



SLOVENSKI STANDARD

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LPG equipment and accessories - Transportable refillable welded and brazed steel
Liquefied Petroleum Gas (LPG) cylinders - Periodic inspection

Flüssiggas-Geräte und Ausrüstungsteile - Ortsbewegliche wiederbefüllbare geschweißte
Flaschen aus Stahl für Flüssiggas (LPG) - Wiederkehrende Prüfung

Equipements pour GPL et leurs accessoires - Bouteilles en acier soudé et brasé
transportables et rechargeables pour gaz de pétrole liquéfié (GPL) - Contrôle périodique

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English Version

LPG equipment and accessories - Transportable refillable welded and brazed steel Liquefied Petroleum Gas (LPG) cylinders - Periodic inspection

Equipements pour GPL et leurs accessoires - Bouteilles en acier soudé et brasé transportables et rechargeables pour gaz de pétrole liquéfié (GPL) - Contrôle périodique

Flüssiggas-Geräte und Ausrüstungsteile - Ortsbewegliche wiederbefüllbare geschweißte Flaschen aus Stahl für Flüssiggas (LPG) - Wiederkehrende Prüfung

This European Standard was approved by CEN on 7 October 2005.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This European Standard (EN 1440:2005) has been prepared by Technical Committee CEN/TC 286 “Liquified 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 May 2006, and conflicting national standards shall be withdrawn at the latest by May 2006.

This European Standard has been submitted for reference into the RID and/or in the technical annexes of the ADR. Therefore the standards listed in the normative references and covering basic requirements of the RID/ADR not addressed within the present standard are normative only when the standards themselves are referred to in the RID and/or in the technical annexes of the ADR.

This European Standard supersedes EN 1440:1996.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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Introduction

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

With experience and confidence gained over more than 60 years and improved cylinder manufacturing quality, it has been possible to allow the extension of intervals between periodic inspections to 15 years in several circumstances.

The very large populations of LPG cylinders in use have led to the development of alternative methods of inspection.

Periodic inspection is normally carried out at a test station operated under the responsibility of a competent gas organisation, or of a third party.

This European Standard has now been prepared to reflect the current state of the art for periodically inspecting LPG cylinders, and is based upon the operating experience of many hundreds of millions of cylinder years of service.

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.

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.

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

1 Scope

This European Standard specifies inspection intervals, procedures for periodic inspection and testing, for transportable refillable welded and brazed steel LPG cylinders of water capacity from 0,5 l up to and including 150 l with a minimum wall thickness of 1,5 mm (see EN 1442 and EN 12807).

This standard does not apply to cylinders permanently installed in vehicles, or to plant and filling equipment.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. 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, *Pressure gauges - Part 1: Bourdon tube pressure gauges - Dimensions, metrology, requirements and testing*

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

EN 1439, *LPG equipment and accessories - Transportable refillable welded and brazed steel Liquefied Petroleum Gas (LPG) cylinders - Procedure for checking before, during and after filling*

EN 1442, *Transportable refillable welded steel cylinders for liquefied petroleum gas (LPG) - Design and construction*

EN 12816, *Transportable refillable steel and aluminium LPG cylinders – Disposal*

EN 13152, *Specification and testing of LPG cylinder valves - Self closing*

EN 13153, *Specification and testing of LPG cylinder valves - Manually operated*

prEN 14894, *LPG Equipment and accessories - Cylinder and drum marking*

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

EN ISO 4628-3, *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)*

ISO 9162, *Petroleum products - Fuels (class F) - Liquefied petroleum gases - Specifications*

3 Terms and definitions

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

3.1

competent body

person or corporate body defined by the national authority, which by combination of appropriate qualification, training, experience, and resources, is able to make objective judgements on the subject

3.2**competent person**

person who by a combination of training, experience and supervision is able to make objective judgements on the subject

3.3**periodic inspection**

activities carried out at defined intervals, such as examining, measuring, testing or gauging the characteristics of a cylinder and comparing these with specified requirements and marking to attest conformity

3.4**production batch**

group of cylinders made consecutively during the same year, by the same manufacturer using the same manufacturing techniques to the same design, nominal size and material specifications on the same production machinery and subject to the same heat treatment conditions

NOTE In this context, "consecutively" need not imply continuous production.

3.5**protected cylinder**

cylinder fully covered with a protection against impact and external corrosion so that the cylinder wall cannot be seen, see Figure B.1

3.6**LPG (liquefied petroleum gas)**

mixture of predominantly butane or propane with traces of other hydrocarbon gases classified in accordance with UN number 1965, hydrocarbon gases mixture, liquefied, NOS or UN number 1075, petroleum gases, liquefied

NOTE In some countries, UN number 1011, 1978 may also be designated LPG.

