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Gaseous hydrogen — Fuelling stations

Hydrogène gazeux — Stations de remplissage

[Revision of first edition (ISO 20100:2008)]

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 20100 was prepared by Technical Committee ISO/TC 197, *Hydrogen technologies*.

This first edition cancels and replaces ISO/TS 20100:2008, which has been technically revised.

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Gaseous hydrogen — Fuelling stations

1 Scope

This International Standard specifies the design characteristics of standalone outdoor public and non-public fuelling stations that dispense gaseous hydrogen used as fuel onboard land vehicles of all types.

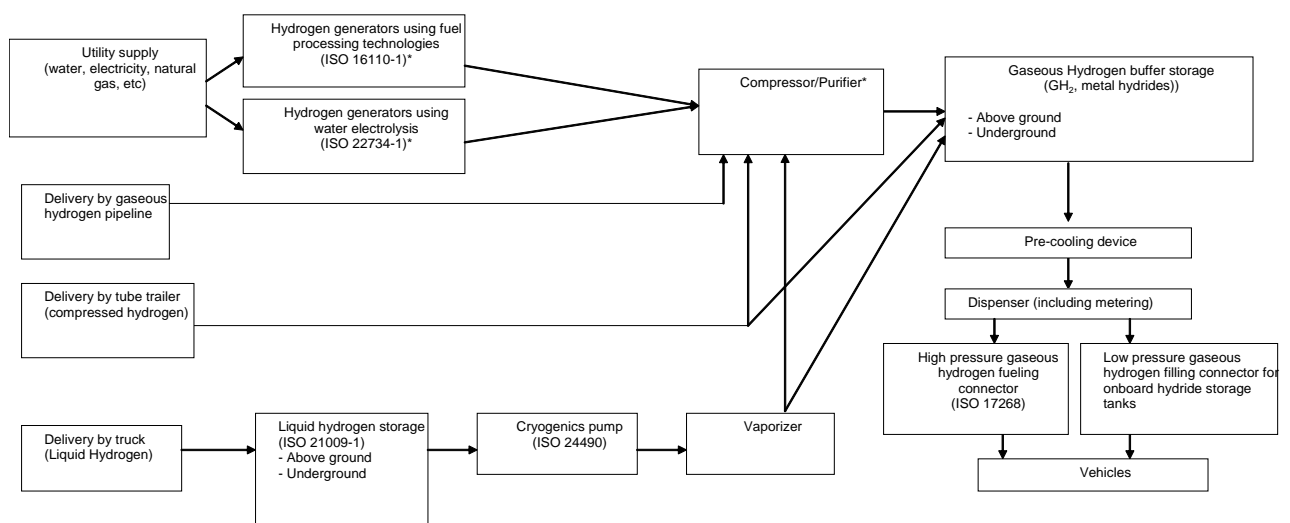
Residential and home applications to fuel land vehicles are excluded from this International Standard.

The fuelling station may comprise, as applicable, the following as shown in Figure 1:

- Delivery of hydrogen by pipeline, trucked in gaseous and/or liquid hydrogen;
- On-site hydrogen generators using water electrolysis process or hydrogen generators using fuel processing technologies;
- Liquid hydrogen storage, pumps and vaporizers;
- Gaseous hydrogen compression and purification systems;

NOTE When the fuelling station comprises an on-site hydrogen generator, the compressor/purifier system is commonly integrated into it.

- Gaseous hydrogen buffer storage; [ISO/DIS 20100](https://standards.iteh.ai/catalog/standards/sist/21217b2c-be13-409b-b4c6-d7c40daaa6b1/iso-dis-20100)
- Pre-cooling device; <https://standards.iteh.ai/catalog/standards/sist/21217b2c-be13-409b-b4c6-d7c40daaa6b1/iso-dis-20100>
- Gaseous hydrogen dispensers.



* May include a buffer vessel for dampening or adjusting flow of compressor suction inlet.

