



SLOVENSKI STANDARD
SIST EN 13445-5:2002/A1:2009
01-februar-2009

Unfired pressure vessels - Part 5: Inspection and testing

Unbefeuerte Druckbehälter - Teil 5: Inspektion und Prüfung

Réipients sous pression non soumis a la flamme - Partie 5: Inspection et contrôles

Ta slovenski standard je istoveten z: EN 13445-5:2002/A1:2007

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EUROPEAN STANDARD
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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 contrôles

Unbefeuerte Druckbehälter - Teil 5: Inspektion und Prüfung

This amendment A1 modifies the European Standard EN 13445-5:2002; it was approved by CEN on 22 March 2007.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This amendment 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 CEN Management Centre has the same status as the official versions.

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

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Contents

Page

Foreword.....	3
1 Scope	4
5 Technical documentation	4
6 Inspection and testing during fabrication.....	4
6.6 Non-destructive testing of welded joints	4
6.6.1 Extent of non-destructive testing.....	4
10 Final assessment.....	5
Annex F (normative) Inspection and testing of pressure vessels or parts subject to creep.....	7
F.1 General.....	7
F.2 Extent of inspection and testing	7
F.3 Performance of NDT and acceptance criteria.....	9
F.4 Records.....	9
Annex H (informative) Declaration of compliance with this standard	10
Annex I (informative) Specific tests during construction to assist in-service inspection.....	11
I.1 General.....	11
I.2 Metallographic investigation	11
I.3 Hardness measurements	11
I.4 Dimensional measurements.....	11
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of the EU Directive 97/23/EC on Pressure Equipment.....	13

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Foreword

This document (EN 13445-5:2002/A1:2007) 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 13445-5:2002 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2007, and conflicting national standards shall be withdrawn at the latest by December 2007.

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 97/23/EC.

For relationship with EU Directive 97/23/EC, see informative Annex ZA, which is an integral part of this document.

This amendment is based on EN 13445-5 up to issue 26 (April 2007).

The document includes the text of the amendment itself. The corrected pages of EN 13445-5 will be delivered as issue 27 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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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EN 13445-5:2002/A1:2007 (E)**1 Scope**

Add a new third paragraph between the current second and third paragraphs:

Special provisions for vessels or vessel parts working in the creep range are given in Clause 5, Clause 6, Clause 10, Annex F and Annex I of this Part.

5 Technical documentation**5.2.1 General description of the pressure vessel**

Add:

- 8) If the vessel is working in the creep range, the following additional information:
- the design life (e.g. 100000 h) and expected life for each load case
 - the parts of the vessel which are subjected to creep
 - the value of the weld creep strength reduction factor which has been used for each weld joint subjected to creep
 - whether lifetime monitoring, (as defined in Clause 19 of EN 13445-3:2002, is or not being applied

SIST EN 13445-5:2002/A1:2009

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6 Inspection and testing during fabrication**6.6 Non-destructive testing of welded joints****6.6.1 Extent of non-destructive testing**

Add in the second paragraph:

For serially produced pressure vessels an alternative route is given in Annex A. This annex is not applicable for vessels or vessel parts working in the creep range.

6.6.1.1 Use of testing groups**6.6.1.1.1 General**

Replace by the following text:

The non-destructive testing of welded joints for final acceptance purposes shall depend upon the testing group or subgroup of the welded joint under consideration.

In Table 6.6.1-1, testing groups 1, 2, 3 and 4 apply below the creep range. Testing groups 1, 2 and 3 are subdivided into sub-groups 1a, 1b, 2a, 2b, 3a, 3b, in order to reflect crack sensitivity of the material. In Table F.2-1 of Annex F, testing sub-groups 1c and 3c apply to creep.

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.

For vessels (or vessel parts) designed according to Design by Analysis – Direct Route of Annex B of EN 13445-3:2002 or designed according to 6.3 of EN 13445-3:2002, only testing group 1 is permissible.

