БЪЛГАРСКИ ИНСТИТУТ ЗА СТАНДАРТИЗАЦИЯ

БЪЛГАРСКИ СТАНДАРТ

Надлъжнозаварени тръби от аустенитна, аустенитно-феритна и феритна корозионноустойчива стомана, предназначени за хранителната и химическата промишленост

БДС EN 10357

ICS: 23.040.10

Austenitic, austenitic-ferritic and ferritic longitudinally welded stainless steel tubes for the food and chemical industry

Austenitische, austenitisch-ferritische und ferritische längsnahtgeschweißte Rohre aus nichtrostendem Stahl für die Lebensmittel- und chemische Industrie

Tubes soudés longitudinalement en acier inoxydable austénitique, ferritique et austéno-ferritique pour l''industrie alimentaire et chimique

Европейският стандарт EN 10357:2013 има статут на български стандарт от 2014-06-17.

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

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Foreword

This document (EN 10357:2013) has been prepared by Technical Committee ECISS/TC 110 “Steel tubes, and iron and steel fittings”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2014, and conflicting national standards shall be withdrawn at the latest by June 2014.

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1 Scope

This European Standard specifies dimensions, tolerances, materials, internal and external surface characteristics, and marking of stainless steels longitudinally fusion welded tubes for the food and chemical industry.

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 10028-7:2007, *Flat products made of steels for pressure purposes - Part 7: Stainless steels*

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

EN 10217-7, *Welded steel tubes for pressure purposes - Technical delivery conditions - Part 7: Stainless steel tubes*

EN ISO 4288, *Geometrical product specifications (GPS) - Surface texture: Profile method - Rules and procedures for the assessment of surface texture (ISO 4288)*

3 Dimensions and tolerances

3.1 Dimensions and tolerances for tubes

Dimensions and tolerances for tubes are indicated in Table 1 and Table 2.

Table 1 — Preferred dimensions and tolerances (mm)

Series A	**External tube diameter**	**13,00**	**19,00**	**23,00**	**29,00**	**35,00**	**41,00**	**53,00**	**70,00**	**85,00**	**104,00**	**129,00**	**154,00**	**204,00**
	External diameter tolerances	±0,10	±0,10	±0,12	±0,15	±0,18	±0,21	±0,27	±0,35	±0,43	±0,78	±0,97	±1,16	±1,53
	Internal diameter (theoretical)	10,00	16,00	20,00	26,00	32,00	38,00	50,00	66,00	81,00	100,00	125,00	150,00	200,00
	Wall thickness	**1,50**	**1,50**	**1,50**	**1,50**	**1,50**	**1,50**	**1,50**	**2,00**	**2,00**	**2,00**	**2,00**	**2,00**	**2,00**
	Wall thickness tolerances	±0,15	±0,15	±0,15	±0,15	±0,15	±0,15	±0,15	±0,20	±0,20	±0,20	±0,20	±0,20	±0,20

Table 2 — Alternative dimensions and tolerances [a] (mm)

