DRAFT INTERNATIONAL STANDARD ISO/DIS 12619-3

ISO/TC **22**/SC **25** Secretariat: **UNI**

Voting begins on **2012-01-06** Voting terminates on **2012-06-06**

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Road vehicles — Compressed Gaseous Hydrogen (CGH2) and Hydrogen/Natural Gas blend fuel system components —

Part 3:
Pressure regulator

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

Partie 3: Regulateur de pression

ICS 43.060.40

In accordance with the provisions of Council Resolution 15/1993 this document is circulated in the English language only.

Conformément aux dispositions de la Résolution du Conseil 15/1993, ce document est distribué en version anglaise seulement.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

Contents

Page

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 12619-3 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 25, *Road vehicles using gaseous fuels*.

ISO 12619 consists of the following parts, under the general title *Road vehicles — Compressed Gaseous Hydrogen (CGH2) and Hydrogen/Natural Gas blends fuel system components*:

— *Part 1: General requirements and definitions*

— *Part 2: Performance and general test methods*

— *Part 3: Pressure regulator*

Road vehicles — Compressed Gaseous Hydrogen (CGH2) and Hydrogen/Natural Gas blends fuel system components — Part 3: Pressure regulator

1 Scope

This Standard specifies tests and requirements for the pressure regulator, a Compressed Gaseous Hydrogen (CGH2) and Hydrogen/CNG blends fuel system component intended for use on the types of motor vehicles defined in ISO 3833.

It is applicable to vehicles using Compressed Gaseous Hydrogen (CGH2) in accordance with ISO 14687 and Hydrogen/Natural Gas blends. It is not applicable to the following:

a) liquefied hydrogen (LH2) fuel system components;

b) fuel containers;

c) stationary gas engines;

d) container mounting hardware;

e) electronic fuel management;

f) refuelling receptacles.

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

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

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 12619-1, *Road vehicles* - Compressed Gaseous Hydrogen (CGH2) and Hydrogen/Natural Gas blends *fuel system components - Part 1: General requirements and definitions*

ISO 12619-2, *Road vehicles* - Compressed Gaseous Hydrogen (CGH2) and Hydrogen/Natural Gas blends *fuel system components - Part 2: Performance and general test methods*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in ISO 12619-1 and the following apply.

3.1 lock-up pressure

stabilized outlet pressure of the regulator at 0 (zero) flow

4 Marking and labelling

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 working pressure or working pressure and temperature range

d) the maximum outlet pressure

e) the type of fuel

The following additional markings are recommended:

f) the direction of flow (when necessary for correct installation)

g) electrical ratings (if applicable)

h) the symbol of the certification agency

i) the type approval number

j) the serial number or date code

k) reference to this Standard

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 Qualifications for construction and assembly

5.1 The pressure regulator shall comply with the applicable provisions of ISO 12619-1 and ISO 12619-2, and with the tests specified in clause 6 of this Standard.

5.2 A pressure relief valve shall be of a type that resets after relieving; it is intended that downstream components are protected from exposure to cylinder pressure.

5.3 A pressure relief valve may be integral to the pressure regulator, or not.

5.4 The pressure regulator shall have a factory-set maximum outlet pressure. The maximum outlet pressure rating and the inlet pressure rating shall be marked on the regulator.

5.5 A mean shall be provided to allow venting from the safety relief valve of the regulator to the outside of the vehicle.

5.6 All non-metallic components or subcomponents in contact with Compressed Gaseous Hydrogen (CGH2) or Hydrogen/Natural Gas blends shall be used according to ISO 11114-2.

6 Tests

6.1 Applicability

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

Test	Applicable	Test procedure as required in ISO 12619-2	Specific test required in this Standard
Hydrostatic strength	X	X	§ 6.2
Leakage	X (External)	X	§ 6.3
Excess torque resistance	X	X	-
Bending moment	X	X	-
Continued operation	X	X	§ 6.4
Corrosion resistance	X	X	-
Oxygen ageing	X	X	-
Ozone ageing	X	X	-
Electrical over-voltages	X	X	-
Non-metallic immersion	X	X	-
Vibration resistance	X	X	-
Brass material compatibility	X	X	-
Non-metallic material compatibility to hydrogen	X	X	-
Insulation resistance	X	-	§ 6.5

Pressure impulse	X	-	§ 6.7
Water jacket freezing	X*	-	§ 6.8
Pre-Cooled Hydrogen Exposure Test	-	-	-
Insulation Resistance	X**	X	-

*Only if the water jacket is present.

**Only if electronic components are present.

Table 1

6.2 Hydrostatic strength

6.2.1 Test the pressure regulator according to the procedure for testing hydrostatic strength specified in ISO 12619-2.

6.2.2 Test the inlet of the first stage at a pressure of 1.5 times the working pressure.

6.2.3 The chambers downstream of the inlet valve to the pressure regulator shall be tested according to the following procedure.

With the inlet to the chamber in an open position and all the outlets plugged, test the chamber at 1.5 times the working pressure of the chamber. If the chamber has a pressure relief valve, the chamber shall be tested at 1.5 times the relief valve's set pressure. If there is no relief valve test the chamber to upstream working pressure.

6.2.4 Test the outlet chamber, port and all outlet fittings at 1.5 times the working pressure, or 0.4 MPa (4 bar), whichever is the greater.

6.3 External leakage

Test the pressure regulator at the temperatures and pressures given in Table 2.

Temperature °C	Stage	Test Pressure (Factor x Working Pressure)	
		First test	Second Test
- 40 or - 20	Inlet to 1	0.80	0.05
+ 20	Inlet to 1	0.05	1.5
+ 120 or + 85*	Inlet to 1	0.05	
- 40 or - 20	Chambers downstream of inlet to 1	0.80	0.05
+ 20		0.05	1.5
+ 120 or + 85*		0.05	

* accordingly to 4.3 of ISO 12619 Part 1.

Table 2 — Test temperatures and pressures

6.4 Continued operation

The regulator shall be able to withstand 50 000 cycles without any failure when tested according to the following procedure. Where the stages of pressure regulation are separate, the working pressure in a) to f) is considered to be the working pressure of the upstream stage.

a) Recycle the regulator for 87.5 % of the total number of cycles at room temperature and at the working pressure. Each cycle shall consist of flow until stable outlet pressure has been obtained, after which the gas flow shall be shut off by a downstream valve within 1 s, until the downstream lock-up pressure has stabilized. Stabilized outlet pressures are defined as set pressure ±15 % for at least 5 s. The regulator shall comply with 6.3 at room temperature at intervals of 20 %, 40 %, 60 %, 80 % and 100 % of room temperature cycles.

b) Cycle the inlet pressure of the regulator for 2.5 % of the total number of cycles at room temperature from 100 % to 50 % of the working pressure. The duration of each cycle shall be no less than 10 s. The regulator shall comply with 6.3 at room temperature at the completion of this test.

c) Repeat the cycling procedure of a) at the maximum temperature in accordingly to 4.3 of ISO 12619 Part 1 at the working pressure for 2.5 % of the total number of cycles.

d) Repeat the cycling procedure of b) at the maximum temperature in accordingly to 4.3 of ISO 12619 Part 1 at the working pressure for 2.5 % of the total number of cycles. The regulator shall comply with 6.3 at the maximum temperature in accordingly to 4.3 of ISO 12619 Part 1 at the completion of this test.

e) Repeat the cycling procedure of a) at – 40 °C or - 20°C, as applicable, and 50 % of working pressure for 2.5 % of the total number of cycles.

f) Repeat the cycling procedure of b) at –40 °C or - 20°C, as applicable, and 50 % of working pressure for 2.5 % of the total number of cycles. The regulator shall comply with 6.3 at –40 °C at the completion of this test.

At the completion of the cycles, the lock-up pressure downstream of the regulator shall not exceed the lock-up pressure specified by the manufacturer.

6.5 Insulation resistance

This test is designed to check for a potential failure of the insulation between the two-pin coil assembly and the pressure regulator casing.

Apply 1 000 V d.c. between one of the connector pins and the housing of the pressure regulator for at least 2 s. The minimum allowable resistance shall be 240 kΩ.

6.6 Pressure impulse

6.6.1 Internal impulse

a) Subject the pressure regulator with its first stage valve rendered fully open to a sudden application of its working pressure at its inlet. The pressure regulator shall retain or release the pressure without any permanent deformation.

b) The lock-up pressure downstream of the regulator shall not exceed the lock-up pressure specified by the manufacturer.

6.6.2 External impulse

The pressure regulator shall withstand 100 inlet pressure pulses, as follows.

a) If the regulator has an integrated solenoid valve, it shall be opened by application of the rated voltage.

b) The outlet of the regulator shall be vented until the inlet chamber is at atmospheric pressure and then closed.