



SLOVENSKI STANDARD
SIST EN 13445-8:2014/oprA2:2018
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Neogrevane (nekurjene) tlačne posode - 8. del: Dodatne zahteve za tlačne posode iz aluminija in aluminijevih zlitin - Dopolnilo A2

Unfired pressure vessels - Part 8: Additional requirements for pressure vessels of aluminium and aluminium alloys

Unbefeuerte Druckbehälter - Teil 8: Zusätzliche Anforderungen an Druckbehälter aus Aluminium und Aluminiumlegierungen

Réceptifs sous pression non soumis à la flamme - Partie 8 : Exigences complémentaires pour les réceptifs sous pression en aluminium et alliages d'aluminium

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ICS:

23.020.32	Tlačne posode	Pressure vessels
77.150.10	Aluminijski izdelki	Aluminium products

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Unfired pressure vessels - Part 8: Additional requirements for pressure vessels of aluminium and aluminium alloys

Réceptifs sous pression non soumis à la flamme -
Partie 8 : Exigences complémentaires pour les
réceptifs sous pression en aluminium et alliages
d'aluminium

Unbefeuerte Druckbehälter - Teil 8: Zusätzliche
Anforderungen an Druckbehälter aus Aluminium und
Aluminiumlegierungen

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 13445-8:2014. 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.

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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
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 13445-8:2014/prA2:2018) 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 standardization request given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of EU Directive 2014/68/EU.

For relationship with EU Directive 2014/68/EU, see informative Annex ZA, which is an integral part of EN 13445-8:2014.

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EN 13445-8:2014/prA2:2018 (E)**1 Modification in the whole document**

Replace all the references to "EN ISO 23277:2009" with "EN ISO 23277:2015".

2 Modifications to Clause 2, Normative references

Replace the whole reference to "EN 12392:2000" with the following one:

"EN 12392:2016, Aluminium and aluminium alloys — Wrought products and cast products — Special requirements for products intended for the production of pressure equipment".

Replace the whole reference to "EN 13445-2:2009" with the following one:

"EN 13445-2:2014, Unfired pressure vessels — Part 2: Materials".

Replace the whole reference to "EN 13445-3:2009" with the following one:

"EN 13445-3:2014, Unfired pressure vessels — Part 3: Design".

Replace the whole reference to "EN 13445-4:2009" with the following one:

"EN 13445-4:2014, Unfired pressure vessels — Part 4: Fabrication".

Replace the whole reference to "EN 13445-5:2009" with the following one:

"EN 13445-5:2014, Unfired pressure vessels — Part 5: Inspection and testing".

Replace the whole reference to "EN ISO 23277:2009" with the following one:

"EN ISO 23277:2015, Non-destructive testing of welds — Penetrant testing — Acceptance levels (ISO 23277:2015)".

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3 Modification to 5.3, Prevention of brittle fracture

Delete the NOTE.

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4 Modification to 5.5, Chemical composition

Replace this subclause with the following:

"The chemical composition shall be in accordance with the material specification.

It is recommended that the material to be used for welded components be produced from rolling or extrusion ingots with hydrogen level no greater than 0,2 ml per 100 g aluminium, measured on liquid metal during casting (see EN 12392:2016, 7.6, accompanying text to Table 2).

EN 12392:2016, 7.6 (accompanying text to Table 2) recommends a maximum lead content not exceeding 150 µg/g".

5 Modifications to 5.6, Material grouping system

Replace the heading with the following:

"

5.6 Materials and material grouping system

".

Replace the 2nd paragraph with the following, in which the references were updated:

"Any product form available in EN 12392:2016 for a material in Table 5.6-1 at an acceptable temper is acceptable for construction to this European Standard, as long as the requirements of 5.2 and 5.5 are fulfilled. Other materials not defined here may be used by agreement by the parties concerned (see EN 13445-2:2014, 4.1.4) if they meet the requirements of 5.2 and 5.5 and a particular material appraisal is produced (see EN 764-4:2014)."

