EHSP
EUROPEAN HYDROGEN SAFETY PANEL

Clean Hydrogen Partnership

EUROPEAN HYDROGEN SAFETY PANEL

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RCS

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DOCUMENT HISTORY

The table below summarises the main revisions of this document.

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1.1	12/05/2026	Final formatting and new template
1.2	27 May 2026	New major release version

Contents

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1. INTRODUCTION

This document gives an overview of the various regulations, codes, and standards (RCS) used to address hydrogen safety. The purpose of the document is not to provide an exhaustive and updated overview of all international and national RCS related to hydrogen but rather just some selected ones which are thought to be most relevant to stakeholders of Clean Hydrogen JU. It provides links to some of the most relevant standardization organisations etc.

Legal framework

Handling flammable, compressed, or cryogenic substances may be dangerous not only for the person doing it but also for others or society as a whole. Industrialisation brought about not only much larger amounts of such substances used for processes of all kinds but also a more complex structure of society which is more vulnerable to technical problems. Therefore, for the last two centuries more or less all countries (or their provinces or communities) have issued legal requirements or regulations to guarantee a minimum level of safety for human life and health as well as for material values. The increasing safety demands of modern citizens towards society, new technologies (nuclear, genetic) as well as new threats (terrorism, pollution) cause an ever-increasing refinement of those rules.

Regulations and standards

A *regulation* is a statutory text at the local, national, regional, or international e.g. United Nations level which is imposed by a legal authority. It usually states minimum safety requirements that are written and adopted by legislative bodies, to regulate a particular kind of activity. Legal requirements are intended to ensure that a product or system or infrastructure or activity will not impact human safety/health, property or the environment.

A *standard* as discussed here is a document, established by consensus and approved by a recognised standardisation body e.g. ISO, IEC, CEN, CENELEC, etc. that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context. An international standard is a standard developed and adopted by an international standardisation organisation (like ISO or CEN) and made available to the public.

Many countries have their national standard body, like PKN, DIN, BSI, AFNOR, etc. The general globalisation and the progressing economic integration of the EU member states affect that

national standards more and more lose their importance in favour of international ones, which are developed in collaboration of international experts and then adopted nationally.

The application of a standard is not mandatory unless a regulation refers to that standard, for example AFIR refers to EN 17127). Even then, the standard should be translated and interpretated by local regulations of each EU country, e.g the legal power comes from the regulation, not from the standard.

Role and distinction

Though standards and regulations are frequently mentioned together, it should be remembered that they are two fundamentally different concepts. While regulations are mandatory for everybody in its domain, standards are not always mandatory. Standards facilitate the trade and use of goods or services and are developed mainly by industrial bodies. Their main role is to make components or services fit together: pressure cylinders with valves, valves with regulators, and further equipment leading the gas to the place of use. This, however, also involves safety issues, and so there is of course an interface with regulations, which are expected to be developed mainly by public bodies.

As shown in Figure 1, the main difference between regulations and codes and standards lies in their legal power. Regulations have legally compelling power, whereas standards have not. Standards are a useful instrument for organisations or interest groups dealing with standardised technology and facilitating international trade.

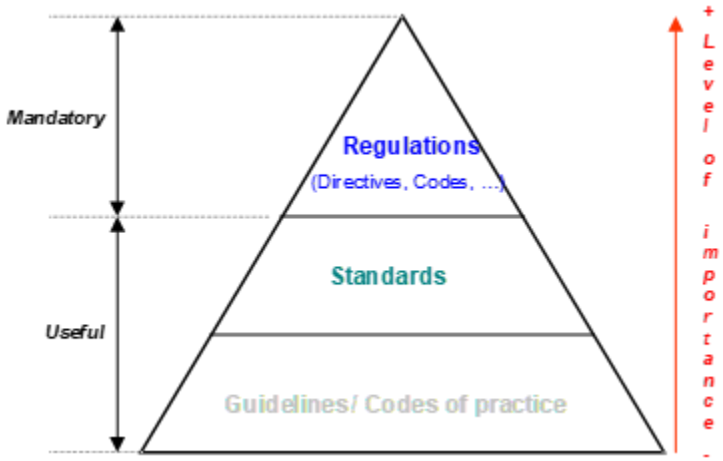

Figure 1. Hierarchy of Regulations, Standards and Codes.

The following table highlights the most important characteristics of legal requirements and standards.

Table 1. Legal requirements versus standards.

	Regulations	**Standards**
Purpose	Protection of the public, the environment, employees, material values etc. from damage or danger	Facilitation of the free exchange of goods and services
Source	Legislative bodies, governments, or other political bodies; sometimes technical expert committees under the supervision of the former	Free agreement by those parties which are interested in such a standard (unless it is mentioned in Regulations when a standard becomes mandatory)
Legal role	Law, ordinance or otherwise mandatory instruments	Usually not mandatory, but may be referenced in regulation (then is mandatory) or considered as acceptable practice in court

EU legislation

European laws, such as Directives or Regulations, prevail over national laws. To carry out their task and following the provisions of the Treaty establishing the European Community (the EC Treaty), the Parliament acting jointly with the Council, the Council and the Commission make regulations and issue directives according to Art. 249 of the EC Treaty.

A *directive* shall be binding, as to the result to be achieved, upon each Member State to which it is addressed, but shall leave the national authorities the choice of form and methods (national transcription).

A *regulation* shall have general application. It shall be binding in its entirety and directly applicable in all Member States. The EU has, for example, a regulation for the type approval of hydrogen vehicles: COMMISSION REGULATION (EU) No 406/2010 of 26 April 2010 implementing Regulation (EC) No 79/2009 of the European Parliament and of the Council on type-approval of hydrogen-powered motor vehicles.

Requirements for products and operational requirements are strictly separated in EU legislation since they belong to different political objectives and are governed by different articles of the EU treaty

Hydrogen gas regulations

Regulations in the EU generally deal with procedures and processes, not so much with individual substances. Substance specific regulations exist only if the substance has quite specific and

important dangerous properties of its own (like acetylene or oxygen) or if it is of such economic importance that a specific body of rules makes sense.

Neither is true for hydrogen. Hydrogen is a flammable gas lighter than air, which is not uncommon. There are many other gases like this for extensive use. And even though it is an important substance in the chemical industry, its economic importance cannot be compared at the moment with that of e.g. natural gas. This means that guidance for handling hydrogen must be sought by looking up the regulations for what somebody wants to do with hydrogen. Then the general rules must be applied to the specific application.

EU directives relevant for hydrogen

Apart from the directives of the EU listed below, there are also other regulations from other sources. International transport of dangerous goods is dealt with in several international agreements which comprise ADR (road), RID (rail), IMO (sea) and ADNR (inland waterways). Air traffic is cared for by IATA and ICAO. For making sure that motor vehicles can be used internationally there are different provisions; some of them involves the UN ECE, e.g. Regulation 134 for hydrogen vehicles.

Despite the European directives, there are also European regulations. European regulations need – in contrast to European directives - no national implementation for becoming legally binding. An example of this is the COMMISSION REGULATION (EU) No 406/2010 and the UN ECE Regulation 134, both relevant for hydrogen vehicles.

ATEX directive 99/92/EC

ATEX directive 99/92/EC is relative to minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres (ATEX).

Hydrogen is a flammable gas that can form an ATEX where mixed with air (such an ATEX is defined by the directive as a mixture in which, after ignition occurs, combustion spreads to the entire unburned mixture).

