

norm

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Unfired pressure vessels - Part 3: Design

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Voorbeeld
Preview

ICS 23.020.30

English version

Unfired pressure vessels - Part 3: Design

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

Unbefeuerte Druckbehälter - Teil 3: Konstruktion

This European Standard was approved by CEN on 23 May 2002.

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Preview



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Voorbeeld
Preview

10.7	Flat ends of non-circular or annular shape.....	145
11	Flanges	148
11.1	Purpose.....	148
11.2	Specific definitions.....	148
11.3	Specific symbols and abbreviations	149
11.4	General.....	150
11.5	Narrow face gasketed flanges	154
11.6	Full face flanges with soft ring type gaskets	169
11.7	Seal welded flanges.....	172
11.8	Reverse narrow face flanges	173
11.9	Reverse full face flanges.....	175
11.10	Full face flanges with metal to metal contact	179
12	Bolted domed ends	182
12.1	Purpose.....	182
12.2	Specific definitions.....	182
12.3	Specific symbols and abbreviations	182
12.4	General.....	182
12.5	Bolted domed ends with narrow face gaskets	182
12.6	Bolted domed ends with full face joints	184
13	Heat Exchanger Tubesheets	187
13.1	Purpose.....	187
13.2	Specific definitions.....	187
13.3	Specific symbols and abbreviations	188
13.4	U-tube tubesheet heat exchangers.....	190
13.5	Fixed tubesheet heat exchangers.....	205
13.6	Floating tubesheet heat exchangers.....	234
13.7	Tubesheet characteristic	253
13.8	Maximum permissible tube to tubesheet joint stress.....	260
13.9	Maximum permissible longitudinal compressive stress for tubes	261
13.10	Design of tubesheet flange extension with a narrow face gasket.....	264
13.11	Design of tubesheet flange extension with a full face gasket	269
13.12	Special tube-to-tubesheet welded joints.....	272
14	Expansion bellows	275
14.1	Purpose.....	275
14.2	Specific definitions.....	275
14.3	Specific symbols and abbreviations	277
14.4	Conditions of applicability.....	278
14.5	U-shaped unreinforced bellows	281
14.6	U-shaped reinforced bellows	295
14.7	Toroidal bellows	299b
14.8	Fabrication	299h
14.9	Inspection and testing.....	299i
14.10	Bellows subjected to axial, lateral or angular displacements.....	300
15	Pressure vessels of rectangular section.....	306
15.1	Purpose.....	306
15.2	Specific definitions.....	306
15.3	Specific symbols and abbreviations	306
15.4	General.....	308
15.5	Unreinforced vessels	308
15.6	Reinforced vessels	314
15.7	Openings	323
16	Additional non-pressure loads.....	325
16.1	Purpose.....	325
16.2	Specific definitions.....	325
16.3	Specific symbols and abbreviations	326
16.4	Local loads on nozzles in spherical shells	328
16.5	Local loads on nozzles in cylindrical shells	338
16.6	Line loads	349
16.7	Lifting lugs	356

16.8	Horizontal vessels on saddle supports.....	360
16.9	Horizontal vessels on ring supports.....	374
16.10	Vertical vessels on bracket supports.....	379
16.11	Vertical vessels with supporting legs.....	384
16.12	Vertical vessels with skirts.....	387
16.13	Vertical vessels with ring supports.....	404
16.14	Global loads.....	415
17	Simplified assessment of fatigue life.....	421
17.1	Purpose.....	421
17.2	Specific definitions.....	421
17.3	Specific symbols and abbreviations.....	423
17.4	Conditions of applicability.....	424
17.5	General.....	425
17.6	Determination of allowable number of pressure cycles.....	425
17.7	Assessment rule.....	451
17.8	Design and manufacture.....	451
17.9	Testing.....	452
18	Detailed assessment of fatigue life.....	453
18.1	Purpose.....	453
18.2	Specific definitions.....	453
18.3	Specific symbols and abbreviations.....	456
18.4	Limitations.....	459
18.5	General.....	460
18.6	Welded material.....	462
18.7	Unwelded components and bolts.....	467
18.8	Elastic-plastic conditions.....	470
18.9	Fatigue action.....	472
18.10	Fatigue strength of welded components.....	475
18.11	Fatigue strength of unwelded components.....	497
18.12	Fatigue strength of steel bolts.....	503
19	Creep design.....	504a
19.1	Purpose.....	504a
19.2	Specific definitions.....	504a
19.3	Specific symbols and abbreviations.....	504a
19.4	Design in the creep range.....	504b
19.5	Nominal Design stress in the creep range.....	504b
19.6	Weld joint factor in the creep range.....	504f
19.7	Pressure loading of predominantly non-cyclic nature in the creep range.....	504g
19.8	Design procedures for DBF.....	504g
20	Design by experimental methods.....	504aa
20.1	Purpose.....	504aa
20.2	Specific definitions.....	504aa
20.3	Specific symbols and abbreviations.....	504aa
20.4	General requirements.....	504ac
20.5	Methods.....	504ad
20.6	Test specifications.....	504af
20.7	Duplicate or similar parts.....	504al
20.8	Bibliography.....	504am
21	Design Rules For Reinforced Flat Walls.....	504ba
21.1	General.....	504ba
21.2	Stayed Flat Walls.....	504ba
21.3	Specific Definitions for Stayed Flat Walls.....	504ba
21.4	Required Thickness of Stayed Flat Walls.....	504ba
21.5	Required Dimensions and Layout of Staybolts and Stays.....	504ba
21.6	Requirements For Threaded Staybolts.....	504bb
21.7	Requirements For Welded-in Staybolts And Welded Stays.....	504bb
21.8	Tables for Stayed Flat Walls.....	504bc
21.9	Figures for Stayed Flat Walls.....	504bd
Annex A (normative) Design requirements for pressure bearing welds.....		505
Annex B (normative) Design by Analysis - direct route.....		529

