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Date: 12 December 2025

Origin: International

Latest date for receipt of comments: 31 December 2025

Project No. 2024/03586

Responsible committee: GSE/6

Interested committees:

Title: BS ISO 19887-2 Draft Gaseous Hydrogen — Fuel system components for hydrogen-fuelled vehicles — Part 2: Rail vehicles.

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Introduction

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For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



9/3305/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:

ISO 19887-2 ED1

DATE OF CIRCULATION:

2025-12-05

CLOSING DATE FOR COMMENTS:

2026-01-30

SUPERSEDES DOCUMENTS:

9/3257/NP, 9/3281/RVN

IEC TC 9 : ELECTRICAL EQUIPMENT AND SYSTEMS FOR RAILWAYS

SECRETARIAT:

France

SECRETARY:

Mr Denis MIGLIANICO

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TITLE:

Gaseous Hydrogen – Fuel system components for hydrogen fuelled vehicles – Part 2: Rail vehicles

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Gaseous Hydrogen — Fuel system components for hydrogen-fuelled vehicles — Part 2: rail vehicles

Hydrogène gazeux — Composants des systèmes d'alimentation des véhicules à hydrogène — Partie 2: Véhicules ferroviaires

WD stage

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Published in Switzerland

WORKING DRAFT

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WORKING DRAFT

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).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by ISO/TC 197/SC 1, *Hydrogen Technologies / Hydrogen at scale and horizontal energy systems* in collaboration with Technical Committee IEC/TC9, *Electrical equipment and systems for railways*.

A list of all parts in the ISO 19887 series can be found on the ISO website.

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.

Introduction

The purpose of this document is to promote the implementation of hydrogen powered rail vehicles through the creation of performance-based testing requirements for components on hydrogen-fuelled vehicles.

The successful commercialization of hydrogen rail vehicle technologies require standards pertaining to vehicle fuel system components that allow strong communalities and synergies with other land vehicles. This will allow manufacturers to achieve economies of scale in production through the ability to manufacture one product for global use across road and rail applications.

This document is based on the ISO 19887-1:2024.

Gaseous Hydrogen — Fuel system components for hydrogen-fuelled vehicles — Part 2 Rail 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 rail vehicles:

- a) check valves (see [Clause 8](#));
NOTE 1 — Check valves that are already type approved according to UN GTR No. 13 or UN Regulation No. 134 do not need to be retested according to all clauses of this document. To prove their suitability to rail applications, the manufacturer may apply the rail specific requirements specified in 4 and 5. This may typically be the case for criteria such as fire and smoke (refer to 4.1.2.2), shock and vibration (refer to 5.13).
- b) manual valves (see [Clause 9](#));
- c) manual container valves (see [Clause 10](#));
- d) automatic valves and automatic container valves (see [Clause 11](#));
NOTE 2 — Automatic container valves that are already type approved according to UN GTR No. 13 or UN Regulation No. 134 do not need to be retested according to all clauses of this document. To prove their suitability to rail applications, the manufacturer may apply the rail specific requirements specified in 4 and 5. This may typically be the case for criteria such as fire and smoke (refer to 4.1.2.2), shock and vibration (refer to 5.13).
- e) hydrogen injectors (see [Clause 12](#));
- f) pressure sensors, pressure switches, 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 including for intercar connections, 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](#));

r) Quick connectors (see [Clause 25](#)).

NOTE 3 — Other components not specifically identified here (e.g. flow restrictors, manifolds) can be assessed to meet the generic design criteria of clause 4 and tested according to clause 5 with adaptations appropriate to the functional needs.

The document references ISO 19887-1 for the main hydrogen component requirements and focuses on the specific details applicable to rail vehicle applications.

1.2 Applicability

This document applies to components incorporated into hydrogen fuel systems specified in IEC 63341-2 that have a nominal working pressure, as specified by the manufacturer, of 35 MPa, or 70 MPa at 15 °C, referred to in this document as the following pressure classes:

- a) “H35” – 35 MPa;
- b) “H70” – 70 MPa.

Nominal working pressures other than those defined may be used, provided 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) fuel containers;
- b) stationary power generation applications;
- c) container mounting hardware;
- d) electronic fuel management;
- e) components intended for liquid hydrogen, or
- f) refuelling receptacles.

NOTE — Refuelling receptacle are typically designed and validated according to dedicated standard such as the ISO 17268 series. Rail specific requirements specified in 4 and 5 may be applied also to refuelling receptacles to prove their suitability to rail applications. This may typically be the case for criteria such as fire and smoke protection (refer to 4.1.2.2), corrosion resistance (refer to 5.7.2), shock and vibration (refer to 5.13).

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*

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

[SOURCE: ISO 19887-1:2024, 3.1]

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](#).

[SOURCE: ISO 19887-1:2024, 3.2]

3.3

discharge line

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

[SOURCE: ISO 19887-1:2024, 3.3]

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

[SOURCE: ISO 19887-1:2024, 3.4]

3.4.1

repeated-use discharge line closure

discharge line closure ([3.4](#)) intended to relieve multiple gas release events

[SOURCE: ISO 19887-1:2024, 3.4.1]

3.4.2

single-use discharge line closure

discharge line closure ([3.4](#)) intended to relieve a single gas release event

[SOURCE: ISO 19887-1:2024, 3.4.2]

3.5

duty cycle

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

[SOURCE: ISO 19887-1:2024, 3.5]

3.5.1

injector duty cycle

operating frequency of an injector as specified by the manufacturer

[SOURCE: ISO 19887-1:2024, 3.5.1]

3.6

external leakage

leakage from any pressure-retaining chamber to atmosphere, or to any chamber venting to atmosphere

[SOURCE: ISO 19887-1:2024, 3.6]

3.7

filling cycle

pressure increase representing a vehicle fuelling for components subjected to container pressure

[SOURCE: ISO 19887-1:2024, 3.7]

3.8

filter assembly

assembly that contains a filter media intended to remove contaminants from the gas stream

[SOURCE: ISO 19887-1:2024, 3.8]

3.9

fitting

connector used to join sections of pipe, tube, hose, or components

[SOURCE: ISO 19887-1:2024, 3.9]

3.10

flexible fuel line

non-rigid tubing or hose through which hydrogen gas flows

[SOURCE: ISO 19887-1:2024, 3.10]

3.11

gastight housing

enclosure meant to capture leakage from pressure-retaining components

[SOURCE: ISO 19887-1:2024, 3.11]

3.12

hydrogen injector

solenoid operating valve used to control hydrogen flow into an engine or associated intake

NOTE 1 to entry: Hydrogen injectors are primarily used for internal combustion engine applications but can also be used to control hydrogen flow into a fuel cell.

[SOURCE: ISO 19887-1:2024, 3.12]

3.13

internal leakage

leakage from one pressure-retaining chamber to another, where both are intended to contain pressure during normal operation

[SOURCE: ISO 19887-1:2024, 3.13]

3.14

leakage capture line

line or hose meant to capture or deliver hydrogen leakage from gastight housings to outside the vehicle

[SOURCE: ISO 19887-1:2024, 3.14]

3.15

leakage capture passages

portions of pressure-retaining components meant to capture and direct gas leakage from the pressure-retaining seals of that component

[SOURCE: ISO 19887-1:2024, 3.15]

3.16

lock-up pressure

stabilized pressure at the outlet of a pressure regulator at zero flow

[SOURCE: ISO 19887-1:2024, 3.16]

3.17

non-metallic, low-pressure rigid fuel line

tubing constructed from non-metallic materials that has been designed not to flex in normal operation and through which fuel flows on the downstream side of pressure regulation