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Gaseous ~~Hydrogen~~ hydrogen — Fuelling stations —

Part 2:
Dispensers and dispensing systems

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Foreword

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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~~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*.

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.

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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 safety and testing requirements for compressed hydrogen fuel dispensers. The successful commercialization of hydrogen land 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. This will allow manufacturers to achieve economies of scale in production through the ability to manufacture one product for global use.

This document is a part of the ISO 19880 series for hydrogen fuelling stations with its scope limited to compressed hydrogen dispensers for land vehicles that use hydrogen as fuel. Dispensers are a major component of hydrogen fuelling stations, without which hydrogen vehicles will not become a significant element of mobility in the future. This document includes requirements for manufacture, commissioning and routine maintenance of dispensers in order to ensure the safe operation of dispensing hydrogen to vehicles.

Note ~~Annex A~~Annex A has additional information about the range of options for dispenser systems.

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Part 2:
Dispensers and dispensing systems

1 Scope

This document ~~describes the~~specifies safety requirements and test methods for the components and systems that enable the transfer of compressed hydrogen to a hydrogen vehicle, as addressed in ISO 19880-1, by a hydrogen dispenser with dispensing pressures up to the H70 pressure class designation.

This document ~~is intended~~applies to ~~cover~~ a hydrogen dispensing system, referred to as a "dispenser"~~,~~: the configuration of ~~which~~the dispenser can range from~~:~~

a) a dispenser cabinet, located in the fuelling area, that can perform all of the functionality needed to deliver hydrogen to a vehicle, to ~~:~~

b) a minimum set of components mounted in or on (as applicable) a dispenser cabinet or other supporting structure as appropriate, with the remaining functionality provided elsewhere in the hydrogen fuelling station.

A dispensing system includes the user and vehicle interface and ~~may~~can include components starting from the hydrogen supply, such as a connection to the banking system, a cooling unit, a dispenser control system, a flow meter, a pressure sensor, a fuel temperature sensor, an ambient temperature sensor, user interface and a fuelling hose assembly. Not all dispensing system 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 the requirements in this document.

This document ~~provides~~specifies the requirements for hydrogen dispensers and can provide specific references to other standards for individual components included in the hydrogen dispenser, such as valves (ISO 19880-3) and hoses (ISO 19880-5).

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

This document does not ~~address~~specify the accuracy of flow meters that can 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.

ISO 3601-1, *Fluid power systems — O-rings — Part 1: Inside diameters, cross-sections, tolerances and designation codes*

ISO 3601-2, *Fluid power systems — O-rings — Part 2: Housing dimensions for general applications*

ISO 3601-3, *Fluid power systems — O-rings — Part 3: Quality acceptance criteria*

ISO- 3864-2, *Graphical symbols – — Safety colours and safety signs – — Part 2: Design principles for product safety labels*

ISO- 4126 (all parts), *Safety devices for protection against excessive pressure*

ISO– 80079-36, ~~*Non-electrical equipment for explosive*~~*Explosive atmospheres ~~— Basic method and requirements~~*

~~ISO 80079-37, — Part 36:~~ *Non-electrical equipment for explosive atmospheres ~~–~~— Basic method and requirements*

ISO 80079-37, *Explosive atmospheres — Part 37: Non-electrical equipment for explosive atmospheres — Non-electrical type of protection constructional safety ~~"c",~~"c", control of ignition sources ~~"b",~~"b", liquid immersion ~~"k"~~"k"*

ISO 14687, *Hydrogen fuel quality – Product specification*-

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

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

ISO 19880-1:2020, *Gaseous hydrogen – — Fuelling stations – — Part 1: General requirements*

ISO 19880-3, *Gaseous hydrogen – — Fuelling stations – — Part 3: Valves*

ISO 19880-5, *Gaseous hydrogen – Fuelling stations – Part 5: Dispenser hoses and hose assemblies*

~~ISO 19880-8, *Gaseous hydrogen – Fuelling stations – Hydrogen fuelling quality*~~

IEC 60079 (all parts), *Explosive atmospheres*

IEC 60204-1, *Safety of machinery – Electrical equipment of machines – Part 1: General requirements*

IEC 60364, *Low-voltage electrical installations*

IEC- 60529, *Degrees of protection provided by enclosures (IP Code)*

SAE J2600, *Compressed Hydrogen Surface Vehicle Fuelling Connection Devices*

SAE J2601, *Fuelling 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~~terminology databases for use in standardization at the following addresses:

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

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

3.1
breakaway device
device on the *fuelling hose* ~~(3.11)~~(3.11) that disconnects the hose from the *dispenser* ~~(3.5)~~(3.5) when a tension limit is exceeded and blocks the flow of hydrogen from the *dispenser* ~~(3.5),~~(3.5), e.g. if the vehicle moves away with the *fuelling hose* ~~(3.11)~~(3.11) connected to the vehicle

[SOURCE: ISO 19880-1:2020, 3.50]

3.2
component pressure rating
maximum pressure at which it is permissible to operate a component as specified by the *manufacturer* ~~(3.15)~~(3.15) at a specified temperature

Note 1 to entry: Components designed with a maximum allowable pressure per the European PED represent the component pressure rating by the *manufacturer* ~~(3.15)~~(3.15) as indicated by the value of "PS".

Note 2 to entry: See Annex E of ISO 19880-1 for discussion of pressure terminology and its application to *dispensing systems* (~~3.6).~~3.6).

Note 3 to entry: Unless otherwise specified, the pressure in this document is expressed in gauge pressure.

[SOURCE: ISO 19880-1:2020, 3.10 modified – Notes 2 to 4 to entry deleted with Note 5 ~~adopted~~to entry of the source definition renumbered as Note 2~~]~~ to entry.]

3.3
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

[SOURCE: ISO 19880-1:2020, 3.11 modified – Note 1 to entry deleted~~]~~.]

3.4
~~-~~flow coefficient
~~-~~C_v
coefficient to represent the flow rate of fluid that a *valve* ~~(3.28)~~(3.28) is capable of handling

Note 1 to entry: C_v is the flow coefficient of a *valve* ~~(3.28)~~(3.28) with the fluid at 15,56 °C under a pressure difference of ~~6~~ 6 894 N/m² (= Pa)

3.5
dispenser
equipment in the *dispensing system* (~~3.6),~~3.6), including the dispenser cabinet(s) and supporting structure, that is physically located in the fuelling area

Note 1 to entry: The hydrogen dispenser typically includes, as a minimum, the *fuelling assembly* (~~3.10),~~3.10), required temperature and pressure instrumentation, filters and the user interface to conduct vehicle fuelling.

Note 2 to entry: The *manufacturer* (~~3.15)~~3.15) of the hydrogen dispenser can elect to include additional equipment in the dispenser, including the possibility of all equipment in the *dispensing system* (~~3.6).~~3.6).

[SOURCE: ISO 19880-1:2020, 3.13]

3.6
dispensing system
system downstream of the hydrogen supply system comprising all equipment necessary to carry out the vehicle fuelling operation, through which the compressed hydrogen is supplied to the vehicle

[SOURCE: ISO 19880-1:2020, 3.17]

3.7
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* (~~3.5)~~3.5) and vehicle

3.8
enclosure
structure, *protective housing* ~~(3.13),~~(3.13), container, machine cabinet, etc., which encloses or partially encloses equipment of a station that may have access for maintenance but is not intended to be occupied

Note 1 to entry: In this document the enclosure of the *dispenser* (~~3.5)~~3.5) is defined as a "dispenser cabinet".

Note 2 to entry: Some hydrogen station *manufacturers* ~~(3.15)~~(3.15) may build an all-in-one *fuelling station* ~~(3.12)~~(3.12) where the dispenser components are built into one side or end of the equipment enclosure without using a separate dispenser cabinet.

Note 3 to entry: The use of an enclosure could be to protect equipment from the environment, provide noise attenuation or provide safety to the areas surrounding the equipment.

[SOURCE: ISO 19880-1:2020, 3.18 modified – Notes 1 and 2 to entry are newly inserted ~~with,~~ the original Note 1 ~~made~~to entry is renumbered as Note 3 to entry and the original Note 2 to entry deleted~~].~~]

3.9
fitting
part or design feature on a component used to join (i.e., connect) any pressure-retaining components in the system

[SOURCE: ISO 19880-1:2020, 3.24]

3.10
fuelling assembly
part of the *dispenser* (~~3.5)~~3.5) providing the interface between the hydrogen *fuelling station* (~~3.12)~~3.12) and the vehicle — an assembly consisting of a *breakaway device* (~~3.1),~~3.1), a hose(s), a *nozzle* (~~3.19)~~3.19) and connections between these components

Note 1 to entry: The fuelling assembly can include, or not include, a nozzle vent line (with hose *breakaway device* ~~(3.1)~~(3.1) and hose) depending on the type of *nozzle* (~~3.19),~~3.19), and communications, if used.