In the title of Table 5.6-1 replace "EN 12392:2000" with "EN 12392:2016".

Insert before Table 5.6-1 itself the following sentence:

"Components that are fabricated, tested and inspected according to EN 13480-8:2017 can be used without any further testing and inspection. The joint efficiency of the component shall be considered in the pressure vessel design. For circumferential welds included in this component the extent of NDT shall not be less than required in Table 8.3-1."

6 Modifications to 6.2, Design temperature and properties

Replace references to EN 13445-2:2009 with reference to EN 13445-2:2014.

Replace the paragraph starting with "For materials of group 22.4 temperatures..." with the following:

"For materials of group 22.4 temperatures above 75 °C may result in grain boundary precipitation of Al₃-Mg₂. These materials may be used at temperatures above 75 °C up to 200 °C only for non-corrosive service."

In NOTE 2 replace the reference "EN 12392:2000" with "EN 12392:2016", and in the subsequent paragraph, replace the reference to "EN 12392:2000" with "EN 12392:2016".

Replace the penultimate paragraph with the following:

"For aluminium and aluminium alloys values of 0,2 % proof stress (or 1 % proof stress for material group 21-1 000 series aluminium) for temperatures above 20 °C shall be established by linear interpolation between two adjacent values in Annex A except that for alloys 5083 and 5086 the respective value at 50 °C may be used for 65 °C."

7 Modification to 6.3, Time-independent nominal design stress

In Table 6.3-2, replace the reference to "EN 12392:2000" with "EN 12392:2016".

8 Modification to 6.5, Fatigue design

Replace the complete existing text with the following:

"For pressure vessels other than testing group 4, fatigue design for over 500 equivalent cycles is covered in Annex B of this document. For the determination of 500 full equivalent pressure cycles see EN 13445-3:2014, 5.4.2."

9 Addition of a new Subclause 6.7, Openings with reinforcing pads

Add a new Subclause 6.7 and re-number the subsequent subclauses under Clause 6 accordingly:

"

6.7 Openings with reinforcing pads

Where an opening is fitted with a reinforcing plate with the presence of a nozzle, $d_{ib}/2r_{is}$ shall not exceed 0,8.

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For cases where a reinforcing pad contributes to the reinforcement (see EN 13445-3:2014, Figures 9.4-3, 9.4-4, and 9.4-10):

- reinforcing plates shall be fitted in close contact with the shell;
- the width of a reinforcing plate l_p' to be considered as contributing to reinforcement is given by:

$$l_p' = \min(l_{so}; l_p) \quad (6.7-1)$$

- the value of e_{np} shall not exceed the following:

$$e_{np} \leq 1.5 e_{ns} \quad (6.7-2)$$

- $e_{a,p}$ and l_p are dimensions of reinforcing pads used in equations for openings that may be reinforced also by reinforcing pads; if a reinforcing pad is not present then the values $e_{a,p}$ and l_p shall be set equal to zero. If the reinforcing pad is contributing to reinforcement then, for all cases:

$$A_{f_p} = l_p' \cdot e_p \quad (6.7-3)$$

10 Addition of a new Subclause 6.11, Limitations in testing groups

"

6.11 Limitations in testing groups

Limitations in testing groups as specified in EN 13445-3:2014, Annex A, Tables A-1 to A-9, shall be considered only if the weld detail covers governing welds (see EN 13445-3:2014, 5.6, for definition of governing welds)."

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11 Modification to 7.6, Qualification of welders and welding operators

Replace the content of the Subclause with the following, whilst deleting Footnote 1):

"The requirements in EN 13445-4:2014, 7.4, shall apply with the following modification: Replace reference to EN ISO 9606-1:2017 with EN ISO 9606-2:2004."

12 Modification to 7.8, Preheat

Add to List Entry 7.8 b) the following text:

"For wall thicknesses over 30 mm this temperature limit may be increased to 200 °C provided that the preheat temperature is qualified by the WPQR."

