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LPG equipment and accessories - Construction and performance of LPG equipment for automotive filling stations - Part 2: Components other than dispensers and installation requirements

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Flüssiggas-Geräte und Ausrüstungsteile - Bau- und Arbeitsweise von Flüssiggas-Geräten für Autogas-Tankstellen - Teil 2: Bauteile, außer Zapfsäulen, und Anforderungen an die Aufstellung

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Équipements pour GPL et leurs accessoires - Équipements devant être utilisés dans les stations-service GPL - Partie 2: Composants autres que les distributeurs, et exigences d'installation

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LPG equipment and accessories - Construction and performance of LPG equipment for automotive filling stations - Part 2: Components other than dispensers and installation requirements

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Foreword

This document (EN 14678-2:2007+A1:2012) 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of an identical text or by endorsement, at the latest by August 2012, and conflicting national standards shall be withdrawn at the latest by August 2012.

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 2011-12-26.

This document supersedes EN 14678-2:2007.

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

EN 14678, *LPG equipment and accessories — Construction and performance of LPG equipment for automotive filling stations* consists of the following parts:

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Part 1: Dispensers

Part 2: Components other than dispensers, and installation requirements

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1 Scope

This European Standard covers the installation requirements, on fixed LPG filling stations and on multi-fuel filling stations, for the automotive LPG equipment and components, which are required to safely dispense automotive LPG.

This European Standard does not cover on-site and off-site safety distances.

NOTE Users of this European Standard should be aware that National regulations may be in place covering all or some of the requirements of this European Standard. National regulations over-ride any requirement in this European Standard in the states where they apply.

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 549, *Rubber materials for seals and diaphragms for gas appliances and gas equipment*

EN 751-2, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water — Part 2: Non-hardening jointing compounds.*

EN 751-3, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water — Part 3: Unsintered PTFE tapes*

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EN 837-1, *Pressure gauges — Part 1: Bourdon tube pressure gauges — Dimensions, metrology, requirements and testing*

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EN 1092-1, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 1: Steel flanges*

EN 1983, *Industrial valves — Steel ball valves*

EN 10226-1, *Pipe threads where pressure tight joints are made on the threads — Part 1: Taper external threads and parallel internal threads — Dimensions, tolerances and designation*

〚A1〛 EN 12542, *LPG equipment and accessories — Static welded steel cylindrical tanks, serially produced for the storage of Liquefied Petroleum Gas (LPG) having a volume not greater than 13 m³ — Design and manufacture* 〚/A1〛

〚A1〛 EN 13445 (all parts), *Unfired pressure vessels* 〚/A1〛

EN 13463-1, *Non-electrical equipment for potentially explosive atmospheres — Part 1: Basic methodology and requirements.*

CEN/TS 13547, *Industrial valves — Copper alloy ball valves*

EN 13709, *Industrial valves — Steel globe and globe stop and check valves*

EN 13789, *Industrial valves — Cast iron globe valves*

EN 14570, *Equipping of LPG tanks overground and underground*

EN 14678-1:2006, *LPG equipment and accessories — Construction and performance of LPG equipment for automotive filling stations — Part 1: Dispensers*

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EN 15257, *Cathodic protection — Competence levels and certification of cathodic protection personnel*

EN 60079-10, *Electrical apparatus for explosive gas atmospheres — Part 10: Classification of hazardous areas (IEC 60079-10:2002)*

3 Terms and definitions

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

3.1
Liquefied Petroleum Gas
LPG
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

NOTE For automotive LPG specification see EN 589.

