SLOVENSKI STANDARD
SIST EN 13445-3:2009/A1:2012

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Neogrevane tlačne posode - 3. del: Konstruiranje - Dopolnilo A1

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/A1:2012**

ICS:

23.020.30	Tlačne posode, plinske jeklenke	Pressure vessels, gas cylinders

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EUROPEAN STANDARD

NORME EUROPÉENNE

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EN 13445-3:2009/A1

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English Version

Unfired pressure vessels - Part 3: Design

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This amendment A1 modifies the European Standard EN 13445-3:2009; it was approved by CEN on 10 May 2012.

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

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Foreword

This document (EN 13445-3:2009/A1:2012) 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 13445-3:2009 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2012, and conflicting national standards shall be withdrawn at the latest by December 2012.

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 97/23/EC.

For relationship with EU Directive 97/23/EC, 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 13445-3:2009 will be published in July 2012 as issue 4 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, 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 1

In Clause 17.2 add the following definition:

17.2.17
fatigue class of a welded joint
The fatigue class C is the value in MPa taken from Table 17-4, column “Class", depending from weld detail and testing group.

In Sub-Clause 17.3

Delete lines for C_1 , C_2 and C_3

Add three lines

C	Fatigue class C (see table 17-4)	MPa
C_{min}	Lowest fatigue class C (see 17.5.4.1)	MPa
N_{eq}	Allowable number of full pressure cycles	

2 Modification 2

Add a new 17.5.4

17.5.4 Alternative to the 500 cycles rule stated in 5.4.2

The condition stated in 5.4.2, formula (5.4-1), for the uniform 500 cycles limit as the maximum number of full pressure cycles (or equivalent full pressure cycles) valid for any vessel designed according to EN 13445-3 may be disregarded and replaced by formula (17.5-1) with the variable limit N_{eq} defined in 17.5.4.1, provided the vessel fulfils all the conditions listed in 17.5.4.2.

$$n_{eq} \le N_{eq} \qquad (17.5\text{-}1)$$

In checking this condition, n_{eq} shall be calculated using the value of P_{max} which corresponds to the value of f used to calculate N_{eq} (see 17.5.4.1).

When formula (17.5-1) is not applicable because one (or more) of the conditions in 17.5.4.2 is not met, the allowable number of full pressure cycles to fulfil the condition for non-cyclic pressure loading shall be kept to 500, and a simplified fatigue analysis according to the rest of Clause 17 or a detailed fatigue analysis according to Clause 18 is necessary.

17.5.4.1 Allowable number of full pressure cycles based on nominal design stress and weld types

For a vessel which fulfils all the conditions listed in 17.5.4.2, the allowable number of full pressure cycles is given by:

$$N_{eq} = 2 \cdot 10^6 \cdot \left[\frac{C_{min} \cdot C_e \cdot C_T}{3f} \right]^3 \qquad (17.5\text{-}2)$$

where:

C_{min} is the lowest fatigue class C among all welded joints of the vessel, or C_{min} = 40 MPa alternatively as a conservative assumption

C_e is the thickness correction for $e > 25$ mm , as defined in 17.6.2.1

C_T is the temperature correction for $T > 100\,°C$, as defined in 17.6.2.2

f is the nominal design stress at calculation temperature of the load case for which P_{max} is calculated .

If, for simplification, n_{eq} is calculated using the calculation pressure P instead of P_{max} , as permitted by 5.4.2, f is the nominal design stress, at calculation temperature, of the load case where the pressure is maximum.

When applying this formula:

— the thickness to be considered for calculation of C_e shall be the largest of all components involved in the welded joints of the fatigue class C_{min}

— the nominal design stress f to be considered shall be the largest of all materials involved in the welded joints of the fatigue class C_{min} . In case of uncertainty, the largest among all vessel components shall be used.

In case where the allowed number of full pressure cycles N_{eq} given by formula (17.5-2) is lower than 500, the design should be modified to reach that number.

The curves showing a number of cycles N_{eq} given by formula (17.5-2) greater or equal to 500 are plotted in Figure 17.5-4 for the case where no correction is needed (i.e. when $C_e = 1$ and $C_t = 1$).

17.5.4.2 Conditions of application of formula (17.5-2)

– At longitudinal welds, the shape deviations (mainly peaking) shall not lead to a stress index η greater than 3. The allowable combinations of tolerances which assure that this limit is not exceeded are given in figures 17.5-1 to 17.5-3.

– Cone-cylinder junctions with knuckle at large end shall have a knuckle radius within the limits $0{,}01 \leq r/D_c \leq 0{,}3$.

– No opening shall be reinforced using a reinforcing plate.

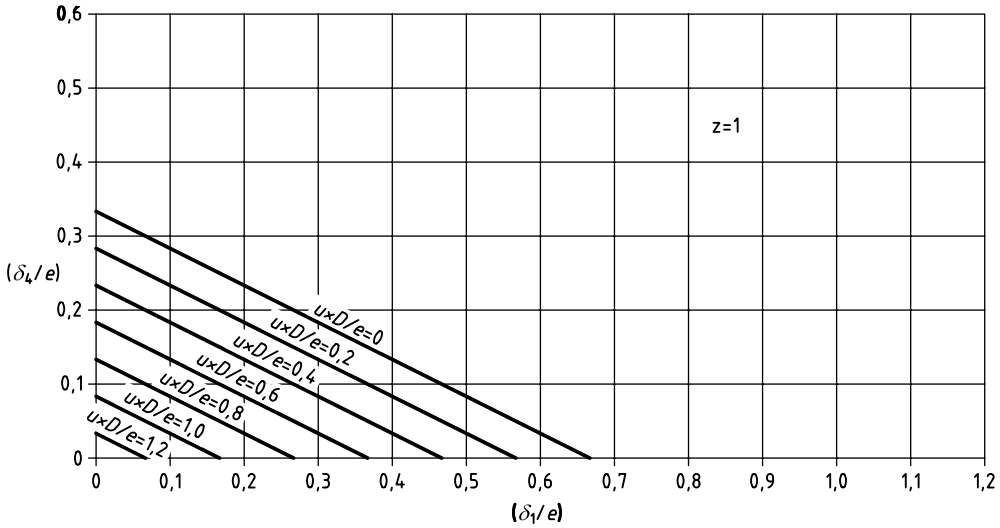
– Openings without nozzles shall have a diameter ratio $d/D \leq 0{,}6$.

– Openings with nozzles shall be such that $0{,}7 \leq e_n/e_s \leq 1{,}5$ and $d/D \leq 0{,}6$.

– No welded flat end shall be designed using the alternative rule of 10.4.4.4.

- No flat end shall have pairs of adjacent openings designed as a fictitious single opening using the alternative calculation given at end of 10.6.2.1.

- The vessel shall include only welded details for which a fatigue class can be found (directly or by assimilation) in Table 17-4.



Key

Ovality $(u \cdot D/e)$
Offset (δ_1/e)
Peaking (δ_4/e)

Figure 17.5-1 - Maximum peaking versus offset, at constant ovality, to obtain $\eta \leq 3$ for joint coefficient $z = 1$