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Automotive LPG filling system for light and heavy duty vehicles - Nozzle, test requirements and dimensions

Füllsysteme an Autogasanlagen für leichte und schwere Fahrzeuge - Anschlussstutzen, Prüfanforderungen und Abmessungen

Dispositif de remplissage GPL pour véhicules légers et poids lourds - Pistolet: conditions d'essais et dimensions

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Petroleum products and
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English version

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Abmessungen

This European Standard was approved by CEN on 25 April 2003.

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 Management Centre 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 Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document EN 13760:2003 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of an identical text or by endorsement, at the latest by February 2004, and conflicting national standards shall be withdrawn at the latest by February 2004.

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(s)**.

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

Annexes A and B are normative.

This document does not deal with the essential safety requirements of the Directive 97/23/EEC (PED).

In the PED the nozzle is classified as a "pressure accessory". It is intended to be connected to a hose, which is classified as "piping".

- Article 1, 3.6 of Directive 97/23/EEC excludes equipment classified as no higher than category 1 under article 9 if it is covered by Directive 94/9/EC (ATEX).
- This document addresses the essential health and safety requirements of Directive 94/9/EC.
- The category 1 limit is defined in Annex 2 Table 6 of the PED and is a function of the product of DN and PS with a limit of 1 000.
- Because the design pressure (PS) in this document is 2 500 kPa and the DN of the intended hose is less than 40, the figure of 1 000 in Table 6 is not reached.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the minimum design, construction, test requirements and the critical dimensions for filling nozzles for the dispensing of automotive Liquefied Petroleum Gas (LPG) to vehicles of categories M and N, as defined in EC Directive 70/156, that are fitted with the Euro filling unit (light duty or heavy duty).

2 Normative references

This European Standard incorporates by dated or undated references, 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 the 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 549, *Rubber materials for seals and diaphragms for gas appliances and gas equipment.*

EN 589, *Automotive fuels - LPG - Requirements and test methods.*

EN 12806, *Automotive liquefied petroleum gas components - Other than containers.*

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

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).*

ISO 188, *Rubber, vulcanized or thermoplastic - Accelerated ageing and heat resistance tests.*

ISO 1431-1, *Rubber, vulcanized or thermoplastic - Resistance to ozone cracking – Part 1: Static strain test.*

ISO 6957, *Copper alloys – Ammonia test for stress corrosion resistance.*

ISO 9227, *Corrosion tests in artificial atmospheres - Salt spray tests.*

IEC 68-2-52, *Environmental testing – Part 2: Tests – Test Kb: Salt mist, cyclic (sodium, chloride solution).*

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply:

3.1

pressure

gauge pressure, unless otherwise stated

3.2

design pressure

maximum pressure at which the filling nozzle may be used

3.3

test pressure

pressure to which the component, or an assembly of components, is subjected during the tests

3.4

filling nozzle

mechanical system, fitted to the hose of the dispensing system, consisting of a filling nozzle body, operating mechanism, including sealing elements and a service gasket if required

3.5

light duty vehicle filling nozzle

filling nozzle intended to fuel vehicles fitted with the light duty vehicle Euro filling unit

3.6

heavy duty vehicle filling nozzle

filling nozzle intended to fuel vehicles fitted with the heavy duty vehicle Euro filling unit

3.7

locking mechanism

component allowing the locking or unlocking operation of the filling nozzle to the filling unit

3.8

service gasket

replaceable gasket ensuring tightness of the connection between the filling nozzle outlet and the filling unit inlet

3.9

torque for connection

torque required to connect the filling nozzle to the filling unit

3.10

torque for disconnection

torque required to disconnect the filling nozzle from the filling unit

3.11

push-on force

force applied in the longitudinal axis of the filling unit to connect the filling nozzle to the filling unit

3.12

pull-off force

force applied in the longitudinal axis of the filling unit to disconnect the filling nozzle from the filling unit

3.13

grip

area where the filling nozzle is held for connection or disconnection

3.14

filling unit

device installed on the outside of the vehicle to receive the filling nozzle and enable the filling of the LPG container

NOTE The filling nozzle as prescribed in this standard is only intended to be used with the Euro filling unit.

4 Design and construction requirements

4.1 General

Any non-electrical equipment, intended for use in a potentially explosive atmosphere, shall comply with the requirements of EN 13463-1. The nozzle shall be designed and constructed according to good engineering practice and in conformity with the required categories for group II equipment to ensure avoidance of any ignition source.

To classify the category of the equipment it shall be subjected to an ignition hazard assessment in accordance with 5.2 of EN 13463-1.

If the nozzle does not contain any effective ignition sources in normal operation it shall be classified as Group II category 3.

