SLOVENSKI STANDARD
oSIST prEN 10305-3:2022

01-maj-2022

Jeklene cevi za precizno uporabo - Tehnični dobavni pogoji - 3. del: Varjene hladno oblikovane cevi

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

Präzisionsstahlrohre - Technische Lieferbedingungen - Teil 3: Geschweißte maßgewalzte Rohre

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

Ta slovenski standard je istoveten z: prEN 10305-3

ICS:

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

oSIST prEN 10305-3:2022 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 10305-3

March 2022

ICS 77.140.75

Will supersede EN 10305-3:2016, EN 10305-5:2016

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 à froid

Präzisionsstahlrohre - Technische Lieferbedingungen - Teil 3: Geschweißte maßgewalzte Rohre

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 459/SC 10.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (prEN 10305-3:2022) has been prepared by Technical Committee CEN/TC 459/SC 10 “Steel tubes and iron and steel fittings”, the secretariat of which is held by UNI.

This document is currently submitted to CEN Enquiry

This document will supersede EN 10305-3:2016 and EN 10305-5:2016.

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

a) Parts 3 and 5 have been merged so as to cover welded cold sized tubes of all shapes;

b) The dimensions, thickness ranges and tolerances have been aligned;

c) Additional steel grades have been added;

d) Editorial updates.

The European Organization for Standardization (CEN) draws attention to the fact that it is claimed that compliance with this document may involve the use of patents applied to two new steel grades described in the informative Annex B of this standard.

CEN takes no position concerning the evidence, validity and scope of these patent rights.

The holder of these patent rights has ensured CEN that they are willing to negotiate licenses, under reasonable and non-discriminatory terms and conditions, with applicants throughout the world. In this respect, the statements of the holders of these patent rights are registered with CEN.

Information may be obtained from:

Grade HXT800NT and HXT1000NT

Tata Steel Nederland Tubes B.V.

4903RH Oosterhout, the Netherlands

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: -*

— *Part 6: Welded cold drawn tubes for hydraulic and pneumatic power systems*

1 Scope

This document specifies the technical delivery conditions for welded cold sized steel tubes of circular cross section with specified outside diameter D ≤ 193,7 mm and of square and of rectangular cross section for precision applications.

This document may also be applied to welded cold sized tube with other cross section shapes.

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 documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 10027-1:2016, *Designation systems for steels - Part 1: Steel names*

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

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 4885:2018, *Ferrous materials - Heat treatments - Vocabulary (ISO 4885:2018)*

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

EN ISO 8492, *Metallic materials - Tube - Flattening test (ISO 8492)*

EN ISO 8493, *Metallic materials - Tube - Drift-expanding test (ISO 8493)*

EN ISO 9712:2012, *Non-destructive testing - Qualification and certification of NDT personnel (ISO 9712:2012)*

CEN/TR 10261, *Iron and steel - European standards for the determination of chemical composition*

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 leaktightness (ISO 10893-1)*

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 10893-3, *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 transverse imperfections (ISO 10893-3)*

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 transverse imperfections (ISO 10893-10)*

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)*

EN ISO 14284, *Steel and iron - Sampling and preparation of samples for the determination of chemical composition (ISO 14284)*

EN ISO 14713-2:2020, *Zinc coatings - Guidelines and recommendations for the protection against corrosion of iron and steel in structures - Part 2: Hot dip galvanizing (ISO 14713-2:2019)*

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

ASNT-TC-1A, *Personnel Qualification and Certification in Non destructive Testing*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 10020:2000, EN 10021:2007, EN 10266:2003, EN ISO 4885: 2018 and the following apply.

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

Note 1 to entry: The employer may 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 through an intermediary, see EN 10021:2007, section 6.

3.3
imperfection
discontinuity in the wall or on the tube 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 subsequent operation (pickling, slitting, cold rolling or coating)

4 Symbols

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

5 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 grades E700, HXT450XT, HXT490XT, HXT590XT, HXT780XT, HXT980XT, HXT590CT, HXT780CT and HXT980CT, which are alloy quality steels.

5.2 Designation

For the tubes covered by this document the steel designation consists of the number of this document (EN 10305-3) plus either:

a) the steel name in accordance with EN 10027-1:2016, with the exceptions indicated below; or

b) the steel number in accordance with EN 10027-2.

In this standard three steel naming conventions are used:

Ennn	E - engineering steel
	nnn - specified minimum yield strength in MPa for the smallest thickness range
HXTnnnXT	H – tubes of high strength steel for cold forming
	XTnnn – product where the rolling condition is not specified followed by specified minimum tensile strength in MPa
	X – dual phase
	T – tubular product
HXTnnnCT	H – tubes of high strength steel for cold forming
	XTnnn – product where the rolling condition is not specified followed by specified minimum tensile strength in MPa
	C – complex phase
	T – tubular product

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 tubes);

b) the term “Cold sized steel tube of circular shape, square shape, rectangular shape or other shape”;

c) the dimensions (see 8.5) and, if applicable, the tolerances (see 8.5.2.4 and 8.5.3);

d) the tube length and tolerance (see 8.5.4);

e) the steel designation (see 5.2);

f) the delivery condition and surface condition (see 7.2.2 and 7.2.3);

g) type of inspection document (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 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 on square and rectangular tubes (see 8.4.2), and tubes of other shapes (see 8.5.3);
- Option 6: removal of internal weld bead or restriction of bead height (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 12: non-destructive testing of circular tubes for the detection of longitudinal imperfections (see 8.4.8;)
- Option 13: non-destructive testing of circular tubes for verification of leak-tightness (see 8.4.8);
- Option 14: specification of a procedure to test transverse strip welds in coiled tubing for the detection of imperfections (see 8.4.9);
- Option 15: specification of a cross section other than circular, square or rectangular, including tolerances (see 8.5.3);

- Option 16: reduced diameter tolerances for circular tubes (see 8.5.1.2) or reduced side length tolerances for square or rectangular tubes (see 8.5.2.4);
- Option 19: reduced wall thickness tolerance (see 8.5.1.3 or 8.5.2.5 or 8.5.3.2);
- Option 20: unilateral wall thickness tolerance (see 8.5.1.3 or 8.5.2.5 or 8.5.3.2);
- Option 21: another length and/or tolerance is specified (see 8.5.4);
- Option 22: reduced maximum deviation from straightness (see 8.5.5.1 or 8.5.5.2);
- Option 23: specified end finishing (see 8.5.6);
- Option 25: flattening or drift expanding test for circular tubes (see Table 10);
- Option 26: test unit with tubes from one cast only (see 10.1);
- Option 27: an alternative value for the flattening distance H is specified by the purchaser (see 11.3);
- Option 28: alternative marking (see section 12);
- Option 29: delivery without corrosion protection (see 13.1);
- Option 30: specified corrosion protection (see 13.1);
- Option 38: unbundled tubes or specific method of packaging (see 13.2);
- Option 39: a product analysis for the tubes shall be supplied (see 8.2);
- Option 40: alternative corner radius specified for square or rectangular tubes (see 8.5.2.6).

NOTE The numbering of the options is the same throughout the EN 10305 series. The options not listed in this standard are not relevant for the products covered.

6.3 Examples of orders

a) Circular tube

12 000 m tube with an outside diameter of D = 40 mm and a wall thickness of T = 1,5 mm in standard lengths of 6 m with tolerance of +50 mm - 0 mm in accordance with EN 10305-3, to be delivered made of steel grade E235 in the normalized condition, with surface condition S2, pickled, with a 3.1 inspection certificate in accordance with EN 10204:

12 000 m tubes – D 40 x T 1,5 – standard length - EN 10305-3 –E235+N – S2 - inspection certificate 3.1

b) Rectangular tube

12 000 m tube, size H = 50 mm × B = 30 mm with a wall thickness of *T* = 3 mm in standard lengths of 6 m with tolerance of +50 mm −0 mm in accordance with EN 10305-3, to be delivered made of steel grade E355 in the normalized condition with surface condition S2, pickled, with a 3.1 inspection certificate in accordance with EN 10204:

12 000 m tubes – H 50 × B 30 × T 3 – standard length - EN 10305-3 – E355+N – S2 - 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.

Steels shall be fully killed.

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

7.2 Tube manufacture, surface conditions and delivery conditions

7.2.1 The tubes shall be manufactured from strip by high frequency electric welding. The tubes shall not contain strip end welds, except for circular tubes to be supplied coiled for which the delivery conditions +A or +N shall be specified.

7.2.2 Possible surface conditions are:

a) S1 (black);

b) S2 (pickled);

c) S3 (cold rolled);

d) S4 (coated to an agreed condition).

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

7.2.3 Tubes made from steel grades E155, E195, E235, E275 and E355 shall be supplied in the delivery condition +CR1 or +A or +N (see Table 1 and Table 4). Tubes made from grades E190, E220, E260, E320, E370, E420, E460, E500, E550, E600, E700, HXT450XT, HXT490XT, HXT590XT, HXT780XT, HXT980XT, HXT590CT, HXT780CT and HXT980CT shall be supplied in the delivery condition +CR2 (see Table 1 and Table 5).

7.2.4 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 ASNT TC-1A or EN ISO 9712.

It is recommended that the level 3 personnel be certified in accordance with EN ISO 9712 or ASTN TC-1A.

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 the appropriate standards, e.g. EN ISO 9712 and ISO 11484.