

SLOVENSKI STANDARD
SIST EN 13445-3:2002/A8:2006
01-oktober-2006

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Unfired pressure vessels - Part 3: Design

Unbefeuerte Druckbehälter - Teil 3: Konstruktion

Réipients sous pression non soumis a la flamme - Partie 3: Conception

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Ta slovenski standard je istoveten z: EN 13445-3:2002/A8:2006

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ICS:

23.020.30 V|æ}^Á[•[á^É]á•\^ Pressure vessels, gas
 b\|^\ \ ^ cylinders

SIST EN 13445-3:2002/A8:2006 **en**

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ICS 23.020.30

English Version

Unfired pressure vessels - Part 3: Design

Réipients sous pression non soumis à la flamme - Partie
3: Conception

Unbefeuerte Druckbehälter - Teil 3: Konstruktion

This amendment A8 modifies the European Standard EN 13445-3:2002; it was approved by CEN on 26 October 2005.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, 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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard (EN 13445-3:2002/A8:2006) 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 13445-3:2002 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2006, and conflicting national standards shall be withdrawn at the latest by October 2006.

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.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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.

The document includes the text of the amendment itself. The corrected pages of EN 13445-3 will be delivered as issue 19 of the standard.

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Insert a new clause 21:

21 Design Rules For Reinforced Flat Walls

21.1 General

Flat walls may be reinforced either by stays and staybolts, which are intended to take a fraction of the pressure load acting on the wall (Stayed Flat Walls), or by stiffeners welded to the same in order to increase their section modulus and their moment of inertia (Stiffened Flat Walls).

21.2 Stayed Flat Walls

Design requirements for stayed flat walls are provided in sub-clauses 21.1 to 21.8. Requirements for the plate thickness and requirements for the staybolt or stay geometry including size, pitch, and attachment details are provided.

21.3 Specific Definitions for Stayed Flat Walls

C is the stress factor for braced and stayed surfaces (see Table 21.8-1).

p is the maximum pitch. The maximum pitch is the greatest distance between any set of parallel straight lines passing through the centres of staybolts in adjacent rows. Each of the three parallel sets running in the horizontal, the vertical, and the inclined planes shall be considered.

21.4 Required Thickness of Stayed Flat Walls

21.4.1 The minimum thickness for stayed flat walls and those parts that, by these rules, require staying as flat plates with braces or staybolts of uniform diameter symmetrically spaced, shall be calculated by the following equation.

$$e = p \sqrt{\frac{P}{fC}} \quad (21.4.1)$$

21.4.2 When stays are used to connect two plates, and only one of these plates requires staying, the value of C shall be governed by the thickness of the plate requiring staying.

21.5 Required Dimensions and Layout of Staybolts and Stays

21.5.1 The required area of a staybolt or stay at its minimum cross section, usually located at the root of the thread, exclusive of any corrosion allowance, shall be obtained by dividing the load on the staybolt computed in accordance with paragraph 21.5.2 by the nominal design stress value for the staybolt material, multiplying the result by 1.10.

21.5.2 The area supported by a staybolt or stay shall be computed on the basis of the full pitch dimensions, with a deduction for the area occupied by the stay. The load carried by a stay is the product of the area supported by the stay and the design pressure. When a staybolt or stay is unsymmetrical because of interference with other construction details, the area supported by the staybolt or stay shall be computed by taking the distance from the centre of the spacing on one side of the staybolt or stay to the centre of the spacing on the other side.

21.5.3 When the edge of a flat stayed plate is flanged, the distance from the centre of the outermost stays to the inside of the supporting flange shall not be greater than the pitch of the stays plus the inside radius of the flange.

21.6 Requirements For Threaded Staybolts

21.6.1 The minimum thickness of plates to which stays may be applied shall be 8 mm.

21.6.2 The maximum pitch shall be 220 mm.

21.6.3 Acceptable proportions for the ends of through stays with washers are shown in Figure 21.9-1. Holes for screw stays shall be drilled full size or punched not to exceed 6 mm less than the full diameter of the hole. The hole shall then be drilled or reamed to the minor diameter of the thread, and tapped fair and true with a full thread.

21.6.4 The ends of staybolts or stays screwed through the plate shall extend beyond the plate not less than two threads when installed, after which they shall be riveted over or upset by an equivalent process without excessive scoring of the plates. Alternatively, the ends of staybolts or stays screwed through the plate shall be fitted with threaded nuts through which the bolt or stay shall extend.

