



SLOVENSKI STANDARD

SIST EN 10305-4:2011

01-november-2011

Nadomešča:
SIST EN 10305-4:2003

Jeklene cevi za precizno uporabo - Tehnični dobavni pogoji - 4. del: Hladnovlečene nevarjene cevi za hidravlične in pnevmatične tlačne vode

Steel tubes for precision applications - Technical delivery conditions - Part 4: Seamless cold drawn tubes for hydraulic and pneumatic power systems

Präzisionsstahlrohre - Technische Lieferbedingungen - Teil 4: Nahtlose kaltgezogene Rohre für Hydraulik- und Pneumatik-Druckleitungen

Tubes de précision en acier - Conditions techniques de livraison - Partie 4 : Tubes sans soudure étirés à froid pour circuits hydrauliques et pneumatiques

Ta slovenski standard je istoveten z: EN 10305-4:2011

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 10305-4

January 2011

ICS 77.140.75

Supersedes EN 10305-4:2003

English Version

Steel tubes for precision applications - Technical delivery conditions - Part 4: Seamless cold drawn tubes for hydraulic and pneumatic power systems

Tubes de précision en acier - Conditions techniques de livraison - Partie 4: Tubes sans soudure étirés à froid pour circuits hydrauliques et pneumatiques

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This European Standard was approved by CEN on 11 December 2010.

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

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EN 10305-4:2011 (E)**Foreword**

This document (EN 10305-4:2011) 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of an identical text or by endorsement, at the latest by July 2011, and conflicting national standards shall be withdrawn at the latest by July 2011.

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 10305-4:2003.

Annex A provides details of significant technical changes between this European Standard and the previous edition.

This document 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 97/23/EC.

For relationship with EU Directive 97/23/EC, see informative Annex ZA, which is an integral part of this document.

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

- SIST EN 10305-4:2011
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- *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 United Kingdom.

1 Scope

This European Standard specifies the technical delivery conditions for seamless cold drawn steel tubes of circular cross section used in hydraulic and pneumatic power systems with specified outside diameter $D \leq 80$ mm.

Tubes according to this document are characterised by having precisely defined tolerances on dimensions and a specified maximum surface roughness.

The allowed pressure rates and upper temperatures are the responsibility of the customer in accordance with the state of the art and in application of the safety coefficients specified in the applicable regulations, codes or standards. Concerning the lower temperature range applicability the impact energy requirements are given at 0° C.

NOTE Once this standard is published in the Official Journal of the European Union (OJEU) under Directive 97/23/EC, presumption of conformity to the Essential Safety Requirements (ESRs) of Directive 97/23/EC is limited to technical data of materials in this standard and does not presume adequacy of the material to a specific item of equipment. Consequently, the assessment of the technical data stated in this material standard against the design requirements of this specific item of equipment to verify that the ESRs of the Pressure Equipment Directive are satisfied, needs to be done.

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 10204:2004, *Metallic products — Types of inspection documents*

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)*

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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)*

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 10893-1:2011)*

EN ISO 10893-2:2011., *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 10893-2:2011)*

EN ISO 10893-3:2011, *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 10893-3:2011)*

EN ISO 10893-10:2011, *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 10893-10:2011)*

3 Terms and definitions

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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

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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

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

3.5**mother tube**

length of tube produced in the final cold drawing process

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 10020:2000, the steel grades given in Table 1 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 10305-4) 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 (outside diameter and inside diameter or other pair of dimensions) (see 8.5.1.1 and Table 4);
- d) steel designation (see 5.2);
- e) type of tube length (see 8.5.2);
- f) type of inspection certificate (see 9.1).

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 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) Surface condition for further processing (see 8.4.1);
- 2) Reduced internal roughness of $\leq 2 \mu\text{m}$ (see 8.4.2);
- 3) Measurement of surface roughness (see 8.4.3);
- 4) Non-destructive testing for the detection of longitudinal imperfections (see 8.4.6);
- 5) Lengths other than 6 m (see 8.5.2);

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- 6) Reduced maximum deviation from straightness (see 8.5.3);
- 7) Alternative marking (see Clause 12);
- 8) Protection by phosphatization (see 13.1);
- 9) Protection by galvanization and chromatization, type blue-white (see 13.1);
- 10) Protection by galvanization and chromatization, type yellow (see 13.1);
- 11) Protection by galvanization and chromatization, type olive green (see 13.1);
- 12) Protection by galvanization and chromatization, type Cr (VI) free) (see 13.1);
- 13) Protection of tube ends (see 13.1);
- 14) Unbundled tubes or specific method of packaging (see 13.2).

6.3 Example of an order

1 000 m tubes with an outside diameter of 20 mm and an inside diameter of 15 mm in accordance with this document, made of steel grade E235, delivered in standard lengths with non-specific inspection and protected by phosphatization:

1 000 m tubes - 20 x d 15 - EN 10305-4 - E235 - in standard lengths
test report 2.2 - option 8.

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7 Manufacturing process

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7.1 Steelmaking process

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The steel making 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 hot finished seamless hollows by cold drawing.

The tubes shall be delivered in the delivery condition +N which means that after the final cold drawing operation the tubes are normalized in a controlled atmosphere.

7.2.2 All non-destructive testing (NDT) activities shall be carried out by qualified and competent level 1, 2 and/or 3 personnel authorised 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 authorisation issued by the employer shall be in accordance with a written procedure. NDT operations shall be authorised 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.

8 Requirements

8.1 General

The tubes, when 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 1.

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 and the delivery conditions, but also on the conditions of preparing for and carrying out the welding.

Table 1 — Chemical composition (cast analysis)^a

Steel grade		% by mass					
Steel name	Steel number	C max.	Si max.	Mn max.	P max.	S max.	Al _{tot} ^b min.
E215	1.0212	0,10	0,05	0,70	0,025	0,015	0,025
E235	1.0308	0,17	0,35	1,20	0,025	0,015	0,015
E355	1.0580	0,22	0,55	1,60	0,025	0,015	0,020
<p>^a Elements not included in this table (but see footnote b) 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.</p> <p>^b 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.</p>							

Table 2 specifies the permissible deviations of product analysis from the specified limits on cast analysis given in Table 1.