



SLOVENSKI STANDARD
SIST EN 13445-2:2009/A1:2012
01-oktober-2012

Neogrevane tlačne posode - 2. del: Materiali - Dopolnilo A1

Unfired pressure vessels - Part 2: Materials

Unbefeuerte Druckbehälter - Teil 2: Werkstoffe

Recipients sous pression non soumis à la flamme - Partie 2: Matériaux

Ta slovenski standard je istoveten z: EN 13445-2:2009/A1:2012

[SIST EN 13445-2:2009/A1:2012](https://standards.iteh.ai/catalog/standards/sist/d181c6e7-d0fe-4a42-a59f-7e866a884225/sist-en-13445-2-2009-a1-2012)

<https://standards.iteh.ai/catalog/standards/sist/d181c6e7-d0fe-4a42-a59f-7e866a884225/sist-en-13445-2-2009-a1-2012>

ICS:

23.020.30	Tlačne posode, plinske jeklenke	Pressure vessels, gas cylinders
-----------	---------------------------------	---------------------------------

SIST EN 13445-2:2009/A1:2012 **en,fr,de**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 13445-2:2009/A1:2012

<https://standards.iteh.ai/catalog/standards/sist/d181c6e7-d0fe-4a42-a59f-7e866a884225/sist-en-13445-2-2009-a1-2012>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13445-2:2009/A1

June 2012

ICS 23.020.30

English Version

Unfired pressure vessels - Part 2: Materials

Réipients sous pression non soumis à la flamme - Partie
2: Matériaux

Unbefeuerte Druckbehälter - Teil 2: Werkstoffe

This amendment A1 modifies the European Standard EN 13445-2:2009; it was approved by CEN on 10 May 2012.

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 13445-2:2009/A1:2012
<https://standards.iteh.ai/catalog/standards/sist/d181c6e7-d0fe-4a42-a59f-7e866a884225/sist-en-13445-2-2009-a1-2012>



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	3
1 Modification 1	4
2 Modification 2	5
3 Modification 3	5
4 Modification 4	8
5 Modification 5	11

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

[SIST EN 13445-2:2009/A1:2012](https://standards.iteh.ai/catalog/standards/sist/d181c6e7-d0fe-4a42-a59f-7e866a884225/sist-en-13445-2-2009-a1-2012)

<https://standards.iteh.ai/catalog/standards/sist/d181c6e7-d0fe-4a42-a59f-7e866a884225/sist-en-13445-2-2009-a1-2012>

Foreword

This document (EN 13445-2:2009/A1:2012) 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 13445-2:2009 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2012, and conflicting national standards shall be withdrawn at the latest by December 2012.

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 97/23/EC.

For relationship with EU Directive 97/23/EC, 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 13445-2:2009 will be published in July 2012 as issue 4 of this 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, 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.

<https://standards.iteh.ai/catalog/standards/sist/d181c6e7-d0fe-4a42-a59f-7e866a884225/sist-en-13445-2-2009-a1-2012>

EN 13445-2:2009/A1:2012 (E)

1 Modification 1

Replace tables B.2-2 and B.2-3 in B.2.2.2 with the following revised tables:

Table B.2-2 — General requirements for prevention of brittle fracture — Reference thicknesses for plates and strips

Plates and Strips								
No. as per Table E.2-1	European Standard	Grade	Material No.	Max. reference thickness e_B		Design reference temperature T_R °C	Material group to CR ISO 15608:2000	Remarks
				AW	PWHT			
1	EN 10028-2:2003	P235GH	1.0345	35	200	- 20	1.1	
2		P265GH	1.0425	35	200			
3		P295GH	1.0481	35	110		1.2	
4		P355GH	1.0473	35	70			
29	EN 10028-3:2003	P275NH	1.0487	35	200	- 20	1.1	
30		P275NL1	1.0488	35	200	- 40		
31		P275NL2	1.1104	35	200	- 50		
32		P355N	1.0562	35	70	- 20	1.2	
33		P355NH	1.0565	35	70	- 20		
34		P355NL1	1.0566	35	70	- 40		
35		P355NL2	1.1106	35	70	- 50		
39	EN 10028-4:2003	11MnNi5-3	1.6212	35	80	- 60	9.1	
40		13MnNi6-3	1.6217	35	70	- 60		
41		15NiMn6	1.6228	35	70	- 80		
50	EN 10028-5:2003	P355M	1.8821	35	- 20	- 20	2.1	a)
51		P355ML1	1.8832	35	- 40	- 40		a)
52		P355ML2	1.8833	35	- 50	- 50		a)
53		P420M	1.8824	35	-	- 20		a)
54		P420ML1	1.8835	35	-	- 40		a)
55		P420ML2	1.8828	35	-	- 50		a)
59	EN 10028-6:2003	P355Q	1.8866	35	70	- 20	1.2	
60		P355QH	1.8867	35	70	- 20		
61		P355QL1	1.8868	35	70	- 40		
62		P355QL2	1.8869	35	70	- 60		

a) TMCP steels shall not be Post Weld Heat Treated

Table B.2-3 — General requirements for prevention of brittle fracture — Reference thicknesses for seamless and welded tubes

