

# Welded stainless steel tubes for the conveyance of water and other aqueous liquids — Technical delivery conditions

The European Standard EN 10312:2002, with the incorporation of amendment A1:2005, has the status of a British Standard

ICS 23.040.10

## National foreword

This British Standard is the official English language version of EN 10312:2002, including Amendment A1:2005. It supersedes BS 4127:1994 which is withdrawn.

The start and finish of text introduced or altered by CEN amendment is indicated in the text by tags  $\boxed{A1}$   $\langle A1 \rangle$ . Tags indicating changes to CEN text carry the number of the amendment. For example, text altered by CEN amendment A1 is indicated by  $\boxed{A1}$   $\langle A1 \rangle$ .

The CEN common modifications have been implemented at the appropriate places in the text and are indicated by common modification tags  $\boxed{C}$   $\langle C \rangle$ .

The UK participation in its preparation was entrusted to Technical Committee ISE/8, Steel pipes, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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English version

**Welded stainless steel tubes for the conveyance of water  
and other aqueous liquids - Technical  
delivery conditions**  
(includes amendment A1:2005)

Tubes soudés en acier inoxydable pour le transport des  
liquides aqueux, y compris l'eau destinée à la  
consommation humaine - Conditions techniques de  
livraison  
(inclut l'amendement A1:2005)

Geschweißte Rohre aus nichtrostenden Stählen für den  
Transport wässriger Flüssigkeiten einschließlich  
Trinkwasser - Technische Lieferbedingungen  
(enthält Änderung A1:2005)

This European Standard was approved by CEN on 16 October 2002; amendment A1:2005 was approved by CEN on 25 April 2005.

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.

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## Foreword

This document EN 10312:2002 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 June 2003, and conflicting national standards shall be withdrawn at the latest by September 2004.

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.

Another European Standard covering tubes for the conveyance of aqueous liquids including water for human consumption is:

EN 10224, *Non-alloy steel tubes and fittings for the conveyance of aqueous liquids including water for human consumption – Technical delivery conditions.*

Annexes A and B are informative.

This document includes a Bibliography.

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.

**A1** Another European Standard covering tubes for the conveyance of aqueous liquids is:

EN 10224, *Non-alloy steel tubes and fittings for the conveyance of water and other aqueous liquids – Technical delivery conditions.*

Compliance of a product with this document does not confer a presumption of fitness of the product for the transport of water intended for human consumption within the meaning of the Directive 89/106/EEC. However, until the operation of the envisaged European Acceptance Scheme for construction products in contact with water intended for human consumption and the revision of the present document, products complying with this document may be used for the transport of water intended for human consumption if they comply with the relevant national, regional or local regulatory provisions applicable in the place of use. **A1**

## Foreword to amendment A1

This document (EN 10312:2002/A1:2005) 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 Amendment to the European Standard EN 10312:2002 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2005, and conflicting national standards shall be withdrawn at the latest by December 2005.

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.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom

## Introduction

<sup>A1</sup> This European Standard applies to welded tubular products in stainless steels for use with all types of aqueous liquids. <sup>A1</sup> In respect of potential adverse effects on the quality of water intended for human consumption, caused by the product covered by this standard:

- a) this standard provides no information as to whether the product may be used without restriction in any of the member states of the EU or EFTA;
- b) it should be noted that, while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of this product remain in force.

The European Committee for Standardisation (CEN) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning steel grade 1.4362 given in Table A1.

CEN takes no position concerning the evidence, validity and scope of this patent right.

The holder of this permit has assured CEN that he/she is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with CEN. Information may be obtained from

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Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those indicated above. CEN is not responsible for identifying any such patent rights.

## 1 Scope

Ⓐ) This European Standard specifies the technical delivery conditions for light gauge welded stainless steel tubes, primarily for water applications, supplied in straight lengths and for use at ambient temperatures. This document does not cover applications where elevated temperature properties are required. The tube is suitable for use with compression fittings or press fittings and for adhesive bonding, silver brazing or inert gas welding of capillary fittings. The document is applicable to tubes in the size range from 6 mm to 267 mm outside diameter made of stainless (except martensitic and precipitation hardening) steel grades taken from EN 10088-2. Ⓐ)

## 2 Normative references

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

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

EN 10020:2000, *Definition and classification of grades of steel.*

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

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

EN 10088-1, *Stainless steels — Part 1: List of stainless steels.*

EN 10088-2, *Stainless steels — Part 2: Technical delivery conditions for sheet/plate and strip for general purposes.*

