

SLOVENSKI STANDARD

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Oprema in pribor za utekočinjeni naftni plin (UNP) - Izdelava in lastnosti opreme za UNP za bencinske servise - 1. del: Točilne naprave

LPG equipment and accessories - Construction and performance of LPG equipment for automotive filling stations - Part 1: Dispensers

Flüssiggas-Geräte und Ausrüstungsteile - Bau- und Arbeitsweise von Flüssiggas-Geräten für Autogas-Tankstellen - Teil 1: Zapfsäulen

Équipements pour GPL et leurs accessoires - Construction et caractéristiques des équipements GPL dans les stations-service - Partie 1: Distributeurs

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75.200	Oprema za skladiščenje nafte, naftnih proizvodov in zemeljskega plina	Petroleum products and natural gas handling equipment
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LPG equipment and accessories - Construction and performance of LPG equipment for automotive filling stations - Part 1: Dispensers

Equipements pour GPL et leurs accessoires - Construction et caractéristiques des équipements GPL dans les stations-service - Partie 1: Distributeurs

Flüssiggas-Geräte und Ausrüstungsteile - Bau- und Arbeitsweise von Flüssiggas-Geräten für Autogas-Tankstellen - Teil 1: Zapfsäulen

This European Standard was approved by CEN on 5 February 2013.

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 CEN-CENELEC Management Centre or to any CEN member.

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EN 14678-1:2013 (E)**Foreword**

This document (EN 14678-1:2013) 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of an identical text or by endorsement, at the latest by September 2013, and conflicting national standards shall be withdrawn at the latest by September 2013.

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 supersedes EN 14678-1:2006+A1:2009.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive.

For relationship with EU Directive, see informative Annex ZA, which is an integral part of this document.

Differences between this document and EN 14678-1:2006+A1:2009 include:

- The addition of test requirements to 5.7.1 and 5.8.1;
- The definition of unattended filling stations and
- The addition of an environmental checklist.

EN 14678 consists of the following parts:

- EN 14678-1, LPG equipment and accessories — Construction and performance of LPG equipment for automotive filling stations — Part 1: Dispensers;
- EN 14678-2, LPG equipment and accessories — Construction and performance of LPG equipment for automotive filling stations — Part 2: Components other than dispensers and installation requirements;
- EN 14678-3, LPG equipment and accessories — Construction and performance of LPG equipment for automotive filling stations — Part 3: Refuelling installations at private and industrial premises.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document is a type C standard as stated in EN ISO 12100:2010. When provisions of this type C standard differ from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards.

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.

Protection of the environment is a key political issue in Europe and elsewhere. Protection of the environment is taken in a very broad sense. What is meant is the total life cycle aspects of, e.g. a product on the environment, including expenditure of energy and during all phases from mining of raw materials, fabrication, packaging, distribution, use, scrapping, recycling of materials, etc.

NOTE Annex D indicates which clauses in this European Standard address environmental issues. Clauses addressing environmental issues are restricted to a general guidance. Limiting values can be specified in national laws.

It is recommended that companies using this European Standard develop an environmental management policy. For guidance see ISO 14000 series [15], [16] and [17].

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 specified.

The PED, Directive 97/23/EC [20], applies to any assembly with a component defined as category II or higher in this Directive: <https://standards.iteh.ai/catalog/standards/sist/c28546b1-aba9-4a07-9fb8-e2e4c29c178e/sist-en-14678-1-2013>

