

STN	Nevyhrievané tlakové nádoby Časť 5: Kontrola a skúšanie	STN EN 13445-5 69 0010
------------	--	--

Unfired pressure vessels - Part 5: Inspection and testing

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. 07/21

Obsahuje: EN 13445-5:2021

Oznámením tejto normy sa ruší
STN EN 13445-5 (69 0010) z decembra 2015

133121

EUROPEAN STANDARD

EN 13445-5

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2021

ICS 23.020.30

Supersedes EN 13445-5:2014

English Version

Unfired pressure vessels - Part 5: Inspection and testing

Réceptifs sous pression non soumis à la flamme -
Partie 5: Inspection et contrôle

Unbefeuerte Druckbehälter - Teil 5: Inspektion und
Prüfung

This European Standard was approved by CEN on 24 February 2021.

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.

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, Turkey 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 13445-5:2021 (E)
Issue 1 (2021-05)

Contents

	Page
1	Scope..... 7
2	Normative references..... 7
3	Terms and definitions 8
4	Performance of inspection and testing 10
4.1	General..... 10
4.2	Inspection 10
4.3	Non-destructive testing (NDT) 10
5	Technical documents 10
5.1	General..... 10
5.2	Information to be contained in the technical documents 10
5.2.1	General..... 10
5.2.2	General description of the pressure vessel 10
5.2.3	Design and construction drawings 11
5.2.4	Descriptions and explanations necessary for an understanding of the drawings and diagrams and the operation of the pressure vessel..... 11
5.2.5	Results of design calculations and examinations carried out..... 11
5.2.6	Test reports..... 13
5.2.7	Technical/manufacturing schedule 13
5.3	Design review 14
5.3.1	General..... 14
5.3.2	Design review 14
6	Inspection and testing during fabrication 15
6.1	General..... 15
6.2	Manufacturing procedures and construction drawings 15
6.3	Material traceability 15
6.3.1	General..... 15
6.3.2	Special Conditions - Material marking 15
6.4	Preparation for manufacturing processes..... 15
6.4.1	General..... 15
6.4.2	Joint preparation testing..... 16
6.4.3	Inspection of vessel supports 16
6.4.4	Inspection associated with forming 16
6.4.5	Testing of areas subject to significant through thickness tensile stress..... 16
6.5	Welding..... 16
6.5.1	General..... 16
6.5.2	Verification of welder and welding operator qualification and procedures qualification 17
6.5.3	Inspection of repairs..... 17
6.6	Non-destructive testing of welded joints..... 17
6.6.1	Extent of non-destructive testing 17
6.6.2	Determination of extent of non-destructive testing..... 21
6.6.3	Performing non-destructive testing..... 29
6.6.4	Description and acceptance level of imperfections..... 30

6.6.5	Stage of performance	30
6.6.6	Procedure for non-destructive retesting	30
6.6.7	Non-destructive testing documentation	31
6.7	Destructive testing	31
6.7.1	Extent of destructive testing	31
6.7.2	Schedule for destructive testing	31
6.7.3	Verification of destructive tests	31
6.7.4	Records	31
6.8	Heat-treatment	31
7	Subcontracted items	32
7.1	General	32
7.2	Subcontracted welding related activities	32
7.3	Subcontracted non-destructive testing activities	32
7.3.1	Use of contract NDT personnel at the premises of the vessel manufacturer	32
7.3.2	Subcontracting of NDT at a subcontractors premises	33
8	Miscellaneous tests	33
9	Calibration	33
9.1	General	33
9.2	Calibration procedure	34
9.2.1	General	34
9.2.2	Calibration	34
9.2.3	Frequency	35
9.3	Identification	35
9.4	Registration	35
10	Final assessment	35
10.1	General	35
10.2	Extent of final assessment	36
10.2.1	Visual and dimensional inspection	36
10.2.2	Review of documentation	37
10.2.3	Proof test	37
10.2.4	Post pressure test inspection	48
10.2.5	Inspection of safety accessories	48
11	Marking and declaration of compliance with the standard	48
11.1	General	48
11.2	Marking method	48
11.2.1	General	48
11.2.2	Direct stamping	49
11.2.3	Nameplate	49
11.3	Marking units	49
11.4	Marking contents	49
11.5	Declaration of compliance with the standard	50
12	Documents	51
12.1	Type of documents	51
12.2	Control and access of documents	52
12.3	Retention of documents	52
Annex A	(normative) Inspection and testing of serially produced pressure vessels	53
A.1	Introduction	53
A.2	Limitations for vessels permitted to be classified as serially produced	53
A.3	Limitations for model	53

