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

Part 1: General requirements and definitions

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

Partie 1: Exigences générales et définitions

Reference number
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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).

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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, *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 blend fuel system components —

Part 1: General requirements and definitions

1 Scope

This part of ISO 12619 specifies general requirements and definitions of compressed gaseous hydrogen (CGH2) 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.

This part of ISO 12619 is applicable to vehicles using CGH2 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:

— liquefied hydrogen (LH2) fuel system components;

— fuel containers;

— stationary gas engines;

— container mounting hardware;

— electronic fuel management;

— refuelling receptacles.

NOTE 1 It is recognized that miscellaneous components not specifically covered herein can be examined to meet the criteria of this part of ISO 12619 and tested according to the appropriate functional tests.

NOTE 2 All references to pressure in this part of ISO 12619 are to be considered gauge pressures unless otherwise specified.

NOTE 3 This part of ISO 12619 may not apply to fuel cell vehicles in compliance with international regulations.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6722-1, *Road vehicles — 60 V and 600 V single-core cables — Part 1: Dimensions, test methods and requirements for copper conductor cables*

ISO 6722-2, *Road vehicles — 60 V and 600 V single-core cables — Part 2: Dimensions, test methods and requirements for aluminium conductor cables*

ISO 12619-2, *Road vehicles — Compressed gaseous hydrogen (CGH2) 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*

ISO 16380[1)], *Road vehicles — Blended fuels refuelling connector*

ISO 17268, *Gaseous hydrogen land vehicle refuelling connection devices*

3 Terms and definitions

3.1
agent
person or organization responsible for holding the compliance certificate

3.2
burst pressure
pressure which causes structural failure of the component and consequential inability of the component to retain hydrogen or hydrogen/natural gas blends

3.3
compressed gaseous hydrogen
CGH2
gaseous hydrogen which has been compressed and stored for use as a vehicle fuel

3.4
filter
component that is intended to remove contaminants from the gas stream

3.5
flexible fuel line
flexible tubing or hose through which gaseous hydrogen or hydrogen/natural gas blend flows

3.6
fitting
connector used in joining a piping, tubing, or hose system

3.7
fuel cell gas injector
device used for introducing gas into the fuel cell

3.8
gas air mixer
device for mixing the gaseous fuel and intake air for the engine

3.9
gas flow adjuster
gas flow restricting device that is installed downstream of a pressure regulator for controlling gas

3.10
gas injector
device for introducing gaseous fuel into the engine or associated intake system

1) To be published.

3.11
gas tight housing
device which vents gas leakage to outside the vehicle including the gas ventilation hose, the clear opening of which is at least 450 mm^2

3.12
hydrogen/natural gas blend
mixture of natural gas and more than 2 % by volume of hydrogen and not pure hydrogen as per ISO 14687-1 or ISO 14687-2

3.13
pressure indicator
pressurized device which indicates the gas pressure

3.14
pressure regulator
device used to control the delivery pressure of gaseous fuel to the engine

3.15
pressure relief device
PRD
one-time use device that when activated under specified performance conditions, is used to vent the container contents

3.16
rigid fuel line
tubing which has been designed not to flex in normal operation and through which either gaseous hydrogen or hydrogen/natural gas blend flow

3.17
service pressure
settled pressure at a uniform gas temperature of 15 °C

3.18
test pressure
pressure to which a component is taken during acceptance testing

3.19
valve
device by which the flow of a fluid may be controlled

3.20
manual valve
valve which is operated manually

3.21
automatic valve
valve which is not operated manually

3.22
automatic cylinder valve
automatic valve rigidly fixed to the cylinder which controls the flow of gas to the fuel system

3.23
check valve
automatic valve which allows gas to flow in only one direction

3.24
excess flow valve
valve which automatically shuts off, or limits, the gas flow when the flow exceeds a set design value

3.25
manual cylinder valve
manual valve rigidly fixed to the cylinder

3.26
pressure relief valve
PRV
self closing device which opens to prevent a pre-determined upstream pressure being exceeded

3.27
service valve
manual valve which is closed only when servicing the vehicle

3.28
working pressure
maximum pressure to which a component is designed to be subjected to and which is the basis for determining the strength of the component under consideration

4 Construction and assembly

4.1 Materials normally in contact with hydrogen shall be determined to be acceptable in hydrogen service, with particular attention to hydrogen embrittlement and hydrogen accelerated fatigue. Materials and design shall be such that there will be no significant change in the functioning of the device, deformation or mechanical change in the device, and no harmful corrosion, deformation, or deterioration of the materials.

