

SLOVENSKI STANDARD

SIST EN 10216-3:2014

01-julij-2014

Nadomešča:

SIST EN 10216-3:2003

SIST EN 10216-3:2003/A1:2004

**Nevarjene jeklene cevi za tlačne posode - Tehnični dobavni pogoji - 3. del:
Legirane jeklene cevi z drobnozrnato mikrostrukturo**

Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 3:
Alloy fine grain steel tubes

iTeh STANDARD PREVIEW

Nahtlose Stahlrohre für Druckbeanspruchungen - Technische Lieferbedingungen - Teil 3:
Rohre aus legierten Feinkornbaustählen

SIST EN 10216-3:2014

https://standards.itih.ai/catalog/standards/sist/1165177-f79-4155-a8db-25242f0593ac/sist-en-10216-3-2014
Tubes sans soudure en acier pour service sous pression - Conditions techniques de
livraison - Partie 3 : Tubes en acier allié à grains fins

Ta slovenski standard je istoveten z: EN 10216-3:2013

ICS:

23.020.30	Tlačne posode, plinske jeklenke	Pressure vessels, gas cylinders
77.140.75	Jeklene cevi in cevni profili za posebne namene	Steel pipes and tubes for specific use

SIST EN 10216-3:2014

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 10216-3:2014](#)

<https://standards.iteh.ai/catalog/standards/sist/f1fc5177-fa79-4155-a8db-25242f0593ac/sist-en-10216-3-2014>

EUROPEAN STANDARD

EN 10216-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2013

ICS 23.040.10; 77.140.75

Supersedes EN 10216-3:2002

English Version

Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 3: Alloy fine grain steel tubes

Tubes sans soudure en acier pour service sous pression -
Conditions techniques de livraison - Partie 3 : Tubes en
acier allié à grain fin

Nahtlose Stahlrohre für Druckbeanspruchungen -
Technische Lieferbedingungen - Teil 3: Rohre aus legierten
Feinkornbaustählen

This European Standard was approved by CEN on 17 August 2013.

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.

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.

[SIST EN 10216-3:2014](https://standards.iteh.ai/catalog/standards/sist/flfc5177-fa79-4155-a8db-25242f0593ac/sist-en-10216-3-2014)

<https://standards.iteh.ai/catalog/standards/sist/flfc5177-fa79-4155-a8db-25242f0593ac/sist-en-10216-3-2014>



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

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

Contents	Page
Foreword	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	6
4 Symbols	6
5 Classification and designation	7
5.1 Classification	7
5.2 Designation	7
6 Information to be supplied by the purchaser	7
6.1 Mandatory information	7
6.2 Options	8
6.3 Examples of an order	8
7 Manufacturing process	9
7.1 Steelmaking process	9
7.2 Tube manufacture and delivery conditions	9
8 Requirements	10
8.1 General	10
8.2 Chemical composition	10
8.3 Mechanical properties	10
8.4 Appearance and internal soundness	18
8.5 Straightness	18
8.6 Preparation of ends	18
8.7 Dimensions, masses and tolerances	19
9 Inspection	23
9.1 Types of inspection	23
9.2 Inspection documents	24
9.3 Summary of inspection and verification testing	24
10 Sampling	26
10.1 Frequency of tests	26
10.2 Preparation of samples and test pieces	26
11 Verification test methods	27
11.1 Chemical analysis	27
11.2 Tensile test	28
11.3 Flattening test	28
11.4 Ring tensile test	28
11.5 Drift expanding test	29
11.6 Ring expanding test	29
11.7 Impact test	29
11.8 Leak tightness test	30
11.9 Dimensional inspection	30
11.10 Visual examination	31
11.11 Non-destructive testing	31
11.12 Material identification	31
11.13 Retests , sorting and reprocessing	31
12 Marking	31
12.1 Marking to be applied	31
12.2 Additional marking	32
13 Protection	32
Annex A (informative) Elevated temperature properties for steel grades P275NL1 and NL2	33
Annex B (informative) Technical changes from the previous edition	34
B.1 Introduction	34
B.2 Technical changes	34

Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 97/23/EC	35
Bibliography	36

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

[SIST EN 10216-3:2014](https://standards.iteh.ai/catalog/standards/sist/f1fc5177-fa79-4155-a8db-25242f0593ac/sist-en-10216-3-2014)

<https://standards.iteh.ai/catalog/standards/sist/f1fc5177-fa79-4155-a8db-25242f0593ac/sist-en-10216-3-2014>

EN 10216-3:2013 (E)

Foreword

This document (EN 10216-3:2013) has been prepared by Technical Committee ECISS/TC 110 "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 June 2014, and conflicting national standards shall be withdrawn at the latest by June 2014.

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 10216-3:2002.

For the list of the most significant technical changes that have been made in this new edition, see Annex B.

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(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This European Standard consists of the following parts, under the general title "*Seamless steel tubes for pressure purposes – Technical delivery conditions*":

- *Part 1 :Non-alloy and alloy steels tubes with specified room temperature properties;*
- *Part 2 :Non-alloy and alloy steel tubes with specified elevated temperature properties;*
- *Part 3: Alloy fine grain steel tubes (the present document);*
- *Part 4 :Non-alloy and alloy steel tubes with specified low temperature properties;*
- *Part 5 :Stainless steel tubes.*

Another European Standard series covering tubes for pressure purposes is:

EN 10217, *Welded steel tubes for pressure purposes – Technical delivery conditions.*

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 in two test categories for seamless tubes of circular cross section, made of weldable alloyed fine grained steel.

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 (ESR) 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 by the designer or manufacturer of the pressure equipment, taking also into account the subsequent manufacturing processes which may affect properties of the base materials.

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, *Definitions and classification of grades of steel*

EN 10021, *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, *Vocabulary of heat treatment terms for ferrous products*

EN 10168:2004, *Steel products - Inspection documents - List of information and description*

EN 10204:2004, *Metallic products - Types of inspection documents*

EN 10220, *Seamless and welded steel tubes - Dimensions and masses per unit length*

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

CEN/TR 10261, *Iron and steel - Review of available methods of chemical analysis*

EN ISO 148-1:2010, *Metallic materials - Charpy pendulum impact test - Part 1: Test method (ISO 148-1:2009)*

EN ISO 377:2013, *Steel and steel products - Location and preparation of samples and test pieces for mechanical testing (ISO 377:2013)*

EN ISO 643, *Steels - Micrographic determination of the apparent grain size (ISO 643)*

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

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

EN ISO 6892-2:2011, *Metallic materials - Tensile testing - Part 1: Method of test at elevated temperature (ISO 6892-2:2011)*

EN ISO 8492:2004, *Metallic materials - Tube - Flattening test (ISO 8492:1998)*

EN ISO 8493:2004, *Metallic materials - Tube - Drift expanding test (ISO 8493:1998)*

EN 10216-3:2013 (E)

EN ISO 8495:2004, *Metallic materials - Tube - Ring expanding test (ISO 8495:1998)*

EN ISO 8496:2004, *Metallic materials - Tube - Ring tensile test (ISO 8496:1998)*

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 (ISO 10893-1)*

EN ISO 10893-8, *Non-destructive testing of steel tubes - Part 8: Automated ultrasonic testing of seamless and welded steel tubes for the detection of laminar imperfections (ISO 10893-8)*

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 14284:2002, *Steel and iron - Sampling and preparation of samples for the determination of chemical composition (ISO 14284)*

ISO 11484:2009, *Steel products - Employer's qualification system for non-destructive testing (NDT) personnel*

3 Terms and definitions

ITh STANDARD PREVIEW

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

3.1 test category

SIST EN 10216-3:2014
<https://standards.iteh.ai/catalog/standards/sist/flfc5177-fa79-4155-a8db-25242f0593ac/sist-en-10216-3-2014>

classification that indicates the extent and level of inspection and testing

3.2 employer

organization for which a person works on a regular basis

Note 1 to entry: The employer may be either the tube manufacturer or supplier or a third party organization providing Non-Destructive Testing (NDT) services.