NOTE 2 Further restrictions are given in Annex A of EN 13445-3:2002.

For vessels designed by experimental methods, the testing group to be considered for the vessel or vessel part shall be determined according to the rules given in Table 6.6.1-1 and the possible limitations stated in 20.5 of EN 13445-3:2002.

NOTE 3 The weld joint coefficient is not used in design by the experimental method without calculation.

For vessels (or vessel parts) working in the creep range only testing groups 1c and 3c are permissible. The extent of NDT is given in Table F.2-1 of Annex F. Testing groups 1, 2 and 3 are permissible for any welded joint not subjected to creep.

10 Final assessment

10.2.3.3 Standard hydrostatic test

Add at the end of a) of 10.2.3.3.1

Formula 10.2.3.3.1-1 applies when the maximum allowable temperature t_{smax} occurs at the maximum allowable pressure P_{S} .

When there exists more than one set of coincident design pressure and temperature, the test pressure shall be determined as above for each combination substituting the actual coincident pressure and temperature values in lieu of P_{S} and t_{smax} in formula 10.2.3.3.1-1. The test pressure of the vessel shall be the largest value of test pressures determined.

Add at the end of 10.2.3.3.1 a e) subclause:

e) For vessels working in the creep range the test pressure shall be calculated as above but using f_{t_s} and f_{t_c} determined from creep strength according to 19.2 of EN 13445-3:2002 or using the following substitutions:

In a)

— f_{t_s} is replaced by f_{nc,t_s}

In b)

— f_{t_c} is replaced by f_{nc,t_c}

where:

f_{nc,t_s} is the nominal design stress for normal operating load cases of the part at maximum allowable temperature, using time independent material characteristics,

EN 13445-5:2002/A1:2007 (E)

$f_{nc,tc}$ is the nominal design stress for normal operating load cases of the part under consideration at calculation temperature, using time independent material characteristics. These stresses being taken from Annex S of EN 13445-3:2002 if no yield strength data are available from the materials standard at that temperature.

For vessels or parts designed to testing sub-group 1c this stress may be determined at the highest temperature for which time independent tensile properties are available in the materials standard.

From the three methods described above for determining test pressure, a consistent method shall be used for all parts.

NOTE The level of the test pressure has no relevance to the safety of the vessel with respect to creep behaviour. The test pressure derived using Annex S of EN 13445-3:2002 is a logical extrapolation of the practice below the creep range. The value derived using the yield strength at the highest temperature for which time independent tensile properties are available in the materials standard gives a lower test pressure, but an adequate demonstration of strength. The value derived from creep strength gives a higher pressure which may be difficult to achieve with large vessels.

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Annex F (normative)

Inspection and testing of pressure vessels or parts subject to creep

Insert this new Annex F.

F.1 General

For vessels or vessel parts subject to creep, Quality Level B of EN ISO 5817:2003 is the reference quality level for maximum allowable imperfection in these areas. The absence of surface imperfections (no undercut, no root concavity and no lack of penetration) and the necessity of smooth transitions are essential. Similarly, shape imperfections, such as peaking, may be critical and the manufacturing tolerances specified in EN 13445-4:2002 shall be respected. In particular, the maximum peaking of EN 13445-4:2002 or the value permitted by the design methods of EN 13445-3:2002 shall not be exceeded.

Extent of Non-Destructive Testing (NDT) of this annex is based on the general requirements of testing sub-groups 1c and 3c, as defined in Table F.2-1.

If lifetime monitoring is a design option, any procedure for control and testing shall be part of the Instructions for use prepared by the manufacturer.

NOTE Supplementary tests may also be prescribed by the manufacturer. These tests will be specified in the Instructions for use.

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F.2 Extent of inspection and testing

In addition to the requirements of 6.6.2, all areas subject to creep shall be inspected by NDT, according to the following Table F.2-1.