Resistance to chloride stress corrosion cracking shall be taken under consideration if selecting stainless steel materials. Resistance to sustained load cracking shall be taken under consideration if selecting aluminium materials.

NOTE 1 Material performance data in hydrogen environments may be found in the Sandia National Laboratory Technical Reference for Hydrogen Compatibility of Materials or the ANSI/AIAA G-095 Guide to Safety of Hydrogen and Hydrogen Systems and ASME B31.12 Hydrogen Piping and Pipelines.

NOTE 2 Guidance to account for the degradation effects of hydrogen on the mechanical performance of a material can be found in ISO/TR 15916.

4.2 Jointing components shall provide gas tight sealing performance. Where joints are required to be disassembled, it is recommended that any tapered thread fittings be replaced

4.3 Components on board shall be suitable for service within the following temperature ranges:

Table 1 — Temperature ranges for on board components

	Location on board	
	Location a	**Location b**
Cold	**– 40°C to 120°C**	**– 40°C to 85°C**
Moderate	**– 20°C to 120°C**	**– 20°C to 85°C**
Location a: Inside the engine compartment in case of internal combustion engine vehicle. Location b: Elsewhere in case of internal combustion engine vehicle. In case of fuel cell vehicle, only location b is considered.		

4.4 Components on board shall be suitable for service in accordance with the following service pressures (as specified for the refuelling connectors in ISO 16380 and ISO 17268):

Table 2 — Hydrogen/natural gas blend fuel system components

Service Pressure	Working Pressure
20 MPa	25 MPa
25 MPa	31,25 MPa
35 MPa	43,75 MPa

Table 3 — Hydrogen fuel system components

Service Pressure	Working Pressure
25 MPa	31,25 MPa
35 MPa	43,75 MPa
70 MPa	87,50 MPa

4.5 All non-metallic materials used in seals and diaphragms shall comply with the oxygen ageing test specified in ISO 12619-2.

4.6 All non-metallic materials in contact with gaseous hydrogen and hydrogen/natural gas blends shall comply with the non-metallic material immersion test, hydrogen compatibility test specified in ISO 12619-2.

4.7 All components subject to weather exposure and other corrosive conditions shall be made of corrosion resistant material or otherwise protected.

4.8 It is recognized that multifunctional components may be made up of several components as defined in ISO 12619-3 and subsequent parts. Such components shall be examined for conformance to this part of ISO 12619 and tested according to the appropriate functional tests.

4.9 Fuel flow shut-off shall be normally closed.

5 Electrical equipment and wiring

5.1 Any openings through which electrical wiring components pass shall be equipped with means to prevent chafing and abrasion of the wire insulation.

5.2 Electrical equipment and circuit wiring in a component shall be of automotive quality with respect to mechanical strength, insulation and current carrying capacity, in accordance with either ISO 6722-1 or ISO 6722-2.

5.3 Materials used for electrical construction shall be suitable for their particular application. When determining the acceptability of an electrical insulating material, consideration shall be given to its mechanical strength, dielectric strength, heat-resistant properties, the degree to which it is enclosed or protected, and any other features influencing fire and accident hazards

6 Instructions

6.1 Clear, concise instructions and diagrams, stated in terms clearly understandable and adequate for proper assembly, installation, maintenance and safe operation, shall be provided by the manufacturer of the component and component package. The information shall also require that intermediate assemblers transmit the component warnings and information to the final installer. The manufacturer shall provide