Figure 1 — Gaseous hydrogen — Fuelling station

2 Normative references

The following referenced documents are indispensable for the application 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 834-1, *Fire resistance test — Elements of building construction — Part 1: General requirements*

ISO 4126-1, *Safety devices for protection against excessive pressure — Part 1: Safety valves*

ISO 4126-2, *Safety devices for protection against excessive pressure — Part 2: Bursting disc safety devices*

ISO 4414, *Pneumatic fluid power — General rules relating to systems*

ISO 7751, *Rubber and plastics hoses and hose assemblies — Ratios of proof and burst pressure to design working pressure*

ISO 11114-4, *Transportable gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 4: Test methods for selecting metallic materials resistant to hydrogen embrittlement*

ISO 14113, *Gas welding equipment — Rubber and plastic hoses assembled for compressed or liquefied gases up to a maximum design pressure of 450 bar*

ISO 14687 (all parts), *Hydrogen fuel — Product specification*

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

ISO 16110-1, *Hydrogen generators using fuel processing technologies — Part 1: Safety*

ISO 16528-1, *Boiler and pressure vessels — Part 1: Performance requirements*

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ISO 17268, *Compressed hydrogen surface vehicle fuelling connection devices*

ISO 21009-1, *Cryogenic vessels — Static vacuum-insulated vessels — Part 1: Design, fabrication, inspection and tests*

ISO 21011, *Cryogenic vessels — Valves for cryogenic service*

ISO 21012, *Cryogenic vessels — Hoses*

ISO 21013-1, *Cryogenic vessels — Pressure-relief accessories for cryogenic service — Part 1: Reclosable pressure-relief valves*

ISO 21013-2, *Cryogenic vessels — Pressure-relief accessories for cryogenic service — Part 2: Non-reclosable pressure-relief devices*

ISO 21013-3, *Cryogenic vessels — Pressure-relief accessories for cryogenic service — Part 3: Sizing and capacity determination*

ISO 22734-1, *Hydrogen generators using water electrolysis process — Part 1: Commercial and industrial applications*

ISO 26142, *Hydrogen detection apparatus — Stationary Applications*

IEC 60079-0, *Electrical apparatus for explosive gas atmospheres — Part 0: General requirements*

IEC 60079-10-1, *Explosive atmospheres — Part 10-1: Classification of areas — Explosive gas atmospheres*

IEC 60079-14, *Electrical apparatus for explosive gas atmospheres — Part 14: Electrical installations in hazardous areas (other than mines)*

IEC 60079-29-1, *Explosive atmospheres — Part 29-1: Gas detectors — Performance requirements of detectors for flammable gases*

IEC 60079-29-2, *Explosive atmospheres — Part 29-2: Gas — Selection, installation, use and maintenance of detectors for flammable gases and oxygen*

IEC 60079-30-1, *Explosive atmospheres — Part 30-1: Electrical resistance trace heating — General and testing requirements*

IEC 60204-1, *Safety of Machinery — Electrical equipment of machines — Part 1: General requirements*

IEC 60364-4-41, *Low-voltage electrical installations — Part 4-41: Protection for safety — Protection against electric shock*

IEC 60445, *Basic and safety principles for man-machine interface, marking and identification — Identification of equipment terminals and conductor terminations*

IEC 60446, *Basic and safety principles for man-machine interface, marking and identification — Identification of conductors by colours or alphanumerics*

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

IEC 60079-2 *Explosive atmospheres — Part 2: Equipment protection by pressurized enclosures*

IEC 61000-6-1, *Electromagnetic compatibility (EMC) — Part 6-1: Generic standards — Immunity for residential, commercial and light-industrial environments*

IEC 61000-6-3, *Electromagnetic compatibility (EMC) — Part 6-3: Generic standards — Emission standard for residential, commercial and light-industrial environments*

IEC 61069-7, *Industrial-process measurement and control — Evaluation of system properties for the purpose of system assessment — Part 7: Assessment of system safety*

IEC 61508, *Functional safety of electrical/electronic/programmable electronic safety-related systems*

3 Terms and definitions

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

3.1

accessory

part capable of performing an independent function and contributing to the operations of the equipment that it serves

3.2

area of occupation

outdoors location within or outside the facility intended for occupation, such as catering areas, playgrounds, overnight parking areas

NOTE 1 Locations not intended for stationing of individuals such as passageways or temporary vehicle parking areas are not considered occupied areas.

NOTE 2 A private domestic area may be considered an area of occupation.