EN 13445-5:2021 (E)
Issue 1 (2021-05)

A.4	Prototype test	54
A.5	Model acceptance	54
A.6	Quality or manufacturing plan	54
A.7	Inspection, non-destructive testing and pressure testing	55
A.7.1	Introduction	55
A.7.2	General NDT procedure for serially produced pressure vessels	55
A.7.3	Pressure test for serially produced pressure vessels	55
A.8	Marking	55
A.9	Documentation / Certification	56
Annex B (normative) Detailed dimensional requirements for pressure vessels		57
Annex C (normative) Access and inspection openings, closing mechanisms and special locking elements		59
C.1	General	59
C.2	Types and dimensions of access and inspection openings	59
C.2.1	Sightholes	59
C.2.2	Handholes	59
C.2.3	Headholes	59
C.2.4	Manholes	60
C.2.5	Rescue holes	60
C.3	Types, location and minimum number of access and inspection openings	60
C.4	Alternative requirements for sightholes openings on small vessels	62
C.5	Closing mechanisms and special locking elements	62
C.5.1	Purpose	62
C.5.2	Definitions	62
C.5.3	Materials of construction, design	62
C.5.4	Screw clamps	63
C.5.5	Hinged bolts	64
C.5.6	Yoke-type closures	65
C.5.7	Quick opening and closing devices	66
Annex D (informative) Leak Testing		73
D.1	General	73
D.2	Leak testing personnel	73
Annex E (informative) Acoustic emission		74
E.1	General	74
E.2	Useful standards	74
E.3	Acoustic emission personnel	74
E.4	Additional requirements	74
Annex F (normative) Inspection and testing of pressure vessels or parts subject to creep		75
F.1	General	75
F.2	Extent of inspection and testing	75
F.3	Performance of NDT and acceptance criteria	77
F.4	Documents	77
Annex G (normative) Inspection and testing of pressure vessels subject to cyclic loads		78
G.1	General	78
G.2	Extent of inspection and testing	78
G.3	Performance and acceptance criteria	78
G.4	Technical documentation, additional requirements	79
Annex H (informative) Declaration of compliance with this standard		80

Annex I (informative) Specific tests during construction to assist in-service inspection	82
I.1 General	82
I.2 Metallographic investigation.....	82
I.3 Hardness measurements	82
I.4 Dimensional measurements.....	83
Annex Y (informative) History of EN 13445-5.....	84
Y.1 Differences between EN 13445-5:2014 and EN 13445-5:2021.....	84
Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2014/68/EU aimed to be covered	85
Bibliography	87

EN 13445-5:2021 (E)
Issue 1 (2021-05)**European foreword**

This document (EN 13445-5:2021) 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 November 2021, and conflicting national standards shall be withdrawn at the latest by November 2021.

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 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.

list of all parts in the EN 13445 series can be found on the CEN website.

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 13445-5:2014. 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 13445:2021 each year, starting with the precedent as Issue 1, consolidating these Amendments and including other identified corrections.

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 Part of this document specifies the inspection and testing of individual and serially produced pressure vessels made of steels in accordance with EN 13445-2:2021.

Special provisions for cyclic operation are given in Annex G of this Part.

Special provisions for vessels or vessel parts working in the creep range are given in Annex F and Annex I of this Part.

NOTE The responsibilities of parties involved in the conformity assessment procedures are given in Directive 2014/68/EU. Guidance on this can be found in CR 13445-7.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CEN/TR 764-6:2012, *Pressure equipment — Part 6: Structure and content of operating instructions*

EN 1779:1999, EN 1779:1999/A1:2003, *Non-destructive testing — Leak testing — Criteria for method and technique selection*

EN 13445-1:2021, *Unfired pressure vessels — Part 1: General*

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

EN 13445-3:2021, *Unfired pressure vessels — Part 3: Design*

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

EN ISO 5817:2014, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) – Quality levels for imperfections (ISO 5817:2014)*

EN ISO 6520-1:2007, *Welding and allied processes — Classification of geometric imperfections in metallic materials — Part 1: Fusion welding (ISO 6520-1:2007)*

EN ISO 9606-1:2017, *Qualification testing of welders - Fusion welding - Part 1: Steels (ISO 9606-1:2012 including Cor 1:2012 and Cor 2:2013)*

EN ISO 9712:2012, *Non-destructive testing — Qualification and certification of NDT personnel (ISO 9712:2012)*

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 17635:2016, *Non-destructive testing of welds — General rules for metallic materials (ISO 17635:2016)*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN