

# SVENSK STANDARD

## SS-EN 13445-1:2014+C4:2017



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### **Tryckkärl (ej eldberörda) – Del 1: Allmänt**

### **Unfired pressure vessels – Part 1: General**

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Europastandarden EN 13445-1:2014 Issue 4 (2017-07) gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 13445-1:2014 Issue 4 (2017-07).

Denna standard ersätter SS-EN 13445-1:2014+C3:2016, utgåva 1.

The European Standard EN 13445-1:2014 Issue 4 (2017-07) has the status of a Swedish Standard. This document contains the official version of EN 13445-1:2014 Issue 4 (2017-07).

This standard supersedes the Swedish Standard SS-EN 13445-1:2014+C3:2016, edition 1.

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EUROPEAN STANDARD

**EN 13445-1**

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 2014

ICS 23.020.30

Supersedes EN 13445-1:2009

English Version

## Unfired pressure vessels - Part 1: General

Réceptifs sous pression non soumis à la flamme - Partie 1:  
Généralités

Unbefeuerte Druckbehälter - Teil 1: Allgemeines

This European Standard was approved by CEN on 19 August 2014.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a 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 European Standard 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.

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

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## Foreword

This document (EN 13445-1:2014) 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of an identical text or by endorsement, at the latest by December 2014, and conflicting national standards shall be withdrawn at the latest by December 2014.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 European Standard concerning “Unfired pressure vessels” comprises 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*
- Part 8: *Additional requirements for pressure vessels of aluminium and aluminium alloys*
- CEN/TR 13445-9, *Unfired pressure vessels — Part 9: Conformance of EN 13445 series to ISO 16528*

Although these Parts may be obtained separately, it should be recognised that the Parts are inter-dependant. As such the manufacture of unfired pressure vessels requires the application of all the relevant Parts in order for the requirements of the Standard to be satisfactorily fulfilled.

Corrections to the standard interpretations where several options seem possible are conducted through the Migration Help Desk (MHD). Information related to the Help Desk can be found at <http://www.unm.fr> ([en13445@unm.fr](mailto:en13445@unm.fr)). A form for submitting questions can be downloaded from the link to the MHD website. After subject experts have agreed an answer, the answer will be communicated to the questioner. Corrected pages will be given specific issue number and issued by CEN according to CEN Rules. Interpretation sheets will be posted on the website of the MHD.

This document supersedes EN 13445-1:2009. This new edition incorporates the Amendments which have been approved previously by CEN members, and the corrected pages up to Issue 5 without any further technical change. Annex Y provides details of significant technical changes between this European Standard and the previous edition.

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**Issue 4 (2017-07)**

Amendments to this new edition may be issued from time to time and then used immediately as alternatives to rules contained herein. It is intended to deliver a new Issue of EN 13445:2014 each year, consolidating these Amendments and including other identified corrections. Issue 4 (2017-07) includes the corrected pages listed in Annex Y.

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.



## Introduction

EN 13445 specifies the requirements for design, construction, inspection and testing of unfired pressure vessels. It defines terms, definitions and symbols applicable to unfired pressure vessels.

**NOTE** In EN 13445 the term pressure vessel includes the welded attachments up to and including the nozzle flanges, screwed or welded connections, or the edge to be welded at the first circumferential weld at connecting piping or other elements. The term unfired excludes vessels that are subject to direct generated heat or flame impingement from a fired process. This does not exclude vessels subject to electrical heating or heated process streams.

In Parts 2 to 5 only pressure vessels manufactured from steels and steel castings as detailed in Part 2 of this standard are covered. Parts 6 and 8 specifically deal with vessels of spheroidal graphite cast iron and aluminium, respectively, where special considerations apply.

### Part 1

This part contains general information on the scope of the standard as well as terms, definitions, quantities, symbols and units which are applied throughout the standard.

### Part 2

This part deals with the general philosophy on materials, material grouping and low temperature behaviour. It is limited to steel with sufficient ductility and, for components operating in the creep range, sufficient creep ductility.

Part 2 also provides the general requirements for establishing technical delivery conditions and the requirements for marking of material.