Ⓐ) EN 10168, *Iron and steel products — Inspection documents — List of information and description.* Ⓐ)

EN 10204, *Metallic products — Types of inspection documents.*

EN 10233, *Metallic materials — Tube — Flattening test.*

EN 10234, *Metallic materials — Tube — 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 10246-2, *Non-destructive testing of steel tubes - Part 2: Automatic eddy current testing of seamless and welded (except submerged arc-welded) austenitic and austenitic-ferritic 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 10246-8, *Non-destructive testing of steel tubes — Part 8: Automatic ultrasonic testing of the weld seam of electric welded steel tubes for the detection of longitudinal imperfections.*

EN 10266, *Steel tubes, fittings and structural hollow sections - Definitions and symbols 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 2566-2, *Steel - Conversion of elongation values - Part 2: Austenitic steels (ISO 2566-2:1984).*

EN ISO 3651-1, *Determination of resistance to intergranular corrosion of stainless steels - Part 1: Austenitic and ferritic-austenitic (duplex) stainless steels - Corrosion test in nitric acid medium by measurement of loss in mass (Huey test) (ISO 3651-1:1998).*

EN ISO 3651-2, *Determination of resistance to intergranular corrosion of stainless steels - Part 2: Ferritic, austenitic and ferritic-austenitic (duplex) stainless steels - Corrosion test in media containing sulfuric acid (ISO 3651-2:1998).*

### 3 Terms and definitions

For the purposes of this European Standard the terms and definitions given in EN 10020:2000, EN 10021, EN 10052, and EN 10266 apply.

### 4 Symbols

See prEN 10266.

### 5 Classification and designation

#### 5.1 Classification

The classification of the steels contained in this European Standard is given in EN 10088-1.

#### 5.2 Designation

For tubes covered by this European Standard, the steel designation consists of the number of this European Standard (EN 10312) and either the steel name in accordance with EN 10027-1 and CR 10260 or the steel number in accordance with EN 10027-2.

### 6 Information to be obtained by the manufacturer

#### 6.1 Mandatory information

The following information shall be obtained by the manufacturer at the time of enquiry and order.

- a) the quantity (total length or number);
- b) the term tube;
- c) the tube series and the dimensions (outside diameter, wall thickness) (see Tables 1 and 2 and annex B);
- d) the steel designation according to this European Standard (see 5.2);

## EN 10312:2002 (E)

e) the length (5 m or 6 m) (see 8.8.3).

### 6.2 Options

A number of options are specified in this European Standard 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.

- 1) annealed or solution annealed condition depending on grade (see 7.2);
- 2) intergranular corrosion test (see 8.4);
- 3) for use with capillary, compression or press fittings (see 8.5.1 and annex B);
- 4) lengths other than 5 m and 6 m (see 8.8.3);
- 5) removal of the internal weld bead (see 8.8.6);
- 6) specific inspection (see 9.1);
- 7) selection of leak tightness test method (see 11.4.1);
- 8) marking on a label (see clause 13);
- 9) end protection of the tubes or bundles of tubes (see clause 14).

### 6.3 Example of an order

EXAMPLE 1000 m of welded steel tube in accordance with EN 10312 series 1 with an external diameter of 76,1 mm, a wall thickness of 1,5 mm, in standard lengths of 6 m made of steel grade X5CrNi 18-10 and with marking on a label would have the following description:

1000 m tube — series1 76,1 × 1,5 — EN 10312 X5CrNi18-10 —6— option 8

## 7 Manufacturing process

### 7.1 Grades of steel for feedstock material

The grades of steel required shall be specified from EN 10088-2.

A list of preferred grades is given in annex A.

### 7.2 Tube manufacture and delivery conditions

Tube shall be manufactured from steel strip and longitudinally welded without the addition of filler material. Tubes shall not include welds used for joining lengths of strip.

Tube shall be supplied in the as-welded condition unless option 1 is specified.

Option 1: The tubes shall be supplied in the solution-annealed condition (austenitic or austenitic-ferritic steels) or the annealed condition (ferritic steels).

When tubes in the annealed condition are specified (see option 1), they shall meet a hardness requirement. The hardness test method, test load and values to be achieved shall be agreed at the time of enquiry and order.

## 8 Requirements

### 8.1 General

The tubes, when supplied in a delivery condition given in 7.2 and inspected in accordance with clause 9 shall conform to the requirements of this European Standard.

