



SLOVENSKI STANDARD

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SIST EN 12807:2010

Oprema in pribor za utekočinjeni naftni plin (UNP) - Premične, ponovno polnljive, trdo spajkane jeklenke iz jekla za UNP - Konstruiranje in izdelava

LPG equipment and accessories - Transportable refillable brazed steel cylinders for liquefied petroleum gas (LPG) - Design and construction

Flüssiggas-Geräte und Ausrüstungsteile - Ortsbewegliche, wiederbefüllbare, hartgelötete Flaschen aus Stahl für Flüssiggas (LPG) - Auslegung und Herstellung

Équipement et accessoires pour GPL - Bouteilles transportables et rechargeables en acier brasé pour gaz de pétrole liquéfié (GPL) - Conception et fabrication

Ta slovenski standard je istoveten z: EN 12807:2019

ICS:

23.020.35 Plinske jeklenke Gas cylinders

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EUROPEAN STANDARD

EN 12807

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LPG equipment and accessories - Transportable refillable brazed steel cylinders for liquefied petroleum gas (LPG) - Design and construction

Équipement et accessoires pour GPL - Bouteilles
transportables et rechargeables en acier brasé pour
gaz de pétrole liquéfié (GPL) - Conception et
fabrication

Flüssiggas-Geräte und Ausrüstungsteile -
Ortsbewegliche, wiederbefüllbare, hartgelötete
Flaschen aus Stahl für Flüssiggas (LPG) - Auslegung
und Herstellung

This European Standard was approved by CEN on 15 March 2019.

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.

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

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EN 12807:2019 (E)**European foreword**

This document (EN 12807:2019) has been prepared by Technical Committee CEN/TC 286 “Liquefied petroleum gas equipment and accessories”, the secretariat of which is held by NSAI.

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 January 2020, and conflicting national standards shall be withdrawn at the latest by January 2020.

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 supersedes EN 12807:2009.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

The main technical changes include the updating of:

- the normative references;
- the environmental considerations; and
- definitions.

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This document has been submitted for reference into the RID [6] and/or in the ADR [5].

All stages of the manufacture, distribution and disposal of these cylinders may have an effect on the environment; CEN/TS 16765 sets out environmental considerations for this document.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, North Macedonia, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document calls for the use of substances and procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

It has been assumed in the drafting of this document that the execution of its provisions is entrusted to appropriately qualified and experienced people.

All pressures are gauge unless otherwise stated.

NOTE This document requires measurement of material properties, dimensions and pressures. All such measurements are subject to a degree of uncertainty due to tolerances in measuring equipment, etc. It may be beneficial to refer to the leaflet “measurement uncertainty leaflet (SP INFO 2000 27 uncertainty pdf)” [7].

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EN 12807:2019 (E)**1 Scope**

This document specifies the minimum requirements for the design, construction and testing during manufacture of transportable refillable brazed steel Liquefied Petroleum Gas (LPG) cylinders, of water capacity from 0,5 l up to and including 15 l, exposed to ambient temperatures.

This document applies only to cylinders having a circular cross-section without any longitudinal joint.

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 1044¹, *Brazing — Filler metals*

EN 10002-1², *Metallic materials - Tensile testing — Part 1: Method of test at ambient temperature*

EN 10204, *Metallic products — Types of inspection documents*

EN 12797, *Brazing — Destructive tests of brazed joints*

EN 12799:2000, *Brazing — Non-destructive examination of brazed joints*

EN 13134, *Brazing — Procedure approval*

EN 14894, *LPG equipment and accessories — Cylinder and drum marking*

CEN/TS 16765, *LPG equipment and accessories — Environmental considerations for CEN/TC 286 standards*

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

EN ISO 11117:2008, *Gas cylinders — Valve protection caps and valve guards — Design, construction and tests (ISO 11117:2008)*

EN ISO 11363-1, *Gas cylinders - 17E and 25E taper threads for connection of valves to gas cylinders - Part 1: Specifications (ISO 11363-1)*

EN ISO 13585, *Brazing — Qualification test of brazers and brazing operators (ISO 13585)*

EN ISO 17672, *Brazing — Filler metals (ISO 17672)*

¹ This standard has been withdrawn and was replaced by EN ISO 17672.

² This standard has been withdrawn and was replaced by EN ISO 6892-1.

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:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1.1

yield strength

upper yield strength R_{eH} or, for steels that do not exhibit a definite yield point, the 0,2 % proof strength $R_{p0,2}$

3.1.2

normalized

condition resulting from heat treatment to a uniform temperature above the upper critical point (A_{c3}) of the steel and then cooled under controlled conditions

3.2 Symbols

For the purposes of this document, the following symbols apply.

