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Gaseous Hydrogen — Fuel system components for hydrogen-fuelled vehicles —

Part 1: Land vehicles

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Contents

Page

Foreword ..... **viii**

Introduction ..... **ix**

1 Scope **1**
1.1 Inclusions 1
1.2 Applicability 2
1.3 Exclusions 2

2 Normative references **2**

3 Terms and definitions **3**

4 General requirements **7**
4.1 General construction and assembly 7
4.1.1 Intended use 7
4.1.2 Material requirements 8
4.1.3 Threaded openings 9
4.1.4 Service temperatures 10
4.1.5 Design service life 10
4.2 Failure modes and effects analysis (FMEA) 10
4.3 Electrical equipment and wiring 10
4.3.1 Openings 10
4.3.2 Equipment 10
4.3.3 Materials 10
4.3.4 Connectors 10
4.4 Component literature 11
4.4.1 General 11
4.4.2 Instructions – General 11
4.4.3 Instructions – Additional considerations 11
4.4.4 Installation instructions 11
4.5 Marking 11
4.5.1 General marking information 11
4.5.2 Marking methods 12
4.5.3 Exclusion of markings 12

5 General test methods **12**
5.1 General test requirements 12
5.1.1 Testing samples 12
5.1.2 References to other standards 12
5.1.3 Pressure and temperature requirements 13
5.1.4 Test gases 13
5.1.5 Material acceptance 14
5.1.6 Multi-functional components 14
5.1.7 Pre-cooling effects 14
5.1.8 Electrically operated components 14
5.2 Hydrostatic strength 14
5.2.1 General 14
5.2.2 Test method 14
5.3 Leakage 15
5.3.1 General 15
5.3.2 External leakage 15
5.3.3 Internal leakage 15
5.3.4 Test conditions 15
5.4 Excess torque resistance 16
5.5 Bending moment 16
5.6 Continuous operation 17
5.6.1 General 17
5.6.2 Test method 17

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5.7 Corrosion resistance 18
5.7.1 General 18
5.7.2 Salt spray exposure 19
5.7.3 Accelerated cyclic corrosion 19
5.8 Ultraviolet resistance of external surfaces 21
5.8.1 General 21
5.8.2 Ultraviolet resistance test 21
5.8.3 Pass criteria 22
5.9 Automotive fluid exposure 22
5.9.1 General 22
5.9.2 Test method 22
5.9.3 Fluids 22
5.9.4 Pass criteria 22
5.10 Atmospheric exposure 22
5.10.1 Oxygen aging 23
5.10.2 Ozone 23
5.11 Abnormal electrical voltages 23
5.11.1 Overvoltage testing 23
5.11.2 Minimum opening voltage 24
5.12 Non-metallic material hydrogen compatibility 24
5.12.1 General 24
5.12.2 Hydrogen gas exposure 24
5.13 Vibration resistance 24
5.13.1 Test method 24
5.13.2 Pass criteria 25
5.14 Stress corrosion cracking resistance 25
5.14.1 General 25
5.14.2 Test method 25
5.14.3 Pass criteria 25
5.15 Insulation resistance 25
5.16 Pre-cooled hydrogen exposure 26

6 Quality assurance 26

7 Production inspection and acceptance testing 26
7.1 Inspection and acceptance testing plan 26
7.2 Inspection of system critical components 26
7.3 External leak testing 26

8 Check valves 26
8.1 Marking 26
8.2 Construction and assembly 27
8.3 Tests 27
8.3.1 General 27
8.3.2 Continuous operation 28
8.3.3 Pass criteria 28

9 Manual valves 28
9.1 Marking 29
9.2 Construction and assembly 29
9.2.1 General 29
9.2.2 Handles 29
9.2.3 Emergency manual shut-off valves 29
9.2.4 Quarter-turn valves 29
9.2.5 Multi-turn valves 29
9.3 Tests 29
9.3.1 General 29
9.3.2 Continuous operation 30
9.3.3 Operating torque 31
9.3.4 Valve stem torque 32

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10 Manual container valves ... **32**
10.1 Marking ... 32
10.2 Construction and assembly ... 32
10.2.1 General ... 32
10.2.2 Handle ... 32
10.2.3 Quarter-turn valves ... 33
10.2.4 Multi-turn valves ... 33
10.2.5 Internal excess flow valve ... 33
10.3 Tests ... 33
10.3.1 General ... 33
10.3.2 Continuous operation ... 33
10.3.3 Operating torque ... 34
10.3.4 Valve stem torque ... 34

11 Automatic valves and automatic container valves ... **35**
11.1 Marking ... 35
11.2 Construction and assembly ... 35
11.2.1 General ... 35
11.2.2 De-energized position ... 35
11.2.3 Shut-off valve failure position ... 35
11.2.4 Internal excess flow valve ... 35
11.3 Tests ... 35
11.3.1 General ... 35
11.3.2 Continuous operation ... 36
11.3.3 Automatic valve manual override torque ... 37