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

### 8.2 Chemical analysis

Chemical analysis shall be in accordance with EN 10088-2. The cast analysis reported by the steelmaker shall apply.

### 8.3 Mechanical properties

Mechanical properties shall be in accordance with EN 10088-2.

### 8.4 Corrosion resistance

In accordance with EN 10088-2 some steels have resistance to intergranular corrosion. When option 2 is specified, tubes shall be tested in accordance with 11.8.

Option 2: The tubes shall be subjected to an intergranular corrosion test (see 11.8).

### 8.5 Appearance and soundness

#### 8.5.1 Appearance

The tubes shall be smooth and have a bright surface, free from all external and internal surface defects that can be detected by visual examination.

NOTE The welding conditions should be controlled so that the heat discoloration in the welded area is kept to a minimum, to ensure corrosion resistance is not reduced.

Surface imperfections, which encroach on the specified minimum wall thickness, shall be considered defects and tubes containing these shall be deemed not to conform to this European Standard.

The tubes are intended for general use unless option 3 is specified, then the outside surface including the weld area and tube ends shall be suitable for the type of fitting specified.

Option 3: Tubes shall be suitable for use for capillary, compression or press fittings, purchaser to specify which type at the time of enquiry and order.

NOTE A surface roughness value can be agreed at the time of enquiry and order.

#### 8.5.2 Soundness

The tubes shall pass a leak tightness test in accordance with 11.4.2, 11.4.3 or 11.4.4. The full length of the weld seam shall be subjected to a non-destructive test in accordance with 11.5 for the detection of imperfections.

## 8.6 Straightness

The deviation from straightness of any tube length  $L$  shall not exceed  $0,0015 L$ . Deviations from straightness over any 1 m length shall not exceed 3 mm for series 1 tubes. For series 2 tubes deviations from straightness shall not exceed:

— 2 mm for  $12 \text{ mm} < D < 128 \text{ mm}$ .

and

— 2,5 mm for  $D \geq 128 \text{ mm}$

## 8.7 Preparation of ends

The tubes shall be delivered with square cut ends, free from harmful burrs.

## 8.8 Dimensions, masses and tolerances

### 8.8.1 General

This European Standard covers two series of outside diameters and related wall thicknesses as given in Tables 1 and 2.

NOTE For recommended uses see annex B.

### 8.8.2 Mass

For the mass per unit length the values given in EN 10088-2 shall be used as a basis for the density of the steel grade concerned.

NOTE Information on the calculation of mass per unit length can be found in EN 10220 and EN ISO 1127.

Table 1 — Dimensions of light gauge stainless steel tubes — Series 1

Dimensions in millimetres

Specified outside diameter <i>D</i>	Outside diameter		Specified wall thickness <i>T</i>
	maximum	minimum	
6	6,04	5,94	0,6
8	8,04	7,94	0,6
10	10,04	9,94	0,6
12	12,04	11,94	0,6
15	15,04	14,94	0,6
18	18,04	17,94	0,7
22	22,05	21,95	0,7
28	28,05	27,95	0,8
35	35,07	34,97	1,0
42	42,07	41,97	1,1
54	54,07	53,84	1,2
66,7	66,75	66,08	1,2
76,1	76,30	75,54	1,5
(103)	103,8	102,2	1,5
108	108,3	107,2	1,5
(128)	129,0	127,0	1,5
133	133,5	132,2	1,5
(153)	154,5	151,5	1,5
159	159,5	157,9	2,0

NOTE Non-preferred sizes of tube are shown in parentheses

Table 2 — Dimensions of light gauge stainless steel tubes — Series 2

Dimensions in millimetres

Specified outside diameter <i>D</i>	Tolerance on <i>D</i>	Specified wall thickness <i>T</i>	Tolerance on <i>T</i>
12,0	± 0,10	1,0	± 0,10
15,0	± 0,10	1,0	± 0,10
18,0	± 0,10	1,0	± 0,10
22,0	± 0,11	1,2	± 0,10
28,0	± 0,14	1,2	± 0,10
35,0	± 0,18	1,5	± 0,10
42,0	± 0,21	1,5	± 0,10
54,0	± 0,27	1,5	± 0,10
64,0	± 0,32	2,0	± 0,15
76,1	± 0,38	2,0	± 0,15
88,9	± 0,44	2,0	± 0,15
108,0	± 0,54	2,0	± 0,15
133,0	± 1,00	3,0	± 0,30
159,0	± 1,00	3,0	± 0,30
219,0	± 1,50	3,0	± 0,30
267,0	± 1,50	3,0	± 0,30

### 8.8.3 Length

The tube shall be supplied in standard lengths of 5 m or 6 m, the length to be specified at the time of enquiry and order, unless option 4 is specified.

