

LPG equipment and accessories - Welded steel pressure vessels for LPG road tankers - Design and manufacture

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 12493:2013+A2:2018 sisaldab Euroopa standardi EN 12493:2013+A2:2018 ingliskeelset teksti.	This Estonian standard EVS-EN 12493:2013+A2:2018 consists of the English text of the European standard EN 12493:2013+A2:2018.
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English Version

LPG equipment and accessories - Welded steel pressure vessels for LPG road tankers - Design and manufacture

Équipements pour GPL et leurs accessoires -
Réservoirs sous pression en acier soudés des camions-
citernes pour GPL - Conception et construction

Flüssiggas-Geräte und Ausrüstungsteile - Geschweißte
Druckbehälter aus Stahl für Straßentankwagen für
Flüssiggas (LPG) - Auslegung und Herstellung

This European Standard was approved by CEN on 22 May 2014 and includes Corrigendum 1 issued by CEN on 1 July 2015 and Amendment 2 approved by CEN on 22 January 2018.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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European foreword

This document (EN 12493:2013+A2:2018) 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of an identical text or by endorsement, at the latest by December 2018, and conflicting national standards shall be withdrawn at the latest by December 2018.

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 22 May 2014, Corrigendum 1 issued by CEN on 1 July 2015 and Amendment 2 approved by CEN on 22 January 2018.

This document supersedes A2 EN 12493:2013+A1:2014 A2.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1 and A2 A2.

The modifications of the related CEN Corrigendum have been implemented at the appropriate places in the text and are indicated by the tags AC AC.

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 technical annexes of the ADR A2 [12] A2.

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

The following main changes have been introduced during the revision of EN 12493:2008+A1:2012:

- revision of the shell thickness calculations to avoid any confusion with ADR design pressures;
- revision of the hydraulic test pressure to avoid any confusion with ADR hydraulic test pressures and to reduce the maximum tensile stress (at the time of the hydraulic test);
- the addition of minimum thickness calculations;
- clarification of the surge plate requirements;
- references to Annex C (normative) changed to 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, 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

This European Standard calls for the use of substances and procedures that may be injurious to health and/or the environment if adequate precautions are not taken. It refers only to technical suitability: it does not absolve the user from their legal obligations at any stage.

A2 Protection of the environment is a key political issue in Europe and elsewhere, for CEN/TC 286 this is covered in CEN/TS 16765 [7] *LPG equipment and accessories — Environmental considerations for CEN/TC 286 standards*, and this Technical Specification should be read in conjunction with this standard. This Technical Specification provides guidance on the environmental aspects to be considered regarding equipment and accessories produced for the LPG industry and the following is addressed:

- a) design;
- b) manufacture;
- c) packaging;
- d) use and operation;
- e) disposal. **A2**

It is recommended that manufacturers develop an environmental management policy. For guidance, see EN ISO 14000 series (**A2** see [8], [9] and [10] **A2**).

Provisions need to be restricted to a general guidance. Limit values are specified in national laws.

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 gauged unless otherwise stated.

NOTE This European Standard 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 might be beneficial to refer to the leaflet “measurement uncertainty leaflet” SP INFO 2000 27 **A2** [15] **A2**.

1 Scope

This European Standard specifies minimum requirements for materials, design, construction and workmanship procedures, and tests for welded LPG road tanker pressure vessels and their welded attachments manufactured from carbon, carbon/manganese and micro alloy steels.

There is no upper size limit as this is determined by the gross vehicle weight limitation.

This European Standard does not cover pressure vessels for pressure vessel containers.

NOTE 1 In the context of this standard the term "road tanker" is understood to mean "fixed tanks" and "demountable tanks" as defined in ADR.

NOTE 2 The equipment for the pressure vessels and the inspection and testing after assembly is covered by EN 12252 and EN 14334, respectively.

NOTE 3 The design type of the road tanker is subject to approval by the competent authority, as required by ADR.

A₂

NOTE 4 This standard is intended for LPG only; however for other liquefied gases see EN 14025. **A₂**

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.