<i>a</i>	Calculated minimum thickness of the cylindrical shell, in millimetres
<i>A</i>	Percentage elongation after fracture
<i>b</i>	Calculated minimum thickness of the end of the cylinder, in millimetres
<i>C</i>	Shape factor for ends (see Table 2, Figure 2 and Figure 3)
<i>D</i>	Outside diameter of the cylinder as given in the design drawing (see Figure 1), in millimetres
<i>D_p</i>	Width of the bend test mandrel (see Figure 7), in millimetres
<i>e</i>	Actual thickness of the material in the finished cylinder (at the point under consideration), in millimetres
<i>h</i>	Height of the cylindrical part of the end (see Figure 1), in millimetres
<i>H</i>	Outside height of the domed part of the end (see Figure 1), in millimetres
<i>L₀</i>	Original gauge length of the test piece, in accordance with EN 10002-1, in millimetres
<i>n</i>	Ratio of width of bend test mandrel to the thickness of the test piece at the joint (see Table 5)
<i>P_c</i>	Calculation pressure ($1 \text{ bar} = 10^5 \text{ Pa} = 10^5 \text{ N/m}^2$), used to calculate the minimum required thickness of the cylindrical shell and ends, in bar
<i>P_b</i>	Maximum pressure attained during the burst test, in bar
<i>P_h</i>	Actual test pressure applied to the cylinder by the manufacturer, in bar
<i>r</i>	Inside knuckle radius of the end, in millimetres
<i>R</i>	Inside spherical radius of the end, in millimetres
<i>R_g</i>	Minimum tensile strength guaranteed by the cylinder manufacturer for the finished cylinder, in N/mm^2

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R_0	Minimum value of yield strength guaranteed by the cylinder manufacturer for the finished cylinder, in N/mm ²
R_m	Actual value of tensile strength determined by the tensile test specified in 7.4, in N/mm ²
R_{eH}	Upper yield strength, in newtons per square millimetre, as defined in EN 10002-1
$R_{p0.2}$	Proof strength, non-proportional extension in newtons per square millimetre, as defined in EN 10002-1
t	Thickness of the bend test specimen at the joint

4 Materials

4.1 Materials for shells and end pressings shall be in accordance with EN ISO 11363-1 or other equivalent material specification or standard meeting the requirements of Table 1. Alternative material specifications shall, as a minimum, specify chemical composition, mechanical properties, heat treatment and delivery conditions.

The materials shall be suitable for a brazing temperature of 1 100 °C for the duration of the brazing operation, without significant grain growth.

NOTE "Materials" refer to materials in the state before any specific transformation occurring during the manufacturing process.

4.2 All parts brazed to the cylinder shall be brazable and made of material compatible with the cylinder material.

4.3 The brazing consumables (see EN 1044) in the form of wire or paste shall be such that they are capable of giving consistent joints with minimum tensile strength at least equal to that specified for the parent materials in the finished cylinder.

4.4 The cylinder manufacturer shall obtain certificates showing the chemical analysis and details of the mechanical properties of the steel supplied for the construction of the pressure retaining parts. The certificates/reports shall be in accordance with EN 10204, Type 3.1 or higher for shells and ends and Type 2.2 or higher for the valve boss.

4.5 The manufacturer shall maintain a system of identification for the materials used in the construction in order that all materials for pressure parts in the completed cylinder can be traced to their origin.

4.6 All stages of the manufacture, distribution and disposal of these cylinders may have an effect on the environment; CEN/TS 16765 sets out environmental considerations for this document.

Table 1 — Material requirements

Element	Limits %
Materials, other than EN ISO 11363-1, used for the fabrication of cylinders shall be of brazable quality and the following limits shall not be exceeded in the cast analysis:	
Carbon	0,22 max.
Silicon	0,50 max.
Manganese	0,30 min. to 1,60 max.
Phosphorus	0,025 max.
Sulphur	0,020 max.
Phosphorus plus sulphur	0,040 max.
Use of micro-alloying elements such as niobium, titanium and vanadium shall be limited to the following contents:	
Niobium	0,05 max.
Titanium	0,05 max.
Vanadium	0,05 max.
Niobium plus vanadium	0,08 max.
Where other micro-alloying elements are used, their presence and amounts shall be reported, together with the above, in the steel manufacturer's certificate.	
Should check analyses be required, they shall be carried out either on specimens taken during manufacture from material in the form as supplied by the steel maker to the cylinder manufacturer or from finished cylinders.	

5 Design

5.1 General requirements

5.1.1 The calculation of the wall thickness of the pressure parts shall be based on the yield strength of the material.

5.1.2 For calculation purposes, the value of the yield strength R_0 is limited to a maximum of $0,85 R_g$.

5.1.3 The calculation pressure (P_c) shall be not less than the higher of:

- absolute developed pressure at 65 °C of the highest pressure LPG mixture to be filled minus 1 bar, or
- 10 bar.

NOTE ADR [5] and RID [6], P200 specifies test pressures for tabulated mixtures of LPG (UN 1965 HYDROCARBON GAS MIXTURE LIQUEFIED, N.O.S) irrespective of the absolute pressure at 65 °C.

5.1.4 A drawing, which includes full dimensions that define the cylinder type (see 8.2) and the specification of the material, shall be produced.

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5.1.5 All stages of the manufacture, distribution and disposal of these cylinders may have an effect on the environment; CEN/TS 16765 sets out environmental considerations for this document.

5.2 Calculation of cylindrical shell thickness

The wall thickness, a , of the cylindrical shell shall be not less than:

$$a = \frac{P_c \times D}{(15 \times R_0) + P_c} \quad (1)$$

5.3 Design of torispherical and semi-ellipsoidal ends concave to pressure

5.3.1 The shape of ends shall be such that the following conditions are fulfilled:

- for torispherical ends $R \leq D$; $r \geq 0,1 D$; $h \geq 4 b$ (see Figure 1),
- for semi-ellipsoidal ends $H \geq 0,2 D$; $h \geq 4 b$ (see Figure 1).

NOTE For torispherical ends the height H can be calculated using:

$$H = (R + b) - \sqrt{\left[\left(R + b \right) - \frac{D}{2} \right] \times \left[\left(R + b \right) + \frac{D}{2} - 2(r + b) \right]} \quad (2)$$

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