

|            |                                                                                     |                                                   |
|------------|-------------------------------------------------------------------------------------|---------------------------------------------------|
| <b>STN</b> | <b>Nevyhrievané tlakové nádoby</b><br><b>Časť 3: Navrhovanie</b><br><b>Zmena A1</b> | <b>STN</b><br><b>EN 13445-3/A1</b><br><br>69 0010 |
|------------|-------------------------------------------------------------------------------------|---------------------------------------------------|

Unfired pressure vessels - Part 3: Design

Táto norma obsahuje anglickú verziu európskej normy.  
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 03/26

Obsahuje: EN 13445-3:2021/A1:2025

142307



EUROPEAN STANDARD

EN 13445-3:2021/A1

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2025

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 amendment A1 modifies the European Standard EN 13445-3:2021; it was approved by CEN on 18 August 2025.

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 CEN-CENELEC Management Centre 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 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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.



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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

**EN 13445-3:2021/A1:2025 (E)****Contents**

Page

|                                                                                                                                       |           |
|---------------------------------------------------------------------------------------------------------------------------------------|-----------|
| European foreword.....                                                                                                                | 4         |
| <b>1 Modifications to the whole document .....</b>                                                                                    | <b>5</b>  |
| <b>2 Modifications to Clause 2, “Normative references” .....</b>                                                                      | <b>5</b>  |
| <b>3 Modifications to 5.7.4.3, “Lap joints” .....</b>                                                                                 | <b>6</b>  |
| <b>4 Modifications to Clause 6, “Maximum allowed values of the nominal design stress for pressure parts” .....</b>                    | <b>7</b>  |
| <b>5 Modification to 7.6.5, “Junctions – general” .....</b>                                                                           | <b>7</b>  |
| <b>6 Modifications to 9.2, “Specific definitions” .....</b>                                                                           | <b>7</b>  |
| <b>7 Modification to 9.3.2, “Symbols” .....</b>                                                                                       | <b>9</b>  |
| <b>8 Modification to 9.4.4.2, “Openings reinforced by elliptical or obround nozzles normal to the shell wall (see 9.4.1.d)” .....</b> | <b>12</b> |
| <b>9 Modification to 9.4.5, “Limitations on diameter” .....</b>                                                                       | <b>12</b> |
| <b>10 Modification to 9.4.7, “Nozzles to shell connections” .....</b>                                                                 | <b>13</b> |
| <b>11 Modifications to 9.4.8, “Distance between a nozzle and a shell butt-weld” .....</b>                                             | <b>13</b> |
| <b>12 Modifications to 9.5, “Isolated openings” .....</b>                                                                             | <b>15</b> |
| <b>13 Modification to 9.6, “Multiple openings” .....</b>                                                                              | <b>29</b> |
| <b>14 Modification to 9.7, “Openings close to a shell discontinuity” .....</b>                                                        | <b>36</b> |
| <b>15 Modification to 11.4.4, “Flange construction” .....</b>                                                                         | <b>38</b> |
| <b>16 Modifications to 16.4.8, “Nozzle longitudinal stresses” .....</b>                                                               | <b>39</b> |
| <b>17 Modifications to 16.6.2, “Additional specific symbols and abbreviations” .....</b>                                              | <b>40</b> |
| <b>18 Modifications to 16.6.8, “Single line loads (see Figures 16.6-2 and 16.6-3)” .....</b>                                          | <b>40</b> |
| <b>19 Modification to 16.7.5, “Load limits for shell” .....</b>                                                                       | <b>40</b> |
| <b>20 Modification to 16.10.1, “General” .....</b>                                                                                    | <b>41</b> |
| <b>21 Modifications to 16.10.2, “Additional specific symbols and abbreviations (see Figure 16.10-1)” .....</b>                        | <b>41</b> |
| <b>22 Modification to 16.10.3, “Conditions of applicability” .....</b>                                                                | <b>46</b> |
| <b>23 Modification to 16.10.4, “Applied forces” .....</b>                                                                             | <b>47</b> |
| <b>24 Modification to 16.10.5, “Load limits of the shell” .....</b>                                                                   | <b>53</b> |
| <b>25 Addition of subclauses 16.10.6, “Support brackets” and 16.10.7 “Design of welds” .....</b>                                      | <b>60</b> |
| <b>26 Modifications to 16.12.5.3, “Stress checks for anchor bolts and concrete” .....</b>                                             | <b>65</b> |
| <b>27 Modifications to 16.12.5.4.2, “General condition of applicability for the types” .....</b>                                      | <b>66</b> |
| <b>28 Modifications to 16.12.5.4.3, “Checks for type 1 – Simple bearing plate” .....</b>                                              | <b>66</b> |
| <b>29 Modifications to 16.12.5.4.4.1, “Checks for the bearing plate” .....</b>                                                        | <b>67</b> |