Series B	**External tube diameter**	**12,00**	**18,00**	**22,00**	**28,00**	**34,00**	**40,00**	**52,00**							
	External diameter tolerances	±0,10	±0,10	±0,12	±0,15	±0,18	±0,21	±0,27							
	Internal diameter (theoretical)	10,00	16,00	20,00	26,00	32,00	38,00	50,00							
	Wall thickness	**1,00**	**1,00**	**1,00**	**1,00**	**1,00**	**1,00**	**1,00**							
	Wall thickness tolerances	±0,10	±0,10	±0,10	±0,10	±0,10	±0,10	±0,10							
Series C	**External tube diameter**	**17,20**	**21,30**	**26,90**	**33,70**	**42,40**	**48,30**	**60,30**	**76,10**	**88,90**	**114,30**				
	External diameter tolerances	±0,10	±0,11	±0,14	±0,17	±0,21	±0,24	±0,30	±0,38	±0,44	±0,86				
	Internal diameter (theoretical)	14,00	18,10	23,70	29,70	38,40	44,30	56,30	72,10	84,90	110,30				
	Wall thickness	**1,60**	**1,60**	**1,60**	**2,00**	**2,00**	**2,00**	**2,00**	**2,00**	**2,00**	**2,00**				
	Wall thickness tolerances	±0,15	±0,15	±0,15	±0,20	±0,20	±0,20	±0,20	±0,20	±0,20	±0,20				
Series D	**External tube diameter**	**25,00**	**25,40**	**32,00**	**38,00**	**38,10**	**38,10**	**50,80**	**50,80**	**51,00**	**63,50**	**63,50**	**76,10**	**76,10**	**76,10**	**101,60**
	External diameter tolerances	±0,13	±0,13	±0,16	±0,19	±0,19	±0,19	±0,25	±0,25	±0,25	±0,32	±0,32	±0,38	±0,38	±0,38	±0,76
	Internal diameter (theoretical)	22,60	22,20	29,60	35,60	35,10	34,90	47,80	47,60	48,60	60,50	60,30	73,10	72,90	72,10	97,60
	Wall thickness	**1,20**	**1,60**	**1,20**	**1,20**	**1,50**	**1,60**	**1,50**	**1,60**	**1,20**	**1,50**	**1,60**	**1,50**	**1,60**	**2,00**	**2,00**
	Wall thickness tolerances	±0,12	±0,16	±0,12	±0,12	±0,15	±0,16	±0,15	±0,16	±0,12	±0,15	±0,16	±0,15	±0,16	±0,20	±0,20

[a] For dimensions different from the ones listed above the tolerances are:
EN ISO 1127-D4 for external diameter < 90 mm
EN ISO 1127-D3 for external diameter > 90 mm
In external diameter tolerances ovality is included
For wall thickness ± 10 %

3.2 Straightness

Straightness deviation for a given length shall be determined by the following formula:

0,0015 × length

and shall not exceed 2 mm/m.

4 Information to be supplied by the purchaser

4.1 Mandatory information

The following information shall be supplied by the purchaser at the time of enquiry and order:

a) the quantity (total weight or total metres or number of tubes);

b) the reference to this standard ;

c) the term “tube”;

d) manufacturing process symbol and surface characteristics (see Table 3);

e) the dimensions (outside diameter D and wall thickness T);

f) single unit length and related tolerance;

g) the designation of the steel grade according to EN 10217-7 except for ferritic grades;

h) the designation of the steel grade according to EN 10028-7 only for ferritic;

i) production and testing according to EN 10217-7 TC1 or TC2; for ferritic grades the reference values shall be agreed;

j) other options according to EN 10217-7.

4.2 Example of an order

1000 m of welded tube according to EN 10357, manufacturing process BC, external diameter = 40 mm, thickness = 1 mm, single unit length 6000 mm (0/+100) mm test category 1 according to EN 10217-7, grade 1.4404 and inspection certificate 3.1 according to EN 10204:

1000 m Tube EN 10357 — BC - 40 × 1 × 6000 (0/+100) mm - TC1 – EN 10217-7/1.4404 - 3.1

5 Materials

Materials used for tubes manufacturing according to this standard shall be:

- austenitics and austenitic-ferritics according to EN 10217-7;
- ferritics according to EN 10028-7.

6 Manufacturing process, requirements and surface characteristics

The tubes shall be manufactured from cold rolled plate, sheet or strip, longitudinally fusion welded, with or without the addition of filler metal.

