



**SLOVENSKI STANDARD**  
**SIST EN 13445-4:2009/A2:2014**  
**01-julij-2014**

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**Neogrevane tlačne posode - 4. del: Proizvodnja - Dopolnilo A2**

Unfired pressure vessels - Part 4: Fabrication

Unbefeuerte Druckbehälter - Teil 4: Herstellung

Réipients sous pression non soumis à la flamme - Partie 4: Fabrication

**Ta slovenski standard je istoveten z: EN 13445-4:2009/A2:2014**

[SIST EN 13445-4:2009/A2:2014](https://standards.iteh.ai/catalog/standards/sist/69b0ef9a-13c9-474f-8e63-acf9cbaefa50/sist-en-13445-4-2009-a2-2014)

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**ICS:**

23.020.30	Tlačne posode, plinske jeklenke	Pressure vessels, gas cylinders
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**SIST EN 13445-4:2009/A2:2014**                      **en,fr,de**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 13445-4:2009/A2**

April 2014

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English Version

## Unfired pressure vessels - Part 4: Fabrication

Réceptifs sous pression non soumis à la flamme - Partie 4:  
Fabrication

Unbefeuerte Druckbehälter - Teil 4: Herstellung

This amendment A2 modifies the European Standard EN 13445-4:2009; it was approved by CEN on 6 February 2014.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## Foreword

This document (EN 13445-4:2009/A2:2014) 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 13445-4:2009 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2014, and conflicting national standards shall be withdrawn at the latest by October 2014.

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(s).

For relationship with EU Directive(s), 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 13445-4:2009 will be published in July 2014 as Issue 6 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, Former Yugoslav Republic of Macedonia, 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.

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**EN 13445-4:2009/A2:2014 (E)****1 Modification of Clause 1 Scope**

*Replace the scope with the following:*

“This document specifies requirements for the manufacture of unfired pressure vessels and their parts, made of steels, including their connections to non-pressure parts. It specifies requirements for material traceability, manufacturing tolerances, welding requirements, requirements for permanent joints other than welding, production tests, forming requirements, heat treatment, repairs and finishing operations.”

**2 Update of Clause 2 Normative References**

*Replace Clause 2 with the following:*

**“2 Normative References**

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 287-1:2011, *Qualification test of welders — Fusion welding — Part 1: Steels*

EN 1321:1996, *Destructive tests on welds in metallic materials — Macroscopic and microscopic examination of welds*

EN 10028-2:2009, *Flat products made of steels for pressure purposes — Part 2: Non-alloy and alloy steels with specified elevated temperature properties*

EN 10028-3:2009, *Flat products made of steels for pressure purposes — Part 3: Weldable fine grain steels, normalized*

EN 10028-4:2009, *Flat products made of steels for pressure purposes — Part 4: Nickel alloy steels with specified low temperature properties*

EN 10216-1:2013, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 1: Non-alloy steel tubes with specified room temperature properties*

EN 10216-2:2013, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 2: Non-alloy and alloy steel tubes with specified elevated temperature properties*

EN 10216-3:2013, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 3: Alloy fine grain steel tubes*

EN 10216-4:2013, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 4: Non-alloy and alloy steel tubes with specified low temperature properties*

EN 10217-1:2002, EN 10217-1:2002/A1:2005, *Welded steel tubes for pressure purposes — Technical delivery conditions — Part 1: Non-alloy steel tubes with specified room temperature properties*

EN 10217-2:2002, EN 10217-2:2002/A1:2005, *Welded steel tubes for pressure purposes — Technical delivery conditions — Part 2: Electric welded non-alloy and alloy steel tubes with specified elevated temperature properties*

EN 10217-3:2002, EN 10217-3:2002/A1:2005, *Welded steel tubes for pressure purposes — Technical delivery conditions — Part 3: Alloy fine grain steel tubes*

EN 10217-4:2002, EN 10217-4:2002/A1:2005, *Welded steel tubes for pressure purposes — Technical delivery conditions — Part 4: Electric welded non-alloy and alloy steel tubes with specified low temperature properties*

EN 10217-5:2002, EN 10217-5:2002/A1:2005 *Welded steel tubes for pressure purposes — Technical delivery conditions — Part 5: Submerged arc welded non-alloy and alloy steel tubes with specified elevated temperature properties*

EN 10217-6:2002, EN 10217-6:2002/A1:2005, *Welded steel tubes for pressure purposes — Technical delivery conditions — Part 6: Submerged arc welded non-alloy and alloy steel tubes with specified low temperature properties*

EN 10222-2:1999, *Steel forgings for pressure purposes — Part 2: Ferritic and martensitic steels with specified elevated temperature properties*

EN 10222-3:1998, *Steel forgings for pressure purposes — Part 3: Nickel steels with specified low temperature properties*

EN 10222-4:1998/A1:2002, *Steel forgings for pressure purposes — Part 4: Weldable fine grain steels with high proof strength*