3.7**tare weight**

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

4 Written scheme of inspection

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

The interval between periodic inspections shall be 15 years provided the conditions of Annex A are fully met and with the approval of the competent authority. An interval of 10 years shall apply if any of the conditions specified in Annex A are not met. For protected cylinders the interval is determined in accordance with 5.4.

The inspection procedures to be applied shall be selected from the alternatives given in Clause 5.

5 Procedures for periodic inspection**5.1 General**

Procedures for periodic inspection shall consist of an external visual inspection as described in 5.2 and, additionally, at least one of the procedures described in 5.3.

An alternative procedure for periodic inspection of protected cylinders is described in 5.4.

Periodic inspections/tests shall be carried out under the responsibility of a body approved by a competent authority.

Cylinders rejected shall be segregated to 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 the agreement of the owner, a cylinder shall be rendered unserviceable in accordance with EN 12816, so that it cannot be re-issued into service as a pressure vessel.

NOTE In some countries, render unserviceable means scrapping.

5.2 External visual inspection

5.2.1 Preparation for external visual inspection

- a) If required, 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 competent body shall decide whether a thickness test is required, e.g. ultrasonic thickness check.

NOTE Cleaning methods may be wire brushing, shot blasting (in accordance with EN ISO 8504 and EN ISO 8501-1), water jet cleaning, chemical cleaning or other suitable methods.

5.2.2 Inspection procedure

The entire surface of the cylinder shall be inspected for:

- a) dents, cuts, gouges, bulges, cracks, laminations or punctures, applying the criteria for rejection in Table 1;
- b) corrosion, giving special attention to areas where water can be trapped, at the base of the cylinder, the junction between the cylindrical shell and the foot-ring, the cylindrical shell and the valve guard or shroud, and in particular hidden corrosion (e.g. data plate) applying the criteria for rejection given in Table 2;
- c) other defects (e.g. depressed bung or fire damage) applying the criteria for rejection given in Table 3;
- d) the integrity of all permanent attachments;
- e) the integrity of all mandatory permanent markings.

5.2.3 Visible defects

Rejection criteria for physical and material defects or heat damage on the cylinder shell are contained in Table 1, Table 2 and Table 3.

Table 1 — Physical defects in the cylinder wall

Defects	Description	Rejection limit
Bulge	Visible swelling of the cylinder	All
Dent	A depression in the cylinder that has neither penetrated nor removed metal, when its width at any point is greater than 2 % of the external cylinder diameter	When the depth of the dent exceeds 25 % of its width at any point ^a
Cut or gouge	A sharp impression where metal has been removed or redistributed	Where the original calculated wall thickness is known: the depth of cut or gouge is such that the undamaged (remaining) wall is less than the minimum calculated wall thickness Where the original calculated wall thickness is not known: all
Dent containing cut or gouge	A depression in the cylinder within which there is a cut or gouge	When the size of the dent or cut or gouge exceeds the dimensions for rejection as an individual defect
Crack	A split or rift in the cylinder shell	All
Lamination	Layering of the material within the cylinder wall appearing as a discontinuity, crack, lap or bulge at the surface.	All

^a Appearance (e.g. sharp dent) and location (e.g. on shoulder of the cylinder) also play a part in the evaluation of dent severity.

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Table 2 — Corrosion on the cylinder wall

Type of corrosion	Description	Rejection limit
Isolated corrosion pits	A pitting of metal occurring in isolated areas at a concentration not greater than 1 pit per 500 mm ² of surface area	When the depth of discrete pits exceeds 0,6 mm (a greater depth of corrosion can be accepted provided that depth of corrosion does not reduce the wall thickness below the minimum calculated wall thickness)
Area corrosion	Reduction in wall thickness over an area not exceeding 20 % of the cylinder surface	When the depth of penetration of any pit exceeds 0,4 mm (a greater depth can be accepted provided that the depth of corrosion does not reduce the wall thickness below the minimum calculated wall thickness)
General corrosion	A reduction in wall thickness over an area exceeding 20 % of the cylinder surface	When the depth of penetration of any pit exceeds 0,2 mm. A greater depth can be accepted providing that the depth of corrosion does not reduce the wall thickness below the minimum calculated wall thickness
Chain pitting or line or channel corrosion	A series of pits or corroded cavities of limited width along the length or around the cylinder circumference	1) When the total length of corrosion in any direction exceeds 50% of the circumference of the cylinder or 2) When the depth of penetration exceeds 0,4 mm. A greater depth can be accepted providing that the depth of corrosion does not reduce the wall thickness below the minimum calculated wall thickness or 3) When the depth of corrosion cannot be measured
Crevice corrosion	Crevice corrosion occurs in the area of the intersection of the foot-ring or shroud with the cylinder	When the depth of penetration exceeds 0,4 mm or when the depth of corrosion cannot be measured