



# SLOVENSKI STANDARD

## SIST EN 10305-5:2016

01-oktober-2016

Nadomešča:  
SIST EN 10305-5:2010

---

**Jeklene cevi za precizno uporabo - Tehnični dobavni pogoji - 5. del: Varjene in hladno dimenzionirane kvadratne in pravokotne cevi**

Steel tubes for precision applications - Technical delivery conditions - Part 5: Welded cold sized square and rectangular tubes

Präzisionsstahlrohre - Technische Lieferbedingungen - Teil 5: Geschweißte maßumgeformte Rohre mit quadratischem und rechteckigem Querschnitt

Tubes de précision en acier - Conditions techniques de livraison - Partie 5 : Tubes soudés calibrés avec section carrée et rectangulaire

**Ta slovenski standard je istoveten z: EN 10305-5:2016**

---

**ICS:**

77.140.75	Jeklene cevi in cevni profili za posebne namene	Steel pipes and tubes for specific use
-----------	---	--

**SIST EN 10305-5:2016**

**en,fr,de**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 10305-5:2016](https://standards.iteh.ai/catalog/standards/sist/e6e65ccc-9f09-4a1c-b84f-9e3cfdda51f7/sist-en-10305-5-2016)

<https://standards.iteh.ai/catalog/standards/sist/e6e65ccc-9f09-4a1c-b84f-9e3cfdda51f7/sist-en-10305-5-2016>

EUROPEAN STANDARD

**EN 10305-5**

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2016

ICS 77.140.75

Supersedes EN 10305-5:2010

English Version

## Steel tubes for precision applications - Technical delivery conditions - Part 5: Welded cold sized square and rectangular tubes

Tubes de précision en acier - Conditions techniques de livraison - Partie 5 : Tubes soudés calibrés avec section carrée et rectangulaire

Präzisionsstahlrohre - Technische Lieferbedingungen - Teil 5: Geschweißte maßumgeformte Rohre mit quadratischem und rechteckigem Querschnitt

This European Standard was approved by CEN on 18 January 2016.

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 CEN-CENELEC Management Centre or to any CEN member.

**iTeh STANDARD PREVIEW**

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-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

<b>Contents</b>	<b>Page</b>
European foreword.....	4
<b>1 Scope</b> .....	<b>5</b>
<b>2 Normative references</b> .....	<b>5</b>
<b>3 Terms and definitions</b> .....	<b>6</b>
<b>4 Symbols</b> .....	<b>6</b>
<b>5 Classification and designation</b> .....	<b>6</b>
5.1 Classification.....	6
5.2 Designation.....	6
<b>6 Information to be supplied by the purchaser</b> .....	<b>7</b>
6.1 Mandatory information .....	7
6.2 Options.....	7
6.3 Example of an order .....	8
<b>7 Manufacturing process</b> .....	<b>8</b>
7.1 Steelmaking process.....	8
7.2 Tube manufacture and delivery conditions.....	8
<b>8 Requirements</b> .....	<b>9</b>
8.1 General.....	9
8.2 Chemical composition.....	9
8.3 Mechanical properties.....	11
8.4 Appearance and internal soundness.....	12
8.5 Dimensions and tolerances .....	13
8.5.1 Side length(s), wall thickness and mass per unit length.....	13
8.5.2 Side length(s) tolerances.....	14
8.5.3 Wall thickness tolerances .....	15
8.5.4 Corner profile .....	16
8.5.5 Length and length tolerances .....	16
8.5.6 Straightness.....	17
8.5.7 Squareness of sides .....	17
8.5.8 Concavity and convexity .....	18
8.5.9 Twist .....	18
8.5.10 Preparation of ends.....	18
<b>9 Inspection</b> .....	<b>19</b>
9.1 Types of inspection.....	19
9.2 Inspection documents .....	19
9.2.1 Types of inspection documents.....	19
9.2.2 Content of inspection documents.....	19
9.3 Summary of inspection and testing.....	20
<b>10 Sampling</b> .....	<b>20</b>
10.1 Frequency of tests .....	20
10.1.1 Test unit.....	20
10.1.2 Number of sample tubes.....	20
10.2 Preparation of samples and test pieces .....	20

10.2.1	General .....	20
10.2.2	Test pieces for the tensile test .....	21
10.2.3	Test pieces for outside roughness measurement .....	21
11	Test methods.....	21
11.1	Tensile test.....	21
11.2	Dimensional inspection.....	22
11.3	Roughness measurement .....	22
11.4	Visual examination .....	22
11.5	Non-destructive testing.....	22
11.6	Retests, sorting and reprocessing.....	22
12	Marking .....	22
13	Protection and packaging.....	23
	Bibliography .....	24

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 10305-5:2016

<https://standards.iteh.ai/catalog/standards/sist/e6e65ccc-9f09-4a1c-b84f-9e3cfdda51f7/sist-en-10305-5-2016>

**EN 10305-5:2016 (E)****European foreword**

This document (EN 10305-5:2016) 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 September 2016 and conflicting national standards shall be withdrawn at the latest by September 2016.

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 10305-5:2010.

