SLOVENSKI STANDARD
SIST EN 10217-1:2003

01-april-2003

Varjene jeklene cevi za tlačne posode - Tehnični dobavni pogoji - 1. del: Nelegirane jeklene cevi s specificiranimi lastnostmi za delo pri sobni temperaturi

Welded steel tubes for pressure purposes - Technical delivery conditions - Part 1: Non-alloy steel tubes with specified room temperature properties

Geschweißte Stahlrohre für Druckbeanspruchungen - Technische Lieferbedingungen - Teil 1: Rohre aus unlegierten Stählen mit festgelegten Eigenschaften bei Raumtemperatur

Tubes soudés en acier pour service sous pression - Conditions techniques de livraison - Partie 1: Tubes en acier non allié avec caractéristiques spécifiées a température ambiante

Ta slovenski standard je istoveten z: **EN 10217-1:2002**

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 10217-1:2003 **en**

EUROPEAN STANDARD

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EN 10217-1

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English version

Welded steel tubes for pressure purposes - Technical delivery conditions - Part 1: Non-alloy steel tubes with specified room temperature properties

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This European Standard was approved by CEN on 25 April 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.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

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Contents

Foreword

This document (EN 10217-1:2002) 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 November 2002, and conflicting national standards shall be withdrawn at the latest by November 2002.

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.

Other parts of EN 10217 are:

Part 2: Electric welded non-alloy and alloy steel tubes with specified elevated temperature properties.

Part 3: Alloy fine grain steel tubes.

Part 4 : Electric welded non-alloy and alloy steel tubes with specified low temperature properties

Part 5: Submerged arc welded non-alloy and alloy steel tubes with specified elevated temperature properties.

Part 6: Submerged arc welded non-alloy steel tubes with specified low temperature properties.

Part 7: Stainless steel tubes.

Another European Standard series covering tubes for pressure purposes is:

EN 10216: Seamless steel tubes for pressure purposes.

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 10217 specifies the technical delivery conditions for two qualities TR1 and TR2 of welded tubes of circular cross section, made of non-alloy quality steel and with specified room temperature properties.

2 NORMATIVE REFERENCES

EN 10217 incorporates by date 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 date references, subsequent amendments to or revisions of, any of these publications apply to EN 10217 only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

The requirements of EN 10217 rule when they differ from those in the standards and documents referred to below:

EN 760, *Welding consumables - Fluxes for submerged arc welding – Classification*

EN 895, *Destructive tests on welds in metallic materials - Transverse tensile test*

EN 910, *Destructive tests on weld in metallic materials -Bend test*

EN 1321, *Destructive tests on welds in metallic materials - Macroscopic and microscopic examination of welds*

EN 10002-1, *Metallic materials - Tensile testing - Part 1 : Method of test (at ambient temperature)*

EN 10020, *Definitions and classification of grades of steel*

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

EN 10027-1, *Designation systems for steels - Part 1 : Steel names, principle symbols.*

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

EN 10045-1, *Metallic materials - Charpy impact test - Part 1 : Test method*

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

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

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

EN 10233, *Metallic materials - Tubes - Flattening test*

EN 10234, *Metallic materials - Tubes - 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 tubes for the detection of longitudinal imperfections*

EN 10246-9, *Non-Destructive Testing of steel tubes – Part 9: Automatic ultrasonic testing of the weld seam of submerged arc-welded steel tubes for the detection of longitudinal and/or transverse imperfections*

EN 10246-10, *Non-Destructive Testing of steel tubes – Part.10: Radiographic testing of the weld seam of automatic fusion arc-welded steel tubes for the detection of imperfections.*

EN 10256, *Non-Destructive Testing of steel tubes - Qualification and competence of level 1 and level 2 NDT personnel*

prEN 10266 [1)], *Steel tubes, fittings and structural hollow sections - Symbols and definition 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)*

prEN 10168 [1)], *Iron and steel products - Inspection documents - List of information and description*

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

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

CR 10260, *Designation systems for steel - Additional symbols*

CR 10261, *ECISS Information Circular IC 11 - Iron and steel - Review of available methods of chemical analysis.*

3 TERMS AND DEFINITIONS

For the purposes of this Part of EN 10217, the definitions given in EN 10020, EN 10021, EN 10052, prEN 10266 and the following apply.

3.1
employer
organisation for which a person works on a regular basis.

NOTE The employer may be either the tube manufacturer or a third party organisation providing Non-Destructive Testing (NDT) services.

3.2
qualification of welding procedure
testing and inspection of the welding procedure for submerged arc welded (SAW) tubes by the manufacturer in accordance with annex **A** .

3.3
approval of welding procedure
testing and inspection of the welding procedure for SAW tubes witnessed and approved in accordance with Annex **A** by an authorised body.

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1) 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.

4 SYMBOLS

For the purposes of this Part of EN 10217, the symbols given in prEN 10266 and the following apply:

— C1, C2 category conformity indicators (see clauses 7.3.1 and 7.3.3.)

