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

Part 5: Fuel selection system and electrical installations

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

Partie 5: Système de sélection du combustible et installations électriques

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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 document 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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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 system components —

Part 5:
Fuel selection system and electrical installations

1 Scope

This document specifies general requirements and definitions of liquefied petroleum gas fuel components (fuel selection system and electrical installations, 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) refuelling receptacles.

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

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

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 rich 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 20766-1:2018, *Road vehicles — Liquefied petroleum gas (LPG) fuel system components — Part 1: General requirements and definitions*

ISO 20766-2:2018, *Road vehicles — Liquefied petroleum gas (LPG) fuel system components — Part 2: Performance and general test methods*

ISO 20766 (all parts), *Road vehicles — Liquefied petroleum gas (LPG) fuel system components*

3 Terms and definitions

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

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

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

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

4 Marking

Marking of components described herein 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);

c) the operating specifications (temperature range, electrical rating).

The following additional markings are recommended:

— the type of fuel;

— the symbol of the certification agency;

— the type approval number;

— the serial number or date code;

— a reference to this document, i.e. ISO 20766-5.

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

5.1 The fuel selection system shall be designed to withstand the maximum operating pressure as applicable.

5.2 The fuel selection system shall be designed to withstand a temperature between the minimum operating temperature and the maximum operating temperature as applicable.

5.3 Electrically operated fuel selection systems shall comply with of ISO 20766-1:2018, Clause 5 and shall plug into the harness with either a direct connection using the same connector or an adapter.

5.4 To prevent electric sparks on the surface of fracture, in case of fracture of the component, the electrical installations shall:

a) be insulated in a manner that no current travels through LPG containing parts;

b) have the electrical system of the device isolated from surrounding components with an isolation resistance greater than 10 MΩ.

5.5 Electrical wiring and connectors used on vehicles shall be recommended by the manufacturer for automotive applications.

5.6 Where a power supply bushing is required to provide passage of electrical power or signals through the pressure boundary it shall comply with the applicable part of the ISO 20766 series.

5.7 The electrical components of the LP-gas fuel system shall be protected against overloads, with at least one separate fuse that is sized for the rated load of the system provided, and its location shall be marked in the operator's manual.

5.8 Installed sections of wiring shall be secured to the vehicle chassis or to the vehicle structure at intervals no more than 40 cm and be tight to the vehicle.

5.9 Electrical cables shall be protected from damage due to flexing, abrasion, and other stresses, and they shall be secured to the vehicle chassis or other vehicle structure at intervals no more than 40 cm and be tight to the vehicle.

5.10 The use of electrical tape to insulate bare wire connections shall not be permitted.

5.11 Installed sections of wiring shall be protected from abrasion, chaffing, snags, or external forces by loom or another protective cover approved for automotive applications.

5.12 Electrical connections shall be sized for the rated load and shall be made with sealed connections having positive locking mechanisms, connectors recommended by the manufacturer or soldered connections protected by heavy wall shrink insulation or other approved insulation.

5.13 Where wiring bundles will be exposed to radiant heat from the engine or exhaust components, methods of protection from overheating shall be provided such as heat shields, thermal insulation, or thermally protected loom.

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 ISO 20766-2	Specific test requirements of this document
Continued operation	X		X (see 6.2)
Corrosion resistance	X[a]	X	
Vibration resistance	X		X (see 6.3)
Brass material compatibility	X[a]	X	
Temperature cycle test	X		X (see 6.4)
Oxygen ageing	X[a]	X	
Non-metallic material immersion	X[a]	X	
Ozone ageing	X[a]	X	
Automotive fluids	X	X	
Resistance to dry-heat	X[a]	X	
Insulation resistance	X		X (see 6.5)
Minimum operating voltage	X		X (see 6.6)
[a] Only if applicable.			

6.2 Continued operation

Subject the fuel selection system and electrical installations to 50 000 switching operations (manual and or digital whichever is available) at room temperature.

One cycle consists of all switching actions the fuel selection system and electrical installations need to make.

80 % of the cycles are performed at ambient temperature, 10 % at -40 °C and 10 % at 85 °C.

Upon completion of this test, the fuel selection system and electrical installations shall pass the insulation resistance test given in 6.5.

If a fuel selection switch is available, it shall be possible to operate after the continued operation test is finished.

6.3 Vibration resistance

Fuel selection system and electrical installations with moving parts or print board circuits shall remain undamaged and shall continue to operate.

The fuel selection system and electrical installations shall be connected to the power source and in operating condition during the vibration test.

The fuel selection system and electrical installations shall meet the requirements of insulation resistance test given in 6.5.

The fuel selection system and electrical installations with switching functions shall also be possible to operate after the vibration test has been carried out in accordance with the test procedure mentioned in ISO 20766-2:2018, Clause 15.

6.4 Temperature cycle test

The fuel selection system and electrical installations shall comply with the insulation resistance test given in 6.5 after having been submitted to a 96-h temperature cycle from the minimum operating temperature up to the maximum operating temperature with a cycle time of 120 min, under working conditions. The fuel selection system and electrical installations shall be connected to a power source an in operating condition during the temperature cycle test.

If a fuel selection switch is available, it shall be possible to operate after the temperature cycle test is finished.

6.5 Insulation resistance

The insulation resistance test is designed to check for a potential failure of the insulation between the fuel selection system and electrical installations and the casing.

Apply a test voltage of 500 V d.c. for a duration of 60 s.

The minimum allowable resistance shall be 240 kΩ.

6.6 Minimum operating voltage

The minimum operating voltage at room temperature shall be ≤8 V for a 12 V system and ≤ 16 V for a 24 V system. The component shall be connected and in working condition during the test. If a fuel selection switch is available, it shall be possible to operate at the given conditions.