21.6.5 The ends of threaded steel stays or staybolts, which are to be riveted shall be fully annealed.

21.7 Requirements For Welded-in Staybolts And Welded Stays

21.7.1 Welded-in staybolts may be used provided the following requirements are satisfied.

- a) The configuration is in accordance with the typical arrangements shown in Figure 21.9-2.
- b) The required thickness of the plate shall not exceed 35 mm.
- c) The maximum pitch shall not exceed 15 times the diameter of the staybolt; however, if the required plate thickness is greater than 20 mm, the staybolt pitch shall not exceed 500 mm.
- d) The size of the attachment welds is not less than that shown in Figure 21.9-2.
- e) The allowable load on the welds shall be equal to the product of the weld area (based on the weld dimension parallel to the staybolt), the nominal design stress of the material being welded, and a weld joint factor of 60%.

21.7.2 Welded stays may be used provided the following requirements are satisfied.

- a) The pressure does not exceed 2 MPa.
- b) The configuration is in accordance with the typical arrangements shown in paragraph 21.9-2 (sketches a, b, e, f, g and h).
- c) The required thickness of the plate does not exceed 13 mm.
- d) The maximum pitch p is determined by Equation (21.4.1) with $C = 2,1$ if either plate thickness is less than or equal to 11 mm thick, and $C = 2,2$ for all other plate thicknesses.
- e) The size of the fillet welds is not less than the plate thickness. The allowable load on the fillet welds shall be equal to the product of the weld area (based on the minimum leg dimension), the nominal design stress of the material being welded, and a weld joint factor of 55%.
- f) The maximum diameter or width of the hole in the plate shall not exceed 30 mm.
- g) The inside welds are properly inspected before the closing plates are attached.

21.8 Tables for Stayed Flat Walls

Table 21.8-1 Stress Factors for Braced and Stayed Surfaces	
Braced and Stayed Surface Construction	Stress Factor
Welded stays or threaded stays through plates not over 11 mm thickness with ends riveted over (e.g. Figure 21.9-2 sketches a and b)	2,1
Welded stays or threaded stays through plates over 11 mm in thickness with ends riveted over (e.g. Figure 21.9-2 sketches a and b)	2,2
Threaded stays through plates with single nuts outside of plate, threaded stays through plates with inside and outside nuts without washers, and stays screwed into plates as shown in Figure 21.9-1 sketch b	2,5
Stays with heads not less than 1.3 times the stay diameter screwed through plates or made a taper fit and having the heads formed on the stays before installing them, and not riveted over, said heads being made to have a true bearing on the plate (e.g. Figure 21.9-1 sketch a)	2,8
Stays fitted with inside and outside nuts and outside washers where the diameter of washers is not less than $0,4 p$ and thickness not less than e (e.g. Figure 21.9-1 sketch a)	3,2

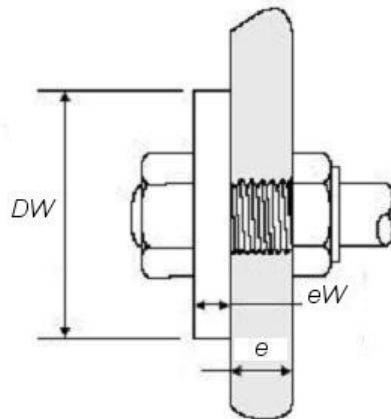
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21.9 Figures for Stayed Flat Walls

DW = not less than 2,5 times the nominal bolt diameter, but it must be at least 0,4 times the pitch of stays if $C = 3,2$.

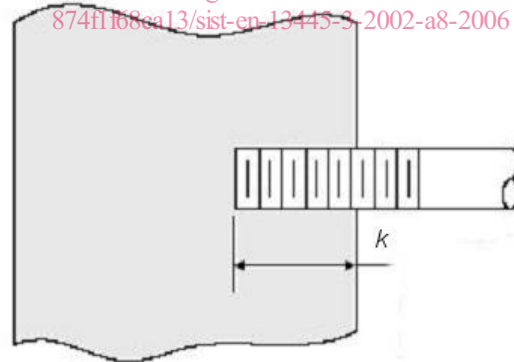
eW = not less than $e/2$ if $C = 2,8$ or less, and not less than e if $C = 3,2$.



(a)
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k = not less than 1,5 times the major diameter of bolts as measured on the outside of the threaded portion

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(b)

Figure 21.9-1 – Threaded End Stays