3.2
non-return valve
valve designed to close automatically to restrict reverse flow

3.3
excess flow valve
valve designed to close automatically, with a small residual flow, when the fluid flow passing through it exceeds a predetermined value, and to re-open when the pressure differential across the valve has been restored below a certain value

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3.4
pressure relief valve
self-closing valve which automatically, without the assistance of any energy other than that of the vapour concerned, discharges vapour at a predetermined pressure, and operates with a pop action

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3.5
hydrostatic relief valve
self-closing valve which automatically, without the assistance of any energy other than that of the fluid concerned, discharges fluid at a predetermined pressure

3.6
shear valve
normally open valve activated by impact, which closes both sides of the break point to prevent flow and remains closed after activation

3.7
shut-off valve
valve to provide a leak-tight seal which is operated either manually, remotely or is self-closing

3.8
contents gauge
device to indicate the liquid level or contents in a pressure vessel

3.9
mounded vessel
pressure vessel above or partially underground of which the part above the ground is completely covered

3.10
underground vessel
vessel below the surrounding ground level and completely covered

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3.11
[A1] overground vessel
pressure vessel above the surrounding ground level and not covered [A1]

3.12
submersible pump
pump which is completely or partially immersed in the liquid LPG

3.13
external pump
pump which is installed on the LPG delivery pipe-work

3.14
hazardous area
[A1] area in which an explosive atmosphere is or may be present, in a quantity such as to require special precautions for the construction and installation of equipment and use of apparatus [A1]

3.15
dispenser
delivery and measuring unit for LPG in the liquid phase (see EN 14678-1)

3.16
breakaway coupling
coupling which separates at a predetermined section when required and each separated section contains a self closing shut-off valve which seals automatically

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3.17
break point
weakened section in a pipe or fitting intended to break when excessive force is applied

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3.18
installer
person or organization who, by qualification, training, experience and resources assumes technical responsibility for the installation of an LPG filling station

[A1] 3.19
unattended filling station
self-service filling station that is not supervised by on-site personnel [A1]

[A1] 3.20
pressure vessel
assembly of the pressure-retaining envelope (including the openings and their closures) and non-pressure-retaining parts attached directly to it [A1]

4 Requirements

4.1 General

The design of the installation shall take into account stresses resulting from internal and external loads such as pressure, thermal expansion, contraction and vibration.

The installer shall be provided with a drawing of the layout of the installation on which the hazardous areas are shown including their classification in accordance with EN 60079-10.

Only components suitable for the selected hazardous area shall be installed.

All components required for operational and emergency purposes shall be easily accessible.

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All remotely operated shut-off valves shall be of the normally closed type.

All equipment and components shall be installed according to the manufacturer's instructions and tested according to the procedures described in Clause 6 and Clause 7.

Overground equipment shall be:

— secured to prevent excessive movement of pipes;

— located to reduce the possibility of impact damage from vehicles or mobile equipment;

— protected with bollards or barriers, where necessary.

4.2 Design pressure

The design pressure for the parts subject to pressure, other than the 〚A1〛 pressure vessel 〈A1〉 and its pressure relief valve, shall be at least 2 500 kPa (25 bar).

4.3 Design temperature

The maximum design temperature shall be + 40 °C.

The minimum design temperature shall be – 20 °C.

For operating conditions outside the above range, different design temperature(s) shall be agreed with the manufacturer and suitably marked.

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4.4 Materials

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Materials in contact with LPG shall be compatible with automotive LPG. Materials exposed to corrosive environments shall be corrosion resistant or protected against corrosion.

Other materials used shall meet the design requirements of this European Standard.

Non-conductive materials exposed to potentially explosive atmospheres, which are susceptible to electrostatic charge, shall comply with EN 13463-1.

NOTE 1 Further information on electrostatics is given in CENELEC Report CLC/TR 50404.

All elastomeric materials in contact with LPG shall be compatible with automotive LPG and shall not distort, harden or adhere to other components to such an extent as to impair the function of those components. Rubber materials shall conform to EN 549.

NOTE 2 For guidance see EN ISO 11114-2.

4.5 Corrosion protection

4.5.1 General

4.5.1.1 Pipe-work, pipe fittings and components shall be constructed from materials which shall not be degraded by the external environment in which the material is used (e.g. be corrosion resistant) or protected with a suitable coating.

4.5.1.2 For underground pipe-work, coatings in accordance with EN 12068 are acceptable. Additional cathodic protection shall be applied if not otherwise adequately protected, see 4.5.2.

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4.5.2 Cathodic protection

Cathodic protection of buried piping shall be applied to reduce the risk of aggressive localised corrosion at points where the protective coating is or could become defective.