So, any employer who runs facilities, where hydrogen is processed in, shall comply with the requirements of the directive, because his workers are potentially at risk from the effects of explosions which may be produced by the ignition of an ATEX which can be formed.

A place in which an ATEX may occur in such quantities as to require special precautions to protect the health and safety of the workers concerned is deemed to be hazardous within the meaning of this directive.

The employer shall classify hazardous places where ATEX's may occur into zones based on the frequency and duration of the occurrence of an ATEX and under the following definition:

- Zone 0: a place in which an ATEX is present continuously or for long periods or frequently.
- Zone 1: a place in which an ATEX is likely to occur in normal operation occasionally.
- Zone 2: a place in which an ATEX is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

Where necessary, places, where ATEX's may occur in such quantities as to endanger the health and safety of workers, shall be marked with the underneath sign at their points of entry.

ATEX directive: 2014/34/EU

This directive applies to equipment and protective systems intended for use in potentially explosive atmospheres. It also applies to controlling devices and regulating devices intended for use outside potentially explosive atmospheres but required for or contributing to the safe functioning of equipment and protective systems concerning the risks of explosion are also covered by the scope of this directive.

Both ATEX directives are interrelated. Equipment from certain categories according to 2014/34/EU can be used in certain zones defined according to 99/92/EC but is forbidden in others.

Pressure vessels regulation (stationary)

The PED (Pressure Equipment Directive – 97/23/EC of the European Parliament and of the Council of 29 May 1997 on the approximation of the laws of the Member States concerning pressure equipment) is applicable in Europe since December 1999 and mandatory since the end of May 2002.

It applies to all stationary vessels with a service pressure of more than 0.5 bar and a volume of more than 50 litres.

In the case of hydrogen energy applications, it is particularly relevant for all pressure vessels (cylinders) and safety accessories (valves, flexible hoses, connectors) used for hydrogen fuelling station.

This pressure equipment directive allows using the same design for the pressure vessels and associated accessories everywhere in the EU.

Since this directive is mandatory in Europe, several “Notified Bodies” have been notified to Brussels by the authorities of each EU member state. These notified bodies can make the “evaluation of conformity” of the pressure equipment; this evaluation is confirmed by the “CE” mark applied onto the equipment. Any notified body (from every country) can approve a CE marked equipment to be used in every country of the EU.

This directive only defines the “essential requirements” which are given in its Annex 1. Detailed requirements are given in the harmonized standards (e.g. prepared by CEN). These EN-Standards are not mandatory; other procedures or “state of the art” can be used by the manufacture to demonstrate to the notified body that the essential requirements are fulfilled.

This European directive does not cover the use of the equipment (operational requirement, periodic inspection, …) which are still under national regulations. This may create difficulties if such equipment is to be moved from one country to another.

Regulations for the Transport of Dangerous Goods

The transport of dangerous goods is at least internationally in most cases worldwide harmonised and regulated. The basis for this is the UN Model Regulations, the so-called Orange Book. It is published every two years by the UN ECOSOC (Geneva) and leads to subsequent changes in the relevant transport regulations for land, sea and air mode.

Despite this, the perspective of a European user or consignor of hydrogen or other gases is different. There, the basis is the rules for the national implementation of the European directive TPED. The TPED (The Council Directive 1999/36/EC on transportable pressure equipment) applies to transportable pressure equipment and is mandatory since July 1st, 2003 for gas cylinders. It will also apply soon to bundles, drums and trailers (July 1st, 2005 optional and July 1st, 2007 mandatory). Since 2009 the UN ECE regulations for European land transport RID/ADR contain a lot of details that had been part of the 1999/36/EC. The TPED was revised and substituted by the Transportable Pressure Equipment Directive 2010/35/EU(TPED) in 2010.

In the case of hydrogen energy applications, it is particularly relevant for the transport of hydrogen to the fuelling stations. It is also applicable to hydrogen pressure tanks used on the vehicle when these tanks are removable, refilled independently from the vehicle and transported to hydrogen

depots. The on-board storage of gases as a propellant in permanently mounted systems is not part of transport regulations. This is part of the approval of the vehicles.

This directive defines the procedural requirements for European conformity assessment and relevant responsibilities and refers to the ADR/RID concerning the technical requirements.

ADR/RID is the transport regulation by road (ADR) and rail (RID) for Europe and many other countries around. TPED refers to “Class 2” (gases), ADR/RID covering other dangerous substances.

EN (and ISO) standards are referred into the ADR/RID and give presumption of conformity to ADR/RID but normally other routes complying with the technical requirements of ADR/RID can be followed.

Contrary to the PED, TPED also covers the use of the equipment including periodic inspection and any other operational requirement. Consequently, it provides full harmonization in Europe. It also allows to “reassess” old national equipment to transform them into “” equipment.

Since the distribution of very most hydrogen takes place on road or rail, in some cases over the sea or by air transport, the standards developed or under improvement of CEN TC 23 and ISO TC 58 are very valid for hydrogen. The most important standards that have been referenced in relevant transport regulations in the subsection below

For European land transport, there are a lot more CEN standards referenced for containments that are acceptable for the transport of hydrogen, which are not presented here. In addition, there are several CEN and ISO standards under development or already published but in the process of getting referenced in regulations, like e.g. the EN 17339: 2020 Transportable gas cylinders - Fully wrapped carbon composite cylinders and tubes for hydrogen.

Machinery directive: 2006/42/EG

This directive applies to machinery. It shall also apply to safety components placed on the market separately.

Pressure vessel directive: 2014/68/EU

This directive applies to the design, manufacturing and evaluation of CE conformity of pressurised equipment or set of equipment that work under a pressure above 0.5 bar.

Low voltage directive: 2014/35/EU

For the purposes of this directive "electrical equipment" means any equipment designed for use with a voltage rating of between 50 and 1000 Volt for alternating current and between 75 and 1500 Volt for direct current.

Electromagnetic compatibility directive: 2014/30/EU

This directive applies to apparatus liable to cause electromagnetic disturbance or the performance of which is liable to be affected by such disturbance.

It defines the protection requirements and inspection procedures relating thereto.

Hydrogen standards related to hydrogen

Hydrogen technology makes sense only when it is applied globally. For this reason, it is quite natural that standards for using hydrogen energy are also global. They are made by global standardization bodies (ISO, IEC) or regional ones (CEN, CENELEC).

For ISO the Technical Committee 197 “Hydrogen Technologies” has the leading role for standards development in the field. It cooperates closely with IEC TC 105 “Fuel Cells”, CEN/CENELEC/JTC6 “Hydrogen in Energy Systems”, etc.

Four technical committees (TC) of the International Organization for Standardization (ISO) produce standards relevant to hydrogen and fuel cell technologies, systems, and infrastructure.

