LEEKKUUMUTUSETA SURVEANUMAD. OSA 6: NÕUDED KERAGRAFIITMALMIST TOODETUD SURVEANUMATE JA SURVEDETAILIDE KAVANDAMISELE JA VALMISTAMISELE

Unfired pressure vessels - Part 6: Requirements for the design and fabrication of pressure vessels and pressure parts constructed from spheroidal graphite cast iron

EESTI STANDARDIKESKUS
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NATIONAL FOREWORD

See Eesti standard EVS-EN 13455-6:2014+A1:2015 sisaldab Euroopa standardi EN 13445-6:2014 (V05, avaldatud 07.2018) ja muudatuse A1:2015 ingliskeelset teksti.	This Estonian standard EVS-EN 13445-6:2014+A1:2015 consists of the English text of the European standard EN 13445-6:2014 (Issue V05, 07.2018) and its amendment A1:2015.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 10.09.2014, muudatuse A1 21.10.2015.	Date of Availability of the European standard is 10.09.2014, for A1 21.10.2015
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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Récipients sous pression non soumis à la flamme - Partie 6: Exigences pour la conception et la fabrication des récipients sous pression et des parties sous pression moulés en fonte à graphite sphéroïdal

Unbefeuerte Druckbehälter - Teil 6: Anforderungen an die Konstruktion und Herstellung von Druckbehältern und Druckbehälterteilen aus Gusseisen mit Kugelgraphit

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

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Foreword

This document (EN 13445-6:2014) 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of an identical text or by endorsement, at the latest by December 2014, and conflicting national standards shall be withdrawn at the latest by December 2014.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 consists of the following Parts:

— Part 1: *General*

— Part 2: *Materials*

— Part 3: *Design*

— Part 4: *Fabrication*

— Part 5: *Testing and Inspection*

— 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: *Requirements for the design and fabrication of pressure vessels and pressure parts constructed from spheroidal graphite cast iron*.

— CEN/TR 13445-9, *Unfired pressure vessels — Part 9: Conformance of EN 13445 series to ISO 16528*

— Part 10: *Additional requirements for pressure vessels of nickel and nickel alloys*

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). 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 13445-6:2009. 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.

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 5 (2018-07) 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies requirements for the design, materials, manufacturing and testing of pressure vessels and pressure vessel parts intended for use with a maximum allowable pressure, PS, equal or less than:

— 100 bar when containing gases or liquids in group 1 or 2

— 1000 bar when containing liquids in group 2 only.

and shell wall thicknesses not exceeding 60 mm, which are constructed of ferritic or austenitic spheroidal graphite cast iron. The thickness limitation of the shell does not apply to thickness of flanges, reinforcements, bosses etc.

NOTE 1 Austenitic spheroidal graphite cast iron grades are principally used for high and low temperature applications and for their corrosion resistance properties.

NOTE 2 The allowable grades of spheroidal graphite cast iron are listed in Tables 5.1-1 and 5.1-2. Service conditions are given in Clause 4.

This European standard, EN 13445-6, does not include lamellar graphite cast iron grades for ferritic and austenitic grades with, with an elongation after fracture equal or less than 15 % which are explicitly excluded. Requirements for the use of cast irons with an elongation after fracture equal or less than 15 % are given in EN 15776.

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 287-6:2010, *Qualification test of welders — Fusion Welding — Part 6: Cast iron*

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

EN 764-5:2002, *Pressure equipment — Part 5: Compliance and inspection documentation of materials*

EN 837-1:1996, *Pressure gauges — Part 1: Bourdon tube pressure gauges — Dimensions, metrology, requirements and testing*

EN 837-3:1996, *Pressure gauges — Part 3: Diaphragm and capsule pressure gauges — Dimensions, metrology, requirements and testing*

EN 1011-8:2004, *Welding — Recommendations for welding of metallic materials — Part 8: Welding of cast irons*

EN 1369:2012, *Founding — Magnetic particle testing*

EN 1370:2011, *Founding — Examination of surface condition*

EN 1371-1:2011, *Founding — Liquid penetrant testing — Part 1: Sand, gravity die and low pressure die castings*

EN 1559-1:2011, *Founding — Technical conditions of delivery — Part 1: General*

EN 1559-3:2011, *Founding — Technical conditions of delivery — Part 3: Additional requirements for iron castings*

EN 1563:2011, *Founding — Spheroidal graphite cast irons*

EN 12680-3:2011, *Founding — Ultrasonic testing — Part 3: Spheroidal graphite cast iron castings.*

EN 12681:2003, *Founding — Radiographic examination*

EN 13445-1:2014, *Unfired pressure vessels — Part 1: General*

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

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

EN 13835:2012, *Founding — Austenitic cast irons*

EN ISO 945-1:2008, *Microstructure of cast irons — Part 1: Graphite classification by visual analysis* (ISO 945-1:2008)

EN ISO 8062-1:2007, *Geometrical product specifications (GPS) — Dimensional and geometrical tolerances for moulded parts — Part 1: Vocabulary* (ISO 8062-1:2007)

EN ISO 8062-3:2007, *Geometrical product specifications (GPS) — Dimensional and geometrical tolerances for moulded parts — Part 3: General dimensional and geometrical tolerances and machining allowances for castings* (ISO 8062-3:2007)

EN ISO 15614-3:2008, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 3: Fusion welding of non-alloyed and low-alloyed cast irons* (ISO 15614-3:2008)

3 Terms, definitions, units and symbols

3.1 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1.1
critical zone
highly stressed area where a fracture is expected to occur in a burst test or where surface fatigue cracks are expected to be initiated due to fluctuating pressure loads

Note 1 to entry: Critical zones may occur, for example, by any of the following:

— sudden change in cross section;

— sharp edges;

— sharp radii;

— peak stresses;

— bending stresses;

— stresses due to other than membrane stress;

— changes in curvature.

Note 2 to entry: A critical zone is analysed by any appropriate method, e.g. holographic, interferometric, strain gauge methods, burst test, fatigue testing, FEM analysis etc.

Note 3 to entry: Additionally, thermal gradients and thermal stresses due to different operating wall temperatures need to be considered in defining critical zones.

3.1.2
purchaser
individual or organisation that buys pressure equipment, including assemblies or parts, for its own use or on behalf of the user and/or operator

3.1.3
manufacturer
individual or organisation responsible for the design, fabrication, testing, inspection, installation of pressure equipment and assemblies where relevant

Note 1 to entry: The manufacturer may subcontract one or more of the above mentioned tasks under its responsibility.