



SLOVENSKI STANDARD
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Automotive liquefied petroleum gas components - Other than containers

Bauteile für Autogasanlagen/Treibgasanlagen - Bauteile, ausgenommen Autogastanks

Composants pour véhicules au gaz de pétrole liquéfiés - Composants autres que le réservoir

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Automotive liquefied petroleum gas components - Other than containers

Bauteile für Autogasanlagen/Treibgasanlagen - Bauteile,
ausgenommen Autogastanks

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Foreword

This document (EN 12806:2003) 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of an identical text or by endorsement, at the latest by October 2003, and conflicting national standards shall be withdrawn at the latest by October 2003.

Annexes A and B are informative.

Annexes C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S and T are normative.

This document includes a Bibliography.

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.

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EN 12806:2003 (E)**1 Scope**

This European Standard specifies the general design and testing requirements for all components, in automotive Liquefied Petroleum Gas (LPG) propulsion systems, which have a working pressure equal to or greater than 20 kPa.

This European Standard also specifies the requirements for the Electric Control Unit (ECU), which is not subjected to pressure, and the gas-tight housing which has a working pressure below 20 kPa.

This European Standard excludes containers.

2 Normative references

This European Standard incorporates by dated or undated reference, 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 of these 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 549:1994, *Rubber materials for seals and diaphragms for gas appliances and gas equipment.*

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

EN ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation (ISO 228-1:2000).*

EN ISO 1307:1998, *Rubber and plastic hoses for general-purpose industrial applications – Bore diameters and tolerances, and tolerances on length (ISO 1307:1992).*

EN ISO 1402, *Rubber and plastics hoses and hose assemblies – Hydrostatic testing (ISO 1402:1994).*

EN ISO 4080, *Rubber and plastics hoses and hose assemblies - Determination of permeability to gas (ISO 4080:1991).*

EN ISO 4672, *Rubber and plastics hoses -- Sub-ambient temperature flexibility tests (ISO 4672:1997).*

EN 60068-2-52, *Environmental testing – Part 2. Tests – Test Kb: Salt mist, cyclic (sodium chloride solution) (IEC 60068-2-52:1996).*

EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989).*

ISO 37, *Rubber, vulcanized or thermoplastic - Determination of tensile stress-strain properties.*

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 1436-1, *Rubber hoses and hose assemblies - Wire-braid-reinforced hydraulic types – Specification – Part 1: Oil-based fluid applications.*

ISO 1817, *Rubber, vulcanized - Determination of the effect of liquids.*

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

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

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

3.1.1

pressure

gauge pressure, unless otherwise stated

3.1.2

test pressure

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

3.1.3

design pressure

pressure on which the calculations are based

3.1.4

working pressure

pressure under normal operating conditions

3.1.5

automotive LPG system

assembly of components enabling a vehicle to use automotive LPG in its propulsion system

NOTE Components are defined in their specific annexes (see Table 1 and Table 2).

3.1.6

container

vessel used for the storage of automotive LPG

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3.2 Abbreviations

ECU Electronic Control Unit

EMC Electromagnetic Compatibility

PRV Pressure Relief Valve

PRD Pressure Relief Device

STP Standard Temperature and Pressure [15,6 °C (288,7 K), 1,013 bar absolute (0,1013 MPa absolute)]

4 Technical requirements

4.1 General

Components shall be designed for use with automotive LPG as specified in EN 589.

The specific requirements for design and testing are detailed in the annexes (see Table 1 and Table 2).

If a device combines two or more functions of separate components, the relevant requirements for each component shall apply.

Table 1 — Annexes dealing with components fitted in or on the container

Component	Annex	Clause
80% stop valve	C	C.1
level indicator	C	C.2
Float	C	C.3
pressure relief valve	C	C.4
remote-controlled service valve with excess flow valve	C	C.5
excess flow valve	C	C.6
pressure relief device (PRD)	C	C.7
fuel pump	D	
gas-tight housing	E	
power supply bushing	F	
non-return valve	G	
multi-valve	H	
NOTE A fuel pump, multi-valve, gas-tight housing, power supply bushing and a non-return valve can be fitted if required for proper operation of the automotive LPG system.		