Annex C (normative) Design by Analysis - method based on stress categories	550
Annex D (informative) Verification of the shape of vessels subject to external pressure.....	569
Annex E (normative) Procedure for calculating the departure from the true circle of cylinders and cones	576
Annex F (normative) Allowable external pressure for vessels outside circularity tolerance	579
Annex G (normative) Alternative design rules for flanges and gasketed flange connections.....	581
Annex H (informative) Table H-1 Gasket factors <i>m</i> and <i>y</i>	631
Annex I (informative) Additional information on heat exchanger tubesheet design.....	634
Annex J (normative) Alternative methods for the design of heat exchanger tubesheets	638
Annex K (informative) Additional information on expansion bellows design	674
Annex L (informative) Basis for design rules related to additional non-pressure loads	681
Annex M (informative) In-service monitoring of vessels operating in fatigue or creep	683
Annex N (informative) Bibliography to Clause 18	685
Annex O (informative) Physical properties of steels	686
Annex P (normative) Classification of weld details to be assessed using principal stresses.....	693
Annex Q (normative) Simplified procedure for fatigue assessment of unwelded zones	706
Annex R (informative) Coefficients for creep-rupture model equations for extrapolation of creep- rupture strength.....	706a
Annex S (informative) Extrapolation of the nominal design stress based on time-independent behaviour in the creep range	706e
Annex ZA (informative) Clauses of this European Standard addressing essential requirements or other provisions of the EU Directives	707

Preview
 EUROPE

Voorbeeld
Preview

Foreword

This document (EN 13445-3:2002, EN 13445-3:2002/A4:2005, EN 13445-3:2002/A5:2006, EN 13445-3:2002/A6:2006, EN 13445-3:2002/A8:2006, EN 13445-3:2002/A11:2006, EN 13445-3:2002/A2:2007, EN 13445-3:2002/A3:2007 and EN 13445-3:2002/A1:2007) has been prepared by Technical Committee CEN/TC 54 "Unfired pressure vessels", the secretariat of which is held by BSI.

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 November 2002, and conflicting national standards shall be withdrawn at the latest by November 2002. EN 13445-3:2002/A4:2005 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2006, and conflicting national standards shall be withdrawn at the latest by January 2006. EN 13445-3:2002/A5:2006 and EN 13445-3:2002/A6:2006 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2006, and conflicting national standards shall be withdrawn at the latest by August 2006. EN 13445-3:2002/A8:2006 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. EN 13445-3:2002/A11:2006 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2007, and conflicting national standards shall be withdrawn at the latest by June 2007. EN 13445-3:2002/A2:2007 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2007, and conflicting national standards shall be withdrawn at the latest by October 2007. EN 13445-3:2002/A3:2007 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2007, and conflicting national standards shall be withdrawn at the latest by October 2007. 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 December 2007, and conflicting national standards shall be withdrawn at the latest by December 2007.

NOTE Issue 25 of EN 13445-3:2002 does not contain the specific provisions of EN 13445-3:2002/A2:2007 concerning non-destructive testing of welded joints and final assessment for vessels designed by experimental methods, which are incorporated in issue 25 of EN 13445-5:2002.

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(s), see informative Annex ZA, which is an integral part of this document.

In this standard the Annexes A, B, C, E, F, G, J, P and Q are normative and the Annexes D, H, I, K, L, M, N, O, R and S are informative.

This European Standard consists of the following Parts:

- Part 1: General.
- Part 2: Materials.
- Part 3: Design.
- Part 4: Fabrication.
- Part 5: Inspection and Testing.
- Part 6: Requirements for the design and fabrication of pressure vessels and pressure parts constructed from spheroidal graphite cast iron.
- CR 13445-7, Unfired pressure vessels - Part 7: Guidance on the use of conformity assessment procedures.

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1 Scope

This Part of this European Standard specifies requirements for the design of unfired pressure vessels covered by EN 13445-1:2002 and constructed of steels in accordance with EN 13445-2:2002.

EN 13445-5:2002, Annex C specifies requirements for the design of access and inspection openings, closing mechanisms and special locking elements.

