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## Road vehicles — Compressed gaseous Hydrogen (CGH<sub>2</sub>) and Hydrogen/Natural gas blends fuel system components —

### Part 4: Check Valve

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

*Partie 4: Clapet de nonretour*

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.

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. [www.iso.org/directives](http://www.iso.org/directives)

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is 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 (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*
- *Part 4: Check valve*

# Road vehicles — Compressed gaseous Hydrogen (CGH<sub>2</sub>) and Hydrogen/Natural gas blends fuel system components —

## Part 4: Check Valve

### 1 Scope

This International Standard specifies general requirements and definitions of Compressed Gaseous Hydrogen (CGH<sub>2</sub>) and Hydrogen/Natural gas blends fuel system components, intended for use on the types of motor vehicles defined in ISO 3833. It also provides general design principles and specifies requirements for instructions and markings.

It is applicable to vehicles using Compressed Gaseous Hydrogen (CGH<sub>2</sub>) in accordance with ISO 14687-1 or ISO 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 located upstream of, and including, the vaporizer;
- 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 International Standard and tested according to the appropriate functional tests.

NOTE 2 All references to pressure in this International 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 International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International 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 3833:1977, *Road vehicles — Types — Terms and definitions*

ISO 6722-1:1996, *Road vehicles — Unscreened low-tension cables — Part 1: Test methods*

ISO 6722-2:1996, *Road vehicles — Unscreened low-tension cables — Part 2: Requirements*

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ISO 6722-3:1993, *Road vehicles — Unscreened low-tension cables — Part 3: Conductor sizes and dimensions for thick-wall insulated cables*

ISO 6722-4:1993, *Road vehicles — Unscreened low-tension cables — Part 4: Conductor sizes and dimensions for thin-wall insulated cables*

ISO 14687-1, *Hydrogen fuel — Product specification — Part 1: All applications except proton exchange membrane (PEM) fuel cell for road vehicles*

ISO/TS 14687-2, *Hydrogen Fuel — Product Specification — Part 2: Proton exchange membrane (PEM) fuel cell applications for road vehicles.*

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 12619-3, *Road vehicles — Compressed gaseous hydrogen (CGH<sub>2</sub>) and hydrogen/natural gas blend fuel system components — Part 3: Pressure regulator*

ISO 15869, *Gaseous hydrogen and hydrogen blends — Land vehicle fuel tanks*

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 International Standard, the terms and definitions given in ISO 12619-1 shall apply.

### 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 working pressure or pressure and temperature range

The following additional markings are recommended:

- d) the direction of flow (when necessary for correct installation)
- e) the type of fuel
- f) electrical ratings (if applicable)
- g) the symbol of the certification agency (if applicable)
- h) the type approval number
- i) the serial number or date code
- j) reference to ISO 12619 Standard.

Marking shall remain legible for the life of the component and shall not be removable without destroying or defacing the marking. Permanent adhesive labels are permissible, or markings may be etched, stamped, or moulded into the component.

NOTE 1 Specific information required for each component can be found in ISO 12619-4 and subsequent parts of this International Standard.

NOTE 2 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 check valve shall comply with the applicable provisions of ISO 12619-1 and ISO 12619-2, and with the tests specified in [Clause 6](#) of this International Standard.

## 6 Tests

### 6.1 Applicability

The tests required to be carried out are indicated in [Table 1](#).

**Table 1 — Tests applicable**

Test	Applicable	Test procedure as required by ISO 12619-2	Specific test requirements of this part of ISO 12619
Hydrostatic strength	X	X	X (see <a href="#">6.2</a> )
Leakage	X	X	X (see <a href="#">6.3</a> )
Excess torque resistance	X	X	
Bending moment	X	X	
Continued operation	X	X	X (see <a href="#">6.4</a> )
Corrosion resistance	X	X	
Oxygen ageing	X	X	
Ozone ageing	X	X	
N-pentane	X	X	
Heat ageing	X	X	
Electrical overvoltages			
Non-metallic material immersion	X	X	
Pre-cooled hydrogen exposure test	X	X	
Material requirements	X	-	-
Non metallic material compatibility to hydrogen	X	X	
Automotive fluid exposure	X	X	
Ultraviolet resistance of external surfaces	X	X	
Vibration resistance	X	X	
Brass material compatibility	X	X	
<sup>a</sup> Not applicable for check valves built into other components.			

## 6.2 Hydrostatic strength

Test the check valve according to the procedure for testing hydrostatic strength specified in ISO 12619-2. The test pressure shall be 2 times the working pressure.

## 6.3 Leakage

Test the check valve at the temperatures and pressures given in Table 2.

**Table 2 — Test temperatures and pressures**

Temperature °C	Pressure MPa [bar]	
	First	Second
- 40 or -20 as applicable	0.75xWP	0.025xWP
20	0.025xWP	1.5xWP
+85 or +120 as applicable	0.05xWP	

## 6.4 Continued operation

The check valve shall be capable of withstanding 20 000 cycles of operation and 24 h of chatter flow when submitted to the following test procedure.

- a) Connect the check valve to a test fixture and apply a pressure equal to the working pressure to the check valve's inlet, then vent pressure from its outlet. Lower the pressure on the check valve's outlet side to between 0 and a maximum of 0,5 times the working pressure prior to the next cycle.
- b) Following 20 000 cycles of operation, subject the check valve to 24 h of chatter flow at a flow rate that causes the most chatter. After this test, the check valve shall comply with the leakage test according to 6.3.

Failure in any sense during the procedure shall constitute a failure of the check valve. All parts shall remain in position and function properly after this test.

After this test, the check valve shall comply with the hydrostatic test according to 6.2.



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