SLOVENSKI STANDARD
oSIST prEN 286-2:2019

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Enostavne neogrevane (nekurjene) tlačne posode, namenjene za zrak ali dušik - 2. del: Tlačne posode za zračne zavore in pomožne sisteme za motorna vozila in njihove priklopnike

Simple unfired pressure vessels designed to contain air or nitrogen - Part 2: Pressure vessels for air braking and auxiliary systems for motor vehicles and their trailers

Einfache unbefeuerte Druckbehälter für Luft oder Stickstoff - Teil 2: Druckbehälter für Druckluftbremsanlagen und Hilfseinrichtungen in Kraftfahrzeugen und deren Anhängefahrzeugen

Récipients à pression simples, non soumis à la flamme, destines à contenir de l'air ou de l'azote - Partie 2 : Récipients à pression pour circuits de freinage et circuits auxiliaires des véhicules routiers et leurs remorques

Ta slovenski standard je istoveten z: **prEN 286-2**

ICS:

23.020.32	Tlačne posode	Pressure vessels
43.040.40	Zavorni sistemi	Braking systems

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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ICS

Will supersede EN 286-2:1992

English Version

Simple unfired pressure vessels designed to contain air or nitrogen - Part 2: Pressure vessels for air braking and auxiliary systems for motor vehicles and their trailers

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 54.

If this draft becomes a European Standard, 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.

This draft European Standard 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.

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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.

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

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European foreword

This document (prEN 286-2:2019) 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 CEN Enquiry.

This document will supersede EN 286-2:1992.

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 the EU Directive 2014/29/EU.

For relationship with EU Regulation 2014/29/EU, see the informative Annex ZA, which is an integral part of this document.

1 Scope

1.1 This document applies to the design and manufacture of simple unfired serially made pressure vessels, herein after referred to as vessels, designed for air breaking equipment and auxiliary systems for motor vehicles and their trailers, and which:

a) include fabrication by welding;

b) have a simple geometry enabling simple-to-use production procedures. This is achieved by either:

   1) a cylindrical shell of circular cross section closed by outwardly dished and/or flat ends having the same axis of revolution as the shell; or:

   2) two dished ends having the same axis of revolution;

c) have branches not larger in diameter than 0,5 of the diameter of the cylinder to which they are welded.

1.2 It applies only to vessels intended to contain compressed air, and which operate within the following constraints:

a) subjected to an internal pressure greater than 0,5 bar;

b) the parts and assemblies contributing to the strength of the vessel under pressure to be made either of non-alloy quality steel or of non-alloy aluminium or non-age hardening aluminium alloys;

c) maximum working pressure 30 bar, the product of that pressure and the capacity of the vessel ($PS \cdot V$) is greater than 50 bar litres and not exceeding 1 500 bar litres;

d) capacity not exceeding 150 litres;

e) minimum working temperature not lower than −50 °C and maximum working temperature not higher than 100 °C.

It does not apply to vessels specifically designed for nuclear use, to vessels specifically intended for installation in or the propulsion of ships and aircraft, or to fire extinguishers.

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.

EN 10028-1:2017, *Flat products made of steels for pressure purposes - Part 1: General requirements*

EN 10028-2:2017, *Flat products made of steels for pressure purposes - Part 2: Non-alloy and alloy steels with specified elevated temperature properties*

EN 10207:2017, *Steels for simple pressure vessels - Technical delivery requirements for plates, strips and bars*

EN 10216-1:2013, *Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 1: Non-alloy steel tubes with specified room temperature properties*

EN 10217-1:2019, *Welded steel tubes for pressure purposes - Technical delivery conditions - Part 1: Electric welded and submerged arc welded non-alloy steel tubes with specified room temperature properties*

EN 10217-2:2019, *Welded steel tubes for pressure purposes - Technical delivery conditions - Part 2: Electric welded non-alloy and alloy steel tubes with specified elevated temperature properties*

EN 10222-2:2017, *Steel forgings for pressure purposes - Part 2: Ferritic and martensitic steels with specified elevated temperatures properties*

EN ISO 148-1:2016, *Metallic materials - Charpy pendulum impact test - Part 1: Test method (ISO 148-1:2016)*

EN ISO 2409:1994, *Paints and varnishes — Cross-cut test (ISO 2409:1992)*

EN ISO 4136:2012, *Destructive tests on welds in metallic materials - Transverse tensile test (ISO 4136:2012)*

