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Gaseous hydrogen — Fuelling stations —

Part 5:

Dispenser hoses and hose assemblies

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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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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, *Hydrogen technologies*.

This second edition cancels and replaces the first edition (ISO 19880-5:2019), which has been technically revised.

The main changes are as follows:

- [subclause 7.2.3](#) revised test gas and pass/fail criteria;
- [subclause 7.7.2](#) revised to add temperature tolerance;
- editorial changes.

A list of all parts in the ISO 19880 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

This document specifies the implementation of performance-based testing for components of dispensing systems and fuelling stations that are based on proven engineering principles, research and the combined expertise of gas utilities, fuel providers, manufacturers, users, and others having specialized experience.

The successful commercialization of hydrogen vehicle technologies requires codes and standards pertaining to fuelling stations, vehicle fuel system components, and the global homologation of standards requirements for technologies with the same end use. Essentially this will allow manufacturers to achieve economies of scale by producing one product for use globally.

International harmonization contributes to reducing technical barriers and stimulates related markets. A series of documents that address hydrogen-fuelled vehicles and fuelling stations is being developed. These documents will provide internationally homologized minimum safety performance criteria at the component level, thus providing a foundation to build a safe “fuelling system”.

This document is based on ANSI/CSA HGV 4.2-2022.

This document was developed based on five pressure classes of wire or textile reinforced hoses and hose assemblies suitable for use with gaseous hydrogen for hydrogen dispensing. This is based on technologies in use at the time of the development of the requirements.

In the future, other types and classes of hoses and hose assemblies will need to be evaluated to determine the suitability of requirements in this document.

This document applies to newly manufactured hoses and hose assemblies for connecting a dispenser to a high-pressure fuelling nozzle.

A nozzle vent hose is included in this document; however, the pressure rating may be lower than the nozzle rating, based on the nozzle and dispenser design.

For general hydrogen safety information, see ISO/TR 15916.

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Gaseous hydrogen — Fuelling stations —

Part 5: Dispenser hoses and hose assemblies

1 Scope

This document specifies the requirements for wire or textile reinforced hoses and hose assemblies suitable for dispensing hydrogen up to 70 MPa nominal working pressure, in the operating temperature range of $-40\text{ }^{\circ}\text{C}$ to $65\text{ }^{\circ}\text{C}$.

This document specifies safety requirements for material, design, manufacture and testing of gaseous hydrogen hose and hose assemblies for hydrogen fuelling stations.

This document does not apply to the following hoses and hose assemblies:

- a) those used as part of a vehicle high pressure on-board fuel storage system;
- b) those used as part of a vehicle low pressure fuel delivery system; and
- c) flexible metal hoses.

NOTE 1 This document was developed primarily for hoses and hose assemblies for dispensing high-pressure hydrogen from refuelling dispensers to hydrogen vehicles. ISO 16964 addresses hoses used to deliver hydrogen from a transportable vessel (e.g. trailer) into a buffer storage of a station.

NOTE 2 Hose assemblies include a hose with connectors on each end (see [Figure 1](#)). Each connector has two basic functional elements that are addressed as described below.

- a) Coupling to hose. This function is defined by requirements and verified (along with the hose itself) by performance-based tests in this document.
- b) Fitting for transition and connection to the piping system or equipment. This function is addressed by reference to appropriate hydrogen equipment standards and piping codes.

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 1402, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing*

ISO 4671, *Rubber and plastics hoses and hose assemblies — Methods of measurement of the dimensions of hoses and the lengths of hose assemblies*

ISO 6802, *Rubber or plastics hoses and hose assemblies — Hydraulic impulse test with flexing*

ISO 6803, *Rubber or plastics hoses and hose assemblies — Hydraulic-pressure impulse test without flexing*

ISO 7326:2016, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions*

ISO 8031:2020, *Rubber and plastics hoses and hose assemblies — Determination of electrical resistance and conductivity*

ISO 8330, *Rubber and plastics hoses and hose assemblies — Vocabulary*

ISO 8331, *Rubber and plastics hoses and hose assemblies — Guidelines for selection, storage, use and maintenance*

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

ISO 15649, *Petroleum and natural gas industries — Piping*

ISO 16964, *Gas cylinders — Flexible hoses assemblies — Specification and testing*

ISO 19880-1, *Gaseous hydrogen — Fuelling stations — Part 1: General requirements*

ISO 30013, *Rubber and plastics hoses — Methods of exposure to laboratory light sources — Determination of changes in colour, appearance and other physical properties*

IEC 60243-1, *Electric strength of insulating materials — Test methods — Part 1: Tests at power frequencies*

IEC 62631-3-1, *Dielectric and resistive properties of solid insulating materials — Part 3-1: Determination of resistive properties (DC methods) — Volume resistance and volume resistivity — General method*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 8330, ISO 19880-1 and the following 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

connector

mating parts that can be put together to form a "connection" which permits the transfer of fluids, electric power, or control signals

Note 1 to entry: *Fittings* (3.4) are a type of connector used in piping systems.