|    |                                                                                                                                                          |     |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 30 | Modifications to 16.12.5.4.4.3, “Checks of the skirt at gussets” .....                                                                                   | 68  |
| 31 | Modification to 16.12.5.4.5.1, “Check for the bearing plate” .....                                                                                       | 68  |
| 32 | Modification to 16.12.5.4.5.2, “Check for top plates” .....                                                                                              | 68  |
| 33 | Modifications to 16.12.5.4.5.5, “Checks for type 4 – Bearing plate with top ring plate” .....                                                            | 68  |
| 34 | Modifications to 16.12.5.4.5.6, “Check of the skirt at top ring plate” .....                                                                             | 70  |
| 35 | Addition of new subclause 16.15, “Global loads on conical shells and conical transitions without knuckles” .....                                         | 70  |
| 36 | Modification to 17.6.2.2, “Temperature” .....                                                                                                            | 77  |
| 37 | Modification to Clause 18, “Detailed assessment of fatigue life” .....                                                                                   | 77  |
| 38 | Modification to Annex A, “Design requirements for pressure bearing welds” .....                                                                          | 127 |
| 39 | Modifications to Annex C, “Design by analysis – Method based on stress categories” .....                                                                 | 145 |
| 40 | Modification to Annex L, “Basis for design rules related to additional non-pressure loads” .....                                                         | 147 |
| 41 | Modification to Annex N, “Bibliography to Clause 18” .....                                                                                               | 147 |
| 42 | Addition of new Annex NA, “Methods of determination of the structural hot-spot stress by finite element analysis using shell and solid elements” .....   | 148 |
| 43 | Addition of new Annex NB, “Cycle counting and determination of equivalent stress range” .....                                                            | 158 |
| 44 | Addition of new Annex NC, “Fatigue assessment of partial penetration welds” .....                                                                        | 191 |
| 45 | Addition of new Annex ND, “Methods for calculation of stress concentrations $\sigma_{total}$ and stress concentration factors $K_t$ ” .....              | 198 |
| 46 | Modifications to Annex P, “Classification of weld details to be assessed using principal stresses” .....                                                 | 202 |
| 47 | Modifications to Annex Q, “Simplified procedure for the fatigue assessment of unwelded zones” .....                                                      | 202 |
| 48 | Modification to Annex Y, “History of EN 13445-3” .....                                                                                                   | 202 |
| 49 | Modification to Annex ZA, “Relationship between this European Standard and the essential requirements of Directive 2014/68/EU aimed to be covered” ..... | 204 |

**EN 13445-3:2021/A1:2025 (E)****European foreword**

This document (EN 13445-3:2021/A1:2025) has been prepared by Technical Committee CEN/TC 54 “Unfired pressure vessels”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2026 and conflicting national standards shall be withdrawn at the latest by May 2026.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

## 1 Modifications to the whole document

Replace “Equation (\*\*\*)” with “Formula (\*\*\*)” and “Equations (\*\*\*)” with “Formulae (\*\*\*)”.

## 2 Modifications to Clause 2, “Normative references”

Add a reference to EN 12952-3:2022 and replace the references to EN 1990:2002, EN 1991-1-6:2005, EN 1992-1-1:2005, EN 1998-1:2004, EN 10222-1:1998, EN 12195-1:2010, EN 13445-2:2021, EN 13445-4:2021, EN 13555:2014, EN ISO 4014:2011, EN ISO 4016:2011 and EN ISO 15613:2004 with the following:

“

EN 1990:2023, *Eurocode — Basis of structural and geotechnical design*

EN 1991-1-6:2005<sup>2)</sup>, *Eurocode 1 — Actions on structures — Part 1-6: General actions — Actions during execution*

EN 1992-1-1:2023, *Eurocode 2 — Design of concrete structures — Part 1-1: General rules and rules for buildings, bridges and civil engineering structures*

EN 1998-1:2004<sup>3)</sup>, *Design of structures for earthquake resistance — Part 1: General rules, seismic actions and rules for buildings*

EN 10222-1:2017, *Steel forgings for pressure purposes — Part 1: General requirements for open die forgings*

EN 12195-1:2010<sup>4)</sup>, *Load restraining on road vehicles — Safety — Part 1: Calculation of securing forces*

EN 12952-3:2022, *Water-tube boilers and auxiliary installations — Part 3: Design and calculation for pressure parts of the boiler*

EN 13445-2:2021+A1:2023, *Unfired pressure vessels — Part 2: Materials*

EN 13445-4:2021+A1:2023, *Unfired pressure vessels — Part 4: Fabrication*

EN 13555:2021, *Flanges and their joints — Gasket parameters and test procedures relevant to the design rules for gasketed circular flange connections*

EN ISO 4014:2022, *Fasteners — Hexagon head bolts — Product grades A and B (ISO 4014:2022)*

EN ISO 4016:2022, *Fasteners — Hexagon head bolts — Product grade C (ISO 4016:2022)*

EN ISO 15613:2004, *Specification and qualification of welding procedures for metallic materials — Qualification based on pre-production welding test (ISO 15613:2004)*

---

2) EN 1991-1-6:2005 is impacted by the corrigendum EN 1991-1-6:2005/AC:2013.

3) EN 1998-1:2004 is impacted by the stand-alone amendment EN 1998-1:2004/A1:2013.

4) EN 12195-1:2010 is impacted by the corrigendum EN 12195-1:2010/AC:2014.

”.

**EN 13445-3:2021/A1:2025 (E)**

*Throughout the text, replace all references to “EN 13445-2:2021” with “EN 13445-2:2021+A1:2023” and replace all references to “EN 13445-4:2021” with “EN 13445-4:2021+A1:2023”.*

**koniec náhľadu – text ďalej pokračuje v platenej verzii STN**