ISO/TC 197 “Hydrogen Technologies” list of standards includes:

- **ISO 13984:1999**. Liquid hydrogen — Land vehicle fuelling system interface;
- **ISO 13985:2006**. Liquid hydrogen. Land vehicle fuel tanks;
- **ISO 16110-1:2007** Hydrogen generators using fuel processing technologies - Part 1. Safety;
- **ISO 16110-2:2010**. Hydrogen generators using fuel processing technologies — Part 2: Test methods for performance;
- **ISO 16111:2018**. Transportable gas storage devices — Hydrogen absorbed in reversible metal hydride;
- **ISO 26142:2010**. Hydrogen detection apparatus. Stationary applications;
- **ISO 17268:2020**. Gaseous hydrogen land vehicle refuelling connection devices;
- **ISO 19880-1:2020**. Gaseous hydrogen. Fuelling stations. General requirements;
- **ISO 19880-3:2018**. Gaseous hydrogen. Fuelling stations. Valves;

- **ISO 19880-5:2019**. Gaseous hydrogen. Fuelling stations. Dispenser hoses and hose assemblies;
- **ISO 19880-8:2019**. Gaseous hydrogen. Fuelling stations. Fuel quality control;
- **ISO 19881:2018**. Gaseous hydrogen. Land vehicle fuel containers;
- **ISO 19882:2018**. Gaseous hydrogen. Thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers;
- **ISO 14687:2019**. Hydrogen fuel quality — Product specification;
- **ISO 22734:2019**. Hydrogen generators using water electrolysis — Industrial, commercial, and residential applications;
- **DD ISO/TS 15869:2009**. Gaseous hydrogen and hydrogen blends. Land vehicle fuel tanks;
- **DD ISO/TS 20100:2008**. Gaseous hydrogen. Fuelling stations;
- **ISO/TR 15916:2015**. Basic considerations for the safety of hydrogen systems;
- **ISO/TS 19883:2017**. Safety of pressure swing adsorption systems for hydrogen separation and purification;
- **ISO/DIS 19884**. Gaseous hydrogen -- Cylinders and tubes for stationary storage, etc.

ISO/TC 22 “Road vehicles” issued the following relevant standards:

- **ISO 23273-2:2013** Fuel cell road vehicles - Safety specifications - Part 2: Protection against hydrogen hazards for vehicles fuelled with compressed hydrogen;
- **ISO 23828:2013.** Fuel cell road vehicles - Energy consumption measurement - Vehicles fuelled with compressed hydrogen;
- **ISO/TR 11954:2008.** Fuel cell road vehicles - Maximum speed measurement; etc.

ISO/TC 58 “Gas cylinders” published the following standards:

- **ISO 11114-1:2020**. Gas cylinders - Compatibility of cylinder and valve materials with gas contents - Part 1: Metallic materials;
- **ISO 11114-2:2013**. Gas cylinders - Compatibility of cylinder and valve materials with gas contents - Part 2: Non-metallic materials;
- **ISO 11114-3:2010**. Gas cylinders - Compatibility of cylinder and valve materials with gas contents - Part 3: Autogenous ignition test for non-metallic materials in an oxygen atmosphere;

- **ISO 11114-4:2017**. Transportable gas cylinders - Compatibility of cylinder and valve materials with gas contents - Part 4: Test methods for selecting steels resistant to hydrogen embrittlement;
- **ISO/CD 11114-5 (under development)**. Gas cylinders - Compatibility of cylinder and valve materials with gas contents - Part 5: Test methods for selecting plastic liners;
- **ISO/TR 13086-1:2011**. Gas cylinders - Guidance for design of composite cylinders — Part 1: Stress rupture of fibres and burst ratios related to test pressure;
- **ISO/TR 13086-2:2017**. Gas cylinders - Guidance for design of composite cylinders - Part 2: Bonfire test issues;
- **ISO/TR 13086-3:2018**. Gas cylinders - Guidance for design of composite cylinders - Part 3: Calculation of stress ratios;
- **ISO/TR 13086-4:2019**. Gas cylinders - Guidance for design of composite cylinders - Part 4: Cyclic fatigue of fibres and liners;
- **ISO/TS 17519:2019**. Gas cylinders - Refillable permanently mounted composite tubes for transportation;
- **ISO 18172-1:2007**. Gas cylinders — Refillable welded stainless-steel cylinders — Part 1: Test pressure 6 MPa and below;
- **ISO 18172-2:2007**. Gas cylinders — Refillable welded stainless-steel cylinders — Part 2: Test pressure greater than 6 MPa;
- **ISO/TR 19811:2017**. Gas cylinders - Service life testing for cylinders and tubes of composite construction;
- **ISO 10961:2019**. Gas cylinders - Cylinder bundles - Design, manufacture, testing and inspection;
- **ISO 11623:2015**. Gas cylinders - Composite construction - Periodic inspection and testing;
- **ISO 11625:2007**. Gas cylinders - Safe handling;
- **ISO 20475:2018**. Gas cylinders - Cylinder bundles - Periodic inspection and testing;
- **ISO 25760:2009**. Gas cylinders - Operational procedures for the safe removal of valves from gas cylinders; etc.

ISO/TC 220 on cryogenic vessels published several standards related to large transportable vacuum-insulated vessels, gas/materials compatibility, and valves for cryogenic service, etc.

It is expected that activities on hydrogen standardization in Europe will increase due to the establishment of CEN/CLC/JTC 6 “Hydrogen in energy systems”. European Committee for Standardization (CEN) published:

- **EN 17124:2018.** Hydrogen fuel. Product specification and quality assurance. Proton exchange membrane (PEM) fuel cell applications for road vehicles;
- **EN 17127:2018.** Outdoor hydrogen refuelling points dispensing gaseous hydrogen and incorporating filling protocols.

Fuel cells detection and explosion protection are topics that are dealt with by IEC. Among the most important standards published there are IEC EN 60079-10, 14, 17, and 19:

- **IEC EN 60079-10** "Electrical apparatus for explosive gas atmospheres. Classification of hazardous areas"
- **IEC/EN 60079-14** " Electrical installations design, selection and erection "
- **IEC/EN 60079-17** "Electrical apparatus for explosive gas atmospheres. Inspection and Maintenance"
- **IEC/EN 60079-19** "Electrical apparatus for explosive gas atmospheres. Repair"

Hydrogen relevant standards are not made only by one or a few committees, however. Since hydrogen energy has relationships to many other fields, standards for pressure vessels, pipelines, gas quality, etc. must be taken into consideration as well.

A comprehensive list of RCS is provided by FCHO standards database12 and H2tools13. The FCHO database is structured along the different categories e.g., transport applications, stationary applications, portable applications, hydrogen generation and infrastructure hydrogen demand. These categories encompass a vast array of standards related to the fuel cell and hydrogen space. H2tools database on the other hand provide various standards application types e.g. electrical interfaces, embrittlement tests, fuel cell modules, fuel cell power systems, fuelling systems, fuelling station design and fuel specifications etc.

1.1 Summary of existing RCS

The codes, regulations and standards are mainly divided into those provided by International Organization for Standardization (ISO), IEC, European Committee for Electrotechnical Standardization (CENELEC), European Committee for Standardization (CEN), Society of Automotive Engineers (SAE), Compressed Gas Association (CGA), European Industrial Gases Association (EIGA), International Electrotechnical Commission (IEC), National Fire Protection

Association (NFPA), Publication Series on Hazardous Substances (PGS), American Society Of Mechanical Engineers (ASME) and American Institute of Aeronautics and Astronautics (AIAA), Seveso directives, ADR etc. It is to be noted this chapter does not include country-specific RCS.

