



SLOVENSKI STANDARD
SIST EN 13445-5:2014/oprA2:2018
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Neogrevane (nekurjene) tlačne posode - 5. del: Pregled in preskušanje - Dopolnilo A2

Unfired pressure vessels - Part 5: Inspection and testing

Unbefeuerte Druckbehälter - Teil 5: Inspektion und Prüfung

Réipients sous pression non soumis à la flamme - Partie 5: Inspection et contrôle

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ICS:

23.020.32 Tlačne posode Pressure vessels

SIST EN 13445-5:2014/oprA2:2018 en,fr,de

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
EN 13445-5:2014
prA2

December 2017

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English Version

Unfired pressure vessels - Part 5: Inspection and testing

Réceptifs sous pression non soumis à la flamme -
Partie 5: Inspection et contrôle

Unbefeuerte Druckbehälter - Teil 5: Inspektion und
Prüfung

This draft amendment is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 54.

This draft amendment A2, if approved, will modify the European Standard EN 13445-5:2014. If this draft becomes an amendment, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for inclusion of this amendment into the relevant national standard without any alteration.

This draft amendment was established by CEN 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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Contents

	Page
European foreword.....	3
1 Modification to Clause 2.....	4
2 Modification to Clause 3.....	4
3 Modification to 6.5.2	4
4 Modification to 6.6.2.1	4
5 Modification to 6.6.2.3.1	4
6 Modification to 6.6.2.5.....	4
7 Modification of Table 6.6.2-1	4
8 Modification to 6.6.3.3	8
9 Modification to 6.6.6	8
10 Modifications to Clause 7.....	8
11 Addition of a new subclause 10.2.3.2.3	8
12 Modification to 10.2.3.3.7.....	9
13 Modification to 11.1	9
14 Modification to 11.4	9
15 Modification to 11.5	9
16 Modification to Annex C.....	9
17 Modification to Annex H	13

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European foreword

This document (EN 13445-5:2014/prA2:2017) has been prepared by Technical Committee CEN/TC 54 “Unfired pressure vessels”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

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, see informative Annex ZA, which is an integral part of EN 13445-5:2014.

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EN 13445-5:2014/prA2:2017 (E)**1 Modification to Clause 2**

Replace reference to EN ISO 17635:2010 with reference to EN ISO 17635:2016 and update the references to this standard throughout the whole document.

2 Modification to Clause 3

Delete definition 3.14 joint batch

3 Modification to 6.5.2

Replace the first sentence with the following:

“The vessel manufacturer shall verify that welding has been done only by welders and operators who have been approved under the requirements as specified in EN 13445-4:2010, 7.4.”

4 Modification to 6.6.2.1

Replace the second sentence with the following:

“This percentage value reflects the extent of non-destructive testing of the total length of the welded joint and takes into consideration the testing group and type of weld.”

5 Modification to 6.6.2.3.1

Replace the first item in the itemized list with the following:

“single run governing welds”;

6 Modification to 6.6.2.5

Replace Item 1) of Clause 6.6.2.5 a) with the following:

“1) non-destructive testing shall be performed at all intersections of longitudinal and circumferential butt joints with $e > 16$ mm. As a minimum, the extent of testing as determined in Table 6.6.2-1 has to be fulfilled. Where the inclusion of all intersections exceeds the percentage in Table 6.6.2-1 then this higher value will apply.

If $e \leq 16$ mm, then it is sufficient for pressure vessels of

- testing group 3b; or
- testing group 3a when made of materials from material group 8.2

to assess the butt joints randomly while testing the circumferential and longitudinal welds”;

Replace Item 2) of Clause 6.6.2.5 a) with the following:

“2) if necessary to attain the percentage required in Table 6.6.2-1, additional randomly selected locations on the butt welded joint or shall be subject to non-destructive testing”;

7 Modification of Table 6.6.2-1

Replace Table 6.6.2-1 with the following table:

Table 6.6.2-1 — Extent of non-destructive testing

TYPE OF WELD ^{a, p}		TESTING ^b	EXTENT FOR TESTING GROUP ^o						
			1a	1b	2a ⁱ	2b ⁱ	3a	3b	
			EXTENT FOR PARENT MATERIALS ^{l,m,n}						
			1 to 10	1.1, 1.2, 8.1	8.2, 9.1, 9.2, 9.3, 10	1.1, 1.2 8.1	8.2, 9.1, 9.2, 10	1.1, 1.2, 8.1	
Full penetration butt weld	1	Longitudinal joints	RT or UT MT or PT	100 % 10 %	100 % 10 % ^d	(100-10) % 10 %	(100-10) % 0	10 % 0	2 % 0
	2a	Circumferential joints on a shell, including circumferential joints between a shell and a non-hemispherical head	RT or UT MT or PT	25 % 10 %	10 % 10 % ^d	(25-10) % 10 %	(10-5) % 0	5 % 0	2 % 0
	2b	Circumferential joints on a shell, including circumferential joints between a shell and a non-hemispherical head, with backing strip ^k	RT or UT MT or PT	NP NP	NA 100 %	NP NP	NA 100 %	NP NP	NA 100 %
	2c	Circumferential joggle joint, including circumferential joints between a shell and a non-hemispherical head ^k	RT or UT MT or PT	NP NP	NA 100 %	NP NP	NA 100 %	NP NP	NA 100 %
	3a	Circumferential joints on a nozzle $d_i > 150$ mm or $e > 16$ mm	RT or UT MT or PT	25 % 10 %	10 % 10 % ^d	(25-10) % 10 %	(10-5) % 10 % ^d	0 % 10 %	0 % 10 % ^d
	3b	Circumferential joints on a nozzle $d_i > 150$ mm or $e > 16$ mm with backing strip ^k	RT or UT MT or PT	NP NP	NA 100 %	NP NP	NA 10 %	NA 100 %	NA 100 %
	4	Circumferential joints on a nozzle $d_i \leq 150$ mm and $e \leq 16$ mm	RT or UT MT or PT	0 % 25 %	0 % 10 %	0 % (25-10) %	0 % (10-5) %	0 % 0 %	0 % 0 %
	5	All welds in spheres, heads and hemispherical heads to shells	RT or UT MT or PT	100 % 10 %	100 % 10 % ^d	(100-10) % 10 %	(100-10) % 0	10 % 0	2 % 0
	6	Assembly of a conical shell with a cylindrical shell without a knuckle (large end of the cone) ^{q, r}	RT or UT MT or PT	100 % 100 %	25 % 100 %	(100-10) % 100 %	(25-10) % 100 %	10 % 10 %	2 % 10 % ^d
7	Assembly of a conical shell with a cylindrical shell without a knuckle (small end of the cone)	RT or UT MT or PT	100 % 10 %	25 % 10 % ^d	(100-10) % 10 %	(25-10) % 10 % ^d	10 % 10 %	2 % 10 % ^d	
Circumferential lapped joints ^k	8a	General application shell to head	RT or UT MT or PT	NP NP	NP NP	NP NP	NP NP	NP NP	NP NP
	8b	Bellows to shell $e \leq 8$ mm	RT or UT MT or PT	0 % 100 %	0 % 100 %	0 % 100 %	0 % 25 %	0 % 25 %	0 % 10 %

Table 6.6.2-1 (continued)

TYPE OF WELD a, p			TESTING b	EXTENT FOR TESTING GROUP °					
				1a	1b	2a i	2b i	3a	3b
				EXTENT FOR PARENT MATERIALS l,m,n					
				1 to 10	1.1, 1.2, 8.1	8.2, 9.1, 9.2, 9.3, 10	1.1, 1.2 8.1	8.2, 9.1, 9.2, 10	1.1, 1.2, 8.1
Assembly of a flat head or a tubesheet, with a cylindrical shell	9	With full penetration	RT or UT MT or PT	25 % 10 %	10 % 10 % d	(25 - 10) % 10 %	(10 - 5) % 10 % d	0 % 10 %	0 % 10 % d
	10	With partial penetration if $a > 16$ mm (a as defined in Figure 6.6.2-1) j	RT or UT MT or PT	NP NP	NA 100 %	NA 100 %	NA 100 %	NA 100 %	NA 10 %
Assembly of a flange or a collar with a shell	11	With partial penetration if $a \leq 16$ mm (a as defined in Figure 6.6.2-1) j	RT or UT MT or PT	NP NP	NA 100 %	NA 100 %	NA 100 %	NA 10 %	NA 10 %
	12	With full penetration	RT or UT u MT or PT	0 % 10 %	0 % 10 % d	0 % 10 %	0 % 10 % d	0 % 10 %	0 % 10 % d
Assembly of a flange or a collar with a nozzle	13	With partial penetration j	RT or UT MT or PT	NP NP	NA 10 %	NA 100 %	NA 10 %	NA 10 %	NA 10 %
	14	With full or partial penetration $d_i \leq 150$ mm and $e \leq 16$ mm j	RT or UT MT or PT	0 % 10 %	0 % 10 %	0 % 10 %	0 % 10 % d	0 % 10 %	0 % 0 %
Nozzle or branch e	15	With full penetration $d_i > 150$ mm and $e > 16$ mm	RT or UT MT or PT	10 % 10 %	10 % 10 % d	(25 - 10) % 10 %	(10 - 5) % 10 % d	0 % 10 %	0 % 10 % d
	16	With full penetration $d_i \leq 150$ mm or $e \leq 16$ mm.	RT or UT MT or PT	0 % 10 %	0 % 0 %	0 % (100-10) %	0 % 10 %	0 % 10 %	0 % 0 %
	17	with partial penetration for any d_i $a > 16$ mm (see Figure 6.6.2-2)	RT or UT MT or PTj	NA 10 %	NA 10 % d	NA (100-10) %	NA 10 % d	NA 10 %	NA 10 % d
	18	with partial penetration $d_i > 150$ mm. $a \leq 16$ mm.(see Figure 6.6.2-2)	RT or UT MT or PTj	NP NP	NP NP	NP NP	NP NP	0 10 %	0 0 %
	19	With partial penetration $d_i \leq 150$ mm. $a \leq 16$ mm.(see Figure 6.6.2-2)	RT or UT MT or PTj	0 % 10 %	0 % 10 %	0 % (100-10) %	0 % 10 %	0 % 10 %	0 % 0 %
	19i	With reinforcing plate	MT or PT	10 %	10 %	10 %	10 %	10 %	0 %
	19j	Weld joint in reinforcing plate s	RT or UT MT or PT	100 % 100 %	100 % 10 %	(100-10) % 10 % d	(100-10) % 10 %	25 % 0	10 % 0
Tube ends into tubesheet	20		MT or PT	t	t	100 %	100 %	t	t
Permanent attachments	21	With full penetration or partial penetration	MT or PT	10 %	10 % d	100 %	10 %	10 %	10 % d

