

SLOVENSKI STANDARD

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Nadomešča:

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Oprema in pribor za utekočinjeni naftni plin (UNP) - Premične, ponovno polnljive jeklenke za UNP, ki niso varjene in trdo spajkane - Periodična kontrola (vključno z dopolnilom A2)

LPG equipment and accessories - Transportable refillable LPG cylinders other than traditional welded and brazed steel cylinders - Periodic inspection

Flüssiggas-Geräte und Ausrüstungsteile - Ortsbewegliche, wiederbefüllbare Flaschen für Flüssiggas (LPG), ausgenommen geschweißte und hartgelötete Stahlflaschen - Wiederkehrende Inspektion

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Équipements pour GPL et leurs accessoires - Bouteilles transportables et rechargeables pour GPL autres que celles en acier soudé et brasé - Contrôle périodique

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

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English Version

**LPG equipment and accessories - Transportable refillable
LPG cylinders other than traditional welded and brazed
steel cylinders - Periodic inspection**

Équipements pour GPL et leurs accessoires - Bouteilles transportables et rechargeables pour GPL autres que celles en acier soudé et brasé - Contrôle périodique

Flüssiggas-Geräte und Ausrüstungsteile - Ortsbewegliche, wiederbefüllbare Flaschen für Flüssiggas (LPG), ausgenommen geschweißte und hartgelötete Stahlflaschen - Wiederkehrende Inspektion

This European Standard was approved by CEN on 19 April 2018 and includes Amendment 2 approved by CEN on 6 March 2020.

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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 16728:2016+A2:2020) 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 October 2020, and conflicting national standards shall be withdrawn at the latest by October 2020.

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 includes Amendment 1 approved by CEN on 19 April 2018.

This document includes Amendment 2 approved by CEN on 6 March 2020.

This document ^{A1} supersedes EN 16728:2016 ^{A1} and deals with the periodic inspection requirements for transportable refillable LPG cylinders that are not covered by EN 1440.

^{A2} This document supersedes EN 16728:2016+A1:2018. ^{A2}

The start and finish of text introduced or altered by amendment is indicated in the text by tags ^{A1} ^{A1}.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ^{A2} ^{A2}.

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

This European Standard has been submitted for reference into the RID [1] and the technical annexes of the ADR [2].

NOTE These regulations take precedence over any clause of this standard. It is emphasized that RID/ADR are being revised regularly at intervals of two years which may lead to temporary non-compliances with the clauses 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, 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.

Introduction

The primary objective of the periodic inspection of transportable refillable liquefied petroleum gas (LPG) cylinders is that, on the completion of the tests, the cylinders may be re-introduced into service for a further period of time.

The new designs of LPG cylinders have led to the development of alternative methods of inspection.

This European Standard has been prepared to reflect the current methodology for periodic inspection of LPG cylinders, and is based on extensive operating experience.

This European Standard calls for the use of substances and procedures that can 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.

Protection of the environment is a key political issue in Europe and elsewhere, for CEN/TC 286 this is covered in CEN/TS 16765 [3], and this Technical Specification should be read in conjunction with this standard.

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

Where judgements are called for, it has been assumed that they are made by competent persons who have been specifically trained for the tasks.

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1 Scope

This European Standard specifies procedures for periodic inspection and testing, for transportable refillable LPG cylinders with a water capacity from 0,5 l up to and including 150 l.

This European Standard is applicable to the following:

- welded steel LPG cylinders manufactured to an alternative design and construction, see EN 14140 or equivalent standard;
- welded aluminium LPG cylinders, see EN 13110 or equivalent standard;
- composite LPG cylinders, see EN 14427 or equivalent standard;
- over-moulded cylinders designed and manufactured according to EN 1442 or EN 14140, see Annex F.

NOTE The requirements of RID/ADR take precedence over those of this standard in the case of cylinders complying with that regulation, including pi marked cylinders.