EXAMPLE Connectors commonly used in hydrogen systems are as follows:

- a) The fuelling nozzle "connector" mates with the receptacle "connector" on the vehicle to form the connection for transfer of compressed hydrogen between the dispenser and the vehicle, as defined in ISO 17268 for this specific application.
- b) The hose assemblies have connectors on each end that allow *coupling* (3.2) to the hoses and connection to the piping system (e.g. hose breakaway device or fuelling nozzle).
- c) Control systems often use electrical connectors to allow rapid and secure assembly or replacement.

3.2

connection fitting

connection part consisting of a fitting inserted into a hose and a mechanical joint

3.3

coupling

integrated structure of *nipple* (3.9) and socket with end portion of a hose crimped together

Note 1 to entry: See [Figure 1](#)

3.4

socket shell

portion of a hose fitting that is compressed by swaging or crimping to seat the hose on to the fitting serrations and create a permanent attachment

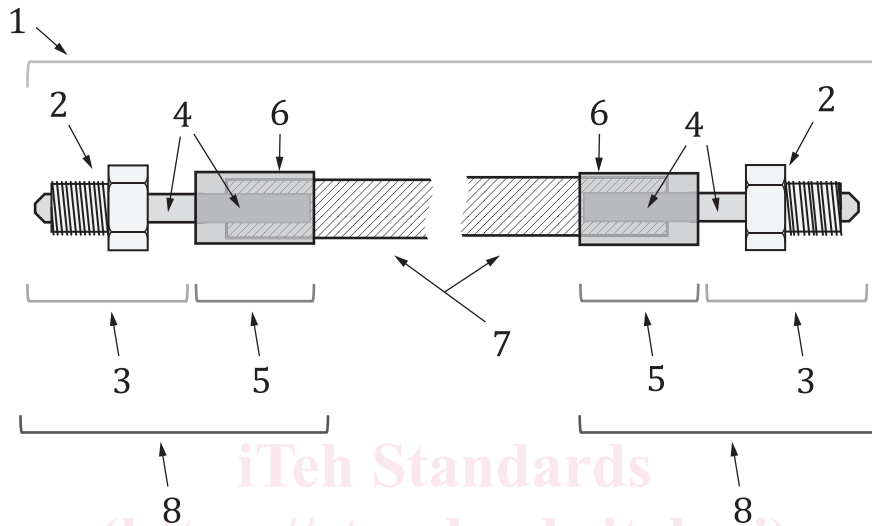
Note 1 to entry: ISO 8330 provides the following names for socket shell: collar and ferrule.

3.5

dispenser hose assembly

hose assembly (3.7) used for dispensing gaseous hydrogen to vehicles through a nozzle

Note 1 to entry: See [Figure 2](#).