- Article 1, 3.6 of the PED excludes equipment classified as no higher than category I under article 9 if it is covered by Directive 94/9/EC (ATEX).
- The category I limit is defined in Annex II Table 6 of the PED. It applies to piping for liquids whose vapour pressure at the maximum allowable temperature is greater than 0,5 bar (50 kPa) above DN 100 or, in the case of maximum allowable pressures greater than 10 bar (1 kPa), is above the product of DN and PS of 1 000.
- Because the maximum allowable pressure (PS) in this document is 25 bar (2 500 kPa) and the DN of the intended piping is less than 40, the product of DN and PS of 1 000 in Table 6 of the PED is not reached.
- The category I limit for vessels is defined in Annex II Table 1 of the PED. It also applies to vessels for liquids whose vapour pressure at the maximum allowable temperature is greater than 0,5 bar (50 kPa) above volumes (V) of 1 l up to a pressure of 200 bar or, in the case of the product of V and PS of 50.
- Because the maximum allowable pressure (PS) in this document is 25 bar (2 500 kPa) and if the V of the intended vessel is less than 2 l, the product of V and PS of 50 in Table 1 of the PED is not reached.

EN 14678-1:2013 (E)**1 Scope**

This European Standard covers the requirements for the design, manufacture, testing and marking of LPG dispensers for automotive LPG filling stations with a maximum allowable pressure of 25 bar (2 500 kPa), where the piping has a maximum DN 40 and any vessel fitted has a volume less than 2 l.

This European Standard covers the requirements for the LPG parts in multi-fuel dispensers.

This European Standard does not cover dispensers with integral pumps.

This European Standard may also be used for piping greater than DN 40 and/or vessels greater than 2 l, but then the PED [20] should also be consulted.

This European Standard does not include any requirement for metering performance.

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.

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

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

EN 1127-1, *Explosive atmospheres — Explosion prevention and protection — Part 1: Basic concepts and methodology*

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EN 1762, *Rubber hoses and hose assemblies for liquefied petroleum gas, LPG (liquid or gaseous phase), and natural gas up to 25 bar (2,5 MPa) — Specification*

EN 1775, *Gas supply — Gas pipework for buildings — Maximum operating pressure less than or equal to 5 bar — Functional recommendations*

EN 13463-1, *Non-electrical equipment for use in potentially explosive atmospheres — Part 1: Basic method and requirements*

EN 13480-1, *Metallic industrial piping — Part 1: General*

EN 13480-2, *Metallic industrial piping — Part 2: Materials*

EN 13480-3, *Metallic industrial piping — Part 3: Design and calculation*

EN 13480-4, *Metallic industrial piping — Part 4: Fabrication and installation*

EN 13480-5, *Metallic industrial piping — Part 5: Inspection and testing*

EN 13617-1, *Petrol filling stations — Part 1: Safety requirements for construction and performance of metering pumps, dispensers and remote pumping units*

EN 13760, *Automotive LPG filling system for light and heavy duty vehicles — Nozzle, test requirements and dimensions*

EN 15001-1, *Gas Infrastructure — Gas installation pipework with an operating pressure greater than 0,5 bar for industrial installations and greater than 5 bar for industrial and non-industrial installations — Part 1: Detailed functional requirements for design, materials*

EN 50525-2-21, *Electric cables — Low voltage energy cables of rated voltages up to and including 450/750 V (U₀/U) — Part 2-21: Cables for general applications — Flexible cables with crosslinked elastomeric insulation*

EN 50525-2-51, *Electric cables — Low voltage energy cables of rated voltages up to and including 450/750 V (U₀/U) — Part 2-51: Cables for general applications — Oil resistant control cables with thermoplastic PVC insulation*

EN 60079-0, *Explosive atmospheres — Part 0: Equipment — General requirements (IEC 60079-0)*

EN 60079-7:2007, *Explosive atmospheres — Part 7: Equipment protection by increased safety "e" (IEC 60079-7:2006)*

EN 60079-10-1, *Explosive atmospheres — Part 10-1: Classification of areas — Explosive gas atmospheres (IEC 60079-10-1)*

EN 60079-14, *Explosive atmospheres — Part 14: Electrical installations design, selection and erection (IEC 60079-14)*

EN 60079-15, *Explosive atmospheres — Part 15: Equipment protection by type of protection "n" (IEC 60079-15)*

EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, mod.)*

EN 60529, *Degrees of protection provided by enclosures (IP Code) (IEC 60529)*

EN 60730-2-10, *Automatic electrical controls for household and similar use — Part 2-10: Particular requirements for motor-starting relays (IEC 60730-2-10)*

EN 60947-3, *Low-voltage switchgear and controlgear — Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units (IEC 60947-3)*

EN 60950-1, *Information technology equipment — Safety — Part 1: General requirements (IEC 60950-1)*

3 Terms and definitions

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

3.1

liquefied petroleum gas

LPG

low pressure 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

Note 1 to entry: For the specification of automotive LPG see EN 589.

3.2

maximum allowable pressure

maximum pressure for which the equipment is designed

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**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

**3.4
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

**3.5
shear valve**
normally open valve activated by impact which closes both sides of the break point to prevent flow and remains closed after activation

Note 1 to entry: Also referred to as an impact check valve.

**3.6
dead man's push button**
manually operated non latching device which immediately stops the flow when released

**3.7
hazardous area**
area in which an explosive atmosphere is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of equipment

**3.8
dispenser**
delivery and measuring unit for LPG in the liquid phase

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**3.9
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

Note 1 to entry: Also referred to as a safe break.

**3.10
nozzle boot**
partially enclosed housing where the filling nozzle is located when not in use

**3.11
LPG system**
installation of piping and components in contact with LPG

**3.12
break point**
weakened section in a pipe or fitting intended to break when excessive force is applied

**3.13
sight glass**
device to allow checking that all, or part, of the measuring system is completely filled with liquid

**3.14
screen**
perforated cladding fabrication which may be provided to enhance the visual appearance of a pump or dispenser or to provide another related function

3.15**standard temperature and pressure****STP**

15,6 °C (288,7 K), 1,013 bar absolute (0,1013 MPa absolute)

3.16**vapour trap**

unventilated part of a structure where vapours can accumulate creating an area of greater hazard than its immediate surroundings

3.17**excess flow protection system**

system, including software and hardware arrangements, designed to assess flow rate and close valves to stop the fluid flow when the flow rate exceeds a predetermined value

4 Requirements**4.1 Environmental**

4.1.1 The manufacturer shall endeavour to acquire materials and components from suppliers who have a declared environmental policy, see EN ISO 14021, EN ISO 14024 and EN ISO 14025.

4.1.2 Materials should be selected to optimise product durability and lifetime and consideration should be made to avoiding the selection of rare or hazardous materials.

4.1.3 Consideration should be made to use recycled or reused materials, and to the selection of materials which can then be subsequently recycled.

4.1.4 The installer shall endeavour to minimise use and wastage of material during all the installation process, with particular attention to welding and allied processes. Unavoidable waste/scrap material shall be recycled.

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4.1.5 Noise levels from installation process shall be evaluated and measures put in place to minimise the impact upon the external environment.

4.2 Electrical equipment**4.2.1 General**

The electrical equipment is deemed to fulfil minimum electrical requirements for the continuity of the protective bonding circuit, its insulation and the voltage if it fulfils the requirements of 5.6.

The provisions of EN 60079-14, EN 60079-0, EN 60204-1 and EN 60950-1, as appropriate, shall apply.

Electrical equipment should be selected to maximise the energy efficiency.

4.2.2 Cabling insulation resistance

The power supply shall have a means of disconnection within the dispenser to allow a 500 V DC insulation test to be applied from the non-hazardous area to all power cables connecting the dispenser to the power supply (PELV, Protective Extra-Low Voltage, cables are not included).

Access to any manual means of disconnection shall be provided, removable cladding or covers are permitted.

Any manual means of disconnection shall be readily accessible by designated and trained personnel.

The means of disconnection shall ensure that:

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- a) all external power cables up to the means of disconnection can be tested between any phase and earth and between phases; and
- b) all dispenser power cables and equipment within the hazardous area can be tested between the power circuit and the earth.