— TC test category.

5 CLASSIFICATION AND DESIGNATION

5.1 Classification

In accordance with the classification system in EN 10020, the steel grades are classified as non-alloy quality steels.

5.2 Designation

5.2.1 For the tubes covered by this Part of EN 10217 the steel designation consists of:

a) the number of this Part of EN 10217;

plus either:

a) the steel name in accordance with EN 10027-1 and CR 10260;

or:

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

5.2.2 The steel name is designated by:

a) the capital letter P for pressure purposes;

b) the indication of the specified minimum yield strength for thickness less than or equal to 16 mm, expressed in MPa (see Table **4**);

plus either:

a) the alphanumeric TR1 for qualities without specified aluminium content, impact properties and specific inspection and testing requirements (see **9.1**);

or:

a) the alphanumeric TR2 for qualities with specified aluminium content, impact properties and specific inspection and testing requirements.

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) (see Table **5**).

d) the designation of the steel grade in accordance with this Part of EN 10217 (see **5.2**);

6.2 Options

A number of options are specified in this Part of EN 10217 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) Tube manufacturing process and/or route (see **7.3.2**).

2) Selection of the delivery condition (see **7.3.5**).

3) Restriction on copper and tin content (see **Table 2**).

4) Product analysis (see **8.2.2**).

5) Longitudinal impact testing at –10 C for quality TR2 (see **Table 4**).

6) Selection of leak-tightness test method (see **8.4.3.1**).

7) Special end preparation (see **8.6**).

8) Exact lengths (see **8.7.3**).

9) Specific inspection for quality TR1 (see **9.1**).

10) Type of inspection document other than the standard document (see **9.2.1**).

11) Tensile test on the weld for tubes with 219,1 < D ≤ 508 mm (see **Table 11**).

12) Test unit restriction for tubes with D ≤ 76,1 mm of quality TR2 (see **10.1.1**).

13) Wall thickness measurement away from the ends (see **11.9**).

14) Non-Destructive Testing method (see either **11.11.1** or **11.11.2**).

15) Additional marking (see **12.2**).

16) Protection (see **13**).

6.3 Example of an order

100 t of welded steel tube with an outside diameter of 168,3 mm, a wall thickness of 4,5 mm in accordance with EN 10217-1, made of steel grade P235TR2 with a 3.1.C inspection certificate in accordance with EN 10204:

100 t – Tube – 168,3 × 4,5 – EN 10217-1 – P235TR2 – Option 10: 3.1.C

7 MANUFACTURING PROCESS

7.1 Steelmaking process

The steelmaking process is at the discretion of the manufacturer.

7.2 Deoxidation process

Steels shall be fully killed.

7.3 Tube manufacture and delivery conditions

7.3.1 All 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.

For pressure equipment in categories III and IV (of Directive 97/23-EC) the personnel shall be approved by a recognised third-party organisation. Tubes not conforming to this requirement shall be marked “C 2”, unless a requirement to mark "C1" (see **7.3.3**)applies

7.3.2 The tubes shall be manufactured by the manufacturing processes and routes as specified in Table **1**.

Unless Option **1** is specified the manufacturing process and route is at the discretion of the manufacturer.

Option 1: *The manufacturing process and/or route is specified by the purchaser.*

The submerged arc weld of SAW tubes shall be made using at least one weld run on the inside and one weld run on the outside of the tube.

The strip used for the manufacture of the helically submerged arc welded (SAWH) tubes shall have a width of not less than 0.8 times or more than 3.0 times the outside diameter of the tube.

The finished tubes shall not include welds used for joining together lengths of the hot or cold rolled strip or plate prior to forming except that for helically welded.

For helically welded submerged arc welded (SAWH) tubes, when the weld joining lengths of strip are part of the delivered tube, they shall have the welding procedure qualified in accordance with annex A and the weld shall be subjected to the same inspection and testing as the helical weld.

7.3.3 Welding shall be carried out by suitably qualified personnel in accordance with suitable operating procedures.

For pressure equipment in categories II, III, and IV, (of Directive 97/23 EC) the operating procedures and the personnel shall be approved by a competent third-party. Tubes not conforming to this requirement shall be marked “C 1”.

7.3.4 The welding procedure for SAW tubes shall be qualified in accordance with Annex **A**.

7.3.5 The delivery conditions of tubes covered by this Part of EN 10217 are shown in Table **1**.

Unless Option 2 is specified at the time of enquiry and order the choice of the delivery condition is at the discretion of the manufacturer.