This European Standard does not apply to cylinders permanently installed in vehicles.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 837-1:1996, *Pressure gauges — Part 1: Bourdon tube pressure gauges — Dimensions, metrology, requirements and testing* <https://standards.iteh.ai/catalog/standards/sist/36fa8bf2-465e-493a-b052-d6e46b08a94e/sist-en-16728-2016a2-2020>

EN 837-3:1996, *Pressure gauges — Part 3: Diaphragm and capsule pressure gauges — Dimensions, metrology, requirements and testing*

EN 1442, *LPG equipment and accessories — Transportable refillable welded steel cylinders for LPG — Design and construction*

EN 10028-7, *Flat products made of steels for pressure purposes — Part 7: Stainless steels*

EN 12816, *LPG equipment and accessories — Transportable refillable LPG cylinders — Disposal*

EN 13110, *LPG equipment and accessories — Transportable refillable welded aluminium cylinders for liquefied petroleum gas (LPG) — Design and construction*

EN 14140:2014, *LPG equipment and accessories — Transportable refillable welded steel cylinders for LPG — Alternative design and construction*

EN 14427:2014, *LPG equipment and accessories — Transportable refillable fully wrapped composite cylinders for LPG — Design and construction*

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

EN 14912, *LPG equipment and accessories — Inspection and maintenance of LPG cylinder valves at time of periodic inspection of cylinders*

EN ISO 4628-3:2003, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 3: Assessment of degree of rusting (ISO 4628-3:2003)*

EN ISO 14245, *Gas cylinders — Specifications and testing of LPG cylinder valves — Self-closing (ISO 14245)*

EN ISO 15995, *Gas cylinders — Specifications and testing of LPG cylinder valves — Manually operated (ISO 15995)*

ISO 2859-1:1999, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ISO 16269-6:2014, *Statistical interpretation of data — Part 6: Determination of statistical tolerance intervals*

3 Terms and definitions

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

3.1

competent authority

authority or authorities or any other body or bodies designated as such in each State and in each specific case in accordance with domestic law

3.2

competent person

person which by combination of appropriate qualification, training, experience, and resources, is able to make objective judgments on the subject

3.3

inspection body

independent inspection and testing body approved by the competent authority

3.4

liquefied petroleum gas

LPG

low pressure gas composed of one or more light hydrocarbons which are assigned to UN 1011, UN 1075, UN 1965, UN 1969 or UN 1978 only and which consists mainly of propane, propene, butane, butane isomers, butene with traces of other hydrocarbon gases



3.5

minor repair

operations that include cleaning and replacement of components accessible without any dismantling of the valve (e.g. outlet seal, excess flow device) and that do not affect the integrity of the pressure receptacle

A1

3.6 over-moulded cylinder OMC

pressure receptacle intended for the carriage of LPG of a water capacity not exceeding 13 l made of a coated steel inner cylinder with an over-moulded protective case made from cellular plastic, which is non removable and bonded to the outer surface of the steel cylinder wall **A1**

3.7 periodic inspection

activities carried out at defined intervals, such as examining, measuring, testing or gauging the characteristics of a pressure vessel and comparing these with specified requirements

3.8 protective casing

layer of protective material which gives mechanical protection which, either cannot be removed without destroying it or is only removable with special tools or is bonded to the cylinder wall

Note 1 to entry: This definition can be applied to cylinders with over-moulded layers or with separate casings.

A1

3.9 reconditioning

major repairs to cylinders, which can include hot work, welding or de-denting carried out by specialists away from potential sources of flammable air/gas mixture **A1**

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A1

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3.10 **A1** tare mass

sum of the mass of the empty cylinder, the mass of the valve including a dip tube where fitted, and the mass of all other parts that are permanently attached to the cylinder when it is being filled, e.g. fixed valve guard

A2

3.11 basic population of OMC

production of cylinders from only one over-moulding manufacturer using new inner cylinders manufactured by only one manufacturer within one calendar year, based on the same design type, the same materials and production processes

3.12 sub-group of OMC

part of a basic population, owned by one single owner

Note 1 to entry: A basic population is split into sub-groups, one per owner. If the whole basic population is owned by one owner, the sub-group equals the basic population. **A2**

4 Requirements for periodic inspection

4.1 General

The interval between periodic inspections shall be dependent on the content of a written scheme.

