



# SLOVENSKI STANDARD SIST EN 10305-3:2003

01-april-2003

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Steel tubes for precision applications - Technical delivery conditions - Part 3: Welded cold sized tubes

Präzisionsstahlrohre - Technische Lieferbedingungen - Teil 3: Geschweißte maßgewalzte Rohre

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Tubes de précision en acier - Conditions techniques de livraison - Partie 3: Tubes soudés calibrés

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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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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 10305-3**

November 2002

ICS 77.140.75

English version

## Steel tubes for precision applications - Technical delivery conditions - Part 3: Welded cold sized tubes

Tubes de précision en acier - Conditions techniques de livraison - Partie 3: Tubes soudés calibrés

Präzisionsstahlrohre - Technische Lieferbedingungen - Teil 3: Geschweißte maßgewalzte Rohre

This European Standard was approved by CEN on 2 October 2002.

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.

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COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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**EN 10305-3:2002 (E)****Foreword**

This document EN 10305-3:2002 has been prepared by Technical Committee ECISS /TC 29, "Steel tubes and fittings for steel tubes" 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of an identical text or by endorsement, at the latest by May 2003, and conflicting national standards shall be withdrawn at the latest by May 2003.

EN 10305 consists of the following parts under the general title "*Steel tubes for precision applications - Technical delivery conditions*":

- *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 and cold sized square and rectangular tubes.*
- *Part 6: Welded cold drawn tubes for hydraulic and pneumatic power systems.*

In this European Standard the annex A is informative.

This document includes a Bibliography.

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

## 1 Scope

This Part of EN 10305 specifies the technical delivery conditions for welded cold sized steel tubes of circular cross section for precision applications.

NOTE This Part of EN 10305 may also be applicable to non-circular (excluding square and rectangular) cross sections.

Tubes according to this Part of EN 10305 are characterized by having precisely defined tolerances on dimensions and a specified surface roughness. Typical fields of application are in the vehicle, furniture and general engineering industries.

## 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 10002-1, *Metallic materials — Tensile testing — Part 1: Method of test at ambient temperature.*

EN 10020, *Definition and classification of grades of steel.*

EN 10021, *General technical delivery requirements for steel and iron products.*

EN 10027-1, *Designation systems for steel — Part 1: Steel names, principal symbols.*

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

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

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

EN 10233, *Metallic materials — Tube — Flattening test.*

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

EN 10246-1, *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, *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, *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.*

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

EN 10246-8, *Non-destructive testing of steel tubes — Part 8: Automatic ultrasonic testing of the weld seam of electric welded steel 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 ISO 377, *Steel and steel products — Location and preparation of samples and test pieces for mechanical testing (ISO 377:1997).*

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

prEN 10168<sup>1)</sup>, *Iron and steel products — Inspection documents — List of information and description*

ENV 10220, *Seamless and welded steel tubes — Dimensions and masses per unit length*.

prEN 10266<sup>1)</sup>, *Steel tubes, fittings and structural hollow sections — Definitions and symbols for use in product standards*.

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

CR 10260, *Designation systems for steel — Additional symbols*.

**3 Terms and definitions**

For the purposes of this European Standard, the terms and definitions given in EN 10020, EN 10021, EN 10052, prEN 10266 and the following apply.

**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****parent coil**

coil originating from the hot rolling process prior to any subsequent operation (pickling, slitting, cold rolling or coating)

**4 Symbols**

See prEN 10266.

**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 Part of EN 10305 the steel designation consists of

— the number of this Part of EN 10305, EN 10305-3;

plus either:

— the steel name in accordance with EN 10027-1 and CR 10260; or

<sup>1)</sup> In preparation, until this document is published as a European Standard a corresponding national standard should be agreed at the time of enquiry and order.



— 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 supplied by the purchaser at the time of enquiry and order:

- a) the quantity (mass or total length or number);
- b) the term “tube”;
- c) the dimensions (see 8.5.1);
- d) the designation of the steel grade in accordance with this Part of EN 10305 (see 5.2);
- e) the delivery condition including the surface condition (see 7.2.1 and 7.2.2);
- f) the length and the type of tube length (see 8.5.2).

