
Neogrevane tlačne posode - Zahteve za konstruiranje in izdelavo tlačnih posod in njihovih delov iz litega železa z raztežkom ob poružitvi, enakim ali manjšim kot 15 %

Unfired pressure vessels - Requirements for the design and fabrication of pressure vessels and pressure parts constructed from cast iron with an elongation after fracture equal or less than 15 %

Unbefeuerte Druckbehälter - Anforderungen an die Konstruktion und Herstellung von Druckbehältern und Druckbehälterteilen aus Gusseisen mit einer Bruchdehnung von 15 % oder weniger

Réipients sous pression non soumis à la flamme - Exigences supplémentaires pour la conception et la fabrication des réipients sous pression et des parties sous pression moulés en fonte à allongement, après rupture, inférieur ou égal à 15 %

Ta slovenski standard je istoveten z: EN 15776:2011/FprA1

ICS:

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

SIST EN 15776:2011/kFprA1:2015 **en,fr,de**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

FINAL DRAFT
EN 15776:2011

FprA1

April 2015

ICS 23.020.30

English Version

**Unfired pressure vessels - Requirements for the design and
fabrication of pressure vessels and pressure parts constructed
from cast iron with an elongation after fracture equal or less than
15 %**

Réipients sous pression non soumis à la flamme -
Exigences supplémentaires pour la conception et la
fabrication des réipients sous pression et des parties sous
pression moulés en fonte à allongement, après rupture,
inférieur ou égal à 15 %

Unbefeuerte Druckbehälter - Anforderungen an die
Konstruktion und Herstellung von Druckbehältern und
Druckbehälterteilen aus Gusseisen mit einer Bruchdehnung
von 15 % oder weniger

This draft amendment is submitted to CEN members for unique acceptance procedure. It has been drawn up by the Technical Committee CEN/TC 54.

This draft amendment A1, if approved, will modify the European Standard EN 15776:2011. If this draft becomes an amendment, 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.

This draft amendment was established by CEN 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.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

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

Content	page
Foreword.....	3
1 Modifications to the whole text	4
2 Modification to the Introduction.....	4
3 Modifications to Clause 2, Normative references	4
4 Modifications to 3.1, Terms and definitions.....	5
5 Modifications to 3.2, Symbols	5
6 Modification to 3.3, Inter relation of thicknesses definitions (EN 13445-6)	5
7 Modification to 4.1, Materials and limitations on temperature, maximum allowable pressure energy content.....	5
8 Modification to 4.2, Cyclic loading.....	7
9 Modification to 5.8.2.5, R^*_m Determination and general test requirements	7
10 Modification to 6.3.5, Penetrant testing.....	7
11 Modification to Annex A.....	8
12 Modification to Annex ZA	8
13 Modifications to the Bibliography.....	9

Foreword

This document (EN 15776:2011/FprA1:2015) has been prepared by Technical Committee CEN/TC 54 “Unfired pressure vessels”, the secretariat of which is held by BSI.

This document is currently submitted to the Unique Acceptance Procedure.

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.

EN 15776:2011/FprA1:2015 (E)**1 Modifications to the whole text**

Replace

"EN 764-5:2002" with "EN 764-5:2014";

"EN 13445-3:2009" and "EN 13445-3" with "EN 13445-3:2014";

"EN 13445-5:2009" and "EN 13445-5" with "EN 13445-5:2014";

"EN 13445-6:2009" and "EN 13445-6" with "EN 13445-6:2014";

"EN 1561" with "EN 1561:2011";

"EN 1563" with "EN 1563:2011" and

"EN 13835" with "EN 13835:2012".

2 Modification to the Introduction

Replace the 1st paragraph with the following:

"This standard is a stand-alone document and may be used for pressure equipment with certain restrictions and limitations.

NOTE For the design and fabrication of cast iron pressure equipment standards with higher elongations and ductility, see EN 13445-6:2014."

3 Modifications to Clause 2, Normative references

Replace

"EN 764-5:2002, *Pressure Equipment — Part 5: Compliance and Inspection Documentation of Materials*"

with

"EN 764-5:2014, *Pressure equipment — Part 5: Inspection documentation of metallic materials and compliance with the material specification*".

Replace "EN 1370" with "EN 1370:2011".

Replace

"EN 1371-1:1997, *Founding — Liquid penetrant inspection — Part 1: Sand, gravity die and low pressure die castings*"

with

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

Replace "EN 1559-1" with "EN 1559-1:2011" and "EN 1559-3" with "EN 1559-3:2011".

Replace "EN 12680-3" with "EN 12680-3:2012".

Replace "EN ISO 8062-3" with "EN ISO 8062-3:2007".

4 Modifications to 3.1, Terms and definitions

In 3.1.1, replace "NOTE" with "Note 1 to entry:" and add the following note:

"Note 2 to entry: Grey cast irons contain 2,0 % - 4,5 % carbon and 1 % - 3 % silicon. The structure consists of branched and interconnected graphite flakes in a matrix which is pearlite, ferrite or a mixture."

In 3.1.2, replace "NOTE" with "Note 1 to entry:" and add the following note:

"Note 2 to entry: The mechanical properties of grey irons can be greatly improved if the graphite shape is modified if molten iron, having a composition in the range 3,2 % - 4,5 % carbon and 1,8 % - 2,8 % silicon, is treated with magnesium. This produces castings with graphite in spheroidal form instead of flakes, known as nodular, spheroidal graphite or ductile iron. Nodular irons are available with pearlite, ferrite or pearlite-ferrite matrices which offer a combination of greater ductility and higher tensile strength than grey cast irons."

