SLOVENSKI STANDARD
SIST EN 13445-5:2009/A4:2013

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Neogrevane tlačne posode - 5. del: Pregled in preskušanje - Dopolnilo A4

Unfired pressure vessels - Part 5: Inspection and testing

Unbefeuerte Druckbehälter - Teil 5: Inspektion und Prüfung

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

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23.020.30	Tlačne posode, plinske jeklenke	Pressure vessels, gas cylinders

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Unfired pressure vessels - Part 5: Inspection and testing

Récipients sous pression non soumis à la flamme - Partie 5: Inspection et contrôles

Unbefeuerte Druckbehälter - Teil 5: Inspektion und Prüfung

This amendment A4 modifies the European Standard EN 13445-5:2009; it was approved by CEN on 12 July 2013.

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Foreword

This document (EN 13445-5:2009/A4:2013) has been prepared by Technical Committee CEN/TC 54 “Unfired pressure vessels”, the secretariat of which is held by BSI.

This Amendment to the European Standard EN 13445-5:2009 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2014, and conflicting national standards shall be withdrawn at the latest by January 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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.

This document includes the text of the amendment itself. The corrected pages of EN 13445-5:2009 will be published in July 2013 as issue 5 of the standard.

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

1 Modification to Clause 1

Replace the 3 first paragraphs with the following:

This Part of this European Standard specifies the inspection and testing of individual and serially produced pressure vessels made of steels in accordance with EN 13445-2:2009.

Special provisions for cyclic operation are given in Annex G of this Part.

Special provisions for vessels or vessel parts working in the creep range are given in Annex F and Annex I of this Part.

2 Modification to Clause 2

In Clause 2, delete the following normative references:

EN 287-1:2004, EN 287-1:2004/A2:2005, Qualification test of welders — Fusion welding — Part 1: Steels.

EN 473:2008, Non-destructive testing — Qualification and certification of NDT personnel — General principles.

EN 571-1:1997, Non-destructive testing — Penetrant testing — Part 1: General principles.

EN 970:1997, Non-destructive examination of fusion welds — Visual examination.

EN 1289:1998, EN 1289:1998/A1:2002, EN 1289:1998/A2:2003, Non-destructive testing of welds — Penetrant testing of welds — Acceptance levels

EN 1290:1998, EN 1290:1998/A1:2002, EN 1290:1998/A2:2003, Non-destructive testing of welds — Magnetic particle testing of welds

EN 1291:1998, EN 1291:1998/A1:2002, EN 1291:1998/A2:2003, Non-destructive testing of welds — Magnetic particle testing of welds — Acceptance levels

EN 1435:1997, EN 1435:1997/A1:2002, EN 1435:1997/A2:2003, Non-destructive testing of welds — Radiographic testing of welded joints

EN 1712:1997, EN 1712:1997/A1:2002, EN 1712:1997/A2:2003, Non-destructive testing of welds — Ultrasonic testing of welded joints — Acceptance levels

EN 1713:1998, EN 1713:1998/A1:2002, EN 1713:1998/A2:2003, Non-destructive testing of welds — Ultrasonic testing — Characterization of indications in welds

EN 1714:1997, EN 1714:1997/A1:2002, EN 1714:1997/A2:2003, Non-destructive examination of welds — Ultrasonic examination of welded joints

EN 12062:1997, EN 12062:1997/A1:2002, EN 12062:1997/A2:2003, Non-destructive testing of welds — General rules for metallic materials

EN 12517-1:2006, Non-destructive testing of welds — Radiographic testing of welded joints — Acceptance levels

EN ISO 4063:2000, Welding and allied processes — Nomenclature of processes and reference numbers (ISO 4063:1998)

In Clause 2, add the following normative references:

EN 287-1:2011, *Qualification test of welders — Fusion welding — Part 1: Steels*

EN ISO 4063:2010, *Welding and allied processes – Nomenclature of processes and reference numbers (ISO 4063:2009, Corrected version 2010-03-01)*

EN ISO 9712:2012, *Non-destructive testing - Qualification and certification of NDT personnel (ISO 9712:2012)*

EN ISO 17635:2010, *Non-destructive testing of welds — General rules for metallic materials (ISO 17635:2010)*

3 Modification to Clause 3

Reword some definitions as stated below and add definition 3.14.

3.1
design review
procedure by which a manufacturer ascertains and declares that the design meets the requirements of this standard

3.2
design approval
procedure by which a responsible authority ascertains that the design meets the requirements of this standard

3.5
testing
procedure used to verify vessel compliance with the technical requirements of this standard by one or more tests

3.6
technical specification
document stating requirements for a product or a procedure

3.7
repair
action or series of actions of rectifying a condition in either base material or weld to establish compliance with this standard

Note 1 to entry: The following definitions 3.8 to 3.13 all relate to serially produced pressure vessels as described in Annex A.

