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Road vehicles — Liquefied petroleum gas (LPG) fuel systems components —

Part 6: Pressure relief valves (PRV)

Véhicules routiers — Équipements pour véhicules utilisant le gaz de pétrole liquéfié (GPL) comme combustible —

Partie 6: Vannes de contrôle de la surpression

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 41, *Specific aspects for gaseous fuels*.

A list of all parts in the ISO 20766 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Road vehicles — Liquefied petroleum gas (LPG) fuel systems components —

Part 6: Pressure relief valves (PRV)

1 Scope

This document specifies general requirements and definitions of liquefied petroleum gas fuel components, intended for use on the types of motor vehicles as defined in ISO 3833. It also provides general design principles, and specifies requirements for instructions and marking.

This document is applicable to vehicles (mono-fuel, bi-fuel or dual-fuel applications) using gaseous fuels in accordance with ISO 9162. It is not applicable to the following:

a) fuel containers;

b) stationary gas engines;

c) container mounting hardware;

d) electronic fuel management; and

e) refuelling receptacles.

NOTE 1 It is recognized that miscellaneous components not specifically addressed herein can be examined for compliance with the criteria of any applicable part of ISO 20766, including testing to the appropriate functional tests.

NOTE 2 All references to pressure in this document are considered gauge pressures unless otherwise specified.

NOTE 3 This document applies to devices which have a service pressure in the range of 110 kPa (Butane rich at 20 °C) and 840 kPa (Propane at 20 °C), hereinafter referred to in this document.

Other service pressures can be accommodated by adjusting the pressure by the appropriate factor (ratio).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 20766-1, *Road vehicles — Liquefied petroleum gas (LPG) fuel systems components — Part 1: General requirements and definitions*

ISO 20766-2, *Road vehicles — Liquefied petroleum gas (LPG) fuel systems components — Part 2: Performance and general test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20766-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
discharge pressure
pressure at which the pressure relief valve opens to release the pressure

4 Markings

Marking of the component shall provide sufficient information to allow the following to be traced:

a) the manufacturer's or agent's name, trademark or symbol;

b) the model designation (part number); and

c) the working pressure or working pressure and temperature range.

The following additional markings are recommended:

— the direction of flow (when necessary for correct installation);

— the type of fuel;

— electrical ratings (if applicable);

— the symbol of the certification agency;

— the type approval number;

— the serial number or date code; and

— reference to this document.

NOTE This information can be provided by a suitable identification code on at least one part of the component when it consists of more than one part.

5 Construction and assembly

The pressure relief valve shall comply with the applicable provisions of ISO 20766-1 and ISO 20766-2, and with the tests specified in Clause 6 of this document.

General provision for the PRV are:

— mounting location (vapour phase); and

— discharge pressure (≤1,0 × WP).

6 Tests

6.1 Applicability

The tests required to be carried out are indicated in Table 1.

Table 1 — Applicable tests

Test	Applicable	Test procedure as required by	Specific test requirements of this document
Hydrostatic strength	X	X	X (See 6.2)
Leakage	X	X	X (See 6.3)
Excess torque resistance	X	X	
Bending moment	X	X	
Continued operation	X		X (See 6.4)
Corrosion resistance	X	X	
Operational test	X		X (See 6.5)
Vibration resistance	X	X	
Brass material compatibility	X	X	
Oxygen ageing	X	X	
Non-metallic material immersion	X	X	
Ozone ageing	X	X	
Resistance to dry-heat	X	X	
Temperature cycle test	X	X	

6.2 Hydrostatic strength

Test the PRV according to the procedure for testing hydrostatic strength specified in ISO 20766-2. The test pressure shall be 2,25 times the working pressure.

The purpose of this test is to check the strength of the body of the PRV. If necessary, the moving part should be blocked to achieve the 2,25 times working pressure.

6.3 Leakage

Test the PRV at the temperatures and pressures given in Table 2.

Table 2 — Test temperatures and pressures

Temperature °C (±5 °C)	Pressure Factor × working pressure (WP)	
	First test	Second test
−40 or −20	0,75 × WP	0,025 × WP
20	0,025 × WP	0,75 × WP
85 or 120	0,05 × WP	

6.4 Continued operation

The PRV shall be capable of withstanding 600 cycles of operation when tested according to the provisions of the continued operation test procedure given in ISO 20766-2 and the following.

a) A test cycle consists of, first, pressurizing the PRV to the discharge pressure. This action shall cause the PRV to open and vent. Once the valve is venting, reduce the inlet pressure; when the PRV reseats the cycle is finished. Cycle time shall be within a period of 10 s ± 2 s.

b) After 600 cycles, test the PRV for leakage at 20 °C ± 5 °C at its 0,75 × working pressure.

6.5 Operational test

6.5.1 General

Verify the opening and re-seating pressures of the PRV.

6.5.2 Test procedure

Three randomly selected samples shall be subjected to the following test procedure. This test has three steps, which shall be conducted in the order given. Appropriate test media shall be chosen (i.e. air, nitrogen, or lpg).

If the test medium is not LPG, then the calculated flow values shall be corrected for LPG.

a) Establish the opening and re-seating values for the samples at 20 °C. Do this by first slowly pressurizing the inlet of the sample to 110 % of the set pressure, noting the value at which it first opens.

b) Lower the inlet pressure until the PRV re-seats; note that value. The valves are considered to have passed if all the following requirements are met:

   — opening pressures shall be ±5 % of the manufacturer's set pressure;

   — re-seating pressures shall be no less than 90 % of the set pressure; and

   — re-seating pressures shall be within ±5 % of the average re-seating pressure.

c) Repeat a) and b) at −40 °C and 85 °C or 120 °C (if required by the operating conditions). At each test temperature, the following criteria shall be met:

   — opening pressures not less than 85 % of the opening pressure recorded during Test 1;

   — re-seating pressures no less than 80 % of the re-seating pressure recorded during Test 1; and

   — re-seating pressures within ±15 % of the average re-seating pressure.

7 Production batch inspection and acceptance testing

The PRV manufacturer shall institute a production batch inspection and acceptance testing programme that ensures consistent safety performance of the product.