International Organization for Standardization (ISO)

1. https://www.ISO.org/en/contents/data/standard/06/95/69539.html
2. **ISO 23273:2013** – Fuel cell road vehicles safety specifications
3. **ISO 23828** – Fuel cell road vehicle energy consumption measurement part
4. **ISO/TR-11954:2010** – Fuel cell road vehicles road maximum speed
5. **ISO 6469-1** – Electrically propelled road vehicles safety specifications – Part 1: On-board rechargeable energy storage systems (RESS)
6. **ISO 6469-2** – Electrically propelled road vehicles safety specifications – Part 2: Vehicle operational safety
7. **ISO 6469-3** – Electrically propelled road vehicles safety specifications - – Part 3: Protection of persons against electric shock
8. **ISO 6469-4** – Electrically propelled road vehicles safety specifications - Part 4: Post crash electrical safety requirements
9. **ISO/TR 8713** – Electrically propelled road vehicles vocabulary
10. **ISO 12619-1** – Road vehicles compressed gaseous hydrogen and Compressed gaseous hydrogen and hydrogen/methane blends fuel components Part 1: General requirements and definitions
11. **ISO 12619-2** – Road vehicles compressed gaseous hydrogen and Compressed gaseous hydrogen and hydrogen/methane blends fuel components Part 2: Performance and general test methods
12. **ISO 12619-3** – Road vehicles compressed gaseous hydrogen and Compressed gaseous hydrogen and hydrogen/methane blends fuel components Part 3: Pressure regulator
13. **ISO 12619-4** – Road vehicles compressed gaseous hydrogen and and hydrogen/methane blends fuel components Part 4: Check Valve
14. **ISO 12619-5** – Road vehicles compressed gaseous hydrogen and
15. **ISO 12619-6** – Road vehicles compressed gaseous hydrogen and
16. **ISO 12619-7** – Road vehicles compressed gaseous hydrogen and
17. **ISO 12619-8** – Road vehicles compressed gaseous hydrogen and

18. **ISO 12619-9** – Road vehicles compressed gaseous hydrogen and
19. **ISO 12619-10** – Road vehicles compressed gaseous hydrogen and
20. **ISO 12619-11** – Road vehicles compressed gaseous hydrogen and
21. **ISO 12619-12** – Road vehicles compressed gaseous hydrogen and
22. **ISO 12619-13** – Road vehicles compressed gaseous hydrogen and
23. **ISO 12619-14** – Road vehicles compressed gaseous hydrogen and
24. **ISO 12619-15** – Road vehicles compressed gaseous hydrogen and
25. **ISO 12619-16** – Road vehicles compressed gaseous hydrogen and
26. **ISO 11114-1** – Gas cylinders compatibility cylinder and valve materials
27. **ISO 11114-2** – Gas cylinders compatibility cylinder and valve materials
28. **ISO 11114-4** – Gas cylinders compatibility cylinder and valve materials
29. **ISO 21087** – Gas analysis analytical methods hydrogen fuel proton
30. **ISO 16110-1** – Hydrogen generators using fuel processing technologies
31. **ISO 16110-2** – Hydrogen generators using fuel processing technologies
32. **ISO 16111** – Transportable gas storage devices hydrogen absorbed
33. **ISO 17268** – Gaseous hydrogen land vehicle refueling connection devices
34. **ISO 19880-1** – Gaseous hydrogen fueling station general requirements
35. **ISO 19880-2** – Gaseous hydrogen fueling station dispensers
36. **ISO 19880-3** – Gaseous hydrogen fueling stations part 3 valves
37. **ISO 19880-4** – Gaseous hydrogen fueling station compressors
38. **ISO 19880-5** – Gaseous hydrogen fueling station part 5 hoses
39. **ISO 19880-8** – Gaseous hydrogen fueling station part 8 hydrogen quality
40. **ISO 19881** – Gaseous hydrogen land vehicle fuel containers
41. **ISO 19882** – Gaseous hydrogen thermally activated pressure relief
42. **ISO/TS-19883** – Pressure swing adsorption system hydrogen separation and
43. **ISO 22734** – Hydrogen generators using electrolysis process
44. **ISO 26142** – Hydrogen detection apparatus stationary applications
45. **ISO 19885-1** – Gaseous hydrogen fuelling protocols hydrogen fuelled
46. **ISO 19885-2** – Gaseous hydrogen fuelling protocols hydrogen fuelled
47. **ISO 19885-3** – Gaseous hydrogen fuelling protocols hydrogen fuelled
48. **ISO 19880-6** – Gaseous hydrogen fueling station fittings
49. **ISO/TS-20100** – Gaseous hydrogen service stations

50. **ISO 11326:2024** – Ships and marine technology test procedures for liquid hydrogen storage tank of hydrogen ships
51. **ISO 13984** – Liquid hydrogen land vehicle fuelling system interface
52. **ISO 13985** – Liquid hydrogen land vehicle fuel tanks
53. **ISO 21009-1** – Cryogenic vessels static vacuum insulated vessels part 1 design fabrication inspection and tests
54. **ISO 21009-2** – Cryogenic vessels static vacuum insulated vessels part 2 operational requirements
55. **ISO 21010** – Cryogenic vessels gas/material compatibility
56. **ISO 21011** – Cryogenic vessels valves for cryogenic service
57. **ISO 21012** – Cryogenic vessels hoses
58. **ISO 21013-1** – Cryogenic vessels pressure relief accessories for cryogenic service part 1 reclosable pressure relief valves
59. **ISO 21013-2** – Cryogenic vessels pressure relief accessories for cryogenic service part 2 non reclosable pressure relief devices
60. **ISO 21013-3** – Cryogenic vessels pressure relief accessories for cryogenic service part 3 sizing and capacity determination
61. **ISO 21014** – Cryogenic vessels cryogenic insulation performance
62. **ISO 21028-1** – Cryogenic vessels toughness requirements for materials at cryogenic temperature part 1 temperatures below 80 degrees C
63. **ISO 21029-1** – Cryogenic vessels transportable vacuum insulated vessels of not more than 1000 litres volume part 1 design fabrication inspection and tests
64. **ISO 20421-1** – Cryogenic vessels large transportable vacuum insulated vessels part 1 design fabrication inspection and testing
65. **ISO 24490** – Cryogenic vessels pumps for cryogenic service
66. **ISO 14687** – Hydrogen fuel quality product specification
67. **ISO 23273** – Fuel cell road vehicles safety specifications protection against hydrogen hazards for vehicles fuelled with compressed hydrogen
68. **ISO 23828** – Fuel cell road vehicle energy consumption measurement part 1 vehicles fuelled with compressed hydrogen
69. **ISO/TR 11954** – Fuel cell road vehicles road maximum speed measurement
70. **ISO 6469-1** – Electrically propelled road vehicles safety specifications part 1 on board rechargeable energy storage systems (RESS)