13 Modifications to 8.2.1, General

Replace the third paragraph with the following (in which the first indent was modified - a restriction to $PS \leq 20$ bar is technically not justified):

"Testing group 4 shall be applicable only for:

- $TS \leq 75$ °C;
- maximum number of full pressure cycles ≤ 500 ; and
- lower level of nominal design stress (according to EN 13445-3:2014)."

In Table 8.2-1, in the 1st column, in the 5th row, replace "Maximum thickness for which specific materials are permitted" with "Maximum thickness at the weld for which specific materials are permitted".

14 Modifications to 8.3, Determination of extent of non destructive testing

Add a new row in Table 8.3-1 (below line numbers 17/18/19, e.g. as 19a), with new boundary conditions ($D2 < 50$ mm, $D1 < 800$ mm, $b \leq 0,15$ mm) and NDT requirements as in 17/18/19:

— Prerequisite: only non-corrosive service;

— New Figure 8.3-1 to 19a: nozzle-to-shell connection for non-corrosive service, $D2 < 50$ mm, $D1 < 800$ mm, $b \leq 0,15$ mm:

"

Table 8.3-1 (concluded)

			Testing group	1	2	3	4
			Parent materials l m n	21, 22.1 to 22.4	21, 22.1 to 22.4 except 23.1	21, 22.1 to 22.4, and 23.1 °	21, 22.1 to 22.4 (except EN AW 5454)
Type of weld ^a			Testing ^b	Extent	Extent	Extent	Extent
Nozzle or branch ^e	15	With full penetration if $d_i > 200$ mm and $e > 25$ mm	RT or UT PT	25 % _g 0 _p	(100–10) % 0 _p	10 % 0 _p	0 0 _p
	16	With full penetration if $d_i \leq 200$ mm or $e \leq 25$ mm	RT or UT PT	NA 25 % _{g p}	NA (25–10) % _p	NA 10 % _{d p}	0 0 _p
	17, 18, 19	With partial penetration for any d_i and $a > 16$ mm	RT or UT PT	NA 25 % _{g p}	NA (25–10) % _p	NA 10 % _{d p}	0 0 _p
Nozzle or branch ^e Only non-corrosive service (see Figure 8.3-1)	19a	$D2 < 50$ mm, $D1 < 800$ mm, $b \leq 0,15$ mm	RT or UT PT ^j	NA 25 % _{g p}	NA (25–10) % _p	NA 10 % _{d p}	0 0 _p
Tube ends into tube sheet	20		PT or leak test ^q	100 %	100 %	10 %	0
Permanent attachments	21	With full penetration or partial penetration	RT or UT PT	0 25 % _p	0 25 % _p	0 25 % _p	0 0 _p
Pressure retaining areas after removal of temporary attachments	22		PT	100 %	100 %	100 %	0 _p
Cladding by welding ^h	23		PT	NA	NA	NA	NA
Repairs	24	RT or UT PT	NDT of repairs shall be 100 % of the area of repair by NDT methods as stated on the type of weld above.				
Finned tube to tube socket	25	$D1 < 50$ mm	RT or UT PT ^j	NA 25 % _{g p}	NA (25–10) % _p	NA 10 % _{d p}	0 0 _p

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connection							
a	See EN 13445-5:2014, Figure 6.6.2-3.						
b	RT = Radiographic testing; UT = Ultrasonic testing; MT = Magnetic particle testing; PT = Penetrant testing.						
c	2 % if $e \leq 30$ mm and same WPS as longitudinal, for aluminium groups 21, 22.1 to 22.4 (except EN AW 5454).						
d	10 % if $e > 30$ mm or 23.1, 0 % if $e \leq 30$ mm (except 23.1).						
e	Percentage in the table refers to the aggregate weld length of all the nozzles, see in EN 13445-5:2014, 6.6.2.5 b).						
f	(deleted)						
g	10 % for aluminium group 21.						
h	Weld cladding is not applicable for aluminium and aluminium alloys.						
i	For explanation of the reduction in NDT in testing group 2, also see 6.6.2.4 of EN 13445-5:2014.						
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. volumetric testing (RT or UT) and surface testing (PT)).						
k	For limitations of application see 6.6.						
l	The percentage of surface examination refers to the percentage of length of the welds both on the inside (where accessible) and the outside.						
m	RT and UT are volumetric while PT is 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".						
o	It is intended that material group 23.1 is only used in a seamless condition (i.e. as seamless vessel shell, nozzle connection, end cap or flange), and only circumferential welding will be applied.						
p	Where pneumatic testing is carried out in accordance with 8.7 the additional NDT requirements shall take precedence over this table. The NDT requirements shall, however, not be less than those specified in this table.						
q	Leak testing at a sensitivity of 10^{-3} atm·ml/s or better (e.g. gas and bubble test method or better).						