Option 2: *The delivery condition is chosen by the purchaser.*

Table 1 — Tube manufacturing process, route and delivery condition

Route N°	Manufacturing Process: Process	Manufacturing Process: Symbol	Manufacturing routes: Starting material	Manufacturing routes: Forming operation	Delivery Condition [a]	Applicable for quality: TR1	Applicable for quality: TR2
1a	Electric welded [b]	EW	As (hot) rolled strip	Cold formed (+ welded)	As welded	X	—
1b					NW	x	—
1c					NP	x	x
2a			Normalising rolled strip		As welded	x	—
2b					NW	x	x
2c					NP	x	x
3			As (hot) rolled or normalising rolled strip	Cold formed (+ welded) + hot stretch reduced at a controlled temperature to give a normalised condition	NR	x	x
4			Cold rolled + stress relieved	Cold formed (+ welded)	NP	x	x
11a	Submerged arc- welded - Longitudinal seam or - helical seam	SAW: -SAWL -SAWH	As (hot) rolled plate or strip	Cold formed (+ welded)	As welded	x	—
11b					NW	x	—
11c					NP	x	x
12a			Normalising rolled plate or strip	Cold formed (+ welded)	As welded	x	x
12b					NW	x	x
12c					NP	x	x
13a			As in lines 11 or 12	Normalising-formed (+ welded)	As welded	x	x
13b					NW	x	x
13c					NP	x	x
21	Continuous welded, only for steel grades P195 and P235 with D ≤ 114,3 mm	BW	As (hot) rolled strip	Hot forming (+ welded)	As welded	x	—

[a] As welded = no heat treatment; NP = Full pipe normalised ; NW = Normalised weld zone; NR= Normalised rolled

[b] For tubes of quality TR2 , only high-frequency welding, minimum frequency 100 kHz, (symbol = HFW) is permitted.

8 Requirements

8.1 General

When supplied in a delivery condition indicated in **7.3** and inspected in accordance with clauses **9**, **10** and **11**, the tubes, shall conform to the requirements of this Part of EN 10217.

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

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.

NOTE When welding tubes produced in accordance with this Part of EN 10217, 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.

Table 2 — Chemical composition (cast analysis) [a], in % by mass

Steel grade		C	Si	Mn	P	S	Cr [b]	Mo [b]	Ni [b]	Al [tot]	Cu [b c]	Nb [b]	Ti [b]	V [b]	Cr+Cu+Mo+Ni [b]
Steel name	Steel number	max.	max.	max.	max.	max.	Max.	max.	max.	min.	max.	max.	max.	max.	max.
P195TR1	1.0107	0,13	0,35	0,70	0,025	0,020	0,30	0,08	0,30	-	0,30	0,010	0,04	0,02	0,70
P195TR2	1.0108	0,13	0,35	0,70	0,025	0,020	0,30	0,08	0,30	0,02 [d]	0,30	0,010	0,04	0,02	0,70
P235TR1	1.0254	0,16	0,35	1,20	0,025	0,020	0,30	0,08	0,30	-	0,30	0,010	0,04	0,02	0,70
p235TR2	1.0255	0,16	0,35	1,20	0,025	0,020	0,30	0,08	0,30	0,02 [d]	0,30	0,010	0,04	0,02	0,70
P265TR1	1.0258	0,20	0,40	1,40	0,025	0,020	0,30	0,08	0,30	-	0,30	0,010	0,04	0,02	0,70
P265TR2	1.0259	0,20	0,40	1,40	0,025	0,020	0,30	0,08	0,30	0,02 [d]	0,30	0,010	0,04	0,02	0,70

[b] Elements not included in this Table shall not be intentionally added to the steel without the agreement of the purchaser, except for elements which may be added for finishing the cast. All appropriate measures shall be taken to prevent the addition of undesirable elements from scrap or other materials used in the steel making process.

[b] The content of these elements need not be reported unless intentionally added to the cast.

[c] ***Option 3***: *In order to facilitate subsequent forming operation, an agreed maximum copper content lower than indicated and an agreed specified maximum tin content shall apply.*

[d] This requirement is not applicable provided the steel contains a sufficient amount of other nitrogen binding elements, which shall be reported.

8.2.2 Product analysis

Option 4: *Tubes of quality TR2 shall have a product analysis supplied; for tubes with outside diameter equal or less than 76,1 mm this option applies only in combination with* ***option 12****.*

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

Table 3 — Permissible deviations of the product analysis from specified limits on cast analysis given in Table 2

Element	Limiting value for the cast analysis in accordance with Table 2 % by mass	Permissible deviation of the product analysis % by mass
C	≤ 0,20	+ 0,02
Si	≤ 0,40	+ 0,05
Mn	≤ 1,40	+ 0,10
P	≤ 0,025	+ 0,005
S	≤ 0,020	+ 0,005
Al	≥ 0,020	− 0,005
Cr	≤ 0,30	+ 0,05
Cu	≤ 0,30	+ 0,05
Mo	≤ 0,08	+ 0,02
Nb	≤ 0,010	+ 0,005
Ni	≤ 0,30	+ 0,05
Ti	≤ 0,04	+ 0,01
V	≤ 0,02	+ 0,01

8.3 Mechanical properties

The mechanical properties of the tubes shall conform to the requirements of Table **4** and **11.4**, **11.5** and **11.6**.