Manufacturing process, requirements and surface characteristics are specified in Table 3

Table 3 — Manufacturing process, requirements and surface characteristics

Manufacturing process	Heat treatment	Surface characteristics and roughness			Symbol
		Internal surface	Internal weld bead	External surface and welding area	
From cold rolled material[a] Welded, welding bead rolled	Not heat treated	*Ra* < 0,80 µm pickled and passivated	*Ra* < 1,60 µm pickled and passivated	Pickled and passivated	**CC**
				Ground, *Ra* < 1,00 µm	**CD**
From cold rolled material[a] Welded, welding bead rolled	Heat treated	*Ra* < 0,80 µm pickled and passivated or bright annealed	*R*a < 1,60 µm pickled and passivated or bright annealed	Pickled and passivated or bright annealed	**BC**
				Ground, *Ra* < 1,00 µm	**BD**

[a] From cold rolled material according to EN 10028–7:2007, Table 6 finish 2B or 2R

Tubes that are not bright annealed and not heat treated shall be internally and externally pickled and passivated. After rinsing, residual acid or welding discolouration shall not be present. Further cleanliness requirements shall be agreed upon in the order.

The weld is to be worked down so that it is flush with the tube wall and then smoothed. There shall be no overlapping of the weld metal and parent metal. There shall also be no protrusions, root gaps (lack of full penetration), overlapping or misalignment of edges, open pores (porosity) or traces of rolling.

The *Ra* roughness values shall be measured longitudinally, while the roughness measurement transversally to the welded bead may be agreed at the time of the order.

For tubes in execution BC and BD in the inspection certificate shall be specified if the tube is bright annealed or heat treated and pickled and passivated.

Tubes ends are to be smooth and free of burrs

7 Testing and inspection documents

Tubes according to this standard shall be tested according to:

- EN 10217-7 for test category TC1 or TC2 for austenitic and austenitic-ferritic materials;
- EN 10028-7 for ferritic materials (for D > 219,1 mm, transversal weld tensile test is required. R_m shall be according to the base material requirements).

Intergranular corrosion testing shall be performed in accordance with EN 10217-7 for austenitic and austenitic-ferritic grades; for ferritic grades the test procedure shall be agreed.

Roughness measurements shall be performed inside the tube at least 5 mm from the end, in accordance with EN ISO 4288 on at least one test run for every 20 tubes per production batch. The measurements shall be recorded.

Measurements shall be performed both on the welded bead and on the base material. The inspection certificate shall report the conformity of the executed measurements.

In the case of CD and BD manufacturing process, additional outside roughness measurements shall be performed at least at 100 mm from the tube end with the same frequency as for the internal one.

The following inspection documents shall be issued:

— 3.1 according to EN 10204

8 Marking

Each tube shall be marked, by suitable and durable methods, with the following information:

— Manufacturer's name or trademark;

— EN 10357 TC1 or TC2 for test categories 1 or 2, respectively, as in EN 10217-7;

— Symbol of the execution process according to Table 3

— Steel grade

— Dimensions

— Heat number

— For TC 2 tubes, the identification number (e.g. order or item number), according to EN 10217-7, which permits the correlation of the product or delivery unit to the related document

— The mark of the inspection representative

Different kind of marking and additional labelling shall be agreed at the time of the order.

9 Packaging and transport

Tubes shall be delivered dry. Ground tubes in CD or BD execution process shall be protected by PE sleeves, unless differently agreed at the time of enquiry and order.

Packaging and transport shall be agreed at the time of the order.

Annex A
(informative)

Responsibility on selection of material

The responsibility for material selection shall remain with the designer/end user. It is not in the scope of this standard to give guidance for selecting the appropriate material for individual applications. Regulations for materials in contact with drinking water for human use, food and dairy applications apply which may vary across the European Union Member states. For guidance, the most commonly used materials are listed in Table A.1 below.

Table A.1 — Steel grades

Steel name	Material number
X5CrNi18–10	1.4301
X2CrNi18–9	1.4307
X2CrNiMo17–12–2	1.4404
X2CrNiMo17–12–3	1.4432
X2CrNiMo18–14–3	1.4435

Bibliography

EN ISO 1127, *Stainless steel tubes - Dimensions, tolerances and conventional masses per unit length (ISO 1127)*