TECHNICAL SPECIFICATION

ISO/TS 19880-1

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Gaseous hydrogen — Fuelling stations —

Part 1: General requirements

Carburant d'hydrogène gazeux — Stations-service —

Partie 1: Exigences générales

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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 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 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: Foreword – Supplementary information.

The committee responsible for this document is ISO/TC 197, *Hydrogen technologies*.

ISO/TS 19880-1 has been prepared with the ultimate goal of developing an International Standard and it replaces ISO/TS 20100:2008, on the same subject, which was withdrawn in 2015.

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

Gaseous hydrogen — Fuelling stations —

Part 1: General requirements

1 Scope

This document recommends the minimum design characteristics for safety and, where appropriate, for performance of public and non-public fuelling stations that dispense gaseous hydrogen to light duty land vehicles (e.g. Fuel Cell Electric Vehicles).

NOTE These recommendations are in addition to applicable national regulations and codes, which can prohibit certain aspects of this document.

This document is applicable to fuelling for light duty hydrogen land vehicles, but it can also be used as guidance for fuelling buses, trams, motorcycles and fork-lift truck applications, with hydrogen storage capacities outside of current published fuelling protocol standards, such as SAE J2601.

Residential applications to fuel land vehicles and non-public demonstration fuelling stations are not included in this Technical Specification.

This Technical Specification provides guidance on the following elements of a fuelling station (see Figure 1 and Figure 2):

- hydrogen production/delivery system
  - delivery of hydrogen by pipeline, trucked in gaseous and/or liquid hydrogen, or metal hydride storage trailers;
  - on-site hydrogen generators using water electrolysis process or hydrogen generators using fuel processing technologies;
  - liquid hydrogen storage;
  - hydrogen purification systems, as applicable;
- compression
  - gaseous hydrogen compression;
  - pumps and vaporizers;
- gaseous hydrogen buffer storage;
- pre-cooling device;
- gaseous hydrogen dispensers.