EN ISO 5173:2010,[1] *Destructive tests on welds in metallic materials — Bend tests*

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 6892-1:2016, *Metallic materials - Tensile testing - Part 1: Method of test at room temperature (ISO 6892-1:2016)*

EN ISO 9227:2017, *Corrosion tests in artificial atmospheres - Salt spray tests (ISO 9227:2017)*

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 9606-2:2004, *Qualification test of welders - Fusion welding - Part 2: Aluminium and aluminium alloys (ISO 9606-2:2004)*

EN ISO 10042:2018, *Welding - Arc-welded joints in aluminium and its alloys - Quality levels for imperfections (ISO 10042:2018)*

EN ISO 14341:2011, *Welding consumables - Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels - Classification (ISO 14341:2010)*

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 15607:2003, *Specification and qualification of welding procedures for metallic materials - General rules (ISO 15607:2003)*

EN ISO 15609-1:2004, *Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 1: Arc welding (ISO 15609-1:2004)*

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[1] As impacted by EN ISO 5173:2010/A1:2011.

EN ISO 15614-1:2017, *Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys (ISO 15614-1:2017)*

EN ISO 15614-2:2005, *Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 2: Arc welding of aluminium and its alloys (ISO 15614-2:2005)*

EN ISO 17636-1:2013, *Non-destructive testing of welds - Radiographic testing - Part 1: X- and gamma-ray techniques with film (ISO 17636-1:2013)*

EN ISO 17636-2:2013, *Non-destructive testing of welds - Radiographic testing - Part 2: X- and gamma-ray techniques with digital detectors (ISO 17636-2:2013)*

EN ISO 18273:2015, *Welding consumables - Wire electrodes, wires and rods for welding of aluminium and aluminium alloys - Classification (ISO 18273:2015)*

ISO 209:2007, *Aluminium and aluminium alloys — Chemical composition*

ISO 2107:2007, *Aluminium and aluminium alloys — Wrought products — Temper designations*

ISO 6361-2:2014, *Wrought aluminium and aluminium alloys — Sheets, strips and plates — Part 2: Mechanical properties*

3 Terms, definitions and symbols

3.1 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1.1
type examination
procedure by which a notified body ascertains and certifies that a specimen of a vessel satisfies the requirements of this document

3.1.2
conformity assessment
procedure adopted at the choice of the manufacturer to check and certify that the manufactured vessels comply with this document

3.1.3
declaration of conformity
confirmation of the manufacturer that the vessels are in conformity with this document

3.1.4
controlled product test
procedure carried out by a notified body during manufacture to ensure that the manufacturer duly fulfils the requirements of this document

3.1.5
design and manufacturing documents
prepared by the manufacturer to describe the construction, materials and fabrication including the certificates

3.1.6
manufacturer's inspector
person(s) employed by the manufacturer, but sufficiently independent from the production personnel, qualified and responsible for inspections, examinations and tests to be carried out on vessels by him or under his responsibility by competent staff

3.1.7
qualification of the inspector
qualification means technical competency on the different inspections, examinations and tests to be carried out under the manufacturer's responsibility, as well as necessary experience

Note 1 to entry: It is the responsibility of the manufacturer to ascertain that the inspector is competent

3.1.8
automatic welding
welding in which all the welding parameters are automatically controlled, some of these parameters may be adjusted to a limited amount (manually or automatically by mechanical or electronic devices) during welding to maintain the specified welding conditions

3.1.9
non-automatic welding
all types of welding other than that defined in 3.1.8

3.1.10
type of vessel
vessels are of the same type if they simultaneously:

— have similar geometrical form (i.e. shell rings and ends or only ends, in both cases ends of the same shape);

— have wall material and thickness within the limit of validity of the welding procedure test, including those for bosses and inspection openings;

— have the same type of bosses and of inspection openings; numbers and positions may vary;

— have the same design temperature limitations

3.1.11
batch
<of vessels> consists at most of 3 000 vessels of the same type

3.1.12
series manufacture
more than one vessel of the same type manufactured during a given period by a continuous manufacturing process in accordance with a common design and using the same manufacturing process

3.1.13
family
vessels form part of the same family if they differ only in diameter and/or in the length of their cylindrical portions

3.1.14
subfamily
vessels of the same family with the same wall thicknesses, the same material, the same welding procedure, the same construction of details; the vessels may vary in number and position of attachments and bosses

3.1.15
maximum design temperature
temperature that is used in the design calculations, and which is never less than the maximum working temperature