A₂ *deleted text* **A₂**

EN 837-2, *Pressure gauges — Part 2: Selection and installation recommendations for pressure gauges*

EN 10025-2, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

EN 10028-2, *Flat products made of steels for pressure purposes — Part 2: Non-alloy and alloy steels with specified elevated temperature properties*

EN 10028-3, *Flat products made of steels for pressure purposes — Part 3: Weldable fine grain steels, normalized*

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

EN 12252, *LPG equipment and accessories — Equipping of LPG road tankers*

EN 13445-2, *Unfired pressure vessels — Part 2: Materials*

EN 13445-3, *Unfired pressure vessels — Part 3: Design*

EN 14717, *Welding and allied processes — Environmental check list*

EN ISO 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method (ISO 148-1)*

EN ISO 3452-1, *Non-destructive testing — Penetrant testing — Part 1: General principles (ISO 3452-1)*

EN ISO 3834-2, *Quality requirements for fusion welding of metallic materials — Part 2: Comprehensive quality requirements (ISO 3834-2)*

EN ISO 4136, *Destructive tests on welds in metallic materials — Transverse tensile test (ISO 4136)*

EN ISO 5173, *Destructive tests on welds in metallic materials — Bend tests (ISO 5173)*

EN ISO 5178, *Destructive tests on welds in metallic materials — Longitudinal tensile test on weld metal in fusion welded joints (ISO 5178)*



EN ISO 5579, *Non-destructive testing — Radiographic testing of metallic materials using film and X- or gamma rays — Basic rules (ISO 5579)*

EN ISO 5817:2007, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections (ISO 5817:2003, corrected version:2005, including Technical Corrigendum 1:2006))*

EN ISO 6520-1:2007, *Welding and allied processes — Classification of geometric imperfections in metallic materials — Part 1: Fusion welding (ISO 6520-1:2007)*

EN ISO 6520-2:2013, *Welding and allied processes — Classification of geometric imperfections in metallic materials — Part 2: Welding with pressure (ISO 6520-2:2013)*

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

EN ISO 9016, *Destructive tests on welds in metallic materials — Impact tests — Test specimen location, notch orientation and examination (ISO 9016)*



EN ISO 9606-1, *Qualification testing of welders — Fusion welding — Part 1: Steels (ISO 9606-1)*

EN ISO 9712, *Non-destructive testing — Qualification and certification of NDT personnel (ISO 9712)*

EN ISO 14732, *Welding personnel — Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials (ISO 14732)*

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

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)*

EN ISO 17636-1, *Non-destructive testing of welds — Radiographic testing — Part 1: X- and gamma-ray techniques with film (ISO 17636-1)*

EN ISO 17636-2, *Non-destructive testing of welds — Radiographic testing — Part 2: X- and gamma-ray techniques with digital detectors (ISO 17636-2)*

EN ISO 17637, *Non-destructive testing of welds — Visual testing of fusion-welded joints (ISO 17637)*

EN ISO 17638, *Non-destructive testing of welds — Magnetic particle testing (ISO 17638)*

EN ISO 17639, *Destructive tests on welds in metallic materials — Macroscopic and microscopic examination of welds (ISO 17639)*

EN ISO 17640, *Non-destructive testing of welds — Ultrasonic testing — Techniques, testing levels, and assessment (ISO 17640)*

Ⓐ₂

EN ISO 19232-1, *Non-destructive testing — Image quality of radiographs — Part 1: Determination of the image quality value using wire-type image quality indicators (ISO 19232-1)* Ⓐ₂

EN ISO 19232-2, *Non-destructive testing — Image quality of radiographs — Part 2: Determination of the image quality value using step/hole-type image quality indicators (ISO 19232-2)*

3 Terms and definitions

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

3.1

liquefied petroleum gas

LPG

low pressure liquefied 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

3.2

yield strength

upper yield strength ReH or, for steels that do not exhibit a definite yield (non-proportional elongation), the 0,2 % proof strength

3.3

cold forming

forming at temperatures not less than 25 °C below the maximum permissible temperature for stress relieving, in accordance with the applicable material specifications

3.4

hot forming

forming at temperatures above the temperature for stress relieving as stated in the material specifications