Replace the text of 3.1.3 with the following:

"austenitic cast iron

cast material with an austenitic matrix which is iron and carbon and silicon based and alloyed with nickel and manganese, copper and/or chromium in order to stabilize the austenitic structure at room temperature

Note 1 to entry: The graphite can be present in flake or spheroidal form (EN 13835:2012)."

Replace the text of 3.1.4 with the following:

"relevant wall thickness

wall thickness representative of the casting, defined for the determination of the size of the cast samples to which the guaranteed mechanical properties apply".

5 Modifications to 3.2, Symbols

Replace the 1st paragraph with:

"For the purposes of this document, symbols used in EN 13445-6:2014 are listed in Table 1."

Delete the row R_m^* :

"

R_m	average tensile strength of three test bars taken from the same cast for design according to DBE route	MPa
-------	--	-----

and add a new line beneath "RM":

"

RM3	average strength from 3 tensile test samples	MPa
-----	--	-----

".

6 Modification to 3.3, Inter relation of thicknesses definitions (EN 13445-6)

In the heading, replace "EN 13445-6" with "EN 13445-6:2014".

7 Modification to 4.1, Materials and limitations on temperature, maximum allowable pressure energy content

Replace the text of 4.1 (including tables) with the following:

EN 15776:2011/FprA1:2015 (E)

"All material grades subject to internal or external pressure shall comply with EN 1561 for grey cast iron, EN 1563 for spheroidal graphite cast iron and EN 13835 for austenitic cast iron. The material grades and corresponding limitations are given in Table 2 and Table 3.

Table 2 — Allowable material grades and limitations for grey cast iron and austenitic lamellar graphite cast iron

Material standard	Material designation		Design temperature limits	Maximum allowable pressure <i>PS</i>	Maximum energy content <i>PS × V</i> for a single casting
	Symbol	Number			
EN 1561:2011	EN-GJL-200	5.100	- 10 ≤ <i>T</i> ≤ 200	25	65 000
	EN-GJL-250	5.1301			
	EN-GJL-300	5.1302	- 10 ≤ <i>T</i> ≤ 200		
	EN-GJL-350	5.1303			
EN 13835:2012	EN-GJLA-XNiCuCr15-6-2	5.1500	- 10 ≤ <i>T</i> ≤ 200		
	EN-GJLA-XNiMn13-7	5.1501			

The product *PS × V*, and the design temperature limit of Table 2 for a single casting may be exceeded only for material grades EN-GJL-300¹ and EN-GJL-350² up to 300 °C and a product *PS × V*, as appropriate, when all the following conditions are met:

- maximum allowable temperature $TS_{max} \leq 300$ °C;
- maximum allowable pressure lowered from 25 bar to $PS \leq 15$ bar;
- documented stress factor ≤ 2 throughout the casting;
- stress relief heat treatment is carried out when the maximum cooling rate in the mould exceeds 30 °C/h for the temperature range from 600 °C decreasing to 150 °C.

NOTE An in-service inspection to Annex B of this standard may be considered to be mentioned in the operating instructions of the part or vessel.

Table 3 — Allowable material grades and design limits for spheroidal graphite cast iron

Material standard	Material designation		Design temperature limits	Maximum allowable pressure <i>PS</i>	Maximum energy content <i>PS × V</i> for a single casting
	Symbol	Number			
EN 1563:2012	EN-GJS-400-15	5.3106	- 10 ≤ <i>TS</i> ≤ 300	100	100 000
	EN-GJS-450-10	5.3107		64	80 000
	EN-GJS-500-7	5.3200			
	EN-GJS-600-3	5.3201		25	65 000

¹ The requirements of particular material grades in this clause may allow the fabrication of paper cylinder and dryer rollers

² The requirements of particular material grades in this clause may allow the fabrication of paper cylinder and dryer rollers.

Material standard	Material designation		Design temperature limits	Maximum allowable pressure <i>PS</i>	Maximum energy content <i>PS × V</i> for a single casting
	Symbol	Number	°C	bar	<i>bar · L</i>
	EN-GJS-700-2	5.3300			
EN 13835:2012	EN-GJSA-XNiCr20-2	5.3500	- 10 ≤ TS ≤ 540	64	80 000
	EN-GJSA-XNiCrNb20-2	5.3502			
	EN-GJSA-XNiSiCr35-5-2	5.3505			
	EN-GJSA-XNiCr30-3	5.3507		25	65 000
	EN-GJSA-XNiSiCr30-5-5	5.3508		64	80 000
	EN-GJSA-XNiCr35-3	5.3509			
NOTE Whatever the used method the grades are based - on the mechanical properties from separately cast samples in a sand mould or mould of comparable thermal diffusivity.					

The applicable requirements for the delivery conditions, given in EN 1559-1:2011 and EN 1559-3:2011 shall also apply.

8 Modification to 4.2, Cyclic loading

Add a new sentence to the end of the Note as follows:

"These area's may be also found in feets, supports, lifting lugs, etc. which may influence stress distribution in the pressure part."

9 Modification to 5.8.2.5, R_m^* Determination and general test requirements

Replace the symbol R_m^* with $RM3$.

10 Modification to 6.3.5, Penetrant testing

Replace 6.3.5 with the following:

"6.3.5 Liquid penetrant testing

The testing shall be carried out in accordance with EN 1371-1:2011. The maximum severity level shall be equal to or better than SP 02/CP 02 in Table 1 of EN 1371-1:2011 and LP 1/AP 1 in Table 2 of EN 1371-1:2011."