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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

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.

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 12619-1 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/methane 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 1: General requirements and definitions

1 Scope

This Standard 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 provide general design principles and specifies requirements for instructions and markings.

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.

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 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 6722-1:2011, *Road vehicles -- 60 V and 600 V single-core cables -- Part 1: Dimensions, test methods and requirements for copper conductor cables*

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

ISO 14687, *Hydrogen fuel - Product specification*

ISO 12619-2[1)] , *Road vehicles* - Compressed Gaseous Hydrogen (CGH2) and Hydrogen/methane blends *fuel system components - Part 2: Performance and general test methods*

ISO/TR 15916, Basic considerations for the safety of hydrogen systems

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

3 Terms and definitions

For the purposes of this Standard, the following terms and definitions apply.

3.1

Valve

device by which the flow of a fluid may be controlled

3.1.1

manual valve

valve which is operated manually

3.1.2

automatic valve

valve which is not operated manually

3.1.3

automatic cylinder valve

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

3.1.4

check valve

automatic valve which allows gas to flow in only one direction

3.1.5

excess flow valve

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

3.1.6

manual cylinder valve

manual valve rigidly fixed to the cylinder

1) Under development

3.1.7

pressure relief valve PRV

device which prevents a pre-determined upstream pressure being exceeded

3.1.8

service valve

manual valve which is closed only when servicing the vehicle

3.2

compressed gaseous hydrogen CGH2

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

3.3

hydrogen blend

a mixture of natural gas and more than 2% by volume of hydrogen and not a pure hydrogen as ISO 14687.

3.4

filter

component that is intended to remove contaminants from the gas stream.

3.5

fitting

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

3.6

flexible fuel line

flexible tubing or hose through which gaseous hydrogen or hydrogen/Natural Gas blend flows

3.7

gas-air mixer

device for mixing the gaseous fuel and intake air for the engine

3.8

gas flow adjuster

gas flow restricting device, installed downstream of a pressure regulator, controlling gas

3.9

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] mm2

3.10

pressure indicator

pressurised device which indicates the gas pressure

3.11

pressure regulator

Device used to control the delivery pressure of gaseous fuel to the engine

3.12

pressure relief device PRD

one time use device triggered by excessive temperature or temperature and pressure which vents gas to protect the cylinder from rupture

3.13

rigid fuel line

tubing which has been designed not to flex in normal operation and through which gaseous hydrogen and hydrogen/Natural Gas blend flow

3.14

service pressure

settled pressure at a uniform gas temperature of 15 °C

3.15

test pressure

pressure to which a component is taken during acceptance testing

3.16

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

3.17

burst pressure

pressure which causes structural failure of the component and consequential inability of the component to retain hydrogen or hydrogen/Natural Gas blends

3.18

gas injector

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

3.19

fuel cell gas injector

device used for introducing gas into the fuel cell

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.

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/PDTR 15916 and the NASA document NSS 1740.16.

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

Location on board	
Location a	Location b
- 40°C **to** 120°C **or** **- 20°C to 120°C**	- 40°C **to** 85°C **or** **- 20°C to 85°C**

Example of location a: inside the engine compartment in case of Internal Combustion engine vehicle.

Example of location b: elsewhere in case of Internal Combustion engine vehicle.

In case of Fuel Cell vehicle only location b is considered