

Transportable refillable fully wrapped composite cylinders for Liquefied Petroleum Gases (LPG) - Design and Construction

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EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 14427:2004 sisaldab Euroopa standardi EN 14427:2004 ingliskeelset teksti.	This Estonian standard EVS-EN 14427:2004 consists of the English text of the European standard EN 14427:2004.
Käesolev dokument on jõustatud 23.09.2004 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.	This document is endorsed on 23.09.2004 with the notification being published in the official publication of the Estonian national standardisation organisation.
Standard on kättesaadav Eesti standardiorganisatsioonist.	The standard is available from Estonian standardisation organisation.

Käsitlusala: This European standard specifies minimum requirements concerning materials, design, construction, prototype testing and routine manufacturing inspections of composite cylinders with a water capacity from 0,5 litre up to and including 150 litres for liquefied petroleum gases exposed to ambient temperatures, with a test pressure of 30 bar. This standard is applicable to cylinders that comprise a liner of metallic material (welded or seamless) or nonmetallic material (or a mixture thereof), reinforced by fibres of glass, carbon or aramid (or a mixture thereof). This standard is also applicable to composite cylinders without liners.	Scope: This European standard specifies minimum requirements concerning materials, design, construction, prototype testing and routine manufacturing inspections of composite cylinders with a water capacity from 0,5 litre up to and including 150 litres for liquefied petroleum gases exposed to ambient temperatures, with a test pressure of 30 bar. This standard is applicable to cylinders that comprise a liner of metallic material (welded or seamless) or nonmetallic material (or a mixture thereof), reinforced by fibres of glass, carbon or aramid (or a mixture thereof). This standard is also applicable to composite cylinders without liners.
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Võtmesõnad: liquef, liquefied gases, liquefied petroleum gas, liquefied petroleum gases, liquid gas cylinder, liquid gas tank, mobile, refillable, safety, safety devices, safety requirements, specification (approval), specifications, testing, types, valve for steel cylinders

ICS 23.020.30

English version

Transportable refillable fully wrapped composite cylinders for Liquefied Petroleum Gases (LPG) - Design and Construction

Bouteilles entièrement bobinées en matériau composite,
transportables et rechargeables pour gaz de pétrole liquéfié
(GPL) - Conception et fabrication

Ortsbewegliche wiederbefüllbare vollumwickelte Flaschen
aus Verbundwerkstoff für Flüssiggas (LPG) - Gestaltung
und Konstruktion

This European Standard was approved by CEN on 18 March 2004.

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.



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

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Foreword

This document 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 November 2004, and conflicting national standards shall be withdrawn at the latest by November 2004.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports the objectives of the framework Directives on Transport of Dangerous Goods.

This European Standard has been submitted for reference into the RID and/or the technical annexes of the ADR. Therefore in this context 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 the technical annexes of the ADR.

Annex A is normative and annexes B and C are informative.

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.

Introduction

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.

1 Scope

This European Standard specifies minimum requirements for materials, design, construction, prototype testing and routine manufacturing inspections of fully wrapped composite cylinders with a water capacity from 0,5 litre up to and including 150 litres for liquefied petroleum gases (LPG) exposed to ambient temperatures, with a test pressure of 30 bar.

This standard is only applicable to cylinders which are fitted with a pressure relief valve (see 4.1.3).

NOTE 1 Cylinders made to this standard are suitable for the temperature range of $-40\text{ }^{\circ}\text{C}$ to $50\text{ }^{\circ}\text{C}$.

This standard is applicable to cylinders with a liner of metallic material (welded or seamless) or non-metallic material (or a mixture thereof), reinforced by fibres of glass, carbon or aramid (or a mixture thereof).

This standard is also applicable to composite cylinders without liners.

NOTE 2 This standard does not address the design, fitting and performance of removable protective sleeves. Where these are fitted, the choice of material and sleeve performance should be considered separately.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN ISO 75-1, *Plastics — Determination of temperature of deflection under load — Part 1: General test method* (ISO 75-1:1993).

EN ISO 75-3, *Plastics — Determination of temperature of deflection under load — Part 3: High-strength thermosetting laminates and long-fibre-reinforced plastics* (ISO 75-3:1993).

EN ISO 175, *Plastics — Methods of test for the determination of the effects of immersion in liquid chemicals* (ISO 175:1999).

EN ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles* (ISO 527-1:1993).

EN ISO 960, *Plastics — Polyamides (PA) — Determination of water content* (ISO 960:1988).

EN ISO 1133, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics* (ISO 1133:1997).

ISO 1183, *Plastics — Methods of determining the density and relative density of non-cellular plastics*.

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

EN ISO 1628-3, *Plastics — Determination of the viscosity of polymers in dilute solution using capillary viscometers — Part 3: Polyethylenes and polypropylenes (ISO 1628-3:2001).*

EN 1964-1, *Transportable gas cylinders — Specification for the design and construction of refillable transportable seamless steel gas cylinders of water capacities from 0,5 litres up to and including 150 litres — Part 1: Cylinders made of seamless steel with an R_m value of less than 1100 MPa.*

EN 1964-2, *Transportable gas cylinders — Specification for the design and construction of refillable transportable seamless steel gas cylinders of water capacities from 0,5 litres up to and including 150 litres — Part 2: Cylinders made of seamless steel with an R_m value of 1100 MPa and above.*

EN 1964-3, *Transportable gas cylinders — Specification for the design and construction of refillable transportable seamless steel gas cylinders of water capacities from 0,5 litres up to and including 150 litres — Part 3: Cylinders made of stainless steel with an R_m value of less than 1100 MPa.*

EN 1975, *Transportable gas cylinders — Specification for the design and construction of refillable transportable seamless aluminium and aluminium alloy gas cylinders of capacity from 0,5 litre up to 150 litre.*

ISO 2884, *Paints and varnishes — Determination of viscosity at a high rate of shear.*

EN ISO 3146, *Plastics — Determination of melting behavior (melting temperature or melting range) of semi-crystalline polymers by capillary tube and polarizing-microscope methods.*

EN ISO 3231, *Paints and varnishes — Determination of resistance to humid atmospheres containing sulphur dioxide (ISO 3231:1993).*

EN ISO 7253, *Paints and varnishes — Determination of resistance to neutral salt spray (fog) (ISO 7253:1996).*

ISO 10286, *Gas cylinders — Terminology.*

EN ISO 11114-2, *Transportable gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 2: Non-metallic Materials (ISO 11114-2:2000).*

EN ISO 11507:2001 *Paints and varnishes — Exposure of coatings to artificial weathering — Exposure to fluorescent UV and water (ISO 11507:1997).*

ISO 11997-2, *Paints and varnishes — Determination of resistance to cyclic corrosion conditions — Part 2: Wet (salt fog)/dry/humidity/UV light.*

EN 12807, *Transportable refillable brazed steel cylinders for liquefied petroleum gas (LPG) — Design and construction.*

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

EN 13152, *Specification and testing for LPG cylinder valves — Self closing.*

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

EN 14140, *Transportable refillable welded steel cylinders for Liquefied Petroleum Gas (LPG) — Alternative design and construction.*

ASTM D 2196-99, *Test methods for rheological properties of non-newtonian materials by rotational (Brookfield type) viscometer.*

ASTM D 2290-00, *Test method for apparent hoop tensile strength of plastics and reinforced plastic or by split disk method.*

ASTM D 2291-98, *Fabrication of ring test specimens for glass-resin composites.*

ASTM D 2343-95, *Test method for tensile properties of glass fibre strands, yarns and rovings used in reinforced plastics.*

ASTM D 2344-84, *Test method for apparent interlaminar shear strength of parallel fiber composites by short beam method.*

ASTM D 4018-99, *Standard test methods for properties of continuous filament carbon and graphite fibre tows.*

3 Terms, definitions and symbols and abbreviations

For the purposes of this European Standard, the terms and definitions given in ISO 10286 and the following apply.

3.1 Terms and definitions

3.1.1

ambient test temperature

temperature of surroundings varying between 10 °C and 35 °C (for test purposes only)

3.1.2

autofrettage

pressure application procedure which strains the metal liner past its yield point sufficiently to cause permanent plastic deformation, and results in the liner having compressive stresses and the fibres having tensile stresses when at zero internal gauge pressure

3.1.3

batch, (of fibres or components of the resin system)

homogeneous quantity of material, identified and certified as such by the supplier

3.1.4

batch, (of metallic liners)

quantity of liners of the same nominal diameter, thickness, length and design, made successively from the same material cast and subjected to the same heat treatment for the same length of time

3.1.5

batch, (of non-metallic liners)

quantity of liners of the same nominal diameter, thickness, length and design, made successively from the same batch of materials and subjected to the same manufacturing process

3.1.6

batch, (of finished cylinders with liners)

quantity of up to 200 finished cylinders, plus cylinders for destructive testing, of the same nominal diameter, thickness, length and design

NOTE The batch may contain different batches of liners, providing the batches are nominally the same and have had the same treatment, fibres and matrix materials.

3.1.7

batch, (of finished cylinders with no liners)

quantity of up to 200 finished cylinders, plus cylinders for destructive testing, of the same nominal diameter, thickness, length and design

3.1.8

burst pressure

highest pressure reached in a cylinder or liner during the relevant burst test