Periodic inspections/tests shall be carried out by a competent person under the control of an inspection body based on a written scheme and in accordance with the procedures specified in Table 1.

NOTE 1 A written scheme describes work procedures, criteria, responsibilities and other minimum requirements.

NOTE 2 With the agreement of the competent authority an alternative to the proof pressure test of cylinders is acoustic emission testing, ultrasonic examination or a combination of both. A1 *deleted text* A1

NOTE 3 Tests can be performed in any order as determined by the written scheme.

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4.2 Steel and aluminium cylinders

The maximum interval between periodic inspections for welded steel cylinders in conformance with EN 14140 or an equivalent standard and, welded aluminium LPG cylinders in conformance with EN 13110, or equivalent standard, shall be 10 years.

However for welded LPG steel cylinders in conformance with EN 14140 manufactured before the 1st January 2015, this maximum interval can be extended to 15 years, provided the conditions of Annex D are fully met and approval from the relevant competent authority(ies) has been given.

4.3 Over-moulded cylinders

For over-moulded cylinders the interval is determined in accordance with Table 1.

4.4 Composite cylinders

For composite cylinders, the determination of the interval between periodic inspections shall depend on the content of a written scheme that shall be approved by a competent authority, or body designated by this authority, which issued the type approval.

Annex E provides guidance on the requirements for 10-year periodic inspection interval for composite cylinders.

4.5 Rejected cylinders

Rejected cylinders shall be segregated and be either reconditioned, re-tested or rendered unserviceable.

The decision to render a cylinder unserviceable may be taken at any stage during the periodic inspection procedure. With agreement by the owner, a cylinder shall be rendered unserviceable in accordance with EN 12816 such that it cannot be re-issued into service as a pressure vessel.

NOTE In some countries, render unserviceable means scrapping.
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Table 1 — Requirements for periodic inspection

Cylinder types	Maximum periodic inspection interval	Procedures
Welded steel cylinders in conformance with EN 14140, or equivalent standard.	10 years	<ul style="list-style-type: none"> — External visual inspection as described in 5.2 and Annex A; — Proof pressure test (hydraulic proof pressure test or, with the agreement of the competent authority, a pneumatic proof test and leak test) as described in 5.3;
Welded steel cylinders in conformance with EN 14140 or equivalent standard – manufactured before 1 st January 2015.	<ul style="list-style-type: none"> — 10 years; or — 15 years with the agreement of the competent authority and under the conditions of Annex D. 	<ul style="list-style-type: none"> — Internal condition check as described in 5.4.1 and Annex A; — Inspection of threads as described in 5.5; — Inspection of valves as described in 5.6.
Welded aluminium cylinders.	10 years	<ul style="list-style-type: none"> — External visual inspection as described in 5.2 and Annex B; — Proof pressure tests (hydraulic proof pressure test or, with the agreement of the competent authority, a pneumatic proof test and leak test) as described in 5.3; — Internal condition check as described in 5.4.1; — Inspection of threads as described in 5.5; — Inspection of valves as described in 5.6.
Composite cylinders	As determined by the competent authority. Guidance for 10 year periodic inspection interval described in Annex E.	<ul style="list-style-type: none"> — External visual inspection as described in 5.2 and Annex C; — Proof pressure test (hydraulic proof pressure test or, with the agreement of the competent authority, a pneumatic proof test and leak test) as described in 5.3; — Internal condition check as described in 5.4.2; — Inspection of threads as described in 5.5; — Inspection of valves as described in 5.6.
Over-moulded cylinders	Annex F provides specific additional inspection requirements with	<ul style="list-style-type: none"> — External visual inspection as described in F.2.2; — Burst Tests as described in F.2.3;

Cylinder types	Maximum periodic inspection interval	Procedures
	destructive tests with an interval of maximum 3 years after putting in service and thereafter every 5 years.	<ul style="list-style-type: none"> — Internal condition check as described in 5.4; — Inspection of threads as described in 5.5 — Inspection of valves as described in 5.6.

