



# SLOVENSKI STANDARD

## SIST EN 10305-2:2010

01-marec-2010

Nadomešča:  
SIST EN 10305-2:2003

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**Jeklene cevi za precizno uporabo - Tehnični dobavni pogoji - 2. del: Varjene hladno vlečene cevi**

Steel tubes for precision applications - Technical delivery conditions - Part 2: Welded cold drawn tubes

Präzisionsstahlrohre - Technische Lieferbedingungen - Teil 2: Geschweißte kaltgezogene Rohre

Tubes de précision en acier - Conditions techniques de livraison - Partie 2: Tubes soudés étirés à froid

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**Ta slovenski standard je istoveten z: EN 10305-2:2009**

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**ICS:**

77.140.75	Jeklene cevi in cevni profili za posebne namene	Steel pipes and tubes for specific use
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**SIST EN 10305-2:2010**

**en**

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**(standards.iteh.ai)**

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EUROPEAN STANDARD

**EN 10305-2**

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2010

ICS 77.140.75

Supersedes EN 10305-2:2002

English Version

**Steel tubes for precision applications - Technical delivery conditions - Part 2: Welded cold drawn tubes**

Tubes de précision en acier - Conditions techniques de livraison - Partie 2: Tubes soudés étirés à froid

Präzisionsstahlrohre - Technische Lieferbedingungen - Teil 2: Geschweißte kaltgezogene Rohre

This European Standard was approved by CEN on 22 November 2009.

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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 Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG**Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## Foreword

This document (EN 10305-2:2010) has been prepared by Technical Committee ECISS/TC 110 “Steel tubes, and iron and steel fittings”, the secretariat of which is held by UNI.

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 July 2010, and conflicting national standards shall be withdrawn at the latest by July 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 10305-2:2002.

EN 10305, *Steel tubes for precision applications — Technical delivery conditions*, consists of the following parts:

- *Part 1: Seamless cold drawn tubes*
- *Part 2: Welded cold drawn tubes*
- *Part 3: Welded cold sized tubes*
- *Part 4: Seamless cold drawn tubes for hydraulic and pneumatic power systems*
- *Part 5: Welded cold sized square and rectangular tubes*
- *Part 6: Welded cold drawn tubes for hydraulic and pneumatic power systems*

According to the CEN/CENELEC Internal Regulations, the national standards organizations 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

**EN 10305-2:2010 (E)****1 Scope**

This European Standard specifies the technical delivery conditions for welded cold drawn steel tubes of circular cross section for precision applications with specified outside diameter  $D \leq 150$  mm.

NOTE This document may also be applied to other types of cross section.

Tubes according to this document are characterized by having precisely defined tolerances on dimensions and a specified maximum surface roughness. Typical fields of application are in the automotive, furniture and general engineering industries.

**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 10020:2000, *Definition and classification of grades of steel*

EN 10021:2006, *General technical delivery conditions for steel products*

EN 10027-1, *Designation systems for steels — Part 1: Steel names*

EN 10027-2, *Designation systems for steels — Part 2: Numerical system*

EN 10052:1993, *Vocabulary of heat treatment terms for ferrous products*

EN 10168, *Steel products — Inspection documents — List of information and description*

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

EN 10246-1<sup>1)</sup>, *Non-destructive testing of steel tubes — Part 1: Automatic electromagnetic testing of seamless and welded (except submerged arc-welded) ferromagnetic steel tubes for verification of hydraulic leak-tightness*

EN 10246-3<sup>2)</sup>, *Non-destructive testing of steel tubes — Part 3: Automatic eddy current testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of imperfections*

EN 10246-5<sup>3)</sup>, *Non-destructive testing of steel tubes — Part 5: Automatic full peripheral magnetic transducer/flux leakage testing of seamless and welded (except submerged arc welded) ferromagnetic steel tubes for the detection of longitudinal imperfections*

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1) Under revision to become EN ISO 10893-1, *Non-destructive testing of steel tubes — Part 1: Automated electromagnetic testing of seamless and welded (except submerged arc-welded) steel tubes for the verification of hydraulic leak-tightness instead of the hydrostatic test (ISO/DIS 10893-1:2009).*

2) Under revision to become EN ISO 10893-2, *Non-destructive testing of steel tubes — Part 2: Automated eddy current testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of imperfections (ISO/DIS 10893-2:2009).*

3) Under revision to become EN ISO 10893-3, *Non-destructive testing of steel tubes — Part 3: Automated full peripheral flux leakage testing of seamless and welded (except submerged arc-welded) ferromagnetic steel tubes for the detection of longitudinal and/or transversal imperfections (ISO/DIS 10893-3:2009).*

EN 10246-7<sup>4)</sup>, *Non-destructive testing of steel tubes — Part 7: Automatic full peripheral ultrasonic testing of seamless and welded (except submerged arc welded) tubes for the detection of longitudinal imperfections*