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As shown above, add a new row 25 in Table 8.3-1 (finned tube to tube socket connection) with new boundary conditions ($D1 < 50$ mm) and NDT requirements as in 17/18/19 (from Table 8.3-1).

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Add the following new Figure after Table 8.3-1:

"

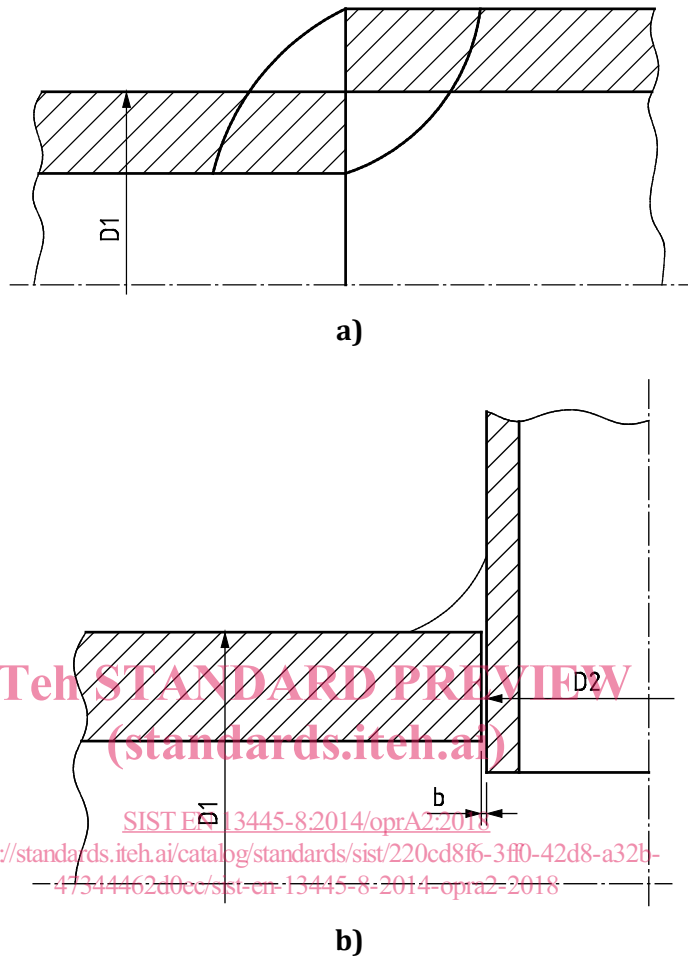


Figure 8.3-1 — Nozzle or branch - only non-corrosive service

"

15 Modifications to 8.4.1, NDT methods

Update Table 8.4-1 as follows:

- Line VT: replace "EN ISO 17637:2011" with "EN ISO 17637";
- Line RT: remains unchanged;
- Line UT: replace "EN ISO 17640:2010" with "EN ISO 17640:2017" and replace "EN ISO 23279:2010" with "EN ISO 23279:2017" (in Footnote ^b too); and
- Line PT: replace "EN ISO 3452:2013" with "EN ISO 3452-1:2013".

Add the following paragraph below Table 8.4-1:

"Digital radiography (RT-D) using storage phosphor imaging plates (RT-CR) or digital detector arrays (DDA) can be used in addition to the NDT methods described in Table 8.4-1. For acceptance levels and criteria, see Table 8.4.2-1."