71. **ISO 6469-2** – Electrically propelled road vehicles safety specifications part 2 vehicle operational safety
72. **ISO 6469-3** – Electrically propelled road vehicles safety specifications part 3 protection of persons against electric shock
73. **ISO 6469-4** – Electrically propelled road vehicles safety specifications part 4 post crash electrical safety requirements
74. **ISO/TR 8713** – Electrically propelled road vehicles vocabulary
75. **ISO 12619-1** – Road vehicles compressed gaseous hydrogen and hydrogen - methane blends fuel components Part 1: general requirements and definitions
76. **ISO 12619-2** – Road vehicles compressed gaseous hydrogen and hydrogen - methane blends fuel components Part 2: performance and general test methods
77. **ISO 12619-3** – Road vehicles compressed gaseous hydrogen and hydrogen - methane blends fuel components Part 3: pressure regulator
78. **ISO 12619-5** – Road vehicles compressed gaseous hydrogen and hydrogen - methane blends fuel components Part 5: manual cylinder valve
79. **ISO 12619-6** – Road vehicles compressed gaseous hydrogen and hydrogen - methane blends fuel components Part 6: automatic valve
80. **ISO 12619-7** – Road vehicles compressed gaseous hydrogen and hydrogen - methane blends fuel components Part 7: gas injector
81. **ISO 12619-8** – Road vehicles compressed gaseous hydrogen and hydrogen - methane blends fuel components Part 8: pressure indicator
82. **ISO 12619-9** – Road vehicles compressed gaseous hydrogen and hydrogen - methane blends fuel components Part 9: pressure relief valve
83. **ISO 12619-10** – Road vehicles compressed gaseous hydrogen and hydrogen - methane blends fuel components Part 10: pressure relief device
84. **ISO 12619-11** – Road vehicles compressed gaseous hydrogen and hydrogen - methane blends fuel components Part 11: excess flow valve
85. **ISO 12619-12** – Road vehicles compressed gaseous hydrogen and hydrogen - methane blends fuel components Part 12: gas tight housing & ventilation hoses
86. **ISO 12619-13** – Road vehicles compressed gaseous hydrogen and hydrogen - methane blends fuel components Part 13: rigid fuel line in stainless steel
87. **ISO 12619-14** – Road vehicles compressed gaseous hydrogen and hydrogen - methane blends fuel components Part 14: flexible fuel line

88. **ISO 12619-15** – Road vehicles compressed gaseous hydrogen and hydrogen - methane blends fuel components Part 15: filter
89. **ISO 12619-16** – Road vehicles compressed gaseous hydrogen and hydrogen - methane blends fuel components Part 16: fittings
90. **ISO 11114-1** – Gas cylinders compatibility of cylinder and valve materials with gas contents Part 1: metallic materials
91. **ISO 11114-2** – Gas cylinders compatibility of cylinder and valve materials with gas contents Part 2: non metallic materials
92. **ISO 11114-3** – Gas cylinders compatibility of cylinder and valve materials with gas contents Part 3: autogenous ignition test for non metallic materials in oxygen atmosphere
93. **ISO 11114-4** – Gas cylinders compatibility of cylinder and valve materials with gas contents Part 4: test methods for selecting metallic materials resistant to hydrogen embrittlement
94. **ISO 11114-5:2022** – Gas cylinders compatibility of cylinder and valve materials with gas contents Part 5: test methods for evaluating plastic liners
95. **ISO 11114-6:2022** – Gas cylinders compatibility of cylinder and valve materials with gas contents Part 6: oxygen pressure surge testing
96. **ISO 21087** – Gas analysis analytical methods for hydrogen fuel proton exchange membrane (PEM) fuel cell applications for road vehicles
97. **ISO 16110-1** – Hydrogen generators using fuel processing technologies safety
98. **ISO 16110-2** – Hydrogen generators using fuel processing technologies test method for performance
99. **ISO 16111** – Transportable gas storage devices hydrogen absorbed in reversible metal hydrides
100. **ISO 17268** – Gaseous hydrogen land vehicle refueling connection devices
101. **ISO 19880-1** – Gaseous hydrogen fueling station general requirements
102. **ISO 19880-2** – Gaseous hydrogen fueling station dispensers
103. **ISO 19880-3** – Gaseous hydrogen fueling stations part 3 valves
104. **ISO 19880-4** – Gaseous hydrogen fueling station compressors
105. **ISO 19880-5** – Gaseous hydrogen fueling station part 5 hoses
106. **ISO 19880-8** – Gaseous hydrogen fueling station part 8 hydrogen quality control
107. **ISO 19881** – Gaseous hydrogen land vehicle fuel containers

108. **ISO 19882** – Gaseous hydrogen thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers
109. **ISO/TS 19883** – Pressure swing adsorption system for hydrogen separation and purification
110. **ISO 19884** – Gaseous hydrogen cylinders and tubes for stationary storage
111. **ISO 22734** – Hydrogen generators using electrolysis process
112. **ISO 26142** – Hydrogen detection apparatus stationary applications
113. **ISO 19885-1** – Gaseous hydrogen fuelling protocols for hydrogen fuelled vehicles part 1 design and development process for fuelling protocols
114. **ISO 19885-2** – Gaseous hydrogen fuelling protocols for hydrogen fuelled vehicles part 2 definition of communications between the vehicles and dispenser control systems
115. **ISO 19885-3** – Gaseous hydrogen fuelling protocols for hydrogen fuelled vehicles part 3 high flow hydrogen fuelling protocols for heavy duty road vehicles
116. **ISO 19887-1:2024** – Gaseous hydrogen fuel system components for hydrogen fuelled vehicles part 1 land vehicles
117. **ISO 20088-1** – Determination of the resistance to cryogenic spillage of insulation materials part 1 liquid phase
118. **ISO 20088-2** – Determination of the resistance to cryogenic spill of insulation materials part 2 vapour exposure
119. **ISO 20088-3** – Determination of the resistance to cryogenic spillage of insulation materials part 3 jet release
120. **ISO 24078:2025** – Hydrogen in energy systems vocabulary
121. **ISO 26142:2010** – Hydrogen detection apparatus stationary applications
122. **ISO 24132:2024** – Ships and marine technology design and testing of marine transfer arms for liquefied hydrogen
123. **ISO 21266-1:2018** – Road vehicles compressed gaseous hydrogen (CGH2) and hydrogen - natural gas blends fuel systems part 1 safety requirements
124. **ISO 21266-2:2018** – Road vehicles compressed gaseous hydrogen (CGH2) and hydrogen - natural gas blends fuel systems part 2 test methods
125. **ISO 23273:2013** – Fuel cell road vehicles safety specifications protection against hydrogen hazards for vehicles fuelled with compressed hydrogen

126. **ISO 17081:2014** – Method of measurement of hydrogen permeation and determination of hydrogen uptake and transport in metals by an electrochemical technique
127. **ISO/DTR 19884-2** – Gaseous hydrogen pressure vessels for stationary storage part 2 material test data of class A materials
128. **ISO/DTR 19884-3** – Gaseous hydrogen pressure vessels for stationary storage part 3 pressure cycle test data
129. **ISO 19880-7:2025** – Gaseous hydrogen fuelling stations part 7 rubber O rings
130. **ISO 19880-9:2024** – Gaseous hydrogen fuelling stations part 9 sampling for fuel quality analysis
131. **ISO/TS 19870:2023** – Hydrogen technologies methodology for determining GHG emissions (production, conditioning, transport)
132. **ISO 19870-1** – Hydrogen technologies GHG emissions methodology part 1 production up to the production gate
133. **ISO 17268-1:2025** – Gaseous hydrogen land vehicle refuelling connection devices part 1 flow capacities ≤ 120 g/s
134. **ISO 22734-1:2025** – Hydrogen generators using water electrolysis part 1 safety
135. **ISO/TS 15916:2026** – Hydrogen technologies basic considerations for the safety of hydrogen systems

The following is only informative:

The following documents under development at different stages (PWI=preliminary work items, AWI= Approved work item, WD = working draft, CD=committee draft, DIS= Draft International Standard, , FDIS= Final Draft International Standard)

