DRAFT INTERNATIONAL STANDARD

ISO/DIS 19880-2

ISO/TC **197**

Secretariat: **SCC**

Voting begins on:
2017-06-30

Voting terminates on:
2017-09-21

Gaseous hydrogen — Fueling stations —

Part 2:
Dispensers

Carburant d'hydrogène gazeux — Stations-service —

Partie 2: Titre manque

ICS: 43.060.40; 71.100.20

This document is circulated as received from the committee secretariat.

Reference number
ISO/DIS 19880-2:2017(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

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).

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 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 197, Hydrogen technologies.

This document was developed using the CSA Standards mentioned in the Bibliography under a Copyright License Agreement between CSA Group and ISO.

A list of all parts in the ISO 19880- series can be found on the ISO website.

Introduction

The purpose of this International Standard is to promote the implementation of hydrogen powered land vehicles through the creation of performance based safety and testing requirements for compressed hydrogen fuel dispensers. The successful commercialization of hydrogen land vehicle technologies requires codes and standards pertaining to fueling stations, 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 International Standard is a part of the series of ISO standards for hydrogen fueling stations with its scope limited to compressed hydrogen dispensers for land vehicles that use hydrogen as fuel. Dispensers are a major component of hydrogen fueling stations, without which hydrogen vehicles will not become a significant element of mobility in the future. This Standard includes requirements for manufacture, commissioning and routine maintenance of dispensers in order to assure the safe operation of dispensing hydrogen to vehicles.

Gaseous hydrogen — Fueling stations —

Part 2:
Dispensers

1 Scope

This standard provides the safety requirements and test methods for complete compressed hydrogen dispensers with dispensing pressures up to the H70 pressure class designation. A typical hydrogen dispenser is illustrated in Figure 1 as installed and fueling a vehicle.

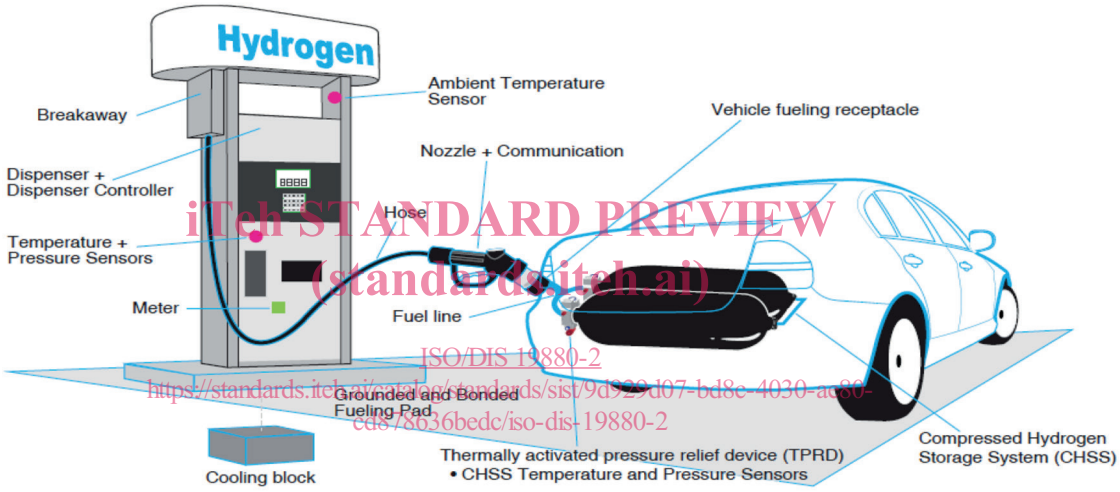

Figure1 — Typical compressed hydrogen dispenser

The process diagram in Figure 2 shows components in the dispenser typically required to meet the dispensing functionality and safety requirements. The actual process configuration and equipment selections may be different, but ultimately the requirements defined by this document need to be met by the dispensing system. Additionally, not all equipment has to be physically housed within the enclosure-at the dispensing area as long as the specification of component design or type and location are adequate to ensure that the overall process meets requirements in this standard.