The design of the filling nozzle shall ensure that:

- a) it is suitable for use with automotive LPG as specified in EN 589;
- b) it is compatible with the relevant filling unit as specified in EN 12806 in accordance with annex B;

- c) entrapment of fingers and/or cold burns are not possible;
- d) it is not possible to open the valve in the filling nozzle if the filling nozzle is not properly locked and sealed on the filling unit;
- e) it locks in the connected position;
- f) it is not possible to disconnect the filling nozzle from the filling unit unless the filling nozzle valve is closed;
- g) internal blocking due to freezing does not occur;
- h) it is tolerant to the effect of dirt;
- i) it will withstand a torque of 150 % of the mounting torque specified by the manufacturer without damage;
- j) the electrical resistance is 1 kΩ maximum;
- k) the materials in contact with LPG are LPG-compatible;
- l) the external surfaces of the filling nozzle are corrosion resistant or protected against corrosion and are made of materials that do not cause sparks when dropped on a surface;
- m) the minimum lifetime is 100 000 cycles;
- n) the maximum design temperature is 65 °C and the minimum design temperature is –20 °C. For extreme cold operating conditions, a minimum design temperature of –40 °C shall be applied;
- o) the design pressure is 2 500 kPa;
- p) a locking mechanism is incorporated;
- q) the nozzle is provided with a means to securely attach it to the delivery hose.

4.2 Service gasket

The service gasket between the filling nozzle and the filling unit, if required, shall be fitted in the nozzle.

Changing the service gasket shall not result in any LPG release.

The minimum lifetime of the service gasket shall be 20 000 cycles.

4.3 Specific requirements

4.3.1 Light duty vehicle filling nozzle

The release of LPG during disconnection shall be less than 1 cm³ liquid.

The flow-rate through the filling nozzle, at a pressure difference of 70 kPa, shall be at least 60 l/min.

The maximum weight of the filling nozzle shall be 2 kg (including swivel, if fitted).

The external diameter of the filling nozzle shall not exceed 54 mm over a length of at least 82 mm measured from the normal attachment point of the vehicle connector as shown in Figure A.1. This includes protruding ancillaries in any position.

The maximum grip diameter of the filling nozzle shall be 60 mm.

The nozzle shall be designed for one hand operation for connection and disconnection.

4.3.2 Heavy duty vehicle filling nozzle

The release of LPG during disconnection shall be less than 1 cm³ liquid.

The flow-rate through the filling nozzle, at a pressure difference of 50 kPa, shall be at least 200 l/min.

The maximum weight of the filling nozzle shall be 3 kg (including swivel, if fitted).

The external diameter of the outlet side of the filling nozzle shall not exceed 80 mm over a length of at least 64 mm as shown in Figure A.2. This includes protruding ancillaries in any position.

4.4 Requirements for connection and disconnection by rotation

The rotation angle in the longitudinal axis shall not exceed 120 degrees.

The maximum torque for connection and disconnection shall be:

- 1,5 N.m for the light duty vehicle filling nozzle,
 - 25 N.m for the heavy duty vehicle filling nozzle,
- at any pressure up to 2 500 kPa in the filling nozzle.

4.5 Requirements for connection and disconnection by movement in the longitudinal axis of the filling nozzle (push and pull)

The maximum push-on force shall be 100 N, at any pressure up to 2 500 kPa in the filling nozzle.

The maximum pull-off force shall be 50 N, at a pressure of 2 500 kPa.

4.6 Requirements for lever operation

The force to close the lever, applied at the centre of the grip area of the lever, shall be 50 N maximum at any pressure up to 2 500 kPa in the filling nozzle.

Provision shall be made to enable the lever or the whole filling nozzle to freely rotate over an angle of 360 degrees around the longitudinal axis of the filling nozzle or the filling hose.

4.7 Requirements for non-metallic materials

All elastomer materials in contact with LPG shall be compatible with LPG in accordance with EN ISO 11114-2 and shall not distort, harden or adhere to the body or seat face to such an extent as to impair the function of the valve. Rubber materials shall conform to the requirements of EN 549, see 5.5.

5 Test procedures

5.1 General

The filling nozzle shall be tested in accordance with Table 1.

Table 1 — Production and prototype tests

Test	Prototype test	Production test	Clause
Overpressure	X		5.2
External leak	X	X	5.3
Endurance	X		5.4
LPG compatibility (for rubber materials)	X		5.5
Corrosion resistance	X		5.6
Resistance to dry heat	X		5.7
Ozone ageing	X		5.8
Temperature cycle	X		5.9
Drop test	X		5.10
Electrical continuity	X		5.11
Freezing	X		5.12

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The tolerances for test temperatures and pressures shall be:

- for low temperature : (+0 -5) °C;
- for high temperature : (+ 5 -0) °C;
- for 20 °C : ± 5 °C;
- test pressures : ± 10 % of the stated value with a maximum of 100 kPa.

5.2 Overpressure test

5.2.1 General

The endurance test shall be performed before the overpressure test.

The test pressure applied shall be 2,25 times the design pressure.

The test shall be performed at 20 °C.

5.2.2 Test procedure

The outlet of the filling nozzle shall be connected to the filling unit for which the filling nozzle is designed. The outlet of the filling unit shall be plugged.

The test medium shall be water or any other suitable liquid.

The pressure shall be raised at a maximum rate of 1 000 kPa per minute until the test pressure is reached.

The test pressure shall then be maintained for at least 1 minute.