EN 13134:2000, *Brazing — Procedure approval*

EN 13445-1:2009, (Issue 5), *Unfired pressure vessels - Part 1: General*

EN 13445-2:2009, (Issue 5), *Unfired pressure vessels - Part 2: Materials*

EN 13445-3:2009, (Issue 5), *Unfired pressure vessels - Part 3: Design*

EN 13445-5:2009, (Issue 5), *Unfired pressure vessels - Part 5: Inspection and testing*

EN 14276-1:2006+A1:2011, *Pressure equipment for refrigerating systems and heat pumps — Part 1: Vessels — General requirements*

EN ISO 3834-2:2005, *Quality requirements for fusion welding of metallic materials - Part 2: Comprehensive quality requirements (ISO 3834-2:2005)*

EN ISO 3834-3:2005, *Quality requirements for fusion welding of metallic materials - Part 3: Standard quality requirements (ISO 3834-3:2005)*

EN ISO 4136:2012, *Destructive tests on welds in metallic materials - Transverse tensile test (ISO 4136:2012)*

EN ISO 5173:2010, *Destructive tests on welds in metallic materials - Bend tests (ISO 5173:2009)*

EN ISO 5178:2011, *Destructive tests on welds in metallic materials — Longitudinal tensile test on weld metal in fusion welded joints (ISO 5178:2001)*

EN ISO 9015-1:2011, *Destructive tests on welds in metallic materials — Hardness testing — Part 1: Hardness test on arc welded joints (ISO 9015-1:2001)*

EN ISO 9016:2012, *Destructive tests on welds in metallic materials — Impact tests — Test specimen location, notch orientation and examination (ISO 9016:2012)*

EN ISO 13585:2012, *Brazing — Qualification test of brazers and brazing operators (ISO 13585:2012)*

**EN 13445-4:2009/A2:2014 (E)**

EN ISO 14732:2013, *Welding personnel — Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials (ISO 14732:2013)*

EN ISO 15609-1:2004, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding (ISO 15609-1:2004)*

EN ISO 15611:2003, *Specification and qualification of welding procedures for metallic materials — Qualification based on previous welding experience (ISO 15611:2003)*

EN ISO 15612:2004, *Specification and qualification of welding procedures for metallic materials — Qualification by adoption of a standard welding procedure (ISO 15612:2004)*

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

EN ISO 15614-1:2004, EN ISO 15614-1:2004/A1:2008, EN ISO 15614-1:2004/A2:2012 *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys (ISO 15614-1:2004)*

”

In addition, the corresponding normative references need to be updated in the standard text:

references to EN 1418:1997 in Clause 7.4 to be changed into EN ISO 14732:2013;

references to EN 287-1:2004 in Clause 7.4 to be changed into EN 287-1:2011;

references to EN 875:1995 in Table 8.3-2 into EN ISO 9016:2012;

references to EN 876:1995 in Clauses 7.3 and 8.4.3 and in Table 8.3-2 into EN ISO 5178:2011;

reference to EN 895:1995 in Table 8.3-2 into EN ISO 4136:2012;

reference to EN 910:1996 in Table 8.3-2 into EN ISO 5173:2010+A1:2011;

reference to EN 1043-1:1995 in Table 8.3-2 into EN ISO 9015-1:2011.

**3 Modification to 7.3**

*In the heading and in the first sentence replace:*

“WPAR”

by

“WPQR”.



## 4 Modification to Clause 7

*Insert new subclause 7.10*

### 7.10 Permanent joints other than welding

#### 7.10.1 General

Where non-welded joints are made between metallic materials and/or non-metallic materials, procedures shall be qualified, for all joints, in a manner similar to that used in qualifying welding procedures. Similarly, operators shall be qualified for carrying out such procedures.

#### 7.10.2 Mechanical roller expansion

Mechanical roller expansion procedures and expansion operator approvals shall be conducted in accordance with Annex C of this European Standard. Other expanding processes, e.g. hydro-expanding and explosive expanding, are not dealt with in Annex C (for such processes see 7.10.1). Where mechanical roller expansion and welding are used in combination, Annex C applies if the mechanical strength of the joint is only assured by the roller expansion process.

#### 7.10.3 Brazing

For hand brazing and manual mechanical brazing, brazing procedures and brazer approvals shall be conducted in accordance with EN 13134:2000 and EN ISO 13585:2012. The rules for fully automated furnace brazing shall be in accordance with EN 14276-1:2006+A1:2011. Old approvals valid under the Directive 97/23/EC already before publication of this standard retain their validity.

## 5 Modification to Annexes

*Insert new Annex C*

### Annex C (normative)

#### Specification and approval of expansion procedures and operators

##### C.1 General

###### C.1.1 Introduction

This annex defines the requirements for the qualification and approval of mechanical roller expansion (RE) procedures and operators.

The approval of expansion procedures is obtained by expansion procedure tests and for operators by procedure test or production.

###### C.1.2 Responsibility

The manufacturer of pressure equipment shall be responsible for the mechanical roller expansion procedures he carries out, and shall conduct the tests required by this annex.

The manufacturer shall keep all mechanical roller expansion procedure qualification records and operator qualifications.