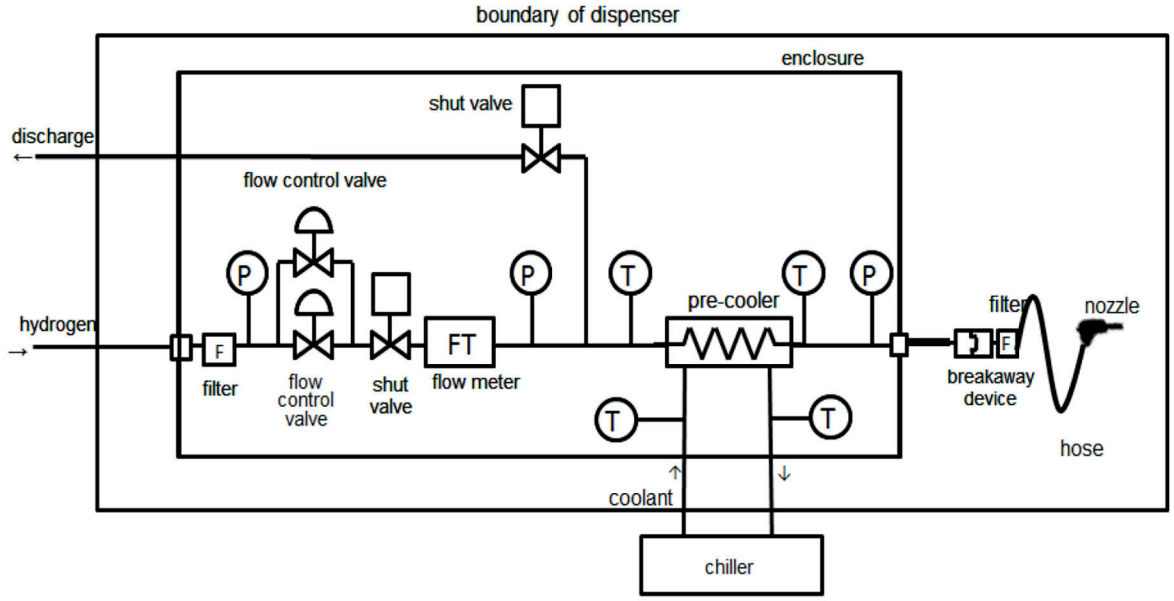

Figure 2 — Example of a dispenser system

This document provides the requirements for hydrogen dispensers and may provide specific references to other standards for individual components included in the hydrogen dispenser such as valves (ISO 19880-3) and hoses (ISO 19880-3).

This document addresses the general requirements of the fueling protocol and directs the user to ISO 19880-1 for additional requirements and the test methods required to verify proper fueling protocol implementation.

This document does not address the accuracy of flow meters that may be used to meter dispensed fuel.

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.

IEC 61511-1, *Functional safety — Safety instrumented systems for the process industry sector — Part 1: Framework, definitions, system, hardware and software requirements*

ISO 13849, *Safety of machinery — Safety-related parts of control systems*

IEC 60204-1, *Safety of machinery — Electrical equipment of machines — Part 1: General Requirements*

IEC 60364, *Electrical installations for buildings*

IEC 60079, *Explosive atmospheres*

ISO 13849-2:2012, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation*

ISO 14687-2, *Hydrogen fuel — Product specification — Part 2: Proton exchange membrane (PEM) fuel cell applications for road vehicles*

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

ISO 17268, *Gaseous hydrogen land vehicle refueling connection devices*

ISO 19880-1[1)], *Gaseous hydrogen — Fueling stations — Part 1: General requirements*

ISO 19880-3[2)], *Gaseous hydrogen — Fueling stations — Part 3: Valves*

ISO 19880-5[3)], *Gaseous hydrogen — Fueling stations — Part 5: Fueling station hoses*

ISO 19880-6, *Gaseous hydrogen — Fueling stations — Part: 6 Fittings*

SAE J2601[4)], *Fueling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles*

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 http://www.iso.org/obp

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

3.1
automatic valve
valve that is self-actuated or remotely actuated by a control device

3.2
breakaway device
component installed upstream of the nozzle to shut off gas flow in the event of vehicle driving away while still connected to the dispenser

3.3
component pressure rating
maximum allowable 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 Pressure under the European Pressure Equipment Directive have their component ratings by the manufacturer indicated by the value of "PS".

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

3.4
control system
system which responds to input signals from the process and/or from an operator and generates output signals causing the process to operate in the desired manner

3.5
Cv value (flow coefficient)
coefficient to represent the flow rate of fluid that a valve is capable of handling

Note 1 to entry: Cv is the flow coefficient of a valve with the fluid at 15,56 °C under a pressure difference of 703 kg/m^2.

Note 2 to entry: There are different types of flow coefficients including Cv, Kv and Av.

1) Under preparation. (Stage at the time of publication ISO/XXX 19880-1.)

2) Under preparation. (Stage at the time of publication ISO/XXX 19880-3.)

3) Under preparation. (Stage at the time of publication ISO/XXX 19880-5.)

4) Under preparation. (Stage at the time of publication ISO/XXX 19880-6.)

3.6
dispenser
parts of the pressurized-gas fueling station via which the pressurized gas is dispensed to vehicles

Note 1 to entry: As an example, the dispenser may include a dispenser housing, gas flow meter, a fueling hose and fueling nozzle attachments.

3.7
dispensing system
system, downstream of the hydrogen storage, comprising all equipment necessary to carry out the vehicle fueling and protect against dispensing faults

3.8
emergency shutdown system (ESS)
system which responds to automatic and/or manually activated emergency shutdown devices to stop hazardous movements and operations such as the flow of hydrogen gas to the dispenser and vehicle

3.0
E-Stop
device for manually activating the ESS

3.10
enclosure
protective housing that may enclose, or partially enclose, equipment such as compressors, valve manifolds, compressed hydrogen storage systems in order to protect equipment from the environment, provide noise attenuation, or provide safety barrier to the areas surrounding the equipment

Note 1 to entry: In this standard the enclosure of the dispenser is defined as a "housing."