Option 4: The tubes shall be supplied in lengths other than 5 m and 6 m, the length shall be agreed at the time of enquiry and order.

### 8.8.4 Tolerance on outside diameter

The tolerance on outside diameter shall be within the limits given in Tables 1 and 2. Out of roundness is included in the tolerance.

### 8.8.5 Tolerance on wall thickness

The tolerance on wall thickness shall be:

- $\pm 10\%$  for series 1 tubes;
- as given in Table 2 for series 2 tubes.

### 8.8.6 Height of the weld seam

The external weld seam shall be removed. The internal weld seam need not be removed unless option 5 is specified.

Option 5: The internal weld seam shall be removed.

### 8.8.7 Tolerance on length

The tolerance on standard lengths is  $\pm 20$  mm. For lengths other than standard lengths, tolerances shall be agreed at the time of enquiry and order.

## 8.9 Reaction to fire

The tube material is class A1<sup>2)</sup>.

## 9 Inspection

### 9.1 Type of inspection



Conformity to the requirements of the order shall be checked by non-specific inspection unless option 6 is specified.

Option 6: The tubes shall be subjected to specific inspection.

### 9.2 Inspection documents

For tubes supplied with non-specific inspection, a test report 2.2 in accordance with EN 10204 shall be issued. For tubes supplied with specific inspection, an inspection certificate 3.1.B in accordance with EN 10204 shall be issued.

### 9.3 Content of inspection document

The content of the inspection document shall be in accordance with  EN 10168  as given below.

The test report or the inspection certificate shall contain the following codes and information:

A	Commercial transactions and parties involved.
B	Description of products to which the inspection document applies.
C02	Directions of the test pieces for D = 267,0 mm.

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2) In accordance with Commission Decision 96/603/EEC of 4 October 1996 the material is class A1 and therefore does not require to be tested for reaction to fire.

C10-C13	Tensile tests if applicable.
C30-C39	Hardness test if applicable.
C60-C69	Other tests.
C71-C92	Chemical composition.
D01	Marking and identification, the surface appearance, the shape and dimensional properties.
D02-D99	Leak Tightness Test, NDT of the weld.
Z	Validation.

#### 9.4 Summary of inspection and testing

Inspection and testing shall be carried out in accordance with Table 3.

**Table 3 — Summary of inspection and testing**

Test/Inspection		Frequency of testing		Clause reference
		Non-specific inspection and testing	Specific inspection and testing	
Mandatory	Cast analysis	Steel manufacturers cast analysis	Steel manufacturers cast analysis	8.2
	Hardness test <sup>a</sup>	By agreement		7.2
	Tensile test <sup>b</sup>	Manufacturer's procedure	1/test unit	11.1
	Drift expanding test for D ≤ 150 mm	Manufacturer's procedure	1/test unit	11.2
	Flattening test	Manufacturer's procedure	1/test unit	11.3
	Leak tightness test	Individual	Individual	11.4
	Weld NDT	Individual	Individual	11.5
	Visual examination	See 11.6		
	Dimensional inspection	See 11.7		
Optional	Material identification	Individual	Individual	11.9
	Intergranular corrosion test	Not applicable	By agreement	11.8

<sup>a</sup> Only for ferritic steel tubes supplied annealed when option 1 is specified.

<sup>b</sup> Only for tubes supplied in accordance with Table 2.

## 10 Sampling

### 10.1 Frequency of tests

#### 10.1.1 Test unit

A test unit shall consist of not more than 400 tubes per steel grade and specified dimension.

#### 10.1.2 Number of sample tubes

One sample tube shall be taken from each test unit.

### 10.2 Preparation of samples and test pieces

Samples and test pieces shall be taken at the tube ends in accordance with the requirements of EN ISO 377.

The test piece for the tensile test shall be prepared in accordance with EN 10002-1 and shall either be a full tube section or a strip section taken from opposite the weld in the direction longitudinal to the axis of the tube.

The test pieces for the drift expanding test and the flattening test shall consist of a full tube section and shall be in accordance with EN 10233 for the flattening test and EN 10234 for the drift expanding test.