Protection shall be either by the connection of sacrificial anodes or the use of an impressed current. Protection shall be applied as soon as practicable after installation.

Attention shall be given to the risks of pick up from stray earth currents and possible interaction with other local electrical networks.

Electrical connections to pipe-work shall be through the use of fully welded pads compatible with the material of the pipe.

Direct electrical connection to the pipe wall by means of clamping shall not be permitted.

Cathodic protection is recommended when:

— specific resistivity of the soil at the installation area is less than 100 Ohm·m, or

— sand used to cover the pipe-work has a specific electrical resistivity of less than 100 Ohm·m, or

— stray currents are likely to occur, for instance in the vicinity of high-voltage lines and electric railways or tramways.

The specific resistivity of the soil shall be established by a competent person as defined by EN 15257.

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The cathodically protected components shall be electrically insulated from earthed objects. There shall be electrical continuity for all buried pipework covered by the cathodic protection system.

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NOTE Flanges and other in line components may require specific continuity connections.

The electrical resistance of the insulators used for this purpose, measured above-ground, shall be at least 100 000 Ohms.

The cathodic protection shall supply a potential of at least -850 mV to the component to be protected, referred to a $Cu/CuSO_4$ reference cell. In anaerobic soils, the potential shall be -950 mV.

The measuring point of the cathodic protection shall be in the form of a measuring post or above-ground measuring box.

The cathodic protection shall be checked for proper functioning prior to commissioning of the installation.

4.6 Storage [A1] pressure vessel [A1]

4.6.1 Design

Overground [A1] pressure vessels [A1] with a volume of 13 m^3 or below shall be designed and manufactured in accordance with EN 12542 or equivalent.

Underground and mounded [A1] pressure vessels [A1] with a volume of 13 m^3 or below shall be designed and manufactured in accordance with [A1] EN 12542 [A1] or equivalent.

[A1] Pressure vessels [A1] with a volume greater than 13 m^3 shall comply with EN 13445 or equivalent.

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4.6.2 Installation

Unless otherwise specified by the [A1] pressure vessel [A1] manufacturer, 0,3 m of clean sand, free of stones and sharp particles, shall be used to surround and cover underground or mounded [A1] pressure vessels [A1]. Where sand is used, the particle diameter and chemical properties shall be selected not to cause damage to the [A1] pressure vessel [A1] and its ancillary equipment.

NOTE Sand with a particle diameter of 3 mm is considered as suitable for this application. Utilisation of sand with a particle diameter less than 3 mm should take into account that it may be washed away, migrating into the surrounding ground. In this case proper protection should be provided (e.g. by means of concrete bed and side walls).

The storage [A1] pressure vessel [A1] shall be installed either above ground, underground or mounded in a fixed position. See Annex A for installation examples.

Adequate provisions shall be taken to avoid movement of the [A1] pressure vessel [A1] in respect to the surrounding ground.

4.6.3 Equipping

All storage [A1] pressure vessels [A1] shall be equipped in accordance with EN 14570.

The following functions are also mandatory for installations covered by this European Standard:

— vapour return when required by dispenser design;

— drainage; and

— pressure indication.

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4.6.4 [A1] Pressure vessel [A1] protection

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Adequate means shall be provided to protect the [A1] pressure vessel [A1] and ancillary components from vehicle impact.

4.7 Pumping units

4.7.1 General

External or submersible pumps are permitted. See Annex A for installation examples.

Precautions shall be taken so that under no circumstances will the pump pressure exceed the maximum design pressure of the installation.

NOTE This can be achieved by installing a by-pass system that discharges into the [A1] pressure vessel [A1] from which the pump is operating.

4.7.2 Submersible pump

Where a submersible pump is used the [A1] pressure vessel [A1] design shall allow for removal of the submersible pump, in accordance with the pump manufacturers recommendations, with minimal loss of [A1] pressure vessel [A1] contents.

NOTE If no isolating barrel has been installed, the [A1] pressure vessel [A1] may have to be emptied before any exchange of the pump.