### Part 3

This part of the standard gives the rules to be used for design and calculation under internal and/or external pressure (as applicable), local loads and actions other than pressure. The rules provided are both design by formulae (DBF), design by analysis (DBA) and design by experiment (DBE).

The part also sets the requirements for when fatigue analysis must be performed and the rules to be followed when this is the case.

**NOTE** Collaborative work is in hand to harmonize flange design across European standards.

### Part 4

This part of the standard specifies requirements for the manufacture of unfired pressure vessels and 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.

### Part 5

This part covers all those inspection and testing activities associated with the verification of the pressure vessel for compliance with the standard, including design review by the manufacturer and supporting technical documentation, NDT and other inspection activities including document control, material traceability, joint preparation and welding.

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**Issue 4 (2017-07)**

The level of testing is driven by the selection of the vessel testing group. Basically, the testing group determines the level of NDT and the joint coefficient used in the design.

In terms of NDT, the overall philosophy has been the general adoption of EN ISO 5817:2014 quality level 'C' for predominantly non-cyclic loaded vessels and level 'B' for vessels subject to cyclic loadings.

**Part 6**

This part contains special rules for material, design, fabrication, inspection, and testing of pressure vessels made from spheroidal graphite cast iron. In general the rules in the relevant parts of parts 2–5 apply with additions and exceptions outlined in this part.

**Part 7**

This part gives guidance on how to use the conformity assessment procedures in the Pressure Equipment Directive 97/23/EC. This is a CEN Technical Report.

**Part 8**

This part contains special rules for material, design, fabrication, inspection, and testing of pressure vessels made from aluminium and aluminium alloys. In general the rules in the relevant parts of parts 2–5 apply with additions and exceptions outlined in this part.

**Part 9**

This part details the conformance of the whole EN 13445 series to ISO 16528-1 "Boilers and pressure vessels — Part 1: Performance requirements". This is a CEN Technical Report. The first edition is limited to vessels of steel construction, but will be amended later to include spheroidal graphite cast iron and aluminium.

## 1 Scope

This part of this European Standard defines the terms, definitions, quantities, symbols and units that are used throughout the EN 13445. It also contains instructions on how to use the standard (Annex A) as well as an index which covers the whole standard (Annex B). This information is aimed to aid the user of the EN 13445.

This European Standard applies to unfired pressure vessels with a maximum allowable pressure greater than 0,5 bar gauge but may be used for vessels operating at lower pressures, including vacuum.

NOTE The selection, application and installation of safety related accessories intended to protect pressure vessels during operation are covered in EN 764-7.

This European Standard is not applicable to pressure vessels of the following types:

- vessels of riveted construction;
- vessels of lamellar cast iron or any other materials not included in parts 2, 6, or 8 of the standard;
- multilayered, autofrettaged or pre-stressed vessels;

This European standard may be applied to the following vessels, provided that account is taken of additional and/or alternative requirements resulting from the hazard analysis and from rules or instructions specific for:

- transportable vessels;
- items specifically designed for nuclear use;
- pressure vessels with a risk of overheating

Other European standards apply to industrial piping (EN 13480) and to water tube and shell boilers (EN 12952 and EN 12953).

## 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 764-1:2004, *Pressure Equipment — Part 1: Terminology — Pressure, temperature, volume, nominal size*

EN 764-2:2012, *Pressure Equipment — Part 2: Quantities, symbols and units*

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

EN 13445-2:2014, *Unfired pressure vessels — Part 2: Materials*

EN 13445-3:2014, *Unfired pressure vessels — Part 3: Design*

EN 13445-4:2014, *Unfired pressure vessels — Part 4: Fabrication*

EN 13445-5:2014, *Unfired pressure vessels — Part 5: Inspection and testing*

EN 13445-6:2014, *Unfired pressure vessels — Part 6: Requirements for the design and fabrication of pressure vessels and pressure parts constructed from spheroidal graphite cast iron*

EN 13445-8:2014, *Unfired pressure vessels — Part 8: Additional requirements for pressure vessels of aluminium and aluminium alloys*