3.1.16
minimum design temperature
lowest temperature used in the selection of materials, and which is never greater than the minimum working temperature

3.1.17
maximum working temperature
T_{max}
highest stabilized temperature which the wall of the vessel may attain under normal conditions of use

3.1.18
minimum working temperature
T_{min}
lowest stabilized temperature in the wall of the vessel under normal conditions use

3.1.19
maximum working pressure
PS
maximum gauge pressure which may be exerted under normal conditions of use

3.1.20
design pressure
P
pressure chosen by the manufacturer and used to determine the thickness of the pressurized parts

3.1.21
inspection slip
document by which the producer certifies that the products delivered meet the requirements of the order and in which they set out the results of the routine in-plant inspection test, in particular chemical composition and mechanical properties, performed on products made by the same production process as the supply, but not necessarily on products delivered

Note 1 to entry: This corresponds to test report “2.2” defined in EN 10204.

3.2 Symbols

For the purpose of this document, the following symbols apply:

A, A_{80mm}	Elongation after rupture	%
A_c, A_R	See 5.2.7.	mm^2
A_f	Cross sectional area effective as compensation	mm^2
A_{fb}	Cross sectional area effective as compensation of the boss	mm^2
A_{fs}	Cross-sectional area effective as compensation of the shell	mm^2
A_p	Area of pressurized zone	mm^2
c	Absolute value of the negative tolerance taken from the material standard or as stated in the drawing plus the absolute value of the reduction of wall thickness by the forming process	mm
c_b	As before for a branch or boss	mm
C	Calculation coefficient for unpierced flat ends	—
d	Diameter of hole	mm
d_{ib}	Internal diameter of a boss	mm
d_{ob}	Outside diameter of a boss	mm
D	Inside diameter of an unpierced flat end	mm
D_c	Outside diameter of the crown section of a torispherical end measured to the tangent between crown and knuckle	mm
D_o	Outside diameter of the shell/ends	mm
e	Nominal wall thickness	mm
e_a	Actual wall thickness	mm
e_{act}	Actual wall thickness of the shell before the pressure test	mm
e_{ah}	Actual wall thickness of the end	mm
e_{as}	Actual wall thickness of the shell	mm
e_c	Calculated thickness	mm
e_{cb}	Calculated wall thickness of a branch or a fictitious branch with the same internal diameter as the boss	mm
e_{ch}	Calculated wall thickness of the dished end	mm
e_{cs}	Calculated wall thickness of the shell	mm
e_h	Nominal wall thickness of the dished end	mm
e_n	e_{act} — corresponding nominal wall thickness as stated in the design drawing	mm
e_{rb}	Wall thickness of boss contributing to reinforcement	mm

e_{rs}	Wall thickness of shell contributing to reinforcement	mm
e_s	Wall thickness of the shell	mm
f	Nominal design stress	N/mm^2
g	Throat thickness of a weld	mm
h	Height of a dished end	mm
h_b, h_{be}, h_{be1}, h_{be2}	See 5.2.6.1 and Figure 3.	mm
K_c	Calculation coefficient which depends on the welding process	—
KCV	Failure energy (impact test)	J/cm^2
KV	Failure energy (impact test)	J
l_b	Length between adjacent bosses	mm
l_{rb}	Length of boss contributing to reinforcement	mm
l_{rs}	Length of shell contributing to reinforcement	mm
L	See 5.2.7.	mm
m	See C.3.	—
N	See 6.1.3.1 and C.3.	—
P	Design pressure[2] (which shall not be less than PS)	bar
P_h	Test pressure[1]	bar
PS	Maximum working pressure[1]	bar
r	Inside knuckle radius for torispherical ends	
R	Inside radius for shells and ends	mm
R_e	Minimum yield strength specified in the material standard	N/mm^2
$R_{e\,act}$	Yield strength of the shell material as determined in the tensile test	N/mm^2
R_{eT}	Minimum yield strength at maximum working temperature specified in the material standard	N/mm^2
R_m	Minimum tensile strength specified in the material standard or guaranteed in the inspection slip by the material manufacturer	N/mm^2
$R_{m\,act}$	Tensile strength of the shell material as determined in the tensile test	N/mm^2
T	Temperature	°C
T_{max}	Maximum working temperature	°C
T_{min}	Minimum working temperature	°C
T'_{min}	Minimum ambient temperature	°C

2) All pressures are gauge pressures.