Test pieces for the intergranular corrosion test shall be in accordance with EN ISO 3651-1 or EN ISO 3651-2 (see 11.8).

## 11 Test methods

### 11.1 Tensile test

The test shall be carried out in accordance with EN 10002-1 and the following determined:

- the tensile strength ( $R_m$ );
- the 0,2 % proof strength ( $R_{p 0,2}$ ) and 1,0 % proof strength ( $R_{p 1,0}$ );
- the percentage elongation after fracture with a reference to a gauge length  $L_0$  of  $5,65 \sqrt{S_0}$ . If a non-proportional test piece is used, the percentage elongation value shall be converted to the value for a gauge length  $L_0 = 5,65 \sqrt{S_0}$  using the tables in EN ISO 2566-2.

### 11.2 Drift expanding test

The test shall be carried out in accordance with EN 10234.

For austenitic and austenitic-ferritic steels the tube section shall be expanded at one end using a conical tool having an included angle,  $\beta$  (see EN 10234) of  $60^\circ$  until the maximum outside diameter of the expanded end exceeds the original outside diameter by 25 %. For ferritic steels the test criteria shall be agreed at the time of enquiry and order.

### 11.3 Flattening test

The test shall be carried out in accordance with EN 10233.

For austenitic and austenitic-ferritic steels, the tube section shall be flattened at room temperature between the platens until the distance between the platens is  $5T$ . The weld shall be placed at  $90^\circ$  to the direction of flattening. For ferritic steels the test criteria shall be agreed at the time of enquiry and order.

## **11.4 Leak-tightness test**

### **11.4.1 General**

**[A<sub>1</sub>]** The manufacturer shall declare the leak tightness applied test method in accordance with either 11.4.2; 11.4.3; or 11.4.4. (See ZA.3) The choice of test method is at the discretion of the manufacturer, unless Option 7 is specified. **[A<sub>1</sub>]**

### **11.4.2 Eddy current test**

Depending on the type of steel, the test shall be carried out in accordance with one of the following standards:

- EN 10246-1 for ferromagnetic steels;
- EN 10246-2 for austenitic steels and ferritic-austenitic steels.

### **11.4.3 Hydrostatic test**

The hydrostatic test shall be carried out at a minimum gauge pressure of 50 bar<sup>3)</sup> for tubes up to and including 76,1 mm outside diameter, and of 30 bar<sup>3)</sup> for tubes greater than 76,1 mm outside diameter.

The tube shall withstand the test pressure without leakage or visible deformation.

NOTE The hydrostatic test is not a strength test.

### **11.4.4 Pneumatic test**

The tube shall be tested with air under water at a minimum pressure of 6 bar<sup>3)</sup>. No air bubbling shall occur.

## **11.5 Non-destructive test of weld seam**

Non-destructive testing of the weld seam shall be carried out in accordance with one of the standards given below for the detection of imperfections.

- EN 10246-3 to acceptance level E4(H);
- EN 10246-8 to acceptance level U4 (minimum notch depth shall be agreed at the time of enquiry and order).

## **11.6 Visual examination**

Tubes shall be visually examined and shall conform to 8.5.1.

## **11.7 Dimensional inspection**

The specified dimensions shall be verified.

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3) 1 bar =  $10^5$  N/m<sup>2</sup> =  $10^5$  Pa.

Wall thickness shall be measured at the tube end.

The tube diameter shall be measured at a distance of not less than 10 mm or more than  $3D$  from the end of the tube.

### **11.8 Intergranular corrosion test**

The test shall be carried out in accordance with EN ISO 3651-1 or EN ISO 3651-2, details to be agreed at the time of enquiry and order.

### **11.9 Material identification**

Each tube shall be tested to assure that the correct grade is being supplied.

## **12 Retests, sorting and reprocessing**

Retests, sorting and reprocessing shall be in accordance with EN 10021.

## **13 Marking**

Unless option 8 is specified, the information shall be marked indelibly on each tube at intervals of not more than 1 m.

Option 8: Marking shall be applied on a label attached to the bundle or the box of the tubes.

The marking shall include the following information:

- the manufacturer's name or trade mark;
- the number of this European Standard;
- the steel name or number;
- the dimensions;
- in case of specific inspection;
  - an identification number (e.g. order or item number) which permits the correlation of the product or delivery unit to the related document;
  - the mark of the inspection representative.

## **14 Packaging**

Carbon steel strapping shall not come into contact with the tubes. Tube ends need not be protected unless option 9 is specified for tubes to be used for water for human consumption.