EN 10256, *Non-destructive testing of steel tubes — Qualification and competence of level 1 and 2 non-destructive testing personnel*

EN 10266:2003, *Steel tubes, fittings and structural hollow sections — Symbols and definitions of terms for use in product standards*

EN ISO 377, *Steel and steel products — Location and preparation of samples and test pieces for mechanical testing (ISO 377:1997)*

EN ISO 2566-1, *Steel — Conversion of elongation values — Part 1: Carbon and low alloy steels (ISO 2566-1:1984)*

EN ISO 4287, *Geometrical product specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters (ISO 4287:1997)*

EN ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature (ISO 6892-1:2009)*

EN ISO 8492, *Metallic materials — Tube — Flattening test (ISO 8492:1998)*

EN ISO 8493, *Metallic materials — Tube — Drift expanding test (ISO 8493:1998)*

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### 3 Terms and definitions (standards.iteh.ai)

For the purposes of this document, the terms and definitions given in EN 10020:2000, EN 10021:2006, EN 10052:1993, EN 10266:2003 and the following apply: <sup>2010</sup>

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#### 3.1

##### **employer**

organization for which a person works on a regular basis

NOTE The employer can be either the tube manufacturer or a third party organization providing non-destructive testing (NDT) services.

#### 3.2

##### **manufacturer**

party to produce and to deliver tubes in accordance with this document

NOTE Where tubes are delivered by a supplier, see EN 10021:2006, Clause 6.

#### 3.3

##### **imperfection**

discontinuity in the wall or on the pipe surfaces detectable by methods described in this document

NOTE Imperfections with a size complying with the acceptance criteria specified in this document are considered to have no practical implication on the intended use of the product.

#### 3.4

##### **defect**

imperfection of a size not complying with the acceptance criteria specified in this document

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4) Under revision to become EN ISO 10893-10, *Non-destructive testing of steel tubes — Part 10: Automated full peripheral ultrasonic testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of longitudinal and/or transversal imperfections (ISO/DIS 10893-10:2009)*.

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NOTE Defects are considered to adversely affect or limit the intended use of the product.

**3.5 parent coil**  
coil originating from the hot rolling process prior to any further operation (pickling, slitting, cold rolling or coating)

## 4 Symbols

For the purposes of this document, the symbols in EN 10266:2003 apply.

NOTE For tubes specified by the outside diameter and by the inside diameter, "T" is the specified or the calculated wall thickness in this document.

## 5 Classification and designation

### 5.1 Classification

In accordance with the classification system in EN 10020 the steel grades given in Table 2 are non-alloy quality steels.

### 5.2 Designation

For the tubes covered by this document the steel designation consists of the number of this document (EN 10305-2) plus either:

- a) the steel name in accordance with EN 10027-1; or
- b) the steel number in accordance with EN 10027-2.

## 6 Information to be supplied by the purchaser

### 6.1 Mandatory information

The following information shall be obtained by the manufacturer at the time of enquiry and order:

- a) quantity (mass or total length or number);
- b) term "tube";
- c) dimensions (see 8.5);
- d) steel designation (see 5.2);
- e) delivery condition (see 7.2.2);
- f) type of tube length and, where applicable, the length (see 8.5.2).

### 6.2 Options

A number of options are specified in this document and these are listed below. In the event that the purchaser does not indicate a wish to implement any of these options at the time of enquiry and order, the tubes shall be supplied in accordance with the basic specification (see 6.1).



- 1) specification of a steel grade not specified in this document (see 8.2);
- 2) suitability for hot-dip galvanizing (see 8.2);
- 3) surface condition for further processing (see 8.4.1);
- 4) measurement of surface roughness (see 8.4.3);
- 5) specific surface roughness (see 8.4.3);
- 6) tube surfaces free from not easily removable substances (see 8.4.6);
- 7) non-destructive testing for the detection of longitudinal imperfections (see 8.4.7);
- 8) non-destructive testing for verification of leak-tightness (see 8.4.7);
- 9) specification of a cross section other than circular (see 8.5.1.1);
- 10) reduced diameter tolerances (see 8.5.1.2);
- 11) unilateral diameter tolerances (see 8.5.1.2);
- 12) reduced eccentricity (see 8.5.1.3);
- 13) reduced wall thickness tolerance (see 8.5.1.4);
- 14) unilateral wall thickness tolerance (see 8.5.1.4);
- 15) tolerance for exact lengths  $\leq 500$  mm or  $> 8\ 000$  mm (see 8.5.2);
- 16) reduced maximum deviation from straightness (see 8.5.3);
- 17) specified end finishing (see 8.5.4);
- 18) inspection certificate 3.1 (see 9.1 and 9.2.1);
- 19) inspection certificate 3.2 (see 9.2.1);
- 20) flattening or drift expanding test for delivery condition +A or +N (see Table 8);
- 21) test unit with tubes from one cast only (see 10.1);
- 22) alternative marking (see Clause 12);
- 23) delivery without corrosion protection (see Clause 13);
- 24) specified corrosion protection (see Clause 13);
- 25) unbundled tubes or specific method of packaging (see Clause 13).