12 Hydrogen injectors ... **37**
12.1 Marking ... 37
12.2 Construction and assembly ... 38
12.2.1 General ... 38
12.2.2 De-energized position ... 38
12.3 Tests ... 38
12.3.1 General ... 38
12.3.2 Continuous operation ... 38
12.3.3 Insulation resistance ... 39
12.3.4 Pneumatic strength ... 39
12.3.5 Extreme temperature cycling ... 39

13 Pressure sensors, temperature sensors, and pressure gauges ... **40**
13.1 Marking ... 40
13.2 Construction and assembly ... 41
13.2.1 General ... 41
13.2.2 Pressure gauge lens ... 41
13.3 Tests ... 41
13.3.1 General ... 41
13.3.2 Continuous operation ... 41
13.3.3 Abnormal electrical voltages ... 42
13.3.4 Insulation resistance ... 43

14 Pressure regulators ... **43**
14.1 Marking ... 43
14.2 Construction and assembly ... 43
14.2.1 General ... 43
14.2.2 Nominal outlet pressure ... 43
14.2.3 Pressure regulator PRV ... 43
14.3 Tests ... 43
14.3.1 General ... 43
14.3.2 Hydrostatic strength ... 44
14.3.3 Leakage ... 45
14.3.4 Continuous operation ... 45
14.3.5 Pressure impulse ... 45

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14.3.6 Pressure chamber – PRV operation 46
15 Pressure relief valves 46
15.1 Marking 46
15.2 Construction and assembly 46
15.2.1 General 46
15.2.2 Venting 46
15.2.3 Inspection and acceptance testing 46
15.3 Tests 46
15.3.1 General 46
15.3.2 Hydrostatic strength 47
15.3.3 Leakage 47
15.3.4 Continuous operation 47
15.3.5 Opening and reseating characteristics 48
16 Pressure relief devices 48
17 Excess flow valves 48
17.1 Marking 48
17.2 Construction and assembly 49
17.3 Tests 49
17.3.1 General 49
17.3.2 Continuous operation 49
17.3.3 Bypass flow 49
18 Gastight housing and leakage capture passages 50
18.1 Marking 50
18.2 Construction and assembly 50
18.2.1 General 50
18.2.2 Inspection and acceptance testing 50
18.3 Tests 50
18.3.1 General 50
18.3.2 Leakage 51
18.3.3 Venting ability and pressure retention 51
18.3.4 Pull-off 52
19 Rigid fuel lines 52
19.1 Marking 52
19.2 Construction and assembly 52
19.3 Tests 52
19.3.1 General 52
19.3.2 Continuous operation 53
19.3.3 Bending 53
20 Flexible fuel lines, hoses, and hose assemblies 53
20.1 Markings 54
20.1.1 General 54
20.1.2 Bulk hoses 54
20.1.3 Hose assemblies 54
20.1.4 Marking surfaces 55
20.1.5 Date code 55
20.2 Construction, assembly, and installation instructions 55
20.2.1 General 55
20.2.2 Linings 55
20.2.3 Hose cover 55
20.2.4 Protection from permeation or leakage 55
20.2.5 Static electricity dissipation 56
20.2.6 End connections 56
20.2.7 Component literature 56
20.3 Tests 56
20.3.1 General 56
20.3.2 Hydrostatic strength 57

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20.3.3 Leakage 58
20.3.4 Corrosion resistance 58
20.3.5 Automotive fluid exposure 59
20.3.6 Vibration resistance 60
20.3.7 Pressure cycle 61
20.3.8 Electrical conductivity 63
20.3.9 Hose permeation 64
20.3.10 Ultraviolet light and water exposure 65
20.3.11 Hydrogen impulse 65
20.3.12 Ozone exposure resistance 67
20.4 Manufacturing plan 67
20.4.1 Documentation 67
20.4.2 Production processes 67
20.4.3 Leakage test conducted as production test 67

21 Filter assemblies 68
21.1 Marking 68
21.2 Construction and assembly 69
21.2.1 General 69
21.2.2 Electrical conductivity 69
21.3 Tests 69
21.3.1 General 69
21.3.2 Continuous operation 69

22 Fittings 70
22.1 Marking 70
22.2 Construction and assembly 70
22.3 Tests 70
22.3.1 General 70
22.3.2 Continuous operation 71
22.3.3 Repeated assembly 71

23 Non-metallic low-pressure rigid fuel lines 71
23.1 General 71
23.2 Marking 71
23.3 Construction and assembly 72
23.4 Tests 72
23.4.1 General 72
23.4.2 Hydrostatic strength 72
23.4.3 Continuous operation 72
23.4.4 Chloride resistance 73

24 Discharge line closures 73
24.1 Markings 73
24.2 Construction and assembly 74
24.2.1 General 74
24.2.2 Inspection and acceptance testing 74
24.3 Tests 74
24.3.1 General 74
24.3.2 Continuous operation 75
24.3.3 Water jet protection 75
24.3.4 Leakage venting 75

Annex A (Informative) **Extreme thermal cycling test 76**

Bibliography 78

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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 document 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).