### 6.2 Options

A number of options are specified in this Part of EN 10305 and these are listed below. In the event that the purchaser does not indicate his 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 Part of EN 10305 (see 8.2);
- 2) surface condition for further processing (see 8.4.1.1);
- 3) removal of internal weld bead (see 8.4.1.5);
- 4) measurement of surface roughness (see 8.4.1.6);
- 5) lower surface roughness (see 8.4.1.6);
- 6) non-destructive testing of the weld seam for the detection of longitudinal imperfections (see 8.4.2);
- 7) non-destructive testing of the full tube circumference for the detection of longitudinal;
- 8) non-destructive testing for verification of leak-tightness (see 8.4.2);
- 9) specification of an agreed testing procedure of transverse welds for the detection of imperfections (see 8.4.2);
- 10) specification of a cross-section other than circular (see 8.5.1.1);
- 11) reduced diameter tolerances (see 8.5.1.2);
- 12) diameter tolerance unilateral (see 8.5.1.2);
- 13) reduced wall thickness tolerance (see 8.5.1.3);
- 14) wall thickness tolerance unilateral (see 8.5.1.3);
- 15) another specified length and/or tolerance (see 8.5.2);
- 16) agreement on a tolerance for exact lengths  $\leq 500$  mm or  $> 8\ 000$  mm (see 8.5.2);

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- 17) special end finishing (see 8.5.4);
- 18) specific inspection (see 9.1);
- 19) inspection certificates 3.1.A or 3.1.C (see 9.2.1);
- 20) flattening or drift expanding test (see Table 9);
- 21) test unit with tubes from one cast only (see 10.1);
- 22) more restrictive requirement on flattening test (see 11.2);
- 23) alternative marking (see clause 12);
- 24) delivery without corrosion protection (see clause 13);
- 25) specified corrosion protection (see clause 13);
- 26) specified method of packaging (see clause 13).

**6.3 Example of an order**

12 000 m tube with an outside diameter of 40 mm and a wall thickness of 1,5 mm in accordance with this Part of EN 10305, made of steel grade E235 in the normalized condition, pickled, to be delivered in standard lengths of 6 m with an 3.1.B inspection certificate in accordance with EN 10204.

12 000 m tubes – 40 x 1,5 - EN 10305-3 - E235 +N, S2 - 6 m standard length - Option 18

**7 Manufacturing process**

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**7.1 Steelmaking process**

The steelmaking process is at the discretion of the manufacturer.

Steels shall be fully killed.

**7.2 Tube manufacture and delivery conditions**

**7.2.1** The tubes shall be manufactured from steel strip by electric welding. The tubes shall not include welds used for joining lengths of flat rolled strip prior to forming the tube, except for coiled tubes which may be supplied in the delivery conditions +A and +N (for testing see 8.4.2).

Possible surface conditions are:

- S1 (black);
- S2 (pickled);
- S3 (cold rolled);
- S4 (coated to an agreed condition).

**NOTE** The surface conditions S1 and S3 apply for the strip. The surface condition S2 and S4 may apply for the strip or the tube; the purchaser should, where necessary, indicate the required condition at the time of enquiry and order.

**7.2.2** Tubes made of the steel grades E155, E195, E235, E275 and E355 shall be supplied in the delivery condition +CR1 or +A or +N (see Table 1). Tubes made of the grades E190, E220, E260, E320, E370 and E420 shall be supplied in the delivery condition +CR2.

**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 levels 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
Welded and cold sized	+CR1 <sup>b</sup>	Normally not heat treated, but suitable for final annealing.
	+CR2 <sup>c</sup>	Not intended for heat treatment after the welding and sizing process
Annealed	+A	After the welding and sizing process the tubes are annealed in a controlled atmosphere.
Normalized	+N	After the welding and sizing process the tubes are normalized in a controlled atmosphere. This delivery condition can be reached via direct processing.
<p><sup>a</sup> Former frequently used corresponding heat treatment symbols are given in Table A.1.</p> <p><sup>b</sup> NOTE 1 After annealing or normalizing, the mechanical properties given in Table 4 for the delivery condition +A or +N, respectively are normally obtained.</p> <p><sup>c</sup> NOTE 2 If further heat treatment is applied, the resulting mechanical properties may be outside the specified requirements.</p>		

## 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 Part of EN 10305.

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

### 8.2 Chemical composition

The cast analysis reported by the steel producer shall apply and comply with the requirements of Table 2. A steel grade not specified in this Part of EN 10305 may be specified (see Option 1).

**Option 1:** A steel grade not specified in this Part of EN 10305 with a maximum total content of alloying elements of 5 % is specified. Chemical composition, mechanical properties and delivery condition shall be specified by the purchaser.

NOTE When subsequently welding tubes are produced in accordance with this Part of EN 10305, account should be taken of the fact that the behaviour of the steel during and after welding is dependent not only on the steel and the delivery condition, but also on the conditions of preparing for and carrying out the welding.