Note 2 to entry: Some hydrogen station manufacturers may build an all-in-one fueling station where the dispenser components are built into one side or end of the equipment enclosure without using a separate dispenser housing.

3.11
fitting
connector used in joining piping, tubing, or components for internal fluid transfer

3.12
fueling assembly
part of the dispenser providing the interface between the hydrogen fueling station and the vehicle - an assembly consisting of a breakaway device, a hose(s), a nozzle and connectors between these components

3.13
fueling station
facility for the dispensing of compressed hydrogen, which includes all stationary equipment that supplies, compresses, stores, and dispenses gaseous hydrogen to fuel a land vehicle

3.14
fueling hose
flexible conduit used for dispensing gaseous hydrogen to vehicles through a fueling nozzle

3.15
housing
protective structure that encloses process piping and may also enclose measurement, control and ancillary dispenser equipment including point of sale and user authorization interface

Note 1 to entry: Housing may be synonymous with: enclosure, cabinet, or frame.

3.16
hydrogen service level (HSL)
pressure level in MPa used to characterize the hydrogen service of the dispenser based on the NWP rating of the vehicle

Note 1 to entry: The numerical value of HSL also matches the number after the "H" in Pressure Class. See the definition of Pressure Class for further discussion.

3.17
manufacturer
person or organization responsible for the design and fabrication of the equipment and components

3.18
maximum allowable working pressure (MAWP)
maximum pressure that a component may experience in service, including upset conditions, independent of temperature, before initiating mitigation options, which is typically the basis for the set point of the pressure relief device protecting the vessel or piping system

Note 1 to entry: The maximum allowable working pressure may 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.

Note 2 to entry: For further guidance on pressure terminology, refer to Annex D of ISO/TR 19880-1.

3.19
nominal working pressure (NWP)
pressure to which a full vehicle tank (that is being fueled by the dispenser) settles at a temperature of 15 ºC

Note 1 to entry: For further guidance on pressure terminology and associated equipment ratings, refer to Annex D of ISO/TR 19880-1.

3.20
nozzle
device connected to a fuel dispensing system, which permits the quick connect and disconnect of fuel supply to the receptacle of the vehicle or storage system

[SOURCE: ISO 17268]

3.21
pressure class
non-dimensional rating for hydrogen vehicle fueling interface hardware that defines the operational pressure limits of a dispenser service (nozzle)

Note 1 to entry: Values are based on achieving the MOP needed to fill the CHSS of the hydrogen vehicle over the full range of operating conditions. See ISO 19880-1 for background and guidance.

Table 1 — Pressure levels for various pressure classes of hydrogen systems

Hydrogen Service Level (HSL)	Pressure Class	Maximum Operating Pressure (MOP)	Dispenser Maximum Allowable Working Pressure (MAWP) Minimum dispenser component rating (PS)
Equal to NWP of vehicle being fueled		1,25xHSL Highest pressure during normal fueling	1,38xHSL Highest permissible set point for dispenser pressure protection in 4.5
25 MPa	H25	31,25 MPa	34,375 MPa
35 MPa	H35	43,75 MPa	48,125 MPa
50 MPa	H50	62,5 MPa	68,75MPa
70 MPa	H70	87,5 MPa	96,25MPa

3.22
pressure safety-relief valve (PSV)
pressure-activated valve that opens at a specified set point to protect a system from overpressure and re-closes when the pressure falls below the set point

Note 1 to entry: Pressure safety-relief valves are also known as pressure safety valves (PSVs) and pressure relief valves (PRVs), but the latter term often leads to confusions with pressure regulating valves, also abbreviated PRVs.

3.23
receptacle
device on the vehicle that receives the nozzle for fueling

3.24
risk assessment
determination of quantitative or qualitative value of risk related to a specific situation, recognized threats (also called hazards) and the layers of protection provided by the system design.

3.25
safety function
function to be implemented by a control system or safety-instrumented system, which is intended to achieve or maintain a safe state for the process, with respect to a specific hazardous situation

3.26
state of charge (SOC)
ratio of hydrogen density to the density at the maximum operating pressure rated at the standard temperature 15 °C in a compressed hydrogen storage system (CHSS)

Note 1 to entry: SOC is expressed as a percentage and is computed based on the gas density as per formula below:

$$SOX(\%) = \frac{\rho(P,T)}{\rho(NWP,15°C)} \times 100 \qquad \text{(Eq. 1)}$$

Hydrogen densities of CHSS at the two major nominal working pressures are respectively:

At 35 MPa and 15 ºC = 24,0 g/L

At 70 MPa and 15 ºC = 40,2 g/L

.