In comparison with the previous edition, the following technical changes have been made:

- a) References were adapted;
- b) The options were renumbered in such a way that now throughout all parts the number of options are the same;
- c) Addition of steel grades E460, E500, E550, E600 and E700;
- d) Editorial updates.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## 1 Scope

This European Standard specifies the technical delivery conditions for welded cold sized steel tubes of square and rectangular cross section for precision applications.

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

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 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)*

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

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

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

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 10893-2)*

EN ISO 10893-11, *Non-destructive testing of steel tubes - Part 11: Automated ultrasonic testing of the weld seam of welded steel tubes for the detection of longitudinal and/or transverse imperfections (ISO 10893-11)*

ISO 11484, *Steel products - Employer's qualification system for non-destructive testing (NDT) personnel*

**EN 10305-5:2016 (E)****3 Terms and definitions**

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.

**3.1 employer**  
organization for which a person works on a regular basis

Note 1 to entry: The employer can be either the tube manufacturer or a third party organization providing services, such as non-destructive testing (NDT).

**3.2 manufacturer**  
party to produce and to deliver tubes in accordance with this document

Note 1 to entry: Where tubes are delivered by an intermediary, 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 1 to entry: 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

Note 1 to entry: 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.

**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, except steel grade E700 which is an alloy quality steel.

**5.2 Designation**

For the tubes covered by this document the steel designation consists of the number of this document (EN 10305-5) 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 supplied by the purchaser at the time of enquiry and order:

- a) the quantity (mass or total length or number of pieces);
- b) the term “tube“;
- c) the dimensions (see 8.5.1);
- d) the steel designation (see 5.2);
- e) the delivery condition including the surface condition (see 7.2.1 and 7.2.2);
- f) type of tube length and, where applicable, the length (see 8.5.5);
- g) type of inspection document (see 9.1).

### 6.2 Options

## iTeh STANDARD PREVIEW

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).

- Option 1: specification of a steel grade not specified in this document (see 8.2);
- Option 3: suitability for hot-dip galvanizing (see 8.2);
- Option 4: surface condition for further processing (see 8.4.1);
- Option 5: position of the weld line (see 8.4.2);
- Option 6: removal of internal weld bead (see 8.4.3);
- Option 8: measurement of surface roughness (see 8.4.5);
- Option 9: specific surface roughness (see 8.4.5);
- Option 11: non-destructive testing of the weld seam for the detection of longitudinal imperfections (see 8.4.8);
- Option 19: reduced wall thickness tolerance (see 8.5.3);
- Option 20: unilateral wall thickness tolerance (see 8.5.3);
- Option 21: another specified length and/or tolerance (see 8.5.5);
- Option 22: reduced maximum deviation from straightness (see 8.5.6);
- Option 23: specified end finishing (see 8.5.10);

**EN 10305-5:2016 (E)**

- Option 26: test unit with tubes from one cast only (see 10.1.1);
- Option 28: alternative marking (see Clause 12);
- Option 29: delivery without corrosion protection (see Clause 13);
- Option 30: specified corrosion protection (see Clause 13);
- Option 38: unbundled tubes or specific method of packaging (see Clause 13).

**6.3 Example of an order**

12 000 m tube, size H = 50 mm × B = 30 mm with a wall thickness of T = 3 mm in accordance with EN 10305-5, made of steel grade E235 in the normalized condition with strip surface condition S2, pickled, to be delivered in standard lengths of 6 m with a 3.1 inspection certificate in accordance with EN 10204:

12 000 m tubes – H 50 × B 30 × T 3 – EN 10305-5 – E235+N – S2 – standard length – inspection certificate 3.1

**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 strip by electric welding. The tubes shall not contain strip end welds.

Possible surface conditions are:

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

The surface conditions S1 and S3 apply for the strip. The surface condition S2 and S4 can 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 one of the delivery conditions given in Table 1, except +CR2. Tubes made of the grades E190, E220, E260, E320, E370, E420, E460, E500, E550, E600 and E700 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 ISO 11484 or, at least, an equivalent to it.

It is recommended that the level 3 personnel be certified in accordance with EN ISO 9712, or, at least, an equivalent to it.

The operation 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 ISO 9712 and ISO 11484.

**Table 1 — Delivery conditions**

Designation	Symbol <sup>a</sup>	Description
Welded and cold sized	+CR1	Normally not heat treated, but suitable for final annealing. <sup>b</sup>
	+CR2	Not intended for heat treatment after the welding and sizing process. <sup>c</sup>
Soft annealed	+A	After welding and sizing the tubes are annealed in a controlled atmosphere.
Normalized	+N	After welding and sizing the tubes are normalized in a controlled atmosphere.
<p><sup>a</sup> In accordance with EN 10027-1.</p> <p><sup>b</sup> After annealing or normalizing, the resulting mechanical properties meet the requirements specified in Table 4 for the delivery condition +A or +N, respectively are normally obtained.</p> <p><sup>c</sup> 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 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. A steel grade not specified in this document may be specified (see option 1).

NOTE When subsequently welding tubes produced in accordance with this document, it is important to take account 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.

**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.

Where the steel grade specified is a strip grade, the mechanical properties of the tube can be considerably different to those of the strip. Accordingly, in such cases, mechanical properties for the tube should be agreed between the manufacturer and customer at the time of enquiry and order.