SLOVENSKI STANDARD
SIST EN 13445-3:2009/oprA2:2012

01-oktober-2012

Neogrevane tlačne posode - 3. del: Konstruiranje - Dopolnilo A2

Unfired pressure vessels - Part 3: Design

Unbefeuerte Druckbehälter - Teil 3: Konstruktion

Récipients sous pression non soumis à la flamme - Partie 3 : conception

Ta slovenski standard je istoveten z: **EN 13445-3:2009/prA2**

ICS:

23.020.30	Tlačne posode, plinske jeklenke	Pressure vessels, gas cylinders

SIST EN 13445-3:2009/oprA2:2012 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
EN 13445-3:2009

prA2

July 2012

ICS 23.020.30

English Version

Unfired pressure vessels - Part 3: Design

Récipients sous pression non soumis à la flamme - Partie 3 : conception

Unbefeuerte Druckbehälter - Teil 3: Konstruktion

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 13445-3:2009. 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.

CEN members are the national standards bodies of 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 United Kingdom.

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.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword

This document (EN 13445-3:2009/prA2:2012) 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).

1 Modification 1

In C.1, replace the last but one paragraph by:

Provisions are given in C.8 for vessels or vessel parts working in the creep range.

Annex C is currently limited to sufficiently ductile materials, like the whole standard, but it is, for components operating in the creep range, also limited to sufficiently creep ductile materials, as defined in EN 13445-2:2009.

2 Modification 2

In C.7, replace the heading by the following:

C.7 Non-creep assessment criteria

3 Modification 3

After the last paragraph of C.7.7.3, add the following:

C.8 Creep assessment criteria

C.8.1 Formulae to be used

In Annex C, stresses which relate to the different stress categories (e.g. membrane, membrane plus bending, primary plus secondary stresses, etc.) are calculated. Allowable values for these are also specified. For creep design, the formulae of interest are reproduced below:

$$(\sigma_{eq})_{Pm} \leq f \qquad \text{(C.8-1)}$$

$$(\sigma_{eq})_{P_L} \leq 1{,}5 \cdot f \qquad \text{(C.8-2)}$$

$$(\sigma_{eq})_{P} \leq 1{,}5 \cdot f \qquad \text{(C.8-3)}$$

$$(\Delta\sigma_{eq})_{P+Q} \leq 3 \cdot f \qquad \text{(C.8-4)}$$

NOTE Subscript P, which means general or local primary membrane plus primary bending stresses, is not mentioned in C.3 where symbols used in Annex C are defined. It is defined through Formula (C.6-1).

Depending on whether the vessel service consists in one or more than one creep load cases, the following rules in C.8.2 or C.8.3 respectively shall be applied at any point likely to be critical for creep damage.

C.8.2 Assessment criteria for a single creep load case

Formulae (C.8-1) to (C.8-4) shall be satisfied at the point under study, using assumed analysis thickness and a nominal design stress f obtained as explained in 19.5.

NOTE To obtain the minimum required thickness, a trial and error procedure must be used.

C.8.3 Assessment criteria for multiple creep load cases

The following procedure shall be applied:

a) For each creep load case, the analysis according to Annex C is carried out with the assumed analysis thickness. The stresses are calculated for the different stress categories (see C.6). The calculated stresses are then divided by the coefficient applicable to that stress category, as shown below:

$$\sigma_{(m)i} = (\sigma_{eq})_{Pm} \tag{C.8-5}$$

$$\sigma_{(L)i} = \frac{(\sigma_{eq})_{P_L}}{1{,}5} \tag{C.8-6}$$

$$\sigma_{(P)i} = \frac{(\sigma_{eq})_{P}}{1{,}5} \tag{C.8-7}$$

$$\sigma_{(P+Q)i} = \frac{(\Delta\sigma_{eq})_{P+Q}}{3{,}0} \tag{C.8-8}$$

b) The largest of $\sigma_{(m)i}, \sigma_{(L)i}, \sigma_{(P)i}, \sigma_{(P+Q)i}$ shall be determined. For the point under study, the fictitious nominal design stress f_{Fi} for the creep load case under consideration shall be the largest of these stresses:

$$f_{Fi} = \max\left(\sigma_{(m)i}; \sigma_{(L)i}; \sigma_{(P)i}; \sigma_{(P+Q)i}\right) \tag{C.8-9}$$

The allowable time to damage, t_D, f_{Fi}, T_i shall be calculated according to Formula (19-11) for this fictitious design stress f_{Fi} at the calculation temperature T_i.

c) Steps a) and b) shall be repeated for each load case.

d) The accumulated creep damage resulting, for the point under study, from all applied load cases shall be determined by the following time-fraction rule:

$$\sum_{i=1}^{n} \frac{t_i}{t_D, f_{Fi}, T_i} \le 1{,}0 \tag{C.8-10}$$

NOTE 1 If more than one material is used in a part or component of the pressure vessel then Formula (C.8-10) shall be applied separately for each region with different material using the fictitious design stress f_{Fi} at the corresponding point and the material creep design curve for the corresponding material.

NOTE 2 To obtain the minimum required thickness, a trial and error calculation covering the whole procedure of C.8.3 for all relevant points may be used.