Table 2 — Annexes dealing with components not fitted in or on the container

Component	Annex
pressure regulator / vaporiser	I
shut-off valve	J
gas injection device or injector	K
gas mixing unit	K
gas dosage unit	L
flexible hoses and gas pipes	M
hydrostatic relief valve	N
LPG filter unit	O
pressure and/or temperature sensor	P
service coupling	Q
electronic control unit	R
fuel rail	S
filling unit	T

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4.2 General design rules

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4.2.1 Electrically operated devices containing LPG

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Electrically operated devices containing LPG shall not produce sparks in the event of failure.

No current shall flow through LPG containing parts.

The electrical system shall be insulated from the body of the component and from the container.

The insulation resistance shall be greater than 10 MΩ.

The electrical enclosures of the LPG installation inside the boot and passenger compartment and in the LPG container shall comply with class IP 40 according to EN 60529:1991.

All other electrical enclosures shall comply with class IP 54 in accordance with EN 60529:1991.

Each electrically operated component shall comply with the relevant EMC requirements (see UN/ECE Regulation 10, 02 series of amendments or equivalent).

4.2.2 Remotely operated valves

Remotely operated valves, (e.g. 80% stop valve, service valve, shut-off valves), shall be of the “normally closed” type.

4.2.3 Heat exchanger materials

Materials shall be compatible with the heat exchange medium. The heat exchanger shall be designed to withstand a pressure of twice the maximum working pressure of the heat exchange medium.

EN 12806:2003 (E)**4.2.4 Components containing high and low pressure parts**

A component, containing both high pressure and low pressure parts, shall be designed to prevent pressure build up in the low-pressure part above the design pressure of that part of the component.

4.3 Materials

Materials in contact with LPG shall be LPG compatible.

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

The component manufacturer shall maintain records of and provide if requested:

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

for the materials used in construction of the parts subjected to pressure.

The component manufacturer shall maintain a system for the identification and tracing of materials used in the fabrication of parts under pressure.

NOTE For guidance on the choice of non-metallic materials, see EN ISO 11114-2.

4.4 Design temperature

The minimum design temperature shall be -20 °C .

For extreme cold operating conditions, a minimum design temperature of -40 °C shall apply.

The maximum design temperature shall be:

- 65 °C for components installed on the vehicle,
- 120 °C for components installed in the engine compartment.

5 Classification of components

Components are classified according to their design pressure and function, see annex A:

- | | |
|----------|---|
| Class 1 | High pressure parts including pipes and fittings containing liquid LPG with a design pressure of 3 000 kPa, excluding valves and pressure relief devices. |
| Class 2 | Low pressure parts operating in the vapour phase including pipes and fittings with a design pressure of 450 kPa. |
| Class 2A | Low pressure parts operating in the vapour phase including pipes and fittings with a design pressure of 120 kPa. |
| Class 3 | Valves and pressure relief devices with a design pressure of 3 000 kPa. |

For a component consisting of several parts, each part shall be classified in its own class depending on the design pressure and function of that part.

6 Construction and workmanship

The manufacturer shall be able to demonstrate that the quality control system ensures that the component produced meets the requirements of this standard.

The manufacturer shall maintain records of the inspections that are carried out during production.

7 Tests

7.1 General

Components except flexible hoses shall be tested in accordance with Table 3.

Flexible hoses shall be tested in accordance with annex M.

Table 3 — Production and prototype tests

Test:	Class 1		Class 2/2A		Class 3		Clause
	Prototype	Production	Prototype	Production	Prototype	Production	
Overpressure	x		x		x		7.2
External leak ^f	x	x	x	x	x	x	7.3
Seat leak ^b	x	x	x	x	x	x	7.4
Operational ^b					x		7.5
Endurance					x		7.6
Vibration ^e					x		7.7
LPG compatibility ^a	x		x		x		7.8
Corrosion resistance ^c	x		x		x		7.9
Resistance to dry heat ^{a, f}	x				x		7.10
Ozone ageing ^{a, f}	x				x		7.11
Creep ^{a, d, f}	x				x		7.12
Temperature cycle ^a	x				x		7.13
^a Only applicable for rubber materials. ^b Only applicable for parts containing a valve. ^c Only applicable for metallic parts exposed to corrosive conditions. ^d Except for the 80% stop valve and excess flow valve as the permitted leak exceeds the requirements of this test. ^e Only applicable to the float operated 80% stop valve. ^f Only for parts having a sealing function							

Test pressure tolerances shall be 10% of the stated value with a maximum of 100 kPa.

Test temperature tolerances shall be:

- - 5 °C for the minimum test temperature;
- + 5 °C for the maximum test temperature;
- ± 5 °C for 20 °C.