
Gaseous hydrogen — Fuelling stations —

Part 1: General requirements

Carburant d'hydrogène gazeux — Stations-service —

Partie 1: Exigences générales

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO 19880-1:2020

<https://standards.iteh.ai/catalog/standards/iso/1b771923-fa7e-46c4-9fb5-2a5aafb94d72/iso-19880-1-2020>



iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO 19880-1:2020

<https://standards.iteh.ai/catalog/standards/iso/1b771923-fa7e-46c4-9fb5-2a5aafb94d72/iso-19880-1-2020>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword	vii
1 Scope	1
2 Normative references	3
3 Terms and definitions	3
4 Abbreviated terms	15
5 Risk management	16
5.1 Hydrogen fuelling station safety recommendations	16
5.2 Risk assessment.....	17
5.3 Mitigation measures to improve system safety	17
5.3.1 General.....	17
5.3.2 Mitigations which reduce the potential for the formation of a flammable mixture	17
5.3.3 Mitigation for the formation of a flammable mixture in enclosures.....	18
5.3.4 Mitigation for the formation of a flammable mixture under a canopy.....	18
5.3.5 Mitigations which reduce the potential for ignition.....	19
5.3.6 Mitigation of the escalation and/or impact of a fire or explosion originating from the fuelling installation	20
5.3.7 Mitigation of the effect of an external fire/events on the fuelling station installation	21
5.3.8 Mitigation of risk to the high pressure hydrogen storage system of the vehicle being fuelled	23
5.4 Safety distances.....	23
5.4.1 General.....	23
5.4.2 Safety distances relating to hydrogen vent stack outlets.....	24
5.5 Protection measures for non-hydrogen hazards	24
5.5.1 General.....	24
5.5.2 Protection measures for asphyxiation hazard in an enclosure (confined space).....	24
5.5.3 Protection measures for emergency egress from enclosed spaces.....	25
5.5.4 Ingress protection measures.....	25
5.5.5 Protection measures for hose whip.....	25
5.5.6 Protection measures for noise	26
5.5.7 Protection against exposure to extremely cold or hot temperatures.....	26
6 Hydrogen supply safety and operation	26
6.1 On site generation	26
6.1.1 Hydrogen generators using water electrolysis	26
6.1.2 Hydrogen generators using fuel processing technologies	26
6.2 Hydrogen delivery.....	27
6.2.1 Gaseous hydrogen supply by tube trailers and multiple element gas containers (MEGC)	27
6.2.2 Liquid hydrogen supply by tanker.....	28
6.3 Pipeline.....	31
7 Equipment and Components	32
7.1 General recommendations.....	32
7.1.1 Hydrogen materials.....	32
7.1.2 Material hydrogen compatibility	32
7.1.3 Other material recommendations	33
7.2 Piping carrying hydrogen	33
7.2.1 General.....	33
7.2.2 Pipe fittings, valves, hoses, for gaseous hydrogen.....	33
7.3 Hydrogen storage recommendations	34
7.3.1 General.....	34
7.3.2 Gaseous hydrogen storage vessels.....	34

	7.3.3	Gaseous hydrogen storage siting recommendations.....	34
7.4		Hazardous areas (with potentially flammable mixtures).....	36
	7.4.1	General.....	36
	7.4.2	Equipment in hazardous areas.....	37
7.5		Hydrogen compressors.....	37
	7.5.1	General.....	37
	7.5.2	Vibration and movement.....	38
	7.5.3	Control and monitoring.....	38
7.6		Instruments for gaseous hydrogen systems.....	39
7.7		Filters for gaseous hydrogen.....	39
7.8		Gaseous hydrogen vent systems.....	40
	7.8.1	General.....	40
	7.8.2	Vent outlet.....	40
	7.8.3	Vent sizing.....	41
	7.8.4	Multiple relief devices.....	42
7.9		Pneumatics and hydraulics.....	42
7.10		Hydrogen purifier.....	43
7.11		Enclosures and buildings containing hydrogen equipment.....	43
	7.11.1	General design.....	43
	7.11.2	Maintenance access and possible occupancy.....	43
	7.11.3	Ventilation of enclosures and buildings containing hydrogen equipment.....	44
	7.11.4	Use of enclosures or compartments within enclosures to control hazards areas.....	44
	7.11.5	Electrical and mechanical equipment within enclosures and buildings containing hydrogen equipment.....	45
	7.11.6	Over-pressure protection of enclosures and buildings containing hydrogen equipment.....	45
8		Dispensing systems.....	45
	8.1	General requirements.....	45
	8.2	Hydrogen vehicle fuelling.....	46
	8.2.1	Dispensing system process control.....	46
	8.2.2	Dispensing system safety devices.....	49
	8.3	Dispensing systems.....	52
	8.3.1	General design and assembly.....	52
	8.3.2	Dispensing system hydrogen components.....	52
	8.3.3	Dispenser housings and cabinets.....	55
	8.3.4	Dispenser fuelling assembly.....	55
	8.4	Dispenser installation.....	56
	8.4.1	General.....	56
	8.4.2	Location and protection of dispensers.....	56
	8.4.3	Fuelling pad.....	57
	8.4.4	Hazardous area around the dispenser.....	57
	8.4.5	Installation of the fuelling assembly to prevent damage in service.....	57
	8.4.6	Electrical continuity for bonding and grounding.....	57
	8.5	Operating considerations.....	58
	8.6	Maintenance and inspection.....	58
9		Hydrogen quality.....	58
	9.1	General.....	58
	9.2	Dispensing system fuel filters.....	58
10		Electrical.....	59
	10.1	General electrical.....	59
	10.1.1	Components.....	59
	10.1.2	Site (interconnections to and/or between equipment assemblies).....	59
	10.1.3	Electrical bonding and grounding.....	60
	10.1.4	Lightning protection.....	60
	10.2	Hazardous areas (potentially flammable mixtures).....	60
	10.2.1	General.....	60
	10.2.2	Protection requirements for electrical equipment within hazardous areas.....	60