5 Inspections and tests

5.1 General

Relevant cylinder data shall be identified before any inspections or tests are carried out.

Cylinders which cannot be safely emptied of gas shall be set aside for special handling.

Cylinders with inoperative or blocked valves shall be set aside for safe valve removal.

Before preparing for inspection, manufacturer's guidelines shall be taken into account to avoid any damage to the cylinders.

Any chemical solutions and/or cleaning methods used shall be selected to ensure that they do not adversely affect the cylinder material.

5.2 External visual inspection

5.2.1 Preparation for external visual inspection

- a) If necessary, the cylinder shall be cleaned and have all loose coatings or labels, corrosion products, tar, oil or other foreign matter removed from its external surface.
- b) Care shall be taken to avoid damaging the cylinder.
- c) When cylinders are treated by a process that might remove cylinder material, the inspection body shall decide whether a thickness test is required, e.g. ultrasonic thickness check.

NOTE Cleaning methods include wire brushing, shot blasting (in accordance with EN ISO 8501-1 [A1] [4] [A1] and the EN ISO 8504 [A1] [5] [A1] series), water jet cleaning, chemical cleaning or other suitable methods, that do not adversely affect any part of the cylinders.

5.2.2 Inspection procedure

5.2.2.1 Welded steel and welded aluminium LPG cylinders:

Cylinders shall be inspected for:

- a) dents, cuts, gouges, bulges, cracks, laminations or punctures, while applying the criteria for rejection in Annex A and Annex B, as appropriate;
- b) corrosion while applying the criteria for rejection in A.2 and Table B.2 as appropriate, giving special attention to areas where water can be trapped;

EXAMPLE At the base of the cylinder;

the junction between the cylindrical shell and the foot-ring;

the junction between the cylindrical shell and the valve guard or shroud;

the cylindrical shell and the valve guard or shroud; and

hidden corrosion e.g. under handles, applying the criteria for rejection given in Annex A and Annex B as appropriate.

- c) other defects (e.g. depressed bung or fire damage), while applying the criteria for rejection given in Annex A and Annex B as appropriate;
- d) integrity of all permanent attachments including protective casing where relevant; and
- e) integrity of all mandatory permanent markings.

5.2.2.2 Composite cylinders:

Cylinders shall be inspected for:

- a) cuts, gouges, bulges, cracks or de-laminations, while applying the criteria for acceptance/rejection in Annex C;
- b) other defects e.g. depressed bung or fire damage, while applying the criteria for acceptance/rejection in Annex C;
- c) integrity of all permanent attachments including protective casing; and
- d) integrity of the mandatory permanent marking.

5.2.3 Rejection criteria

Details of defects and rejection limits are described in:

- Annex A for specific requirements for welded steel LPG cylinders manufactured in accordance with EN 14140 or equivalent standard;
- Annex B for specific requirements for welded aluminium LPG cylinders; and
- Annex C for specific requirements for composite LPG cylinders.

5.3 Proof pressure test

5.3.1 General

The test shall consist of one of the proof pressure tests, as described in 5.3.2 and 5.3.3. ^{A2} deleted text ^{A2} ^{A1} The pneumatic proof test shall only be implemented where such an operation does not entail any danger. ^{A1}

^{A2} NOTE See also ADR, chapter 6.2.1.6.1. ^{A2}

Pressure gauges that are used to read the cylinder test pressure shall be in accordance with EN 837-1:1996 and EN 837-3:1996, accuracy class 1,6 or better. They shall be calibrated or checked for accuracy against a master gauge at regular intervals and not less frequently than once every six months. The master gauge shall be re-calibrated in accordance with national requirements.

All joints within the system shall be leak tight.

The test equipment shall not restrict the expansion of the cylinder.