INTERNATIONAL STANDARD

ISO 12619-2

First edition
2014-06-15

AMENDMENT 1
2016-05-15

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

Part 2: Performance and general test methods

AMENDMENT 1

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

Partie 2: Performance méthodes d'essai en général

AMENDEMENT 1

Reference number
ISO 12619-2:2014/Amd.1:2016(E)

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 41, *Specific aspects for 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*

— *Part 4: Check valve*

— *Part 5: Manual cylinder valve*

— *Part 6: Automatic valve*

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

Part 2: Performance and general test methods

AMENDMENT 1

Page 10, 22.2

Add the following clauses after 22.2:

23 Material requirements

Materials normally in contact with hydrogen shall be determined to be acceptable in hydrogen service, with consideration of hydrogen embrittlement and hydrogen accelerated fatigue. The performance tests cannot guarantee that all cases and conditions of hydrogen service will be validated, so it is still incumbent on the manufacturer to carefully screen materials of construction for their intended use. Materials and design shall be such that there will be no significant change in the functioning of the component, deformation or mechanical change in the component, and no harmful corrosion, deformation, or deterioration of the materials when subject to the service conditions provided in ISO 12619-1, 4.4.

NOTE Material performance data in hydrogen environments can be found in the Sandia National Laboratory Technical Reference for Hydrogen Compatibility of Materials or ANSI/AIAA G-095, ANSI/CSA CHMC 1, ASME B31.12, and SAE J2579, Appendix B.

Non-metallic materials normally in contact with hydrogen shall be determined to be acceptable in hydrogen service. Consideration shall be given to the fact that hydrogen diffuses through these materials more easily than through metals; therefore, the suitability of materials shall be verified. Non-metallic materials shall retain their mechanical stability with respect to strength (fatigue properties, endurance limit, creep strength) when exposed to the full range of service conditions and lifetime as specified by the manufacturer. Materials shall be sufficiently resistant to the chemical and physical action of the fluids that they contain and to environmental degradation. The chemical and physical properties necessary for operational safety shall not be significantly affected within the scheduled lifetime of the equipment unless replacement is foreseen; specifically, when selecting materials and manufacturing methods, due account shall be taken of the material's corrosion and wear resistance, electrical conductivity, impact strength, aging resistance, the effects of temperature variations, the effects arising when materials are put together (for example, galvanic corrosion), the effects of ultraviolet radiation, and the degradation effects of hydrogen on the mechanical performance of a material.

24 Ultraviolet resistance of external surfaces

24.1 General

The external non-metallic surfaces, including organic coatings, of the component shall be evaluated for resistance to ultraviolet effects using a minimum 1 000 h exposure using a UVA 340 lamp in accordance with ISO 4892-3. The inlet and outlet connections of the component shall be connected or capped in accordance with the manufacturer's installation instructions.

24.2 Pass criteria

There shall be no evidence of blistering, cracking, chalking, or softening. If the non-metallic material is integral to pressure containment or the function of the device, then, at the conclusion of this test, the device shall meet the requirements of Clauses 5 and 6.

25 Automotive fluid exposure

25.1 General

External portions of components shall be able to withstand exposure to the following fluids without mechanical degradation. Resistance may be determined by the test in 25.2, by comparable published data or by known properties (e.g. 300 series stainless steel). The decision about the applicability of test data and known properties shall be at the discretion of the independent inspection or test agency.

25.2 Method

The external surfaces of the component shall be exposed to the following test. The inlet and outlet connections of the component shall be connected or capped in accordance with the component manufacturer's installation instructions. The component shall be exposed for at ambient temperature by spraying the exterior of the component once per hour, 24 times, over a period of up to three days (e.g. three 8 h shifts over three days or 24 h straight). Alternatively, the component may be immersed in the solution for 24 h. In the immersion method, the fluid shall be replenished as needed to assure complete exposure for the duration of the test. A distinct test shall be performed with each of the three fluids specified in 25.3. One component may be used for all three exposures sequentially.

25.3 Fluids

The following fluids shall be used:

a) Sulfuric acid: 19 % solution by volume in water;

b) Ethanol/gasoline: 5/95 % concentration of M5 fuel meeting the requirements of ASTM D4814;

c) Windshield washer fluid: 50 % by volume solution of methanol and water.

25.4 Pass criteria

After exposure to each chemical, the component shall be wiped off and rinsed with water and examined.

The component shall not show signs of mechanical degradation that could impair the function of the component such as cracking, softening, or swelling. Cosmetic changes such as pitting or staining are not considered failures. At the conclusion of all exposures, the components(s) shall meet the leakage requirements of Clause 6 and hydrostatic strength requirements of Clause 5.

26 N-pentane

Resistance to n-pentane according to ISO 1817 with the following conditions:

a) Medium: n-pentane;

b) Temperature: 23 °C (tolerance according to ISO 1817);

c) Immersion period: 72 h.

Requirements:

— Maximum change in volume: 20 %;

— Maximum change in tensile strength: 25 %;

— Maximum change in elongation at break: 30 %.

After storage in air with a temperature of 40 °C for 48 h, the mass compared with the original value may not decrease more than 5 %.

27 Heat ageing

27.1 The test has to be done in compliance with ISO 188. The test piece has to be exposed to air at a temperature equal to the maximum operating temperature for 168 h.

27.2 The allowable change in tensile strength should not exceed +25 %. The allowable change in ultimate elongation shall not exceed the following values:

a) Maximum increase: 10 %;

b) Maximum decrease: 30 %.

Page 11, Bibliography

Add the following entry:

[6] ISO 4892-3, *Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps*

ICS 43.060.40

Price based on 3 pages