10.2.3	Protection from ignition due to accumulation of static charge	60
10.3	Electromagnetic compatibility and interference (EMC)	62
10.3.1	General	62
10.3.2	Industrial (EMC) Environments	62
10.3.3	Residential, Commercial, and Light-Industrial (EMC) Environments	62
11	Instrumentation and control system	62
11.1	General	62
11.2	Emergency shutdown functionality	63
11.2.1	General	63
11.2.2	Manually actuated emergency stop devices	64
11.2.3	Hydrogen detection systems	64
11.3	Remote system control	65
11.4	Modifications to control system	66
12	Station inspection and tests	66
12.1	General	66
12.2	Pressure test	66
12.3	Leak test	67
12.4	Electrical testing	67
12.5	Fuelling safety and performance functional testing	68
12.5.1	General	68
12.5.2	Fuelling protocol test	68
12.5.3	Test procedure	69
12.5.4	Site acceptance testing options	69
12.5.5	Additional performance considerations for fuelling	71
12.6	Hydrogen quality testing	72
12.7	Station inspection and tests following modifications	72
13	Operation	72
13.1	General	72
13.2	Warning signs	72
13.3	Dispenser operational instructions	73
13.4	Functional identification	74
13.5	Marking of equipment (data plate)	74
13.6	Reference designations	75
13.7	Training	75
13.8	Emergency response plan	75
13.9	Emergency contact information	76
14	Technical documentation	76
14.1	General	76
14.2	Information to be provided	76
14.3	Recommendations applicable to all documentation	78
14.4	Installation documents	78
14.4.1	General	78
14.4.2	Installation documentation for hazardous areas	79
14.4.3	Venting documentation	79
14.4.4	Seismic documentation	79
14.4.5	Handling and lifting documentation	79
14.5	Overview diagrams and function diagrams	80
14.6	Circuit diagrams	80
14.7	Flow (P&ID) diagrams	80
14.8	Fuelling station operating manual	81
14.9	Maintenance and service manuals	81
14.10	Parts list	81
15	Inspection and maintenance	82
15.1	Inspection and maintenance program	82
15.2	Maintenance and testing frequency of gas detection	83
15.3	Maintenance and inspection frequency of filters	83

15.4	Maintenance of pressure relief devices	84
15.5	Hot work.....	84
15.6	Modifications to the hydrogen fuelling station and associated equipment.....	84
Annex A	(informative) Safety methodologies and risk assessment.....	85
Annex B	(informative) Further guidance on risk management.....	107
Annex C	(informative) Hydrogen dispensing and examples of fuelling and communications protocols, and corresponding verification testing.....	113
Annex D	(informative) Reference fuelling limits of hydrogen and fuel cell vehicles.....	131
Annex E	(informative) Pressure level application to design verification requirements for hydrogen dispensing systems and compressed hydrogen storage systems	132
Annex F	(informative) Countermeasures for unsuitable hydrogen fuelling protocols.....	137
Annex G	(informative) Recommendations for, and example of, vehicular impact protection measures.....	138
Annex H	(informative) Example for leakage testing of hydrogen fuelling system	141
Annex I	(informative) Minimum fuelling station acceptance inspection, testing and validation checklist.....	142
Annex J	(informative) Hydrogen station testing apparatus (HSTA)	149
Annex K	(informative) Sampling procedures and hardware for hydrogen fuel quality analysis ...	151
Bibliography		167

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[ISO 19880-1:2020](https://standards.itih.ai/catalog/standards/iso/1b771923-fa7e-46c4-9fb5-2a5aafb94d72/iso-19880-1-2020)

<https://standards.itih.ai/catalog/standards/iso/1b771923-fa7e-46c4-9fb5-2a5aafb94d72/iso-19880-1-2020>

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 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 Technical Committee ISO/TC 197, *Hydrogen technologies*.

This first edition cancels and replaces ISO/TS 19880-1:2016, which has been technically revised.

The main changes compared to the ISO/TS 19880-1:2016 are as follows:

- where appropriate, guidance information from the TS was converted to requirements;
- the difference between the risk assessment and the design requirement clauses were clarified and references were added to ensure that the appropriate clauses were linked;
- Annex A from the TS on safety distances was removed;
- Annex C from the TS on hydrogen quality control was removed to ISO 19880-8;
- the presentation of the information was improved and much of the guidance information was moved to informative annexes.

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.