Table 6.6.2-1 (continued)

TYPE OF WELD ^{a, p}		TESTING ^b	EXTENT FOR TESTING GROUP ^o					
			1a	1b	2a ⁱ	2b ⁱ	3a	3b
			EXTENT FOR PARENT MATERIALS ^{l, m, n}					
			1 to 10	1.1, 1.2, 8.1	8.2, 9.1, 9.2, 9.3, 10	1.1, 1.2 8.1	8.2, 9.1, 9.2, 10	1.1, 1.2, 8.1
Pressure retaining areas after removal of temporary attachments	22	MT or PT	100 %	100 %	100 %	100 %	100 %	100 %
Cladding by welding ^h	23	MT or PT	100 %	100 %	100 %	100 %	100 %	100 %
Repairs	24	RT or UT	100 %	100 %	100 %	100 %	100 %	100 %
		MT or PT	100 %	100 %	100 %	100 %	100 %	100 %

^a See Figure 6.6.2-3.

^b RT = Radiographic testing, UT = Ultrasonic testing, MT = Magnetic particle testing, PT = Penetrant testing

^c 2 % if $e \leq 35$ mm and same WPS as longitudinal, for steel groups 1.1 and 8.1

^d 10 % if $e > 35$ mm, 0 % if $e \leq 35$ mm

^e Percentage in the table refers to the total weld length of all nozzle attachments in one group of nozzles (see 6.6.2.5 b).

^f No RT or UT for weld throat thickness ≤ 16 mm

^g 10 % for steel groups 8.2, 9.1, 9.2, 9.3 and 10

^h Volumetric testing if risks of cracks due to parent material or heat treatment

ⁱ For explanation of the reduction in NDT in testing group 2, see 6.6.1.2.

^j In exceptional cases or where the design or load bearing on the joint is critical, it may be necessary to employ both techniques (i.e. RT and UT, MT and PT). See Table 6.6.3-1 for other circumstances for use of both techniques.

^k For limitations of application, see EN 13445-3:2014, 5.7.3.2.

^l The percentage of surface examination refers to the percentage of length of the welds both on the inside and the outside.

^m RT and UT are volumetric while MT and PT are surface testing. When referenced in this table both volumetric and surface are necessary to the extent shown.

ⁿ NA means "testing not applicable", NP means "type of joint not permitted" (see EN 13445-3:2014, Annex A)

^o In case of cyclic loading refer to G.2.

^p Annex A of EN 13445-3:2014 gives design limitations on welds.

^q Unless the design is such that the thickness at the weld exceeds $1,4 e_1$ (see 7.6.6 of EN 13445-3:2014). In which case, use NDT of line 2a.

^r For connections with a knuckle, line 2a applies.

^s The extent of testing is only applicable if the reinforcing plate is welded together while resting on the vessel.

^t Type and extent of testing are to be determined under the responsibility of manufacturer and customer.

^u RT or UT not possible for geometrical reasons.