4.2.3 Cables used in hazardous area

Unarmoured elastomeric and/or plastic insulated cables, with a semi-rigid or tough sheath, are suitable for use in pumps, dispensers and remote pumping units electrical cables used in hazardous areas shall comply with either:

- a) EN 60079-14 and EN 50525-2-51; or
- b) EN 60079-14 and EN 50525-2-21; or
- c) the requirements of 5.4.

4.2.4 Dead man's push button

The dead man's push button shall be in accordance with the requirements of EN 60947-3, see 4.5.8.

4.2.5 Insulation and isolation

In order to avoid danger from sources of electrical energy capable of causing shock, and also, in hazardous areas, from non-intrinsically safe energy sources capable of causing incentive sparks, all such sources of energy and conductive components which are intended to remain live during maintenance, testing or inspection, shall be insulated or shielded in accordance with Clause 6 of EN 60204-1:2006 so as to prevent accidental contact.

In order to prevent electrostatic discharges between the nozzle and the filler connection that could cause ignition, materials and components shall be selected to ensure that the resistance between nozzle and earth is less than 10^6 ohms when measured with a low voltage ohm-meter.

Power sources such as batteries, and capacitors which do not decay to a stored energy level of less than 0,2 mJ within 10 s, shall be considered as potential ignition sources and therefore shall be insulated or isolated.

The means of isolation shall:

- a) apply to all phase conductors. Neutral/negative conductors should be considered as phase conductors;
- b) be operable prior to access to the internals of any electrical enclosure in a hazardous area, and be suitable for the hazardous area in which it is mounted; and
 - 1) for sources of energy not exceeding 24 V, be in accordance with either EN 60947-3 or include a gap between contacts in accordance with EN 60730-2-10 or be capable of satisfying a 500 V dielectric test across the contacts; or
 - 2) for sources of energy exceeding 24 V, be in accordance with EN 60947-3.

4.2.6 Chemical cells in non-hazardous areas

There is a possibility of explosive atmosphere generation from chemical cells used to supply electrical power to the display head or other equipment attached to the dispenser; thus producing its own hazardous area.

Chemical cells shall be located in a ventilated area. If the chemical cells are located in an enclosure with no internal hazardous area, low and high level ventilation shall be provided consistent with a degree of protection IP33 according to EN 60529 or more open.

The means of construction of the cells and their enclosure shall be in accordance with Clause 4 of EN 60079-7:2007 for emission of gas and method of connection of cells. Conformity shall be demonstrated by the supplier's declaration.

These provisions apply to all cells and batteries of cells except for primary cells operated in the discharge mode only.

4.3 Design

4.3.1 Maximum allowable pressure

The maximum allowable pressure, for the LPG pressure containing parts, shall be at least 25 bar (2 500 kPa).

4.3.2 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.

For some parts of Europe and certain applications, temperatures lower than -20 °C can be encountered and for these applications the minimum design temperature shall be -40 °C.

However, where a design temperature outside the above range is required, the manufacturer shall demonstrate the suitability of the design at this temperature and the temperature shall be marked in accordance with 8.2.

4.3.3 Materials

4.3.3.1 All materials in contact with LPG shall be physically and chemically compatible with LPG under all the normal operating conditions for which the dispenser is intended.

4.3.3.2 Materials exposed to corrosive conditions shall be corrosion resistant or protected against corrosion.

NOTE Materials complying with the requirements of EN 13175 may be used.

4.3.3.3 The component manufacturer shall maintain, and provide if requested, the following records of the materials used in construction of the parts subjected to pressure:

- chemical analysis certificates,
- mechanical property data, and
- results of metallurgical and mechanical tests and analysis.

4.3.3.4 All elastomeric materials in contact with LPG shall be compatible with 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 the requirements of EN 549. For guidance on selection of non-metallic materials see EN ISO 11114-2.