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SIST EN 13445-2:2002/A1:2009

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13445-2:2002/A1

June 2007

ICS 23.020.30

English Version

Unfired pressure vessels - Part 2: Materials

Réceptifs sous pression non soumis à la flamme - Partie 2
: Matériaux

Unbefeuerte Druckbehälter - Teil 2: Werkstoffe

This amendment A1 modifies the European Standard EN 13445-2:2002; 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.

CEN members are the national standards bodies of 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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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 13445-2:2002/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 13445-2:2002 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of an identical text or by endorsement, at the latest by December 2007, and conflicting national standards shall be withdrawn at the latest by December 2007.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 13445-2 up to issue 26 (April 2007).

The document includes the text of the amendment itself. The corrected pages of EN 13445-2 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 13445-2:2002/A1:2007 (E)

1 Scope

Add at the end of the first sentence after "sufficient ductility":

but it is, for components operating in the creep range, also limited to sufficiently creep ductile materials.

Delete the second sentence

2 Normative references

Add:

EN 10291:2000, Metallic materials - Uniaxial creep testing in tension – Method of test.

Replace the reference to prEN 13479-1 with:

EN 13479:2004, Welding consumables – General product standard for filler metals and fluxes for fusion welding of metallic materials.

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3 Terms and definitions

Add:

[SIST EN 13445-2:2002/A1:2009](https://standards.iteh.ai/catalog/standards/sist/381bbeef-5950-4010-9fc2-21fa5acc0856/sist-en-13445-2-2002-a1-2009)

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3.1.7

weld creep strength reduction factor (WCSRF)

factor to account for possible creep strength reduction at the weldment

In Table 3.2-2 – Mechanical quantities:

Celsius temperature	Add T	
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Include at the end:

Mean 1 % creep strain limit at calculation temperature T and lifetime t	$R_{p1,0/T/t}$	MPa, N/mm ²
Mean creep rupture strength at calculation temperature T and lifetime t	$R_{m/T/t}$	MPa, N/mm ²
Weld creep strength reduction factor	z_c	-

4 Requirements for materials to be used for pressure-bearing parts

4.2 Special provisions

Insert a new paragraph 4.2.4 and old paragraph 4.2.4 becomes 4.2.5

4.2.4 Design properties in the creep range

4.2.4.1 Creep properties of base material

For interpolation and extrapolation of creep properties given in the materials standard, see EN 13445-3:2002, Clause 19.

When creep properties are not available from a materials standard, they shall be determined using EN 10291:2000.

4.2.4.2 Creep properties of weldments

Creep properties of weld joints subjected to stresses normal to the weld may differ significantly from those of the base material.

For the design of vessels in the creep range, this is taken into account in EN 13445-3 by making use of a weld creep strength reduction factor z_c obtained from tests on weldments. If no data are available, a default value of z_c is used.

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An acceptable method to determine z_c by cross-weld tests is given in Annex C (see also [17]).

4.3.5 Welding consumables

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Replace the first paragraph with: [1fa5acc0856/sist-en-13445-2-2002-a1-2009](https://standards.itih.ai/catalog/standards/sist/381bbeef-5950-4010-9fc2-1fa5acc0856/sist-en-13445-2-2002-a1-2009)

Technical delivery conditions for welding consumables used for the welding of pressure parts and attachments to pressure parts shall be in accordance with EN 13479:2004 and EN 12074:2000.

Annex C (informative)

Procedure for determination of the weld creep strength reduction factor (WCSRF)

Insert the following new Annex C. The old Annex C becomes Annex D and so on

The WCSRF will be taken as 1 when all the following conditions are fulfilled by the steel manufacturer:

C.1 Stress rupture tests on weldments made on specimens of the same steel products as used in the vessel and which are comparable as regards consumable shall be carried out according to the European Creep Collaborative Committee (E.C.C.C.) Recommendations [18].

C.2 Two test temperatures shall be selected within a range of ± 30 °C about the mean design temperature. At each of these temperatures, creep tests shall be carried out at stresses selected to give durations up to 1/3 of the creep design life (typically 1000, 3000, 10000, 30000, 60000, 100000 h, etc.). It has to be shown that the lower limit of the achieved creep values of the welded joint are not lower than the lower accepted scatter band (-20%) of specified mean values of the creep strength of the base material according to the materials standard. However if the failure is located in the Heat Affected Zone (HAZ), extrapolation is not allowed without further testing at longer times showing no further apparent decrease. In this case extrapolation may be made by a factor equivalent to the factor showing stabilised conditions used in these longer tests.

C.3 When no cracking in the HAZ has been found in the tests prescribed above, an additional set of tests at a higher temperature shall be made with the value of the Larson Miller Parameter (LMP) equal to or greater than that at the extrapolation point. This testing shall be made to confirm that the location of the failure does not change from the base material to HAZ. The temperature shall ideally be no more than 50 °C greater than the higher temperature test in C.2 (in order to avoid an unacceptable modification of the microstructure). The stress shall lead to a minimum testing time of 10kh. The temperature and testing time shall be selected so that the creep Time Temperature Parameter (TTP) e.g. Larson Miller Parameter (LMP) in these tests is at least the value at the extrapolation point (time and temperature). A minimum of 3 samples shall be tested. The fracture location of the creep specimens shall be checked by microscopic examination.

C.4 If fracture location of the creep specimens in C.3 is within the base material, the WCSRF may be taken as unity for a time equal to the time achieved in the tests in C.2 multiplied by a maximum of 3.

C.5 When the creep strength properties of cross weld specimens fall below the minimum value given in the scatter band a specific weld reduction factor can be used based on the ratio of the average value of the creep strength compared to 80 % of the mean value of the base material.

Annex ZA (informative)

Relationship between this European Standard and the Essential Requirements of the EU Directive 97/23/EC in Pressure Equipment

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 97/23/EC

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 97/23/EC

Clause(s)/sub-clause(s) of this EN	Content	Essential requirements of Directive 97/23/EC, Annex I
<i>Add:</i> 4.2.4	Design properties in the creep range	2.2.3 (b), 7 th indent

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WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.