3.3 fine grain steel

steel having a ferritic grain size equal to or finer than 6 in accordance with EN ISO 643

4 Symbols

For the purpose of this document, the symbols given in EN 10266 and the following apply.

- d specified inside diameter
- d_{min} specified minimum inside diameter
- T_{min} specified minimum wall thickness
- D_c calculated outside diameter
- d_c calculated inside diameter

- T_c calculated wall thickness
- TC test category

5 Classification and designation

5.1 Classification

5.1.1 This Part of EN 10216 covers steel grades in four qualities (see Table 2 and Table 4):

- the basic quality (P ... N, Q);
- the elevated temperature quality (P ... NH, QH);
- the low temperature quality (P ... NL1, QL, QL1);
- the special low temperature quality (P ... NL2, QL2).

5.1.2 In accordance with the classification system in EN 10020, the steel grades P275NL1, P355N, P355NH and P355NL1 are classified as alloy quality steels and the other steel grades are classified as alloy special steels.

5.2 Designation

5.2.1 For the tubes covered by this Part of EN 10216 steel, the designation consists of:

- the number of this Part of EN 10216;

plus either

- the steel name in accordance with EN 10027-1;

or

- the steel number allocated in accordance with EN 10027-2.

5.2.2 The steel name is designated by:

- the capital letter P for pressure purposes;
- the indication of the specified minimum yield strength for the lowest applicable wall thickness group expressed in megapascals (Table 4);
- one of the additional symbols N, NH, NL1, NL2, Q, QH, QL, QL1 or QL2 (see 5.1.1, Table 2 and Table 4).

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 (outside diameter D and wall thickness T or a set of dimensions covered by option 10) (see Table 7);

EN 10216-3:2013 (E)

- d) the designation of the steel grade in accordance with this Part of EN 10216 (see 5.2);
- e) the test category, except for P620 and P690 (see 9.3).

6.2 Options

A number of options are specified in this Part of EN 10216 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) Cold finishing (see 7.2.2);
- 2) restriction on copper and tin content (see Table 2);
- 3) product analysis (see 8.2.2);
- 4) verification of elevated temperature properties of NH-grades (see 8.3.2);
- 5) verification of elevated temperature properties of NL- and QL-grades (see 8.3.2);
- 6) selection of method for verification of leak-tightness (see 8.4.2.1);
- 7) Non-Destructive Testing for test category 2 tubes for detection of transverse imperfections (see 8.4.2.2);
- 8) Non-Destructive Testing for test category 2 tubes for the detection of laminar imperfections (see 8.4.2.2);
- 9) special ends preparation (see 8.6);
- 10) set of dimensions other than D and T (see 8.7.1);
- 11) exact lengths (see 8.7.3);
- 12) the type of inspection certificate 3.2 other than the standard document (see 9.2.1);
- 13) additional verification of impact energy at a temperature different from the standard temperature (see Table 15);
- 14) test pressure for hydrostatic leak-tightness test (see 11.8.1);
- 15) wall thickness measurement away from the ends (see 11.9);
- 16) Non-Destructive Testing method (see 11.11.1);
- 17) additional marking (see 12.2);
- 18) protection (see Clause 13).

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 10216-3:2014

[https://standards.iteh.ai/catalog/standards/sist/flfc5177-fa79-4155-a8db-](https://standards.iteh.ai/catalog/standards/sist/flfc5177-fa79-4155-a8db-25242f0593ac/sist-en-10216-3-2014)

25242f0593ac/sist-en-10216-3-2014

6.3 Examples of an order

500 m of seamless tube with an outside diameter of 168,3 mm, a wall thickness of 4,5 mm in accordance with EN 10216-3, made of steel grade P355N, test category 1, with a 3.1 inspection certificate in accordance with EN 10204:

EXAMPLE 500 m – Tube – 168,3 x 4,5 – EN 10216-3 – P355N – TC1.