3.3 authority having jurisdiction

organization, office or individual responsible for approving a facility along with an equipment, an installation or a procedure

3.4 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

3.5 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 that is intended to automatically operate the fuelling station within its normal operating parameters

NOTE The control system includes the measuring, monitoring and reporting and recording functions, as applicable.

3.6b critical exposure

exposures subject to severe escalation potential if exposed to a flammable atmosphere or thermal effects from hydrogen leak, due to occupancy by people or presence of large quantities of hazardous materials.

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3.7 design pressure

maximum pressure permissible in a storage vessel or a piping system for a designated temperature during normal operation

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NOTE 1 The design pressure is the basis for the pressure setting of the pressure relief device protecting the vessel or piping system.

NOTE 2 The design pressure may also be the maximum allowable operating pressure rating of pressure vessels manufactured in accordance with national pressure vessel codes.

3.8 dispenser

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

NOTE As an example, the dispenser may include a dispenser cabinet, gas flow meter, a fuelling hose and fuelling nozzle attachments.

3.9 dispenser cabinet

protective housing that encloses the dispenser gas containing 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

structure that protects equipment from the environment, provides noise attenuation, or provides safety to the areas surrounding the equipment

3.12**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

3.13**fill pressure**

pressure attained at the end of fuelling

NOTE Fill pressure varies according to the gas temperature in the vehicle tank, which is dependent on the changing parameters and the ambient conditions.

3.14**fitting**

connector used in joining a piping, tubing, or hose system

3.15**forecourt**

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

3.16**connector**

a joined assembly of a nozzle and receptacle, which permits quick connect and disconnect of fuel supply to the vehicle or storage system

3.17**fuelling hose**

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

3.18**nozzle**

device connected to a fuel dispensing system, which permits the transfer of fuel

3.19**receptacle**

device connected to a vehicle or storage system which receives the station nozzle and permits transfer of fuel

NOTE This may also be referred to as a fuelling inlet.

3.20**fuelling pad**

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

3.21**fuelling 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

3.22**guard**

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

NOTE Depending on its construction, a guard may be called casing, cover, screen, door, enclosed guard, etc.

3.23**harm**

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

3.24

hazard

potential source of harm

3.25

hazardous event

occurrence of a hazardous situation that will result in a harm to people, property or environment

3.26

hazardous situation

circumstance in which people, property or the environment are exposed to one or more hazards

3.27

hose 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

3.28

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

3.29

hydrogen purifier

equipment to remove oxygen, moisture and other impurities from the hydrogen

NOTE Hydrogen purifiers may comprise purification vessels, dryers, filters and separators.

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3.30

maximum fill pressure

maximum pressure to which a vehicle tank may be filled

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3.31

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

3.32

nominal working pressure

nominal working pressure is the vehicle tank pressure, as specified by the manufacturer, at a uniform gas temperature of 15 °C and full gas content

3.33

non-public fuelling station

fuelling station that does not sell or dispense gaseous hydrogen to the general public, e.g. private or municipal vehicle fleet operation

3.34

operator

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

3.35

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

3.36**plinth**

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

3.37**pre-cooling**

process of cooling hydrogen prior to dispensing

3.38**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 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-relief 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.
- Pressure Safety-relief Equipment (PSE) — Equipment such as disks that are designed to open at a specified set point to protect a system from burst and remain open.
- Temperature-activated Pressure Relief Device (TPRD) — A PRD that opens at a specified temperature to protect a system from burst and remains open.

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3.39**public fuelling station**

fuelling station that sells gaseous hydrogen to the general public

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3.40**risk**

combination of the probability of occurrence of harm and the severity of that harm

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3.41**safeguarding**

use of specific technical means, to protect persons from the hazards which cannot reasonably be removed or sufficiently limited by design

3.42**safety**

freedom from unacceptable risk

3.43**safety device**

device other than a guard, which eliminates or reduces risk, alone or associated with the guard

3.44**separation distance**

minimum separation between a hazard source and an object (human, equipment or environment), which will mitigate the effect of a likely foreseeable incident and prevent a minor incident escalating into a larger incident

3.45**safety function**

function to be implemented by a safety-instrumented system, other technology safety related system or external risk reduction facilities, which is intended to achieve or maintain a safe state for the process, with respect to a specific hazardous situation