INTERNATIONAL STANDARD

ISO 12619-11

First edition
2017-08

Road vehicles — Compressed gaseous hydrogen (CGH2) and hydrogen/natural gas blends fuel system components —

Part 11: Excess flow valve

Véhicules routiers — Composants des circuits d'alimentation pour hydrogène gazeux comprimé (CGH2) et mélanges de gaz naturel et hydrogène —

Partie 11: Valve de limitation de débit

Reference number
ISO 12619-11:2017(E)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: 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 12619 series can be found on the ISO website.

Road vehicles — Compressed gaseous hydrogen (CGH2) and hydrogen/natural gas blends fuel system components —

Part 11: Excess flow valve

1 Scope

This document specifies tests and requirements for the excess flow valve, a compressed gaseous hydrogen (CGH_2) and hydrogen/natural gas blend fuel system component intended for use on the types of motor vehicles defined in ISO 3833.

It is applicable to vehicles using CGH_2 in accordance with ISO 14687-1 or ISO 14687-2 and hydrogen/natural gas blend using natural gas in accordance with ISO 15403-1 and ISO/TR 15403-2. It is not applicable to the following:

a) liquefied hydrogen (LH_2) fuel system components;

b) fuel containers;

c) stationary gas engines;

d) container mounting hardware;

e) electronic fuel management;

f) refuelling receptacles;

g) fuel cell vehicles.

NOTE 1 It is recognized that miscellaneous components not specifically covered herein can be examined to meet the criteria of this document and tested according to the appropriate functional tests.

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

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 12619-1, *Road vehicles — Compressed gaseous hydrogen (CGH_2) and hydrogen/natural gas blend fuel system components — Part 1: General requirements and definitions*

ISO 12619-2, *Road vehicles — Compressed gaseous hydrogen (CGH_2) and hydrogen/natural gas blend fuel system 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 12619-1 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 http://www.iso.org/obp

3.1
internal excess flow valve
excess flow valve installed inside the cylinder or cylinder valve

3.2
external excess flow valve
excess flow valve installed outside the cylinder or cylinder valve

3.3
shut-off type excess flow valve
excess flow valve that stops flow when in the closed position

3.4
flow-limiter type excess flow valve
excess flow valve that limits flow when activated

Note 1 to entry: The device resets automatically when the excess flow condition is no longer present.

3.5
activation pressure
differential pressure flow or other condition specified by the manufacturer at which the excess flow valve is activated

4 Marking

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);

c) the operating specifications (working pressure, temperature range, excess flow valve type, activation flow or ΔP, maximum flow when activated).

The following additional markings are recommended:

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

— the type of fuel;

— the electrical ratings (if applicable);

— the symbol of the certification agency;

— the type approval number;

— the serial number or date code;

— a reference to this document, i.e. ISO 12619-11:2017.

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 excess flow valve shall comply with the applicable provisions of ISO 12619-1 and ISO 12619-2 and with the tests specified in Clause 6. Tolerances should follow the specifications of ISO 12619-2.

6 Tests

6.1 Applicability

There are many types of excess flow valves available. This document provides requirements for two different designs: internal and external excess flow valves. A valve of either design could be one of two different types: shut-off or flow-limiter. A shut-off valve should have a means of resetting after activation. As excess flow valve designs vary, so will the tests required.

The function of an excess flow valve can be achieved in other ways. For example, instead of using a mechanical device, an electronic system can be adopted to ensure the closing or limiting of the gas flow from the cylinder in an accident.

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

Table 1 — Applicable tests

Test method	Applicable	Test procedure as required by ISO 12619-2	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	X (see 6.4)
Bending moment	X	X	X (see 6.5)
Continued operation	X	X	X (see 6.6)
Corrosion resistance	X	X	—
Oxygen ageing	X	X	—
Ozone ageing	X	X	—
Heat ageing	X	X	—
Automotive fluids	X	X (only for external excess flow valve)	—
Non-metallic material immersion	X	X	—
Vibration resistance	X	X	—
Brass material compatibility	X	X	—
Operation	X	—	X (see 6.7)
Pressure impulse	X	—	X (see 6.8)

6.2 Hydrostatic strength

The purpose of the hydrostatic strength test is to establish the strength of the housing.

Test the excess flow valve according to the procedure for testing hydrostatic strength specified in ISO 12619-2.

For internal or external excess flow valves, the test pressure shall be 2,5 times the working pressure.

6.3 Leakage

The internal leakage test shall be conducted on shut-off type excess flow valves. Test the excess flow valve according to the procedure for leakage test as specified in ISO 12619-2 at the temperatures and pressures given in Table 2.

Table 2 — Test temperature and pressure

Temperature °C	**Pressure** Factor × working pressure (WP)	
	First test	**Second test**
−40 or −20 as applicable	0,6 × WP	Activation pressure
20	Activation pressure	1,2 × WP
85 or 120	Activation pressure	

6.4 Excess torque resistance

The excess torque resistance test shall be conducted only on external excess flow valves. The test procedure shall be carried out according to ISO 12619-2.

6.5 Bending moment

The bending moment test shall be conducted only on external excess flow valves. The test procedure shall be carried out according to ISO 12619-2.

6.6 Continued operation

6.6.1 The excess flow valve shall be subjected to 20 cycles at a differential pressure equal to working pressure. One cycle shall consist of one opening and one closing. Upon completion of the test, the valve shall comply with 6.3 and 6.7.

6.6.2 Following cycling, operation and leakage testing, perform the hydrostatic test in accordance with 6.2.

6.7 Operation

Measure the activation flow or ΔP and the flow of the excess flow valve when it activates. Perform the test using the activation conditions stated by the manufacturer; the measured flows and pressures shall meet the manufacturer's specified flow and pressure.

6.8 Pressure impulse

The excess flow valve shall withstand 100 pressure pulses as follows.

a) If the excess flow valve is external, connect both inlet and outlet to a pipe or tube of the type specified by the manufacturer and of at least 1 m in length each.

b) If the excess flow valve is internal, the valve containing the excess flow valve to be tested shall be connected securely by a suitable fitting to a pressurized source of dry air, nitrogen or natural gas. Connect the outlet to a pipe or tube of the type specified by the manufacturer and of at least 1 m in length.

c) Both the outlet and inlet of the excess flow valve shall be conditioned at atmospheric pressure.

d) Working pressure shall be instantaneously applied to the valve inlet.

e) Steps c) and d) shall be repeated 100 times.

f) Test the component in the same way with reverse flow direction.

Following the pressure impulse test, conduct an operation test according to 6.7.