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 All 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 operating authorization issued by the employer shall be in accordance with a written procedure.

NDT operations shall be authorized by 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.

7.2.2 The tubes shall be manufactured by a seamless process.

Unless option 1 is specified, the tubes may be either hot or cold finished at the discretion of the manufacturer. The terms "hot finished" and "cold finished" apply to the condition of the tube before it is heat treated in accordance with 7.2.3.

Option 1: *The tubes shall be cold finished before heat treatment.*

7.2.3 The tubes shall be supplied in the relevant heat treatment conditions as specified in Table 1 and Table 4.

Table 1 — Forming operation and delivery condition

Forming operation	Heat treatment condition	Symbol for the delivery condition
Hot finished	Normalized ^{a b}	+N
	Quenched and tempered	+QT
Hot rolled + cold finished	Normalized ^b	+N
	Quenched and tempered	+QT
^a See 7.2.4. ^b See 7.2.5.		

7.2.4 In case of steel grade P355N and P355NH, normalizing may be replaced by normalizing forming.

7.2.5 For steel grade P460 it may be necessary to apply delayed cooling or additional tempering after normalizing. For N-steel grades, accelerated cooling after austenitising may be necessary in order to achieve the intended structure and material properties in case of wall thickness above 25 mm or T/D > 0,15.

EN 10216-3:2013 (E)

In both cases, the decision shall be left to the discretion of the manufacturer but shall be stated to the customer at the time of enquiry and order. Steel tubes treated with accelerated cooling shall be designated by the steel name supplemented by the symbol "+QT".

8 Requirements**8.1 General**

When supplied in a delivery condition indicated in 7.2 and inspected in accordance with Clauses 9, 10 and 11, the tubes shall conform to with the requirements of this Part of EN 10216.

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

Tubes shall be suitable for hot and cold bending provided the bending is carried out in an appropriate manner.

When tubes are specified in the order by d , d_{\min} or T_{\min} the following formulae, with all terms in mm, shall apply for the calculation of outside diameter D_c , inside diameter d_c and wall thickness T_c , instead of D , d and T for the relevant requirements in 7.2.5, 8.4.1.4, 10.2.2.2, 11.3, 11.8.1, 11.9, 11.11.4, 12.1 and Table 1, footnote c, Tables 4, 5, 6, 7, 10, 12, 15 and 16:

$$D_c = d + 2T \quad (1)$$

$$D_c = d_{\min} + \frac{\text{tolerance} \cdot \text{of} \cdot d_{\min}}{2} + 2T \quad (2)$$

$$d_c = d_{\min} + \frac{\text{tolerance} \cdot \text{of} \cdot d_{\min}}{2} \quad (3)$$

$$T_c = T_{\min} + \frac{\text{tolerance} \cdot \text{of} \cdot T_{\min}}{2} \quad (4)$$

For tolerances, see Tables 10, 11 and 12.

8.2 Chemical composition**8.2.1 Cast analysis**

The cast analysis reported by the steel producer shall apply and conform to the requirements of Table 2.

When welding tubes produced in accordance with this Part of EN 10216, account should be taken of the fact that the behaviour of the steel during and after welding is dependent not only on the steel, but also on the applied heat treatment and the conditions of preparing for and carrying out the welding.

8.2.2 Product analysis

Option 3: *A product analysis for the tubes shall be supplied.*

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

8.3 Mechanical properties

8.3.1 The mechanical properties of the tubes shall conform to the requirements in Tables 4, 5, 6, 7, Annex A, and in 11.3, 11.4, 11.5, 11.6 and 11.7.