTE 1 Hardness figures in parentheses are only requirements of this European Standard when they are agreed between purchaser and supplier, otherwise they are given for guidance purposes only.  
NOTE 2 MPa is equivalent to 1 N/mm<sup>2</sup>.

<sup>a</sup> Straight lengths only.  
<sup>b</sup> 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 length. The outside diameter and wall thickness shall conform to the requirements given in Table 2, Table 3 and Table 4.

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

$$\text{Nominal outside diameter } (d) - 2 \times \text{nominal wall thickness } (e).$$

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  $(23 \pm 5)$  °C.

### 6.3.2 Nominal dimensions

The standardized nominal outside diameters and nominal wall thicknesses for smooth tubes are given in Table 2. The recommended nominal dimensions of the length for straight length are indicated in 10.2.2

Other dimensions can be agreed between the purchaser and the supplier.