Seamless and welded tubes								
No. as per Table E.2-1	European Standard	Grade	Material No.	Max. reference thickness e_B mm		Design reference temperature T_R °C	Material group to CR ISO 15608:2000	Remarks
				AW	PWHT			
231	EN 10216-3:2004	P275NL1	1.0488	35	100	- 40	1.1	a)
232		P275NL2	1.1104	35	100	- 50		a)
233		P355N	1.0562	35	70	- 20	1.2	
234		P355NH	1.0565	35	70	- 20		
235		P355NL1	1.0566	35	70	- 40		
236		P355NL2	1.1106	35	70	- 50		
248	EN 10216-4:2004	P215NL	1.0451	10	10	- 40	1.1	a)
249		P255QL	1.0452	35	40	- 40		a)
250		P265NL	1.0453	25	25	- 40		a)
251		26CrMo4-2	1.7219	15	40	- 60	5.1	a)
252		11MnNi5-3	1.6212	35	40	- 60	9.1	a)
253		13MnNi6-3	1.6217	35	40	- 60	9.1	a)
306	EN 10217-3:2004	P275NL1	1.0488	35	40	- 40	1.1	a)
307		P275NL2	1.1104	35	40	- 50		a)
308		P355N	1.0562	35	40	- 20	1.2	a)
309		P355NH	1.0565	35	40	- 20		a)
310		P355NL1	1.0566	35	40	- 40		a)
311		P355NL2	1.1106	35	40	- 50		a)
316	EN 10217-4:2004	P215NL	1.0451	10	10	- 40	1.1	a)
317		P265NL	1.0453	16	16	- 40	1.1	a)
321	EN 10217-6:2004	P215NL	1.0451	10	10	- 40	1.1	a)
322		P265NL	1.0453	25	25	- 40	1.1	a)

a) Thickness limitation results from wall thickness limitation in the European material standards and in the European component standards respectively.

2 Modification 2

Add to B.2.2.2 Ferritic steels, the following sentence below Table B.2-2:

If the planned component thickness is greater than that given in table B.2-2 alternative Charpy toughness requirements are provided in chapter B.2.3.1.

3 Modification 3

Replace text in B.2.3.1 with the following text and tables:

This method 2 applies to C, CMn, fine grain steels, Ni-alloyed steels with not more than 1.5 % Ni and with a specified minimum yield strength ≤ 500 MPa and to austenitic-ferritic steels with a specified minimum yield strength ≤ 550 MPa. This method 2, based on fracture mechanics [16,32] can be used to determine the requirements to avoid brittle fracture in these steels, and may be used at a design reference temperature T_R

EN 13445-2:2009/A1:2012 (E)

which is lower than the design reference temperature T_R derived by method 1. In this procedure the design reference temperature T_R is not equal to the impact test temperature T_{KV} . The diagrams show the relationship between T_R and T_{KV} depending on reference thickness and material strength. Distinction is made for as-welded (AW) and post weld heat treated (PWHT) condition. This method does not apply to thermomechanically-rolled steels thicker than 35 mm. Two alternatives are provided in Tables B.2-13 and B.2-14 (Nomograms for reference thickness up to 35 mm in AW-condition and up to 110 mm in PWHT condition) and table B.2-15 (for reference thickness up to 200 mm).

For constructional details reference thickness e_B is defined in Table B.4-1.

Table B.2-13 and B.2-14 show which figure shall be used to determine the impact test temperature T_{KV} or the design reference temperature T_R . The condition "non-welded" shall be treated as the condition PWHT. Parent material, welds and HAZs shall meet the impact energy KV at impact test temperature T_{KV} .

Table B.2-15 provides toughness requirements for components with thickness up to 200 mm in PWHT condition. The weld metal, the heat affected zones and other parts affected by manufacturing processes shall satisfy the same impact energy requirements as given in the table B.2-15 at T_R .

NOTE Table B.2-15 complies with method 2 basic principles and allows the use of pressure components with reference thickness e_B up to 200 mm thickness, when Nomograms of Method 2 do not apply anymore. However, the application of table B.2-15 for lower thicknesses than 110 mm is not restricted, but will result in higher toughness requirements as can be derived from Figures B.2-1 to B.2-7 or method 1.

Linear interpolation between strength and thickness levels given in the Figures B.2-1 to B.2-11 is allowed. Alternatively the next higher strength class or wall thickness can be used. Lower test temperatures than T_{KV} are admissible for the same requirements.

The temperature adjustment given in Table B.2-12 applies also to method 2. Extrapolations for temperature ranges beyond the temperature ranges as given in the nomograms are not permissible.

SIST EN 13445-2:2009/A1:2012

<https://standards.iteh.ai/catalog/standards/sist/d181c6e7-d0fe-4a42-a59f-7e866a884225/sist-en-13445-2-2009-a1-2012>

Table B.2-13 — Impact energy requirements for C, CMn, fine grain steels, Ni-alloyed steels with not more than 1,5 % Ni

Specified minimum yield strength of base material MPa	Required impact energy KV (on 10 mm × 10 mm test pieces) J min	Figure defining required T_{KV}	
		Non welded or post-weld heat treated	As welded
$R_e \leq 275$	27	B.2-1	B.2-2
$R_e \leq 355$	27	B.2-3	B.2-4
$R_e \leq 460$	40	B.2-5	B.2-6
$R_e \leq 500$	40	B.2-7	B.2-8

Table B.2-14 — Impact energy requirements for austenitic-ferritic stainless steels

Specified minimum yield strength of base material MPa	Required impact energy KV (on 10 mm x 10 mm test pieces) J min	Figure defining required T_{KV} for all applications
$R_e \leq 385$	40	B.2-9
$R_e \leq 465$	40	B.2-10
$R_e \leq 550$	40	B.2-11

Table B.2-15 — Impact energy requirements for higher thickness for C, CMn, fine grain steels, Ni-alloyed steels with not more than 1,5 % Ni

Specified minimum yield strength of base material MPa	Required impact energy KV (on 10x10 mm specimen) at T_R J min	Maximum thickness mm
$R_e \leq 275$	27	200
$R_e \leq 355$	40	70 - 200
$R_e \leq 460$	60	65 - 200
$R_e \leq 500$	60	60 - 200