1. **ISO/CD 19885-2** – Gaseous hydrogen — Fuelling protocols for hydrogen-fuelled vehicles — Part 2: Definition of communications between the vehicle and dispenser control systems
2. **ISO/CD 19885-3** – Gaseous hydrogen – Fuelling protocols for hydrogen fuelled vehicles — Part 3: Hydrogen fuelling protocols for road vehicles
3. **ISO/DIS 13985** – Liquid hydrogen — Land vehicle fuel storage system
4. **ISO/WD 24925** – Cryo-compressed hydrogen refuelling protocol
5. **ISO/AWI 19888-1** – Hydrogen Technologies — Aerial Vehicles — Part 1: Liquid Hydrogen Fuel Storage System

6. **ISO/WD 26018** – Liquid hydrogen — Fuel system components for hydrogen fuelled vehicles
7. **ISO/WD 25578** – Liquid hydrogen — Land vehicle refuelling connection devices
8. **ISO/AWI 19880-11** – Gaseous hydrogen — Fuelling stations — Part 11: Part 11: High pressure Liquid Hydrogen Pumps
9. **ISO/DIS 19870-4** – Hydrogen technologies — Methodology for determining the greenhouse gas emissions associated with the hydrogen supply chain — Part 4: Emissions associated with the storage and transport of hydrogen via LOHC
10. **ISO/AWI 16110-2** – Hydrogen generators using fuel processing technologies — Part 2: Test methods for performance
11. **ISO/PWI 25666** – LH2 maritime terminals
12. **ISO/PWI 24926** – Hydrogen generators using metal oxidation
13. **ISO/PWI 24919** – Hydrogen energy storage power stations
14. **ISO/WD TS 22734-2** – Hydrogen generators using water electrolysis — Part 2: Testing guidance for performing electricity grid service
15. **ISO/CD TS 19889-1** – Hydrogen technologies — Interoperability — Part 1: Part 1: Interface between gaseous hydrogen trailer and hydrogen fuelling station
16. **ISO/CD 19887-2** – Gaseous Hydrogen — Fuel system components for hydrogen-fuelled vehicles — Part 2: Rail vehicles
17. **ISO/AWI 19886** – Hydrogen technologies — General hydrogen station requirements
18. **ISO/AWI 19885-4** – Gaseous hydrogen — Fuelling protocols for hydrogen fuelled vehicles — Part 4: Part 4: Validation of Hydrogen Fuelling Protocols Applied in a Dispenser
19. **ISO/DIS 19884-1** – Gaseous hydrogen — Pressure vessels for stationary storage — Part 1: General requirements
20. **ISO/AWI 19880-1** – Gaseous hydrogen — Fuelling stations — Part 1: General requirements
21. **ISO/PWI 19880-4** – Gaseous hydrogen – Fueling stations — Part 4: Compressors
22. **ISO/DIS 19870-2** – Hydrogen technologies — Methodology for determining the greenhouse gas emissions associated with the hydrogen supply chain — Part 2: Emissions associated with the conditioning and transport of gaseous and liquid hydrogen up to consumption gate

23. **ISO/DIS 19870-3** – Hydrogen technologies — Methodology for determining the greenhouse gas emissions associated with the hydrogen supply chain — Part 3: Emissions associated with the production, storage and transport of ammonia up to delivery gate and the conversion of ammonia into hydrogen
24. **ISO/DIS 17268-2** – Gaseous hydrogen land vehicle refuelling connection devices — Part 2: Flow capacities greater than 120 g/s

European norms (CEN/CENELEC) and directives

1. http://europa.eu/legislation_summaries/transport/rail_transport/tr0006_en.htm
2. Dangerous Substances Directive: **67/548/EEC**
3. Low Voltage Directive **(LVD) 2006/95/EC**
4. Electromagnetic Compatibility Directive **(EMC) 2004/108/EC**
5. Pressure Equipment Directive **(PED) 97/23/EC**
6. Simple Pressure Vessels Directive **(SPVD) 2009/105/EC**
7. Transportable Pressure Equipment Directive **(TPED) 1999/36/EC**
8. Gas Appliances Directive **2009/142/EC** – Includes fuel cells (where the primary function is heating)
9. Equipment and protective systems for potentially explosive atmosphere Directive **(ATEX 95) 94/9/EC**
10. Directive on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres **(ATEX 137) 99/92/EC**
11. Machinery Directive **(MD) 2006/42/EC**
12. **Seveso II Directive**
13. Directive **ATEX 2014/34/E**
14. **EU regulation (AFIR)** on Alternative Fuels Infrastructure Regulation, 2014
15. **Commission Regulation (EU) No 406/2010** of 26 April 2010 implementing Regulation **(EC) No 79/2009** of the European Parliament and of the Council on type-approval of hydrogen-powered motor vehicles.
16. **EU regulation 406/2010** Implementing **EC** Regulation **79/2009** on type-approval of hydrogen-powered motor vehicles **EU 2010**
17. Measures to encourage improvements in the safety and health of workers **89/391/EEC**
18. Personal protective equipment **Directive 89/686/EEC**

19. **EN 1251-1** – Cryogenic vessels — Transportable vacuum insulated vessels of not more than 1 000 litres volume — Part 1: Design, fabrication, inspection and tests
20. **EN17127** – Outdoor hydrogen refuelling points dispensing gaseous hydrogen and incorporating filling protocols.
21. **EN 16942** – Fuels — Identification of vehicle compatibility — Graphical expression for consumer information
22. **ENISO 4022** – Permeable sintered metal materials — Determination of fluid permeability **(ISO 4022:2018)**
23. **EN ISO 17268** – Gaseous hydrogen land vehicle refuelling connection devices.
24. **EN 17124** – Hydrogen fuel — Product specification and quality assurance — Proton exchange membrane **(PEM)** fuel cell applications for road vehicles
25. **EN 60204-1** – Safety of machinery - Electrical equipment of machines - Part 1 : general requirements.
26. **ATEX 114** "equipment" **Directive 2014/34/EU** - Equipment and protective systems intended for use in potentially explosive atmospheres.
27. **ATEX 137** "workplace" **Directive 1999/92/EC** - Minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres.
28. **ATEX 2014/34/EU:** Equipment intended for use in Potentially Explosive Atmospheres
29. **ATEX 1999/92/EC:** Minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres.
30. **EN 14373** – Explosion suppression systems
31. **EN 14460** – Explosion resistant equipment
32. **EN 14797** – Explosion venting devices
33. **EN 15089** – Explosion isolation systems
34. **EN 15233** – Methodology for functional safety assessment of protective systems for potentially explosive atmospheres
35. **EN 16020** – Explosion diverter
36. **EN 16009** – Flameless explosion venting devices
37. **EN 16447** – Explosion isolation flap valves
38. **CEN/TR 15281** – Guidance on inerting for the prevention of explosions
39. **EN ISO 16852** – Flame arresters. Performance requirements, test methods and limits for use

40. Inland transport of dangerous goods **Directive, 2008/68/EC**
41. **CLP (EC) 1272/2008**
42. **Low Voltage Directive 2014/35/EU**
43. **Electromagnetic Compatibility Directive (EMC) 2014/30/EU**
44. **Pressure Equipment Directive (PED) 2014/68/EU**
45. **Simple Pressure Vessels Directive (SPVD) 2014/29/EU**
46. **Transportable Pressure Equipment Directive (TPED) 2010/35/EU**
47. **Gas Appliances Regulation (EU) 2016/426**
48. **Equipment and protective systems for potentially explosive atmosphere ATEX 2014/34/EU**
49. **Directive on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres (ATEX 137) 99/92/EC**
50. **Machinery Regulation (EU) 2023/1230**
51. **Seveso III 2012/18/EU**
52. **Directive ATEX 2014/34/E**
53. **EU regulation on Alternative fuels infrastructure 2023/1804**
54. **The Electromagnetic Compatibility Directive: EMC 2014/30/EU**
55. **EU regulation 2019/2144** – Type-approval requirements motor vehicles – general safety
56. **Measures to encourage improvements in the safety and health of workers 89/391/EEC**
57. **Personal protective equipment regulation EU 2016/425**
58. **EN ISO 24078:2025** – Hydrogen in energy systems — Vocabulary
59. **EN ISO 22734 1:2025** – Hydrogen generators using water electrolysis — Part 1: Safety
60. **CEN ISO/TS 15916:2026** – Hydrogen technologies — Basic considerations for the safety of hydrogen systems

<u>The following is only informative:</u>

The following documents under development at different stages (preEN: pre-norm or draft European Standard (Draft EN).

1. **prEN ISO 17268-2** Gaseous hydrogen land vehicle refuelling connection devices - Part 2: Flow capacities greater than 120 g/s (ISO/DIS 17268-2:2026)

2. **prEN XXX** Specifications for gaseous hydrogen refuelling points for maritime and inland waterways vessels
3. **prEN ISO 25578** Liquid hydrogen — Land vehicle refuelling connection devices
4. **prCEN/TS** Hydrogen Gas Safety in Enclosed Spaces
5. **FprEN ISO 19870-1** Hydrogen technologies - Methodology for determining the greenhouse gas emissions associated with the hydrogen supply chain - Part 1: Emissions associated with the production of hydrogen up to the production gate (**ISO/FDIS 19870-1:2026**)
6. **prEN ISO 19870-3** Hydrogen technologies - Methodology for determining the greenhouse gas emissions associated with the hydrogen supply chain - Part 3: Emissions associated with the production, storage and transport of ammonia up to delivery gate and the conversion of ammonia into hydrogen (**ISO/DIS 19870-3:2026**)
7. **prEN ISO 19870-2** Hydrogen technologies - Methodology for determining the greenhouse gas emissions associated with the hydrogen supply chain - Part 2: Emissions associated with the conditioning and transport of gaseous and liquid hydrogen up to consumption gate (**ISO/DIS 19870-2:2026**)

Society of Automotive Engineers (SAE)

1. **SAE AS 6858 / EUROCAE** – Installation of Fuel Cell Systems in Large Civil Aircraft
2. **SAE-air-6464-eurocae-working-group-80-SAE-ae-7afc** – Hydrogen fuel cells
3. **SAE J1766** – Recommended practice electric and hybrid electric vehicle
4. **SAE J2760** – Pressure terminology used fuel cells and other hydrogen
5. **SAE J29901** – Hydrogen and fuel cell vehicle first and second responder
6. **SAE J3089** – Vehicular hydrogen sensor test method
7. **SAE J3219** – Hydrogen fuel quality screening test chemicals fuel cell
8. **SAE J2572** – Measuring exhaust emissions energy consumption and range
9. **SAE J2574** – Fuel cell electric vehicle terminology
10. **SAE J2594** – Design recycling proton exchange membrane **(PEM)** fuel cell
11. **SAE J2600** – Compressed hydrogen vehicle fueling connection devices
12. **SAE J2601** – Fueling protocols light duty gaseous hydrogen surface
13. **SAE J26012** – Fueling protocols heavy duty gaseous hydrogen surface
14. **SAE J26013** – Fueling protocols gaseous hydrogen powered industrial
15. **SAE J26014** – Ambient temperature fixed orifice fueling

16. **SAE J2719** – Hydrogen fuel quality fuel cell vehicles
17. **SAE J27191** – Application guideline use hydrogen fuel quality
18. **SAE J2799** – 70 MPa compressed hydrogen surface vehicle refueling
19. **SAE J2615** – Performance test procedures fuel cell systems automotive
20. **SAE J2616** – Performance test procedures fuel processor subsystem
21. **SAE J2617** – Performance test procedure PEM fuel cell stack subsystem
22. **SAE J2719201109** – Hydrogen fuel quality fuel cell vehicles
23. **SAE 7373** – Gaseous hydrogen storage general aviation
24. **SAE 6679** – Liquid hydrogen storage aviation
25. **SAE AIR6464** – EUROCAE/SAE WG80/AE-7AFC Hydrogen Fuel Cells Aircraft Fuel Cell Safety Guidelines
26. **SAE AS 6858 / EUROCAE** Installation of Fuel Cell Systems in Large Civil Aircraft
27. **SAE J2579:** – Standard for Fuel Systems in Fuel Cell and Other Hydrogen Vehicles
28. **SAE J2578:** – General fuel cell vehicle safety U.S
29. **SAE AIR 6464 EUROCAE** Working Group 80
30. **SAE AE 7AFC** – Hydrogen Fuel Cells Aircraft Fuel Cell Safety Guidelines
31. **SAE AS 6858** – Installation of Fuel Cell Systems in Large Civil Aircraft
32. **Fuel Cell Standards Committee** - Safety Working Group
33. **SAE J1766** – Recommended Practice for Electric and Hybrid Electric Vehicle Battery Systems Crash Integrity Testing
34. **SAE J2760** – Pressure Terminology Used in Fuel Cells and Other Hydrogen Vehicle Applications
35. **SAE J2990/1** – Hydrogen and Fuel Cell Vehicle First and Second Responder Recommended Practice
36. **SAE J3089** – Vehicular Hydrogen Sensor Test Method
37. **SAE J3219** – Hydrogen Fuel Quality Screening Test of Chemicals for Fuel Cell Vehicles
38. **SAE J2572** – Measuring the Exhaust Emissions, Energy Consumption and Range of Fuel Cell Powered Electric Vehicles Using Compressed Hydrogen
39. **SAE J2574** – Fuel Cell Electric Vehicle Terminology
40. **SAE J2594** – Design for Recycling Proton Exchange Membrane **(PEM)** Fuel Cell Systems
41. **Fuel Cell Standards Committee** - Interface Working Group