3.8
serial production
manufacture of identical vessels or parts which subsequently are joined to form a complete vessel and which are manufactured to a single model acceptance, using the same manufacturing procedure involving a continuous fabrication process

3.9
continuous fabrication process
process where the welding of the main seams and branch welds is essentially continuous, that means there are no stoppages or fabrication break-downs requiring resetting of the welding machine and/or NDT equipment

Note 1 to entry: Adjustments to the welding machine within the welding procedure limitations do not qualify as resetting the welding machine.

3.10
model acceptance
procedure which ascertains that a representative sample of the production (a prototype vessel/part) meets the requirements of this standard in respect of design, manufacturing and testing

Note 1 to entry: Model acceptance is conducted by the manufacturer or the responsible authority depending on the conformity assessment module chosen.

3.11
prototype vessel/part
first or representative sample of a series of pressure vessels/parts covered by a single model acceptance

3.12
batch of vessels
part of a series where the welding of the main weld joints and branch welds has been essentially continuously produced by the same welding procedures

3.13
shift
period of time per day during which the welders and welding operators remain the same

3.14
joint batch
several joints made by the same welder or welding operator using a single welding procedure specification

4 Modification to sub-clause 4.2

Add a second paragraph:

All inspections shall be carried out by qualified personnel.

5 Modification to Clause 5

In 5.1, second paragraph replace design documentation *by* design.

Add a sub-clause title 5.2.1 General *before the first sentence of 5.2 and renumber 5.2.1 to 5.2.6 to become 5.2.2 to 5.2.7.*

In the current 5.2.1b), replace manufacturers *by* manufacturer.

In the current 5.2.1c), delete the items 6 and 7, and add a new item 6 as follows:

6) if the vessel is designed for cyclic operation the allowed numbers of cycles, the range of action (as defined in EN 13445-3:2009, 5.3.1) during the cycle and the locations where the cumulative fatigue damage index D (as defined in EN 13445-3:2009, Clauses 17 and 18) is greater than 0,8. The maximum permissible peaking shall also be given.

In the current 5.2.1c), renumber the item 8 to become item 7, and modify the last indent as follows:

— whether lifetime monitoring, as defined in Clause 19 of EN 13445-3:2009, is being applied or not.

Modify the current 5.2.2 (to become 5.2.3) as follows:

5.2.3 Design and construction drawings

The manufacturer analysis of hazards identifying those which apply to the pressure vessel on account of action (as defined in EN 13445-3:2009, 5.3.1) shall be documented and be of sufficient detail.

Details of the design including the design methods adopted, performance criteria and construction drawings shall be provided. Guidance about the detailed dimensional information that shall be provided is given in Annex B. Process diagrams, sub-assemblies or other data relevant to design shall also be maintained.

Modify the current 5.2.4.1 (to become 5.2.5.1) as follows:

5.2.5.1 Design calculations shall be provided by the vessel manufacturer to the extent necessary to demonstrate compliance to this standard.

Supporting detailed drawings shall be prepared with all dimension notations marked. At least on the pressure vessel general arrangement drawing, the testing group(s) shall be clearly identified.

In the current 5.2.4.2, replace computer *by* computer software.

In the current 5.2.4.3, replace in the first sentence other design methods *by* other equivalent design methods, *and modify b), b1) and e) as follows:*

b) graphs which show;

   1) the element subdivision (mesh size);

e) where appropriate, the dividing and classifying of the stresses into different stress categories;

In the current 5.2.4.4, replace in the first sentence necessary *by* given*, and replace item b) by the following:*

b) construction sequence schedule if the testing is to be carried out in several steps;

In the current 5.2.5a), replace certificate *by* certificates.

Replace the current 5.2.5c) by the following:

c) the content of the manufacturing records, including measurement of peaking for vessels subject to cyclic loads ;

Delete the current 5.2.5d).

In the current 5.2.6a), replace structural testing *by* testing.

In the current 5.2.6c5), replace masonry *by* refractory.

Add a second sentence to the first paragraph of sub-clause 5.3.1: It shall include the year of edition and the number of issue of the standard used, with reference to possible used Amendments.

In 5.3.2d), write the requirements of Annex C of this standard.

In 5.3.2g), replace the reference to 5.2.4.3 *by a reference to* 5.2.5.3.

6 Modification to Clause 6

At the end of 6.1, add the following Note:

NOTE For guidance on use of conformity assessment procedures, see CEN/TR 13445-7.

In 6.3.1, second paragraph, replace Testing of material traceability *by* Procedures to ensure material traceability*:*

In 6.4.2, second paragraph, delete the first sentence: All inspections shall be carried out by qualified personnel.

In 6.4.4 and 6.4.5, replace the last sentence by The result of the inspection shall be documented.