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This document was prepared by Technical Committee ISO/TC 197, *Hydrogen Technologies,* in collaboration with Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 41, S*pecific aspects for gaseous fuels*.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The purpose of this document is to promote the implementation of hydrogen powered land vehicles through the creation of performance-based testing requirements for components on hydrogen-fuelled vehicles. The successful commercialization of hydrogen land vehicle technologies requires standards pertaining to vehicle fuel system components and the global homologation of standards requirements for technologies with the same end use. This will allow manufacturers to achieve economies of scale in production through the ability to manufacture one product for global use.

This document is based on the CSA Standard CSA/ANSI HGV 3.1:22.

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Gaseous Hydrogen — Fuel system components for hydrogen-fuelled vehicles —

Part 1: Land vehicles

1 Scope

1.1 Inclusions

This document establishes requirements for newly produced compressed hydrogen gas fuel system components, as listed below, that are intended for use on hydrogen gas powered land vehicles:

a) check valves (see Clause 8);

b) manual valves (see Clause 9);

c) manual container valves (see Clause 10);

d) automatic valves and automatic container valves (see Clause 11);

e) hydrogen injectors (see Clause 12);

f) pressure sensors, temperature sensors, and pressure gauges (see Clause 13);

g) pressure regulators (see Clause 14);

h) pressure relief valves (PRV) (see Clause 15);

i) pressure relief devices (PRD) (see Clause 16, and refer to ISO 19882);

j) excess flow valves (see Clause 17);

k) gastight housing and leakage capture passages (see Clause 18);

l) rigid fuel lines (see Clause 19);

m) flexible fuel lines, hoses, and hose assemblies (see Clause 20);

n) filter assemblies (see Clause 21);

o) fittings (see Clause 22);

p) non-metallic, low-pressure rigid fuel lines (see Clause 23);

q) discharge line closures (see Clause 24).

NOTE Other components not specifically identified here can be examined to meet the criteria of ISO 19887-1 and tested according to the appropriate functional needs.

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1.2 Applicability

This document applies to components that have a nominal working pressure, as specified by the manufacturer, of 25 MPa, 35 MPa, 50 MPa, or 70 MPa at 15 °C, referred to in this document as the following pressure classes:

a) “H25” – 25 MPa;

b) “H35” – 35 MPa;

c) “H50” – 50 MPa; and

d) “H70” – 70 MPa.

Other nominal working pressures for hydrogen gas besides those defined can be used if the qualification test requirements of this document are met.

This document also applies to components downstream of the first stage of pressure reduction with a maximum operating pressure designated by the manufacturer in MPa or kPa.

1.3 Exclusions

This document does not apply to the following:

a) hydrogen gas fuel system components incorporated during the manufacture of motor vehicles originally manufactured in compliance with the international regulations on hydrogen and fuel cell vehicles, such as UN GTR No. 13, UN Regulation No. 134, UN Regulation No. 146, or IEC 62282-4-101;

b) fuel containers;

c) stationary power generation applications;

d) container mounting hardware;

e) electronic fuel management;

f) refuelling receptacles; or

g) components intended for liquid hydrogen.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 188, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

ISO 1431-1, *Rubber, vulcanized or thermoplastic — Resistance to ozone cracking — Part 1: Static and dynamic strain testing*

ISO 6270-2, *Paints and varnishes — Determination of resistance to humidity — Part 2: Condensation (in-cabinet exposure with heated water reservoir)*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

ISO/TR 11340, *Rubber and rubber products — Hydraulic hose assemblies — External leakage classification for hydraulic systems*

ISO 14687, *Hydrogen fuel quality — Product specification*

ISO 19882, *Gaseous hydrogen — Thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers*

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ASTM B117, *Standard Practice for Operating Salt Spray (Fog) Apparatus*

ASTM D572, *Standard Test Method for Rubber—Deterioration by Heat and Oxygen*

ASTM D1149, *Standard Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment*

ASTM D1193-06, *Standard Specification for Reagent Water*

ASTM G154, *Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Materials*

SAE J343, *Test and Test Procedures for SAE 100R Series Hydraulic Hose and Hose Assemblies*

SAE J2719, *Hydrogen Fuel Quality for Fuel Cell Vehicles*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
bypass flow
intentional flow through or around an excess flow valve, or similar valve, in its activated position

3.2
compressed hydrogen gas
hydrogen gas that has been compressed

Note 1 to entry: For more information on compressed hydrogen gas composition, see 5.1.4.3.

3.3
discharge line
components attached to the exhaust port of pressure relief devices or pressure relief valves or other devices releasing gas

3.4
discharge line closure
device used to keep contamination out of a discharge line while still permitting escape of gas from the line to atmosphere

3.4.1
repeated-use discharge line closure
discharge line closure (3.4) intended to relieve multiple gas release events

3.4.2
single-use discharge line closure
discharge line closure (3.4) intended to relieve a single gas release event

3.5
duty cycle
one complete operation of the component such as pressurization and depressurization or on and off, as applicable

3.5.1
injector duty cycle
operating frequency of an injector as specified by the manufacturer

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