### 6.3 Example of an order

12 000 m tube with an outside diameter of 60 mm and an inside diameter of 56 mm in accordance with this document, made of steel grade E235 in the normalized condition, delivered in random lengths, with a 3.1 inspection certificate in accordance with EN 10204:

12 000 m tube – 60 x d 56 – EN 10305-2 – E235 +N – random length – Option 18

**EN 10305-2:2010 (E)****7 Manufacturing process****7.1 Steelmaking process**

The steelmaking process is at the discretion of the manufacturer with the exception that the open hearth (Siemens-Martin) process shall not be employed unless in combination with a secondary steelmaking or ladle refining process.

Steels shall be fully killed.

NOTE This excludes the use of rimming, balanced or semi-killed steel.

**7.2 Tube manufacture and delivery conditions**

**7.2.1** The tubes shall be manufactured from electric welded hollows by cold drawing. The tubes shall not contain strip end welds.

**7.2.2** The tubes shall be supplied in one of the delivery conditions given in Table 1.

**7.2.3** All non-destructive testing (NDT) activities shall be carried out by qualified and competent level 1, 2 and/or 3 personnel authorized to operate by the employer.

The qualification shall be in accordance with EN 10256 or, at least, an equivalent to it.

It is recommended that the level 3 personnel be certified in accordance with EN 473 or, at least, an equivalent to it.

The operating authorization issued by the employer shall be in accordance with a written procedure. NDT operations shall be authorized by a level 3 NDT individual approved by the employer.

NOTE The definition of level 1, 2 and 3 can be found in appropriate standards, e.g. EN 473 and EN 10256.

**Table 1 — Delivery conditions**

Designation	Symbol <sup>a</sup>	Description
Cold drawn / hard	+C	No final heat treatment after final cold drawing.
Cold drawn / soft	+LC	Final heat treatment is followed by a suitable drawing pass (limited reduction of area).
Cold drawn and stress relieved	+SR	After final cold drawing the tubes are stress relieved in a controlled atmosphere.
Soft annealed	+A	After final cold drawing the tubes are annealed in a controlled atmosphere.
Normalized	+N	After final cold drawing the tubes are normalized in a controlled atmosphere.
<sup>a</sup> In accordance with EN 10027-1.		

**8 Requirements****8.1 General**

The tubes, when supplied in a delivery condition indicated in Table 1 and inspected in accordance with Clauses 9, 10 and 11, shall comply with the requirements of this document.

In addition, the general technical delivery requirements specified in EN 10021 apply.

## 8.2 Chemical composition

The cast analysis reported by the steel producer shall apply and comply with the requirements of Table 2 (but see options 1 and 2).

**Option 1:** A steel grade not specified in this document with a maximum total content of alloying elements of 5 % and agreed chemical composition, mechanical properties and delivery condition, is specified.

**NOTE** When subsequently welding tubes produced in accordance with this document account should be taken of the fact that the behaviour of the steel during and after welding is dependent not only on the steel composition and the delivery condition but also on the conditions of preparing for and carrying out the welding.

**Table 2 — Chemical composition (cast analysis)<sup>a</sup>**

Steel grade		% by mass					
Steel name	Steel number	C max.	Si max.	Mn max.	P max.	S max.	Al <sup>total</sup> min. <sup>b</sup>
E155	1.0033	0,11	0,35	0,70	0,025	0,025	0,015
E195	1.0034	0,15	0,35	0,70	0,025	0,025	0,015
E235	1.0308	0,17	0,35	1,20	0,025	0,025	0,015
E275	1.0225	0,21	0,35	1,40	0,025	0,025	0,015
E355	1.0580	0,22	0,55	1,60	0,025	0,025	0,020

<sup>a</sup> Elements not included in this table (but see footnote <sup>b</sup>) shall not be intentionally added to the steel without the agreement of the purchaser, except for elements which may be added for the purposes of deoxidation and/or nitrogen binding. All appropriate measures shall be taken to prevent the addition of undesirable elements from scrap or other materials used in the steel making process.

<sup>b</sup> This requirement is not applicable provided the steel contains a sufficient amount of other nitrogen binding elements, such as Ti, Nb or V. When using titanium, the manufacturer shall verify that  $(Al + Ti/2) \geq 0,020$ . Additions of Nb, Ti and V are permitted at the discretion of the manufacturer. The content of these elements shall be reported.

**Option 2:** The composition of the specified steel grade shall be such that it is suitable for hot-dip galvanizing (see e.g. EN ISO 1461 for guidance).

Table 3 specifies the permissible deviation of product analysis from the specified limits on cast analysis given in Table 2.