Option 9: Tubes or bundles of tubes shall be supplied with protection at the ends.

## **A1** 15 Evaluation of conformity

### 15.1 General

The compliance of tubes with the requirements of this document and with the stated values (including classes) shall be demonstrated by:

- initial type testing;
- factory production control.

### 15.2 Initial type testing (ITT)

#### 15.2.1 General

ITT is the complete set of tests or other procedures described in the technical specification, determining the performance of samples of products representative of the steel tube designs. Initial type testing shall be performed to show conformity with this document on first use of this document for welded stainless steel tubes being put onto the market and:

- at the beginning of the production of a new or modified steel tube type or change to the raw material;
- at the beginning of a new or modified method of production.

In the case of type testing on welded stainless steel tubes for which initial type testing in accordance with this document was already performed, type testing may be reduced:

- if it has been established that the performance characteristics compared with the already tested steel tubes have not been affected or;
- if historical data is available (see 15.2.4).

The results of all type tests shall be recorded and stored for at least 5 years.

#### 15.2.2 Characteristics

All characteristics in Clause 8, for which the manufacturer is stating a value, shall be subject to ITT by tests and/or calculation and/or tabulated values in accordance with the relevant subclasses of Clause 8.

#### 15.2.3 Product families

For the purposes of testing (including FPC testing) welded stainless steel tubes may be grouped into families, where it is considered that the results for a characteristic from any one product is common to all tubes within that family.

#### 15.2.4 Use of historical data

Tests previously performed on the same steel tube type in accordance with the provisions of this document (same characteristic(s), test method, sampling procedure, system of attestation of conformity, etc.) may be taken into account.

#### 15.2.5 'Deemed to satisfy' provisions and use of reference tabulated data

In those cases where conformity with this document is based on 'deemed to satisfy' provisions or tabulated values, type testing shall be limited to the verification of whether the steel tube meets the requirements to use those values, classes or levels, unless better values, classes or levels are being claimed. **A1**

**A1** 15.2.6 Sampling

ITT shall be performed on samples of welded stainless steel tubes representative of the manufactured types in accordance with Table 4. The frequency of testing or assessment shall be in accordance with Clause 9.4.

**Table 16 Characteristics and compliance criteria for the initial type testing of welded stainless steel tubes.**

Characteristic	Requirement Clause	Assessment Method	Compliance Criteria
Yield Strength	8.3	11.1	Pass
Dimensional Tolerances	8.8 except for 8.8.3 and 8.8.6	11.7	Pass
Tightness: Liquid	8.5.2	11.4	Pass

**15.3 Factory production control (FPC)****15.3.1 General**

The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market conform to the stated performance characteristics. The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control feedstock and any other incoming materials or components, equipment, the production process and the product.

An FPC system conforming to the requirements of EN ISO 9001, and made specific to the requirements of this document, shall be considered to satisfy the above requirements.

The results of inspections, tests or assessments requiring action shall be recorded, as shall any action taken. The action to be taken when control values or criteria are not met shall be recorded and retained for the period specified in the manufacturer's FPC procedures.

**15.3.2 Equipment**

Testing — All weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

Manufacturing — All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer's written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

**15.3.3 Feedstock and components**

The specifications of all incoming feedstock and components shall be documented, as shall the inspection scheme for ensuring their conformity. **A1**

#### **A1** 15.3.4 Design process

The factory production control system shall document the various stages in the design of products; identify the checking procedure and those individuals responsible for all stages of design.

During the design process itself, a record shall be kept of all checks, their results, and any corrective actions taken. This record shall be sufficiently detailed and accurate to demonstrate that all stages of the design phase, and all checks, have been carried out satisfactorily.

#### **15.3.5 Product testing and evaluation**

The manufacturer shall establish procedures to ensure that the stated values of all declared performance characteristics are being maintained during regular production and record the results of these as part of the production control system. These records shall be retained for the period defined in the manufacturer's FPC procedures and shall include at least the following:

- identification of the product tested;
- dates of sampling;
- test methods used;
- test and inspection results;
- dates of the tests;
- identification of the responsible authority within the factory.

NOTE See also 15.2.3.

#### **15.3.6 Inspection**

Inspection of welded stainless steel tubes shall be in accordance with Clause 9.

#### **15.3.7 Non-conforming products**

The manufacturer shall have written procedures, which specify how non-conforming products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures. **A1**

## Annex A (informative)

### Preferred steel grades

Table A.1 lists preferred grades of steel, which can be used. The steels conform to EN 10088-2.

**Table A.1 – Steel grades**

Type of steel	Steel Grade	
	Steel Name	Steel Number
Ferritic	X3CrTi17	1.4510
	X3CrNb17	1.4511
	X2CrMoTi18-2	1.4521
Austenitic	X2CrNi18-9	1.4307
	X2CrNi19-11	1.4306
	X5CrNi18-10	1.4301
	X6CrNiTi18-10	1.4541
	X2CrNiMo17-12-2	1.4404
	X5CrNiMo17-12-2	1.4401
	X6CrNiMoTi17-12-2	1.4571
	X2CrNiMo17-12-3	1.4432
	X3CrNiMo17-13-3	1.4436
	X2CrNiMo18-14-3	1.4435
	X2CrNiMoN17-13-5	1.4439
	X1NiCrMoCu25-20-5	1.4539
	X1CrNiMoCuN20-18-7	1.4547
	X1NiCrMoCuN20-20-7	1.4529
	Austenitic – ferritic	X2CrNiN23-4
X2CrNiMoN22-5-3		1.4462
<sup>a</sup> Patented grade.		

## Annex B (informative)

### Recommended use of tubes

The recommended use of tubes, manufactured in accordance with this European Standard, with fittings, is given in Table B.1.

**Table B.1 – Recommended use of tubes with fittings**

Fitting	Series 1	Series 2
Capillary	Yes <sup>a</sup>	No
Compression	Yes <sup>b</sup>	Yes
Press	Yes <sup>b</sup>	Yes
NOTE Diameters and wall thickness should be in accordance with Tables 1 and 2.		
<sup>a</sup> Tubes for use with capillary fittings supplied with outside diameter $D$ in accordance with series 1 may have their wall thickness in accordance with series 2.		
<sup>b</sup> Care needs to be taken to avoid damaging the tube.		

## Annex ZA (informative)

### Clauses of this European Standard addressing the provisions of the EU Construction Products Directive

#### ZA.1 Scope and relevant characteristics

This European Standard has been prepared under a mandate M131 (Pipes, Tanks and Ancillaries not in contact with water intended for human consumption) given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard shown in this annex meet the requirements of the mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the construction products covered by this annex for their intended uses indicated herein; reference shall be made to the information accompanying the CE marking.

**WARNING:** Other requirements and other EU Directives, not affecting the fitness for intended use, may be applicable to the construction products falling within the scope of this standard.

NOTE 1 In addition to any specific clauses relating to dangerous substances contained in this standard, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

NOTE 2 An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (accessed through <http://europa.eu.int/comm/enterprise/construction/internal/dangsub/dangmain.htm>).

This annex has the same scope as Clause 1 of this standard with regard to the products covered. It establishes the conditions for the CE marking of tube or fittings intended for the use indicated below and shows the relevant clauses applicable (see Table ZA.1).

Construction Product: Welded stainless steel tube

Intended uses: In installations for the transport/disposal/storage of water not intended for human consumption.


The requirement on a certain characteristic is not applicable in those Member States where there are no regulatory requirements on that characteristic for the intended end use of the product. In this case, manufacturers placing their products on the market of these Member States are not obliged to determine nor declare the performance of their products with regard to this characteristic and the option "No performance determined" (NPD) in the information accompanying the CE marking (see ZA.3) may be used. 

Table ZA.1 – Relevant clauses

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Essential characteristics	Requirement clauses in this (or another) European Standard	Levels and/or classes	Notes
Reaction to fire	8.9	Ferrous products are Class A1	Class
<b>Yield strengt</b> (From EN10088-2)  (crushing strength, internal and external pressure strength, longitudinal bending strength, maximum load for admissible deformation)	8.3	-	MPa
Dimensional tolerances	8.8 except for 8.8.3 and 8.8.6 (The height of the internal and external weld bead is not a requirement of the mandate <sup>a</sup> )	-	Tolerance (<mm) + Pass
Tightness: Liquid	8.5.2	-	Test method + Pass
Durability	11.8	-	Pass
<sup>a</sup> When required, for the calculation of crushing strength, internal and external pressure strength, longitudinal bending strength, or the maximum load for admissible deformation, the weld bead is assumed to be flush with the surface of the tube.			