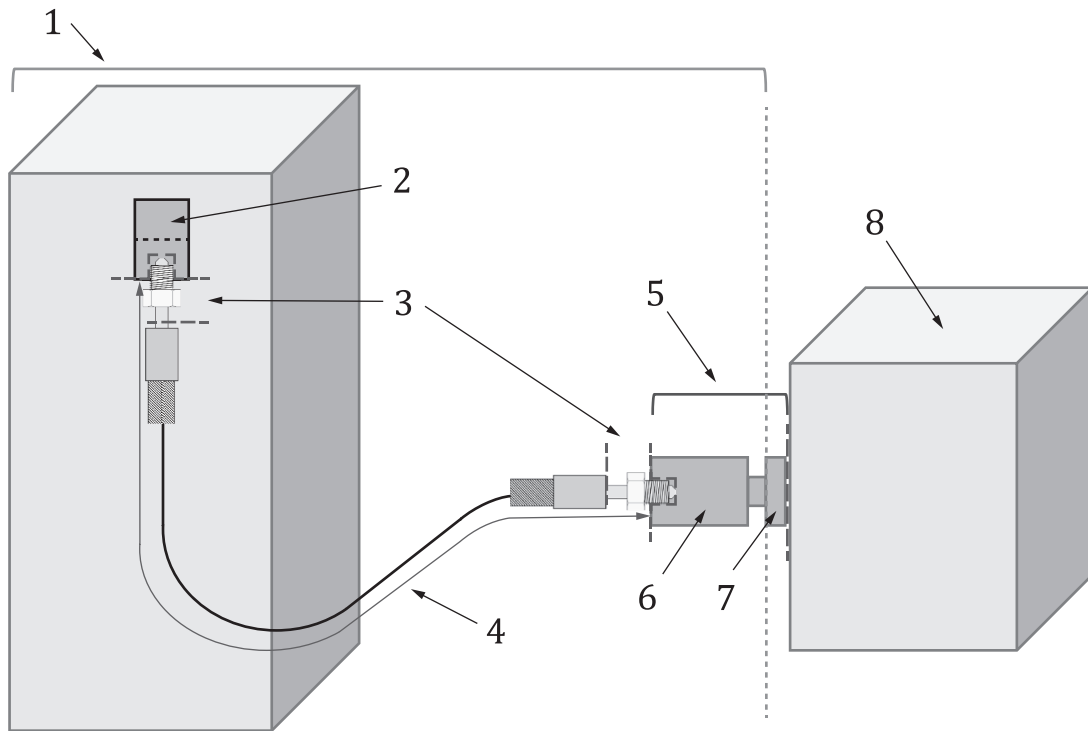


Key

- 1 hose assembly
- 2 mechanical joint
- 3 connection fitting (key 2+ key 4)
- 4 nipple
- 5 coupling (key 4 + key 6)
- 6 socket shell
- 7 hose
- 8 fitting (key 2 + key 4+ key 6)

NOTE Definition of the terms used in the key table and how they are defined under ISO 8330 are explained in [Clause 3](#), terms and definitions.

Figure 1 — Conceptual diagram of hose assembly and fitting



Key

- 1 dispenser
- 2 breakaway device
- 3 *connection fitting*
- 4 *hose assembly*
- 5 *connector*
- 6 nozzle
- 7 receptacle
- 8 vehicle

NOTE Definition of the terms used in the key table are explained in [Clause 3](#).

Figure 2 — Components connecting a dispenser to a vehicle

**3.6
fitting**

connector ([3.1](#)) used to join any pressure retaining components in the system, and in the case of the *hose assembly* ([3.7](#)), device, usually made of metal, attached to the end of a hose to facilitate connection to equipment or other hose

Note 1 to entry: Other hoses are shown in [Figure 1](#).

Note 2 to entry: Fittings can be used in a finished *hose assembly* ([3.7](#)); however; requirements for fittings are out of scope of this document.

**3.7
hose assembly**

assembly which includes the hose and end connections, including any necessary *fittings* ([3.6](#)), bend restrictors, and appropriate markings

3.8

breakaway device

device on the fuelling hose that disconnects the hose from the dispenser when a tension limit is exceeded and blocks the flow of hydrogen from the dispenser

Note 1 to entry: An example application is if the vehicle moves away with the fuelling hose connected to the vehicle.

Note 2 to entry: [Figure 2](#) shows the breakaway device connected directly to the dispenser.

Note 3 to entry: A breakaway device placed between two hose assemblies is called a “hose breakaway device”, which is designed to separate when a given pull force is applied in order to cut off the flow of hydrogen to prevent gas leakage and protect the dispenser from damage from vehicles driving away.

[SOURCE: ISO 19880-1: 2020, 3.5, modified — added Notes 2 and 3 to entry.]

3.9

nipple

section of the fitting that is inserted into the hose

Note 1 to entry: ISO 8330 provides the following names for nipple: spigot, hose nipple, hose fitting stem, insert, hosetail, tail and shank.

3.10

nozzle vent hose

hose used to depressurize the fuelling nozzle and vent the hydrogen to an approved location

Note 1 to entry: See ISO 17268 for type B nozzle definition.

3.11

minimum bend radius

smallest specified radius to which a hose may be bent in service

Note 1 to entry: The minimum bend radius is shown in [Table 3](#).

3.12

pressure rating

maximum pressure at which it is permissible to operate a component as specified by the manufacturer at the maximum temperature expected during service

3.13

proof pressure

pressure applied during a non-destructive test and held for a specified period of time to prove the integrity of the construction

4 Classification

This clause applies to newly manufactured hoses and hose assemblies for dispenser hoses connecting the dispenser to the fuelling nozzle supply port.

This document is intended for new hose and hose assembly designs and existing designs made with new materials. It is not intended for existing hose designs with history of use, hoses made of existing materials with history of use, or hoses qualified by industry-recognized organizations for use in compressed gaseous hydrogen applications.

NOTE The exclusions in this clause do not preclude manufacturers from using this document for certification purposes for existing hoses and hose assemblies with history of use.

Hoses and couplings shall meet the requirements in this document with end fittings selected by the manufacturer, customer, or testing agency as required to connect to the test equipment. Fittings shall be in accordance with the requirements of the appropriate documents in the ISO 19880 series, ISO 17268, or ISO 15649.