[SOURCE: ISO 19880-1:2020, 3.26]

3.11
fuelling hose
flexible conduit used for dispensing gaseous hydrogen to vehicles through a fuelling *nozzle* (3.19)

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[SOURCE: ISO 19880-1:2020, 3.27]

3.12
fuelling station
facility for the dispensing of compressed hydrogen vehicle fuel, often referred to as a hydrogen refuelling station (HRS) or hydrogen filling station, including the supply of hydrogen, and hydrogen compression, storage and *dispensing systems* (~~3.6)~~3.6)

[SOURCE: ISO 19880-1:2020, 3.29]

3.13
housing
guard or *enclosure* (~~3.8)~~3.8) for operating parts, control mechanisms, or other components, that need not be accessible during normal operation

Note 1 to entry: Housing may be synonymous with: *enclosure* (~~3.8),~~3.8), cabinet or frame.

[SOURCE: ISO 19880-1:2020, 3.40 ~~modified~~]

3.14
hydrogen service level
HSL
pressure level in MPa used to characterize the hydrogen service of the *dispensing system* (~~3.6)~~3.6) 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* ~~(3.20)~~(3.20) (see Table 1 in ISO 19880-1).

Note 2 to entry: See Annex E of ISO 19880-1 for application of pressure terminology to hydrogen-dispensing systems and vehicles.

[SOURCE: ISO 19880-1:2020, 3.42 ~~modified~~]

3.15
manufacturer
person or organization responsible for the design and manufacturer of the equipment and components

3.16
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.

Note 2 to entry: See Annex E of ISO 19880-1 for a discussion of pressure terminology and the application to *dispensing systems* (3.6) and *fuelling stations* (3.12) in general.

[SOURCE: ISO 19880-1:2020, 3.45]

3.17
maximum operating pressure
MOP
highest pressure that is expected for a component or system during normal operation, including ~~Note 2 to entry: See Annex~~ anticipated transients

Note 1 to entry: In the case of the *dispensing system* (3.6), the MOP is equivalent to the maximum fuelling pressure of the vehicle.

Note 2 to entry: See Annex E of ISO 19880-1 for a discussion of pressure terminology and the application to *dispensing systems* (~~3.6)~~3.6) and *fuelling stations* (~~3.12)~~3.12) in general.

~~[SOURCE: ISO 19880-1:2020, 3.45 modified]~~

~~3.17~~

~~maximum operating pressure~~
~~MOP~~
~~highest pressure that is expected for a component or system during normal operation, including anticipated transients~~

~~Note 1 to entry: In the case of the *dispensing system* (3.6), the MOP is equivalent to the maximum fuelling pressure of the vehicle.~~

~~Note 2 to entry: See Annex E of ISO 19880-1 for a discussion of pressure terminology and the application to *dispensing systems* (3.6) and *fuelling stations* (3.12) in general.~~

[SOURCE: ISO 19880-1:2020, 3.47 ~~modified~~]

3.18
nominal working pressure
NWP
pressure of a vehicle compressed hydrogen storage system (CHSS) at 100 % *SOC* (~~3.27~~3.27) at a gas temperature of 15 °C

Note 1 to entry: For further guidance on pressure terminology and associated equipment ratings, see Annex E of ISO 19880-1.

[SOURCE: ISO 19880-1:2020, 3.51 modified – Notes 1 to 4 to entry deleted and new Note 1 to entry inserted~~].~~]

3.19
nozzle
device connected to a fuel *dispensing system* (~~3.6~~)3.6) which permits the quick connect and disconnect of fuel supply to the *receptacle* ~~(3.22)~~(3.22) of the vehicle or storage system

[SOURCE: ISO 17268: 2012, 3.11]

3.20
pressure class
non-dimensional rating of components designed to dispense hydrogen to road vehicles at the required pressure

Note 1 to entry: The numbers following "H" in the pressure class are numerically the same as HSL, but the HSL identifies only the level of the dispensing service whereas the pressure class designation shows that the component is fully capable of meeting the pressure and temperature requirements for dispensing hydrogen at the indicated service level.

Note 2 to entry: See Annex E of ISO 19880-1 for a discussion of pressure terminology and its application to *dispensing systems* (~~3.6~~)3.6) and *fuelling stations* (~~3.13~~)3.13) in general.

[SOURCE: ISO 19880-1:2020, 3.58 modified – Note 3 to entry deleted]

3.21
pressure relief device
PRD
safety device that releases gases or liquids above a specified pressure value in cases of emergency or abnormal conditions

Note 1 to entry: PRDs can be activated by pressure or another parameter, such as temperature, and can be either re-closing devices (such as *valves* ~~(3.28)~~(3.28)) or non-re-closing devices (such as rupture disks and fusible plugs). Common designations for these specific types of PRDs are as follows:

