SLOVENSKI STANDARD
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Priključne naprave za oskrbo kopenskih vozil s plinastim vodikom - 1. del: Pretok plina do vključno 120 g/s (ISO/DIS 17268-1:2024)

Gaseous hydrogen land vehicle refuelling connection devices - Part 1: Flow capacities up to and including 120 g/s (ISO/DIS 17268-1:2024)

Gasförmiger Wasserstoff - Anschlussvorrichtungen für die Betankung von Landfahrzeugen - Teil1: Durchflussmengen bis einschließlich 120g/s (ISO/DIS 17268-1:2024)

Dispositifs de raccordement pour le ravitaillement des véhicules terrestres en hydrogène gazeux - Partie 1: Capacités de débit jusqu'à 120 g/s inclus (ISO/DIS 17268-1:2024)

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Gaseous hydrogen land vehicle refuelling connection devices —

Part 1: Flow capacities up to and including 120 g/s

ICS: 43.060.40; 27.075

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Contents

Page

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 Technical Committee ISO/TC 197, *Hydrogen technologies*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 268, *Cryogenic vessels and specific hydrogen technologies applications*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 17268:2012), which has been technically revised.

The main changes compared to the previous edition are as follows:

— Document will only apply to connectors designed for flow rates up to 120 g/s

— Elimination of the H11, H25, and H50 connectors

— Specifying the maximum allowable volume of air between the nozzle and receptacle

— Creation of nominal flow rate categories and associated pressure drop test

— Change in maximum hydrogen gas design temperatures from 85 °C to 65 °C

— Combination of the pre-cooled hydrogen exposure and freezing tests into the Cold Gas Test (See Clause 7.26.

— Change the name of H35 high flow (H35HF) to H35 medium flow (H35MF). Also, modifications to the H35MF receptacle to prevent the H35MF nozzle connecting to the H70 receptacle

— Increase in bore diameter of the H70 receptacle to 4 mm

— Change in the hardness requirement of all receptacles

In addition, there were modifications to the machine interface, dropping, leakage, abnormal loads, low and high temperature, hydrostatic, and user abuse tests

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.

Gaseous hydrogen land vehicle refuelling connection devices —

Part 1:
Flow capacities up to and including 120 g/s

1 Scope

This document defines the design, safety and operation characteristics of gaseous hydrogen land vehicle (GHLV) refuelling connectors.

GHLV refuelling connectors consist of the following components, as applicable:

— receptacle and protective cap (mounted on vehicle);

— nozzle;

— communication hardware.

This document is applicable to refuelling connectors which have nominal working pressures or hydrogen service levels up to 70 MPa and maximum flow rates up to 120 g/s.

This document is not applicable to refuelling connectors dispensing blends of hydrogen with natural gas.

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

ISO 12103-1, *Road vehicles — Test contaminants for filter evaluation — Part 1: Arizona test dust*

ISO 15501-1, *Road vehicles — Compressed natural gas (CNG) fuel systems — Part 1: Safety requirements*

3 Terms and definitions

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

ISO and IEC maintain terminological 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
communication hardware
infrared data association (IrDA) components which are used to transmit signals from the vehicle *(receptacle)* (3.19) to the dispenser *(nozzle)* (3.14) and designed to meet SAE J2799 or equivalent

3.2
component pressure rating
maximum pressure at which it is permissible to operate a component as specified by the manufacturer at a specified temperature

Note 1 to entry: Components designed to the *maximum allowable working pressure* (3.11) per the European Pressure Equipment Directive (PED) represent the component ratings by the manufacturer that is indicated by the value of "PS."

Note 2 to entry: See Table 1 for required component pressure ratings for various *pressure classes* (3.16) of fuelling *connectors* (3.3).

Note 3 to entry: Further guidance on dispenser pressure terminology is included in ISO 19880-1.

Table 1 — Dispensing system pressure levels and refuelling connector ratings

***NWP* (3.13) of vehicle *(receptacle)* (3.19) or *HSL* (3.9) of dispenser *(nozzle)* (3.14)**	***Pressure class* (3.16)**	***Maximum operating pressure (MOP)* (3.12)**	**Dispensing system maximum allowable working pressure *(MAWP)* (3.11) Minimum dispenser component pressure rating**
Equal to NWP of the vehicle storage system per vehicle label		*1,25 × HSL/1,25 × NWP Highest fill pressure during normal fuelling*	*1,375 × HSL Highest permissible setpoint for dispenser pressure protection in ISO 19880-1*:2020, 8.2.2.3
35 MPa	H35 or H35MF[a]	43,75 MPa	48,125 MPa
70 MPa	H70	87,5 MPa	96,25 MPa
[a] Medium-flow connectors for heavy-duty commercial vehicles.			

3.3
connector

joined assembly of *nozzle* (3.14) and *receptacle* (3.19) which permits the transfer of hydrogen

3.4
cycle
process of making a positive connection between the *nozzle* (3.14) and the *receptacle* (3.19), pressurizing to the *maximum operating pressure* (3.12), depressurizing and disconnecting

3.5
dry air
air with a dew point adequate to prevent condensation during testing

3.6
dry helium
helium with a dew point adequate to prevent condensation during testing and at least 99 % pure

3.7
dry hydrogen
hydrogen which meets or exceeds the quality level in ISO 14687

3.8
grade, hydrogen
level of hydrogen quality based upon ISO 14687

3.9
hydrogen service level
HSL
pressure level used to characterize the hydrogen service of the dispenser based on the NWP (3.113.11) rating of the vehicle

Note 1 to entry: The numerical value of HSL also matches the number after the “H” in the pressure class (3.14).

Note 2 to entry: HSL is expressed in MPa.

3.10
leak test gas
gas for testing leaks that consists of *dry hydrogen* (3.7), or *dry helium* (3.6), or blends of a minimum 10 % of hydrogen or helium with nitrogen on a molar basis

3.11
maximum allowable working pressure
MAWP
Maximum pressure permissible in a system at the temperature specified for the pressure

Note 1 to entry: The maximum allowable working pressure can also be defined as the design pressure, the maximum allowable operating pressure, the maximum permissible working pressure, or the maximum allowable pressure for the rating of pressure vessels and equipment manufactured in accordance with national pressure vessel codes.

3.12
maximum operating pressure
MOP
highest pressure that is expected for a component or system during normal operation

Note 1 to entry: Further guidance on dispenser pressure terminology is included in ISO 19880-1.

Note 2 to entry: The maximum operating pressure is 125 % of the *nominal working pressure* (3.13) or *hydrogen service level* (3.9), as applicable, for the purpose of testing of *nozzles* (3.14) and *receptacles* (3.19) in this document.

3.13
nominal working pressure
NWP
pressure of a full vehicle compressed hydrogen storage system at a gas temperature of 15 °C

Note 1 to entry: See ECE/TRANS/180/Add.13/Amend.1 Part II-3.37.

Note 2 to entry: See Table 1 for NWPs covered in this document.

Note 3 to entry: Further guidance on pressure terminology is included in ISO 19880-1.

Note 4 to entry: NWP is also known as “settled pressure” in ISO 10286.

3.14
nozzle
device connected to a fuel dispensing system, which permits the quick connect and disconnect of fuel supply to the vehicle or storage system

3.15
positive locking device
device with the feature which requires actuation of an interlocking mechanism to achieve proper connection of the *nozzle* (3.14) to the *receptacle* (3.19) before pressure is applied

3.16
pressure class
non-dimensional rating of components that indicates the components are designed to dispense hydrogen to road vehicles at the required pressure and temperature

Note 1 to entry: See Table 1 for pressure classes of fuelling *connectors* (3.3).

Note 2 to entry: Further guidance on dispenser pressure terminology is included in ISO 19880-1.

3.17
pressure drop
The difference in pressure between two specific points at specific flow conditions.

3.18
protective cap
means to prevent dirt and other contaminants from getting into the inlet of the vehicle *receptacle* (3.19)

3.19
receptacle
device connected to a vehicle or storage system which receives the *nozzle* (3.14)

Note 1 to entry: This can also be referred to as a fuelling inlet of gas filling port in other documents.

4 General construction requirements

4.1 Nozzles and receptacles shall be designed in accordance with reasonable concepts of safety, durability and maintainability.

4.2 Nozzles and receptacles designed and tested in accordance with this document shall

a) prevent hydrogen fuelled vehicles from being filled by fuelling stations with pressures higher than the design values specified for the vehicle, as shown in Table 2;

b) prevent hydrogen fuelled vehicles from being filled by fuelling stations with flow rates higher than the design values specified for the vehicle, as shown in Table 2;

c) prevent hydrogen fuel cell vehicles which can only use ISO 14687 Grade D hydrogen from being filled by fuelling stations that dispense ISO 14687 Grade F hydrogen, as shown in Table 2;

d) allow for internal combustion hydrogen vehicles which use ISO 14687 Grade F hydrogen to be filled by fuelling stations that dispense ISO 14687 Grade D hydrogen, as shown in Table 2;

e) prevent hydrogen fuelled vehicles from being filled by other compressed gas fuelling stations, , including but not limited to those specified in ISO 16380, ISO 14469 and CSA NGV 1, as shown in Table 3; and

f) prevent other gaseous fuelled vehicles from being filled by hydrogen fuelling stations including but not limited to those specified in ISO 16380, ISO 14469 and CSA NGV 1, as shown in Table 3

Table 2 — Compatibility of nozzles and receptacles

	←Receptacle→						
Nozzle ↓	H35 Grade D	H35MF Grade D	H70 Grade D	H35 Grade F	H35MF Grade F	H70 Grade F	H35HF* H70HF*
H35 Grade D	O	O	O	O	O	O	X
H35MF Grade D	X	O	X	X	O	X	X
H70 Grade D	X	X	O	X	X	O	X
H35 Grade F	X	X	X	O	O	O	X
H35MF Grade F	X	X	X	X	O	X	X
H70 Grade F	X	X	X	X	X	O	X
H35HF* H70HF*	X	X	X	X	X	X	O

* H35HF and H70HF is mentioned in this document only for reference to future compatibility and will be specified in ISO 17268-2, when published

Key

O: Can connect

X: Cannot connect

Table 3 — Incompatibility of nozzles and receptacles with systems for other gaseous fuels

	←Receptacle→		
Nozzle ↓	ISO 16380	ISO 14469	CSA NGV1
H35 Grade D	X	X	X
H35MF Grade D	X	X	X
H70 Grade D	X	X	X
H35 Grade F	X	X	X
H35MF Grade F	X	X	X
H70 Grade F	X	X	X
H35HF* H70HF*	X	X	X

* H35HF* and H70HF is mentioned in this document only for reference to future compatibility and will be specified in ISO 17268-2, when published

Key

O: Can connect

X: Cannot connect

4.3 Nozzles and receptacles shall be well fitted and manufactured in accordance with good engineering practice.

4.4 Nozzles and receptacles shall be

a) designed to minimise the possibility of incorrect assembly;

b) designed to be secure against displacement, distortion, warping or other damage;

c) constructed to maintain operational integrity under normal and reasonable conditions of handling and usage

d) designed with no self-evident means of defeating the safety features without specialised knowledge and tooling; and

e) designed for use by the general public with minimal training.

4.5 Nozzles and receptacles shall be manufactured of materials suitable and compatible for use with compressed hydrogen at the pressure and the temperature ranges to which they will be subjected as specified in 3.2, 5.9 and 6.9. Materials used in the construction of nozzles, receptacles and protective caps shall be non-sparking or spark-reducing. All pressure bearing and wetted components shall also be made from material that is compatible with deionised water. Non-metallic material compatibility including compatibility of seal materials based on oxygen aging testing (7.14) and hydrogen resistance testing (7.15) for material malfunctions from diffusion and depressurization shall be documented by the component manufacturer or an independent third party.

4.6 The nozzle shall be connected to or disconnected from the receptacle without the use of tools.

4.7 All receptacles shall be mounted on the vehicle in compliance with the envelope requirements specified in Annex A.

4.8 Protective caps are intended to protect the receptacle or nozzle from foreign debris and shall not hold pressure. Resistance shall be appropriate to prevent inadvertent dislodging. All protective caps shall have a retainer to attach them to the receptacle, vehicle, or nozzle.

4.9 Nozzles and receptacles defined in this document can be used to fuel different types of GHLVs. The refuelling stations for these vehicles may have significantly different process limits and refuelling protocols. The nozzle and receptacle alone shall ensure that a GHLV cannot refuel at an incompatible station. If this occurs, the GHLV may be exposed to conditions outside of its intended limits, such as fuel container overheating. If this is a potential problem, the user and station manufacturer should develop additional controls to mitigate this risk.

4.10 As stated in Part I E. 81. (f) (iii) of ECE/TRANS/180/Add. 13/Amend 1 “Assurance of capability to sustain multiple occurrences of over-pressurization due to fuelling station failure is provided by the requirement to demonstrate absence of leak in 10 exposures to 150 per cent NWP fuelling followed by long-term leak-free parking and subsequent fuelling/de-fuelling.” It is presupposed that nozzles and receptacles defined in this document are tested in this way to accommodate similar fuelling station over-pressurization occurrences.

4.11 The maximum volume of air allowed between the receptacle and nozzle after connection shall not exceed the volumes in Table 4.

Table 4 — Maximum volume of air allowed between nozzle and receptacle after connection

Pressure class	Nozzle allowable volume of air (cm^3)	Receptacle allowable volume of air (cm3)
H35	4	4
H35 HF	4	4
H70	2	2