In 6.5.1, replace the first paragraph by Permanent backing strip and joggle joints shall be subject to the same type of non-destructive testing and acceptance criteria as a single-sided butt weld.

In the title of 6.5.2, replace approval *by* qualification.

In 6.5.2, first paragraph, replace the reference to EN 287-1:2004 *by* EN 287-1:2011*, and replace* Procedures *by* Welding procedures.

In 6.5.3, add a second sentence to the second paragraph:

For material groups 1.1 and 8.1 only visual testing (VT) is required.

Add a sub-clause title 6.6.1.1 General *before the first sentence of 6.6.1 and renumber 6.6.1.1 to become 6.6.1.2.*

In the current 6.6.1.1.1, replace in the first sentence The non destructive testing *by* The extent of non destructive testing

In the current 6.6.1.1.1, modify Note 3 to become Note 2, the text after Note 1 to become Note 3, and Note 2 to become Note 4 as follows:

NOTE 1 The testing groups or sub-groups take into consideration the manufacturing difficulties associated with different groups of steel, maximum thickness, welding process, service temperature range and joint coefficient. It is intended that any of the testing groups will provide adequate integrity for typical applications within the limitations contained within Tables 6.6.1-1 and F.2-1.

NOTE 2 The weld joint coefficient is not used in design by the experimental method without calculation.

NOTE 3 For vessels (or vessel parts) designed according to Design by Analysis – Direct Route of Annex B of EN 13445-3:2009 or designed according to 6.3 of EN 13445-3:2009, only testing group 1 is permissible.

NOTE 4 Further restrictions are given in Annex A of EN 13445-3:2009.

In the current 6.6.1.1.2, modify the third paragraph:

If a combination of testing groups is necessary for a vessel made of several parts designed according to different methods (e.g. one part according to DBF and another part according to DBA alternative route or creep range), the following shall apply:

In the current 6.6.1.1.2, item b), replace the higher *by* the more stringent.

In the current 6.6.1.1.4, first paragraph and fifth indent, replace welding procedure approval test *by* Welding Procedure Qualification (WPQR).

In the current 6.6.1.1.4, second paragraph, replace repair *by* repair by welding.

In the current 6.6.1.1.4, fourth paragraph, replace range of approval *by* range of qualification.

In Table 6.6.1-1, replace the maximum thickness for which specific materials are permitted:

— *In testing group 2b, from* 30 mm *to* 35 mm for group 1.2

— *In testing group 4, from* 12 mm *to* 16 mm for groups 1.1, 8.1

In Table 6.6.1-1, replace the welding process for testing group 2 from Fully mechanical welding only *to* Fully mechanised welding only.

In Table 6.6.1-1, add a Table footnote k for the extent of NDT for governing welded joints of testing group 4 : [k] except for assembly of a conical shell to a cylindrical shell without knuckle (large end of the cone) for which MT or PT shall be 100 %

In Table 6.6.1-1, modify the service temperature range of testing group 4 as follows: Limited to (-10 to +300) °C for group 1.1, (-105 to +300) °C for group 8.1

In Table 6.6.1-1, delete at the end of Table footnote a to the maximum extent possible

In 6.6.2.1, first paragraph, second sentence, replace the total length of the welded joint *by* total length of the welded joint or each joint batch.

In 6.6.2.2, replace the current text with the following: Table 6.6.2-1 applies to all joints, except those described in 6.6.2.3.

In 6.6.2.3.2, modify the title to Single run governing welds made by manual welding procedure, *delete the first sentence of the first paragraph, replace in item a)* Table 10.2.3.3-1 *by* Table 10.2.3.3.1-1 *and delete the two last paragraphs after b).*

Add 6.6.2.3.4 as follows:

6.6.2.3.4 Non destructive testing of welding joints in supporting structures

— Butt joints (full penetration or partial penetration) subjected to tensile stress shall have 10 % NDT

— Fillet welds in tension or shear shall have 10 % NDT (PT or MT) if the throat thickness is more than 12 mm.

In 6.6.2.5, item a.2), replace the butt welded joint *by* the butt welded joint or joint batch.

In 6.6.2.5, modify item a.3), as follows:

3) openings within main welds (longitudinal or circumferential) or within a distance of 12 mm from the main welds shall be examined for a length of 200 mm or reinforcing length l_{so} defined in EN 13445-3:2009 Clause 9, whatever is the smallest, on each side of the opening. These shall be included as an addition to the percentage in Table 6.6.2-1, if applicable.

In 6.6.2.5, modify item b), as follows:

b) Nozzles and branches made by butt joints (types 1, 3a, 3b and 4 in Figure 6.6.2-3)

In 6.6.2.5, second paragraph replace shall be grouped as follows *by* shall be grouped for each type of weld as follows.

Replace Table 6.6.2-1 by the following: