

# DRAFT AMENDMENT

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## Road vehicles — Compressed gaseous hydrogen (CGH<sub>2</sub>) and hydrogen/natural gas blend fuel system components —

### Part 3: Pressure regulator

### AMENDMENT 1

*Véhicules routiers — Composants des circuits d'alimentation pour hydrogène gazeux comprimé (CGH<sub>2</sub>) et mélanges de gaz naturel et hydrogène —*

*Partie 3: Régulateur de pression*

*AMENDEMENT 1*

ICS: 43.060.40

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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.

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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.

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

ISO 12619 consists of the following parts, under the general title *Road vehicles — Compressed Gaseous Hydrogen (CGH<sub>2</sub>) 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 (CGH<sub>2</sub>) 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 (CGH<sub>2</sub>) and Hydrogen/Natural Gas 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 (CGH<sub>2</sub>) in accordance with ISO 14687-1 or ISO/TS 14687-2 and Hydrogen/Natural Gas blends [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<sub>2</sub>) 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.

NOTE 3 This Standard may not apply to fuel cell vehicles in compliance with international Regulations.

## 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 referenced document (including any amendments) applies. Members of ISO and IEC maintain registers of currently valid International Standards.

- [ISO 11114-2](#), Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 2: Non-metallic materials
- [ISO 12619-1](#), Road vehicles — Compressed gaseous hydrogen (CGH<sub>2</sub>) and hydrogen/natural gas blend fuel system components — Part 1: General requirements and definitions

- [ISO 12619-2](#), Road vehicles — Compressed gaseous hydrogen (CGH<sub>2</sub>) and hydrogen/natural gas blend fuel system components — Part 2: Performance and general test methods
- [ISO 14687-1](#), Hydrogen fuel — Product specification — Part 1: All applications except proton exchange membrane (PEM) fuel cell for road vehicles
- [ISO 14687-2](#), Hydrogen fuel — Product specification — Part 2: Proton exchange membrane (PEM) fuel cell applications for road vehicles
- [ISO 15403-1](#), Natural gas — Natural gas for use as a compressed fuel for vehicles — Part 1: Designation of the quality
- [ISO/TR 15403-2](#), Natural gas — Natural gas for use as a compressed fuel for vehicles — Part 2: Specification of the quality

### 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 (if applicable)
- 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 means 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 (CGH<sub>2</sub>) 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.

Table 1 – Required tests

Test	Applicable	Test procedure as required in ISO 12619-2	Specific test required in this part of ISO 12619
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	-
<a href="#">N-pentane</a>	<a href="#">X</a>	<a href="#">X</a>	=
<a href="#">Heat ageing</a>	<a href="#">X</a>	<a href="#">X</a>	=
Electrical over-voltages	X	X	-
Non-metallic immersion	X	X	-
<a href="#">Material requirements</a>	<a href="#">X</a>	<a href="#">X</a>	=
<a href="#">Non metallic material compatibility to hydrogen</a>	<a href="#">X</a>	<a href="#">X</a>	=
<a href="#">Ultraviolet resistance of external surfaces</a>	<a href="#">X</a>	<a href="#">X</a>	=
<a href="#">Automotive fluid exposure</a>	<a href="#">X</a>	<a href="#">X</a>	=
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.			

## 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 two 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 two times the working pressure of the chamber. If the chamber has a pressure relief valve, the chamber shall be tested at two 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 two 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.

**Table 2 — Test temperatures and pressures**

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	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.

## 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.