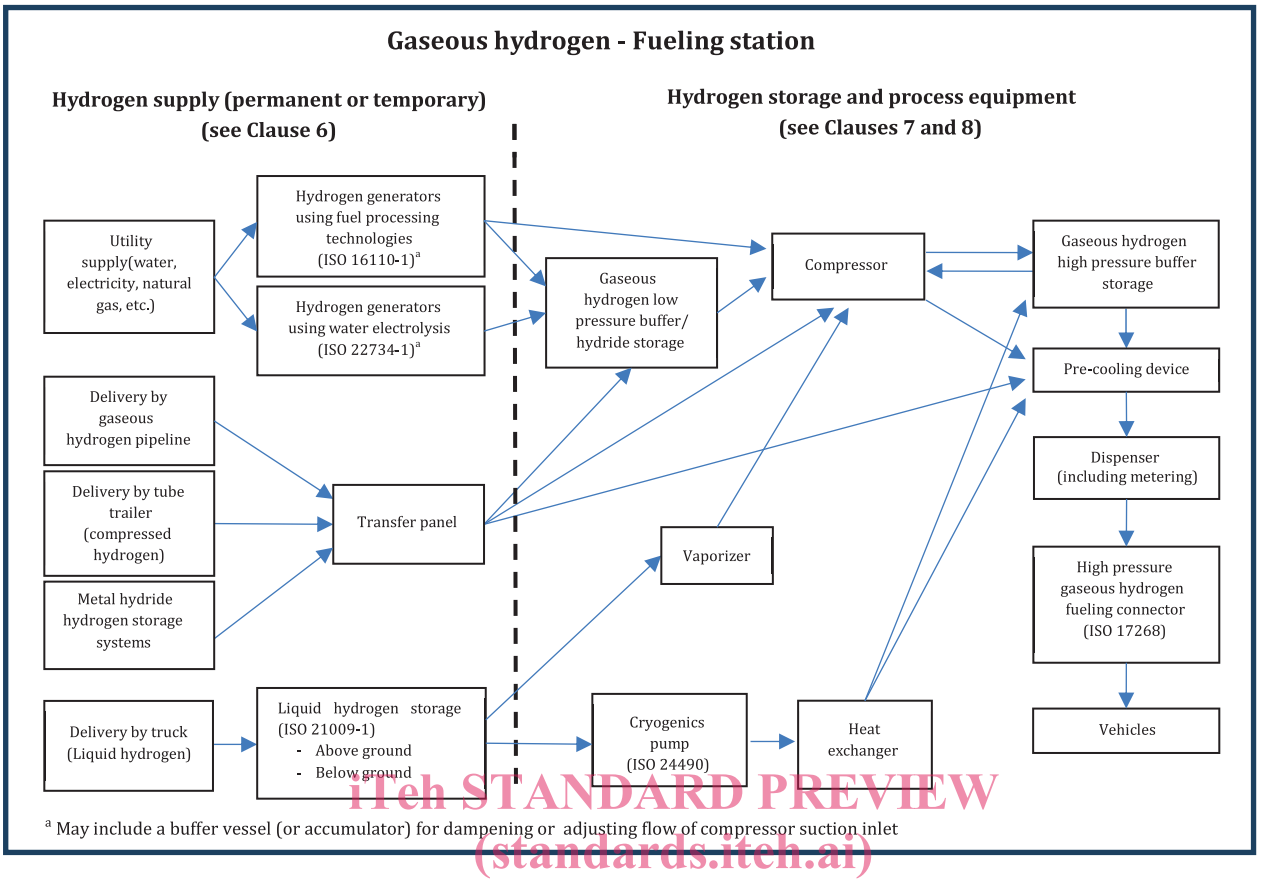

Figure 1 — Example of typical elements in a hydrogen fuelling station, including the hydrogen supply

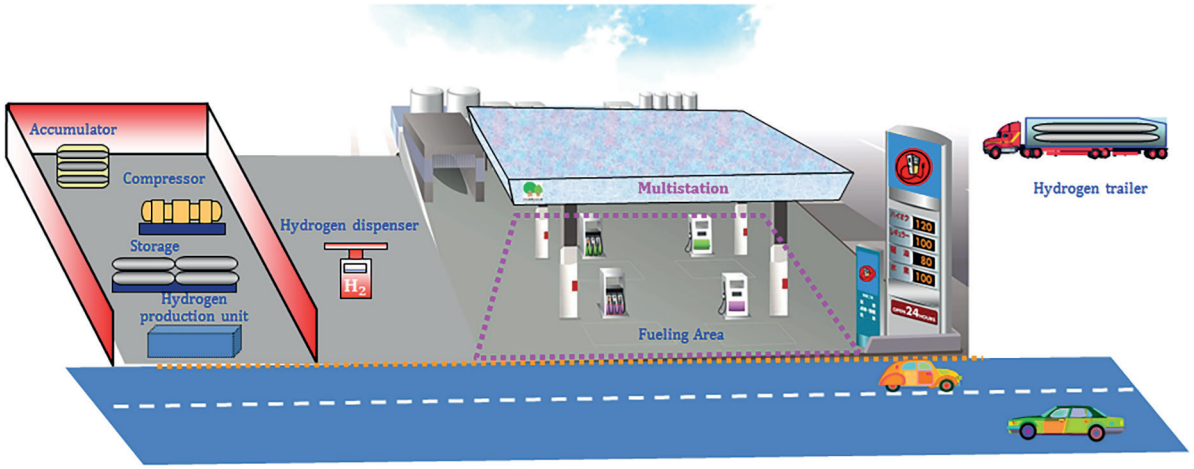

Figure 2 — Image of an example hydrogen fuelling station

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

There are no normative references in this document.

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:

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

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

3.1
accessory
device with an operational function

3.2
authority having jurisdiction
AHJ
organization, office or individual responsible for approving a facility along with an equipment, an installation or a procedure

3.3
bleed venting
expiration or inspiration of air or gas from, or to, one side of a diaphragm of any accessory, component, or equipment such as a valve, pressure regulator or switch

3.4
breakaway device
device installed on a dispensing hose that separates when a given pull force is applied and closes the flow of hydrogen to prevent gas leakage and protect the dispenser from damage from vehicles driving away

3.5
buffer storage tanks
pressurized tanks, which can be located between a hydrogen generator and a compressor for an even flow of gas to the compressor or between the compressor and dispenser for accumulation of pressurized gas supply for vehicle fuelling

3.6
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

Note 1 to entry: A separate safety instrumented system (SIS), typically with a greater reliability than the more basic process control system (BPCS), may be required, according to the manufacturer's risk assessment, to respond solely to safety critical alarms. Further information is provided in IEC 61508 and 61511.

3.7
connector
joined assembly of nozzle and receptacle which permits the transfer of hydrogen

[SOURCE: ISO 17268:2012, 3.1]

3.8
dispenser
parts of the pressurised-gas fuelling station via which the pressurised gas is dispensed to vehicles

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

3.9
dispenser cabinet
protective housing that encloses process piping and may also enclose measurement, control and ancillary dispenser equipment

3.10
dispensing system
system comprising all equipment necessary to carry out the vehicle fuelling operation, downstream of the hydrogen supply system

3.11
enclosure
protective housing that may enclose, or partially enclose, equipment in order to protect it from the environment, provide noise attenuation, or provide safety to the areas surrounding the equipment

3.12
frequency
rate of occurrence of events, e.g., how many time the event occurs in a specified time or number of opportunities

3.13
fail-safe
design feature that ensures that safe operating conditions are maintained in the event of a malfunction of control devices or an interruption of a supply source

3.14
fitting
connector used to join any pressure retaining components in the system

3.15
forecourt
surfaced area where vehicle dispensing operations are conducted including the fuelling pad and any area underneath a canopy

3.16
fuel temperature
temperature of the hydrogen fuel, measured less than 1 m upstream of the dispenser hose breakaway

3.17
fuelling assembly
part of the dispenser providing the interface between the hydrogen fuelling station and the vehicle - an assembly consisting of a breakaway device, a hose(s), a nozzle and connectors between these components

3.18
fuelling hose
flexible conduit used for dispensing gaseous hydrogen to vehicles through a fuelling nozzle

3.19
fuelling pad
area adjacent to the hydrogen dispensers, where customers park their vehicles for fuelling

3.20
fuelling station
facility for the dispensing of compressed hydrogen vehicle fuel, often referred to as a hydrogen fuelling station (HRS) or hydrogen filling station, including the supply of hydrogen, and hydrogen compression, storage and dispensing systems

3.21
standalone
independent facility for the dispensing of compressed hydrogen only

Note 1 to entry: This is a type of *fuelling station* (3.20).

3.22
integrated
facility for the dispensing of compressed hydrogen integrated into an existing, or new build, conventional fuelling station

Note 1 to entry: This is a type of *fuelling station* (3.20).

3.23
fuelling station operator
person or organisation responsible for the safe operation, maintenance and housekeeping of the fuelling station

3.24
guard
part of a machine specially used to provide protection by means of a physical barrier

Note 1 to entry: Depending on its construction, a guard may be called casing, cover, screen, door, enclosed guard, etc.

3.25
harm
physical injury or damage to the health of people, or damage to property or the environment

[SOURCE: ISO/IEC Guide 51:2014, 3.1]

3.26
harmonised standard
European standard developed by a recognised European Standards Organisation (CEN, CENELEC, or ETSI), in line with a European Directive

Note 1 to entry: harmonized standards are created following a request from the European Commission to one of these organisations. Manufacturers, other economic operators, or conformity assessment bodies can use harmonised standards to demonstrate that products, services, or processes comply with relevant EU legislation.

3.27
hazard
potential source of harm

[SOURCE: ISO/IEC Guide 51: 2014, 3.2]

3.28
hose assembly
includes the hose, appropriate end connectors (couplings or fittings), bend restrictors (if necessary), and appropriate markings

3.29
housing
section of a system that encloses, and is intended to protect, operating parts, control mechanisms, or other components that need not be accessible during normal operation

3.30
hydrogen purifier
equipment to remove undesired constituents from the hydrogen

Note 1 to entry: Hydrogen purifiers may comprise purification vessels, dryers, filters and separators.

3.31
incident
any unplanned event that resulted in injury or ill health of people, or damage or loss to property, plant, materials or the environment or a loss of business opportunity

Note 1 to entry: The use of the term incident is intended to include the term accident.

3.32
maximum allowable working pressure
MAWP
maximum pressure that a component may experience in service, including upset conditions, independent of temperature, before initiating mitigation options, 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: Further guidance on pressure terminology is included in Annex D.

3.33
maximum operating pressure
MOP
highest pressure that is expected for a component or system during normal operation

Note 1 to entry: This is the pressure from which hydrogen at a temperature of 85 °C would settle at the NWP at a temperature of 15 °C.

Note 2 to entry: Further guidance on pressure terminology is included in Annex D.

3.34
mechanically actuating safety equipment
mechanically actuating equipment that prevents the fuelling station operation outside specified acceptable maximum or minimum operating pressures or that prevents a gas leakage in the event of an incident

3.35
mitigation
combination of the measures incorporated at the design stage, and those measures required to be implemented by the station operator, dispenser operator, or others involved with the operation and maintenance of the fuelling station

3.36
multiple-element gas container
MEGC
multimodal assembly of cylinders, tubes or bundles of cylinders which are interconnected by a manifold and assembled within a framework, including service equipment and structural equipment necessary for the transport of gases

Note 1 to entry: This definition is taken from the UN Model Regulations. ADR uses a different definition.

[SOURCE: ISO 10286:2015, 2.2.1]

3.37
nominal working pressure
NWP
pressure for which the dispenser is intended to be operated for a given gas temperature of 15 °C

Note 1 to entry: This defines a full vehicle tank gas density, of either 35 MPa or 70 MPa at 15 °C.

Note 2 to entry: Further guidance on pressure terminology is included in Annex D.

3.38
non-public fuelling station
fuelling station (3.20)that does not sell or dispense gaseous hydrogen to the general public

EXAMPLE private or municipal vehicle fleet operation

3.39
nozzle
device connected to a fuel dispensing system, which permits the quick connect and disconnect of fuel supply to the vehicle or storage system

[SOURCE: ISO 17268:2012, 3.8]

3.40
outdoors
location outside of any building or structure, or locations under a roof, weather shelter or canopy provided this area is not enclosed on more than two sides

3.41
plinth
raised area on the forecourt, supporting and protecting the dispensers and associated equipment

3.42
positive isolation
provision of a safe environment for performing maintenance, repair or replacement operations on process facilities

Note 1 to entry: Positive isolation can be provided to equipment or piping items for maintenance purposes using various arrangements depending on following factors, as piping rating, equipment in shutdown or equipment under service.

Note 2 to entry: An assembly commonly referred to as Double Block and Bleed is often used for this purpose. For such systems, two block valves are required for additional isolation between the operational process side and the device requiring maintenance. A bleed is used to drain/vent the fluids trapped between the two block valves.

Note 3 to entry: A blind or a spade is an alternative way to provide positive isolation.

3.43
pre-cooling
process of cooling hydrogen fuel temperature prior to dispensing

3.44
pressure relief device
PRD
device designed to release pressure in order to prevent a rise in pressure above a specified value due to emergency or abnormal conditions

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

— Pressure Safety Valve (PSV) — pressure activated valve that opens at specified set point to protect a system from burst and re-closes when the pressure falls below the set point.

— Temperature-activated Pressure Relief Device (TPRD) — a PRD that opens at a specified temperature to protect a system from burst and remains open.

3.45
probability
an expression of the chance (likelihood) that a considered event will take place to property, system, business or to the environment

3.46
public fuelling station
fuelling station (3.20) that sells gaseous hydrogen to the general public