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**LPG equipment and accessories -
Transportable refillable welded steel
cylinders for LPG - Design and construction**

LPG equipment and accessories - Transportable
refillable welded steel cylinders for LPG - Design
and construction

EESTI STANDARDI EESSÕNA**NATIONAL FOREWORD**

<p>Käesolev Eesti standard EVS-EN 1442:2006+A1:2008 sisaldab Euroopa standardi EN 1442:2006+A1:2008 ingliskeelset teksti.</p>	<p>This Estonian standard EVS-EN 1442:2006+A1:2008 consists of the English text of the European standard EN 1442:2006+A1:2008.</p>
<p>Standard on kinnitatud Eesti Standardikeskuse 25.03.2008 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.</p>	<p>This standard is ratified with the order of Estonian Centre for Standardisation dated 25.03.2008 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.</p>
<p>Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 30.01.2008.</p>	<p>Date of Availability of the European standard text 30.01.2008.</p>
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English Version

**LPG equipment and accessories - Transportable refillable
welded steel cylinders for LPG - Design and construction**

Équipements pour GPL et leurs accessoires - Bouteilles en
acier soudé transportables et rechargeables pour gaz de
pétrole liquéfiés (GPL) - Conception et fabrication

Flüssiggas-Geräte und Ausrüstungsteile - Ortsbewegliche,
wiederbefüllbare, geschweißte Flaschen aus Stahl für
Flüssiggas (LPG) - Gestaltung und Konstruktion

This European Standard was approved by CEN on 18 May 2006 and includes Amendment 1 approved by CEN on 20 December 2007.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 1442:2006+A1:2008) 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of an identical text or by endorsement, at the latest by July 2008, and conflicting national standards shall be withdrawn at the latest by July 2008.

This document supersedes A1 EN 1442:2006 A1.

This document includes Amendment 1, approved by CEN on 2007-12-20.

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

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 has been extensively re-formatted to align with other more recent LPG cylinder standards.

The main technical changes are a widening of the range of materials permitted, reference to the latest ISO welding standards, the introduction of radiography as a permitted alternative to radiographic examination of welds, a reduction in the minimum required burst pressure from 50 bar to 35 bar and simplification of the marking requirements by reference to EN 14894.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

This European Standard 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 European Standard that the execution of its provisions is entrusted to appropriately qualified and experienced people.

All pressures are gauge unless otherwise stated.

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1 Scope

This European Standard specifies the minimum requirements for the design, construction and testing during manufacture of transportable refillable welded steel Liquefied Petroleum Gas (LPG) cylinders, of water capacity from 0,5 l up to and including 150 l, exposed to ambient temperatures.

This European Standard applies only to cylinders having a circular cross-section.

2 Normative references

The following referenced documents are indispensable for the application 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 287-1, *Qualification test of welders — Fusion welding — Part 1: Steels*

EN 462-1, *Non-destructive testing — Image quality of radiographs — Part 1: Image quality indicators (wire type) — Determination of image quality value*

EN 462-2, *Non-destructive testing — Image quality of radiographs — Part 2: Image quality indicators (step/hole type) — Determination of image quality value*

EN 473:2000, *Non-destructive testing — Qualification and certification of NDT personnel — General principles*

EN 895, *Destructive tests on welds in metallic materials — Transverse tensile test*

EN 910, *Destructive tests on welds in metallic materials — Bend tests*

EN 962:1996, *Transportable gas cylinders — Valve protection caps and valve guards for industrial and medical gas cylinders — Design, construction and tests*

EN 970, *Non-destructive examination of fusion welds — Visual examination*

EN 1321, *Destructive tests on welds in metallic materials — Macroscopic and microscopic examination of welds*

EN 1418, *Welding personnel — Approval testing of welding operators for fusion welding and resistance weld setters for fully mechanized and automatic welding of metallic materials*

EN 1435:1997, *Non-destructive examination of welds — Radiographic examination of welded joints*

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

EN 10120, *Steel sheet and strip for welded gas cylinders*

EN 10204:2004, *Metallic products — Types of inspection documents*

EN 14784-1, *Non-destructive testing — Industrial computed radiography with storage phosphor imaging plates — Classification of systems*

EN 14784-2, *Non-destructive testing — Industrial computed radiography with storage phosphor imaging plates — General principles for testing of metallic materials using X-rays and gamma rays*

EN 14894:2006, *LPG equipment and accessories — Cylinder and drum marking*

EN ISO 643, *Steels — Micrographic determination of the apparent grain size (ISO 643:2003)*

EN ISO 5817:2003, *Welding — Fusion welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections (ISO 5817:2003)*

EN ISO 6520-1, *Welding and allied processes — Classification of geometric imperfections in metallic materials — Part 1: Fusion welding (ISO 6520-1:1998)*

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

EN ISO 15613, *Specification and qualification of welding procedures for metallic materials — Qualification based on pre-production welding test (ISO 15613:2004)*

EN ISO 15614-1, *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 15614-1:2004)*

3 Terms, definitions and symbols

3.1 Terms and definitions

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

3.1.1

yield strength

upper yield strength R_{eH} or

0,2 % proof strength (non-proportional elongation), $R_{p0,2}$, for steels that do not exhibit a defined yield

3.1.2

normalised

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

3.1.3

stress relieved

condition resulting from heat treatment in which a finished cylinder is heated to a uniform temperature below the lower critical point (A_{c1}) of the steel and cooled in a still atmosphere, the object of which is to reduce the residual stresses without altering the metallurgical structure of the steel

3.1.4

weld-override zone

area on a circumferential weld where the weld metal deposition has carried on beyond the start point

3.2 Symbols

a calculated thickness of the cylindrical shell, in millimetres.

A percentage elongation after fracture.

b calculated thickness of the end of the cylinder, in millimetres.

C shape factor for ends (see Table 2, Figure 2 and Figure 3).

D outside diameter of the cylinder as given in the design drawing (see Figure 1), in millimetres.

D_p outside diameter of a bend test mandrel (see Figure 8), in millimetres.