NOTE This Part applies to design of vessels before putting into service. It may be used for in service calculation or analysis subject to appropriate adjustment.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies (including amendments).

EN 286-2:1992, *Simple unfired pressure vessels designed to contain air or nitrogen — Part 2: Pressure vessels for air braking and auxiliary systems for motor vehicles and their trailers.*

EN 288-8:1995, *Specification and approval of welding procedures for metallic materials — Part 8: Approval by a pre-production welding test.*

EN 764-1:2004, *Pressure equipment — Terminology — Part 1: Pressure, temperature, volume, nominal size*

EN 764-2:2002, *Pressure equipment — Part 2: Quantities, symbols and units*

EN 764-3:2002, *Pressure equipment — Part 3: Definition of parties involved*

EN 837-1, *Pressure gauges — Part 1: Bourdon tube pressure gauges - Dimensions, metrology, requirements and testing*

EN 837-3, *Pressure gauges — Part 3: Diaphragm and capsule pressure gauges - Dimensions, metrology, requirements and testing*

EN 1092, *Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN-designated.*

EN 1591-1:2001, *Flanges and their joints - Design rules for gasketed circular flange connections — Calculation method.*

EN 1708-1:1999, *Welding - Basic weld joint details in steel — Part 1: Pressurized components*

EN 10222-1:1998, *Steel forgings for pressure purposes — Part 1: General requirements for open die forgings*

EN ISO 4014:2000, *Hexagon head bolts — Product grades A and B (ISO 4014:1999).*

EN ISO 4016:2000, *Hexagon head bolts — Product grade C (ISO 4016:1999).*

ISO 261:1998, *ISO general purpose metric screw threads — General plan.*

3 Terms and definitions

For the purposes of this Part of this European Standard, the terms and definitions given in EN 13445-1:2002, EN 13445-2:2002 and the following apply:

3.1

action

imposed thermo-mechanical influence which causes stress and/or strain in a structure, e.g. an imposed pressure, force, temperature

3.2

analysis thickness

effective thickness available to resist the loadings in corroded condition

3.3

assumed thickness

thickness assumed by the designer between the minimum required shell thickness e and the shell analysis thickness e_a

3.4

calculation pressure

differential pressure used for the purpose of calculations of a component

[prEN 764-1:2001]

3.5

calculation temperature

temperature used for the purpose of calculations of a component

[prEN 764-1:2001]

3.6

chamber

single fluid space within a unit of pressure equipment

[prEN 764-1:2001]

3.7

component

part of pressure equipment or assembly which can be considered as an individual item for the calculation

[prEN 764-1:2001]

3.8

cryogenic applications

applications involving liquefied gases at low temperature

3.9

design pressure

pressure at the top of each chamber of the pressure equipment chosen for the derivation of the calculation pressure of each component

[prEN 764-1:2001]NOTE Any other location may be specified.

3.10

design temperature

temperature chosen for the derivation of the calculation temperature of each component

[prEN 764-1:2001]

3.11

differential pressure

pressure for which the algebraic value is equal to the difference of pressure on both sides of a component

[prEN 764-1:2001]

3.12

governing weld joint

main full penetration butt joint the design of which, as a result of membrane stresses, governs the thickness of the component

- 3.13**
load case
combination of coincident actions
- 3.14**
main joint
weld joint assembling main pressure bearing parts
- 3.15a**
maximum permissible pressure for normal operating load cases
pressure obtained with the analysis thickness e_a at the calculation temperature for a given component, using the relevant design formulae or procedures
- 3.15b**
maximum permissible pressure for testing load cases
pressure obtained with the minimum possible fabrication thickness e_{min} at the test temperature for a given component, using the relevant design formulae or procedures and $z = 1$
- 3.16**
minimum possible fabrication thickness
minimum possible thickness after fabrication
- 3.17**
nominal design stress
stress value to be used in the formulae for the calculation of pressure components
- 3.18**
nominal thickness
thickness as specified on the drawings
- 3.19**
test pressure
pressure at which the equipment is subjected for test purposes
- [prEN 764-1:2001]
- 3.20**
test temperature
temperature at which the pressure test of the pressure equipment is carried out
- [prEN 764-1:2001]
- 3.21**
volume
internal volume of a chamber, including the volume of nozzles to the first connection (flange, coupling, weld) and excluding the volume of internal permanent parts (e.g. baffles, agitators)
- NOTE EN 13445-1:2002 and EN 13445-2:2002 have adopted terminology, symbols and definitions of prEN 764-1:2001, EN 764-2:2002 and EN 764-3:2002.
- 3.22**
weld throat thickness of a fillet weld
height of the inscribed isosceles triangle measured from the theoretical root point
- 3.23**
creep range
temperature range in which material characteristics used in design are time dependent

NOTE See also 5.1.

4 Symbols and abbreviations

For the purposes of this Part of this European Standard, the general symbols and abbreviations shall be in accordance with EN 13445-1:2002, EN 13445-2:2002 and Table 4-1:

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