SLOVENSKI STANDARD
SIST EN 13445-3:2009/oprA1:2010

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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/prA1**

ICS:

23.020.30	Tlačne posode, plinske jeklenke	Pressure vessels, gas cylinders

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EUROPEAN STANDARD

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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 A1, 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 Management Centre has the same status as the official versions.

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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.

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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/prA1:2010) 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).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

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 7-4, column “Class” depending from weld detail and testing group.

In Sub-Clause 17.3 add two lines

C_{min}	Lowest Fatigue class *C* (see 17.5.4.1)	MPa
N_{eq}	Allowable number of full pressure cycles	

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.

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

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

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

For a vessel which fulfils all 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 $e > 25\,\text{mm}$, 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 highest 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 highest of all materials involved in the welded joints of the fatigue class C_{min}. In case of uncertainty, the highest 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 $d/D \leq 0{,}6$.

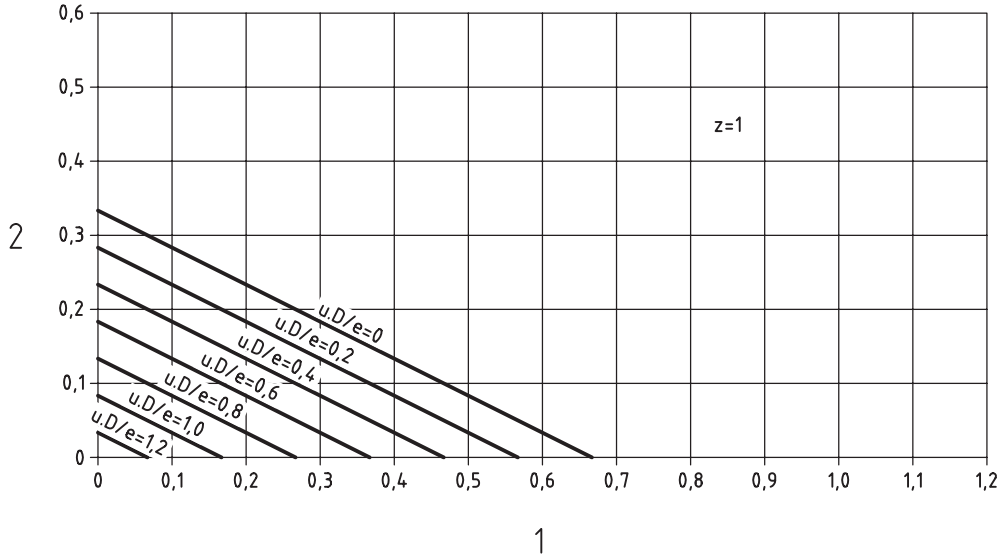
– Openings with nozzles shall be such that $0{,}7 \leq e_n/e_s \leq 1{,}5$ and $d/D \leq 0{,}6$.

– 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.

When formula 17.5-1 is not applicable because one (or more) of the above conditions is not met, the allowable number of full pressure cycles shall be kept to 500, except if a higher number can be proved using the simplified fatigue analysis procedure defined in the rest of Clause 17.

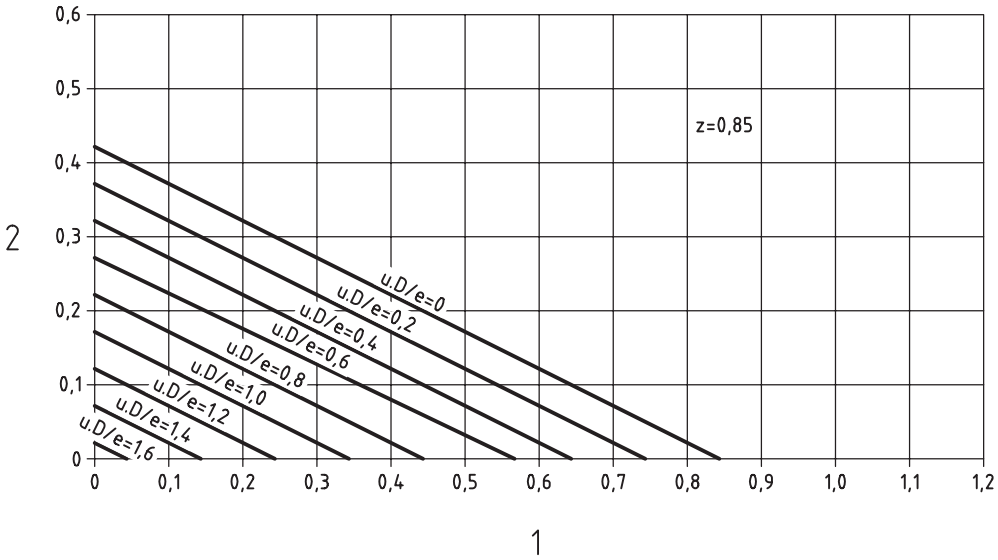


Key

Ovality (*u.D/e)*
1 offset (δ_1/e)
2 peaking (δ_4/e)

Maximum peaking versus offset, at constant ovality, to obtain $\eta \leq 3$

Figure 17.5-1

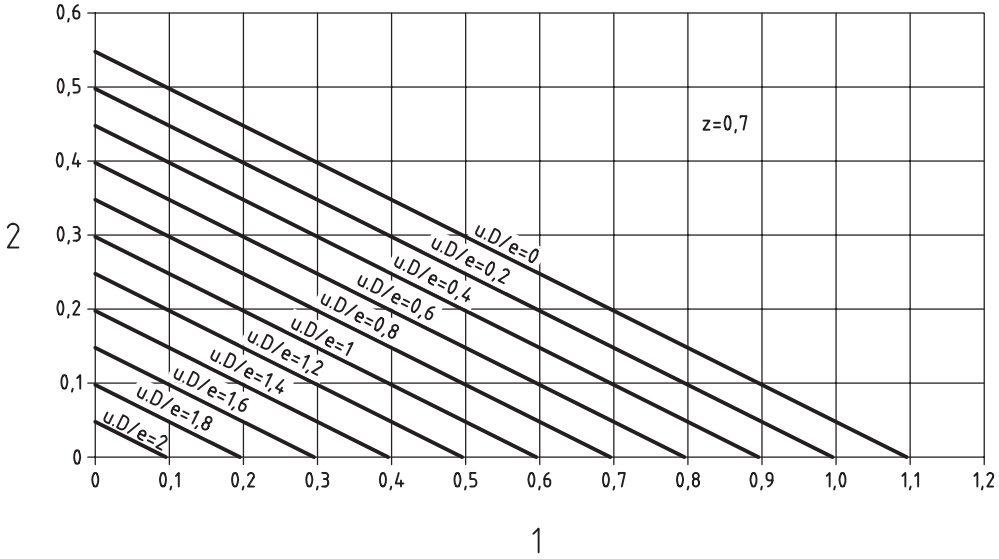


Key

Ovality (*u.D/e)*
1 offset (δ_1/e)
2 peaking (δ_4/e)

Maximum peaking versus offset, at constant ovality, to obtain $\eta \leq 3$

Figure 17.5-2



Key

Ovality ($u.D/e$)
1 offset (δ_1/e)
2 peaking (δ_4/e)

Maximum peaking versus offset, at constant ovality, to obtain $\eta \leq 3$

Figure 17.5-3