## ZA.2 Procedure(s) for the attestation of conformity of welded stainless steel tubes

### ZA.2.1 Systems of attestation of conformity

The system for the attestation of conformity of welded stainless steel tubes, indicated in Table ZA.1, in accordance with the Decision of the Commission 99/472/EC of 1999-07-17 as given in Annex III of the mandate for (Pipes, Tanks and Ancillaries not in contact with water intended for human consumption) is shown in Table ZA.2 for the indicated intended use and relevant class:

Table ZA.2 – Attestation of conformity systems

Product	Intended use	Level or class	Attestation of conformity system
Welded stainless steel tube	In installations for the transport/disposal/storage of water, not intended for human consumption.	-	4
System 4: See Directive 89/106/EEC (CPD) Annex III.2. (ii), Third possibility			

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**A1**) The attestation of conformity of the welded stainless steel tube in Table ZA.1 shall be according to the evaluation of conformity procedures indicated in Table ZA.3 resulting from the application of the clauses of this European Standard indicated therein.

**Table ZA.3 – Assignment of evaluation of conformity tasks for tube under system 4**

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks under the responsibility of the manufacturer	Factory production control (FPC)	Parameters related to all relevant characteristics of Table ZA.1	15.3
	Initial type testing	All characteristics of Table ZA.1	15.2

### ZA.2.2 Declaration of conformity

When compliance with this annex is achieved, the manufacturer or his agent established in the EEA, shall prepare and retain a declaration of conformity, which entitles the manufacturer to affix the CE marking. This declaration shall include:

- name and address of the manufacturer, or his authorised representative established in the EEA, and place of production;
- description of the product (welded stainless steel tube for use in installations for the transport/disposal/storage of water not intended for human consumption), and a copy of the information accompanying the CE marking; Annex ZA of this European Standard);
- provisions to which the product conforms (i.e. Annex ZA of this European Standard);
- this product is not intended for use in heating networks where elevated temperature properties are required;
- name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.

The above mentioned declaration and certificate shall be presented in the official language or languages of the Member State in which the product is to be used. **A1**

**ZA.3 CE Marking**


The manufacturer or his authorised representative established within the EEA is responsible for the affixing of the CE marking. The CE marking symbol shall be in accordance with Directive 93/68/EEC and shall be shown on the accompanying commercial documents. The following information and characteristics shall accompany the CE marking symbol (where relevant):

- name or identifying mark and registered address of the producer;
- last two digits of the year in which the marking is affixed;
- number of this European Standard [EN 10312];
- product name and description e.g. tube + description of area of use;
- specified proof strength;
- leak-tightness test method;
- dimensional tolerance;
- Reaction to fire i.e. Class A1;
- Durability (where relevant) i.e. resistance to intergranular corrosion – and test method used;
- "no performance determined" for characteristics where this is relevant;
- series number.

The NPD option may be used when and where the characteristic, for a given intended use, is not subject to regulatory requirements in the country of destination.

Figure ZA.1 gives an example of the information to be given on the commercial documents. 

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 01234	
AnyCo Ltd, P.O. Box 21, B – 1050  05	
<b>EN 10312</b>  Welded stainless steel tubes, Series 1, 76.1 x 1.5mm, grade X5CrNi18-10, for use in installations for the transport/disposal/storage of water not intended for human consumption or other aqueous products.  National regulations establish the suitability of this product if intended to be used in contact with water intended for human consumption.  This product is not suitable for use at elevated temperatures (e.g. in heating networks)	
<b>Yield strength (min)</b>	230 MPa
<b>Dimensional tolerances</b>	Passed
<b>Tightness: Liquid (hydrostatic test)</b>	Passed
<b>Reaction to fire:</b>	Class A1
<b>Durability:</b>	1.5 mm/yr (EN ISO 3651-1)

*CE conformity marking, consisting of the “CE”-symbol given in Directive 93/68/EEC.*

*Identification number of the certification body*

*Name or identifying mark and registered address of the producer*

*Last two digits of the year in which the marking was affixed*

*No. of European standard*

*Description of product*

*and*

*information on regulated characteristics*

**Figure ZA.1 – Example CE marking information**

In addition to any specific information relating to dangerous substances shown above, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE European legislation without national derogations need not be mentioned.

A1

## Bibliography

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

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

EN 10220, *Seamless and welded steel tubes - General tables of dimensions and masses per unit length.*

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

EN ISO 1127, *Stainless steel tubes — Dimensions, tolerances and conventional masses per unit length.*

EN ISO 9001, *Quality management systems - Requirements (ISO 9001:2000).*



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