42. **SAE J2600** – Compressed Hydrogen Vehicle Fueling Connection Devices (defines geometries of receptacles for different pressure levels)
43. **SAE J2601** – Fueling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles
44. **SAE TIR J2601/2** – Fueling Protocols for Heavy Duty Gaseous Hydrogen Surface Vehicles (buses)
45. **SAE TIR J2601/3** – Fueling Protocols for Gaseous Hydrogen Powered Industrial Trucks (forklifts)
46. **SAE J2601/4** – Ambient Temperature Fixed Orifice Fueling
47. **SAE J2601/5_202502** – High-Flow Prescriptive Fueling Protocols for Gaseous Hydrogen Powered Medium and Heavy-Duty Vehicles
48. **SAE J2719** – Hydrogen Fuel Quality for Fuel Cell Vehicles
49. **SAE J2719/1** – Application Guideline for Use of Hydrogen Fuel Quality Specification
50. **SAE J2799** – 70 **MPa** Compressed Hydrogen Surface Vehicle Refueling Connection Device and Optional Vehicle to Station Communication
51. **SAE J2615** – Performance Test Procedures of Fuel Cell Systems For Automotive Applications
52. **SAE J2616** – Performance Test Procedures for the Fuel Processor Subsystem of Automotive Fuel Cell System.
53. **SAE J2617** – Performance Test Procedure of **PEM** Fuel Cell Stack Subsystem for Automotive application.
54. **SAE J2719:201109** – Hydrogen Fuel Quality for Fuel Cell Vehicles
55. **SAE J3089-2018** – Characterization of On-Board Vehicular Hydrogen Sensors.
56. **SAE AS 7373** – Gaseous Hydrogen for Storage for General Aviation
57. **SAE AS 6679** – Liquid Hydrogen for Storage for Aviation
58. **European Organization for Civil Aviation Equipment (EUROCAE) / Society of Automotive Engineers (SAE)**
59. **EUROCEA / AIR 6464 SAE AIR 6464 EUROCAE WG80 / SAE AE-7AFC** – Hydrogen Fuel Cells Aircraft Fuel Cell Safety Guidelines
60. **EUROCEA / AS 6858 SAE AS 6858 EUROCAE / SAE** – Installation of Fuel Cell Systems in Large Civil Aircraft

Compressed Gas Association (CGA)

1. CGA C-6.4: – Methods for External Visual Inspection of Natural Gas Vehicle (NGV) and Hydrogen Vehicle (HV) Fuel Containers and Their Installation
2. **CGA C-21:** – Design, Qualification and Testing for Pressure Vessels for Portable, Reversible Metal Hydride Systems
3. **CGA G-5:** – Hydrogen
4. **CGA G-5.3:** – Commodity Specification for Hydrogen
5. **CGA G-5.4:** – Standard for Hydrogen Piping Systems at Consumer Sites
6. **CGA G-5.5:** – Hydrogen Vent Systems
7. **CGA G-5.6:** – Hydrogen Pipeline Systems
8. **CGA G-5.8** – High-Pressure Hydrogen Piping Systems at Consumer Location.
9. **CGA G-4.15:** – Vacuum-Jacketed Piping in Liquid Oxygen Service standard by Compressed Gas Association
10. **CGA H-3:** – Cryogenic Hydrogen Storage
11. **CGA H-4:** – Terminology Associated with Hydrogen Fuel Technologies
12. **CGA H-5:** – Installation Standard for Bulk Hydrogen Supply Systems
13. **CGA H-7,** – Standard Procedures for Hydrogen Supply Systems
14. **CGA H-10:** – Combustion Safety for Steam Reformer Operation
15. **CGA H-11:** – Safe Start up and Shutdown Practices for Steam Reformers
16. **CGA H-12:** – Mechanical Integrity of Syngas Outlet Systems
17. **CGA H-13:** – Safe Start up and Shutdown Practices for Steam Reformers Hydrogen Pressure Swing Adsorber (PSA) Mechanical Integrity Requirements
18. **CGA H-14:** – HYCO Plant Gas Leak Detection and Response Practices
19. **CGA H-15:** – Safe Catalyst Handling in HYCO Plants
20. **CGA H-16:** – Guideline on Remedial Actions for HYCO Plant Components Subject to High Temperature Hydrogen Attack
21. **CGA H-17,** – Small Scale Hydrogen Production
22. **H-18** – Safe Operation of Hydrogen, Carbon Monoxide, and Syngas Pipeline Systems
23. **CGA P-6:** – Standard Density Data, Atmospheric Gases and Hydrogen
24. **CGA P-8.3:** – Perlite Management
25. **CGA P-8.7** – Safe Location of Oxygen, Nitrogen, and Argon Gas Vents.
26. **CGA P-12:** – Safe Handling of Cryogenic Liquids
27. **CGA P-28:** – Risk Management Plan Guidance Document For Bulk Liquid Hydrogen Systems

28. **CGA P-30:** – Guideline for portable cryogenic liquid containers – Use, care and disposal.
29. **CGA P-31:** – Liquid Oxygen, Nitrogen, and Argon Cryogenic Tanker Loading System Guide
30. **CGA P-35:** – Guidelines for Unloading Tankers of Cryogenic Oxygen, Nitrogen, and Argon
31. **CGA P-40:** – Calculation Method for the Analysis and Prevention of Overpressure During Refilling of Cryogenic Tanks with Rupture Disk(s)
32. **CGA P-41:** – Locating Bulk Liquid Storage Systems in Courts
33. **CGA P-48:** – Reciprocating Cryogenic Pumps and Pump Installations for Oxygen, Argon, and Nitrogen
34. **CGA P-56:** – Cryogenic Vaporization Systems-Prevention Of Brittle Fracture Of Equipment And Piping **(EIGA Doc 133/05)**
35. **CGA P-59:** – Prevention of Excessive Pressure During Filling of Cryogenic Vessels
36. **CGA P-75:** – Standard for Proper Handling of Insulated Tanks that are in Obvious Signs of Loss of Vacuum
37. **CGA P-96:** – Reciprocating Cryogenic Pumps and Pump Installations for Hydrogen and Liquefied Natural Gas
38. **CGA S-1.1:** – Pressure Relief Device Standards-Part 1-Cylinders for Compressed Gases
39. **CGA S-1.2:** – Pressure Relief Device Standards-Part 2-Portable Containers for Compressed Gases
40. **CGA S-1.3:** – Pressure Relief Device Standards-Part 3-Stationary Storage Containers for Compressed Gases
41. **CGA C-6.4** – Methods for External Visual Inspection of Natural Gas Vehicle (NGV) and Hydrogen Vehicle (HV) Fuel Containers and Their Installation
42. **CGA C-21** – Design, Qualification and Testing for Pressure Vessels for Portable, Reversible Metal Hydride Systems
43. **CGA P-28** – Risk Management Plan Guidance Document For Bulk Liquid Hydrogen Systems
44. **CGA V-6:** – Standard Cryogenic Liquid Transfer Connections
45. **CGA TM-13:** – eLearning: Putting a Hydrogen Supply System Into and Out of Service
46. **CGA TM-14:** – eLearning: Hydrogen Emergency Response

47. **CGA TM-15:** – eLearning: Hydrogen Leak Prevention, Detection, and Repair

European Industrial Gases Association (EIGA)

1. **DOC 1320** – Oxygen-pipeline-and-piping-systems
2. **DOC 3318** – Cleaning-of-equipment-for-oxygen-service
3. **DOC 75** – Methodology for Determination of safety distances
4. **DOC 13** – Oxygen Pipeline and Piping Systems
5. **DOC 33** – Cleaning of Equipment for Oxygen Service
6. **DOC 7** – Metering of cryogenic liquids
7. **DOC 41** – Guidelines for sea transport of MEGCs and portable tanks for gases
8. **DOC 151** – Prevention of excessive pressure during filling cryogenic vessels
9. **DOC 251** – Overview of Hydrogen Production Methods
10. **DOC 250** – Standard Procedures for Hydrogen Supply Systems
11. **DOC 247** – Hydrogen Overview - Distribution-Storage-Applications
12. **DOC 246** – Guideline for Small Scale Hydrogen Production
13. **DOC 244** – Reciprocating Cryogenic Pumps and Pump Installations for Hydrogen and Liquified Natural Gas
14. **DOC 243** – Guideline on Remedial Actions for HYCO Plant Components Subject to High Temperature Hydrogen Attack
15. **DOC 242** – Safety of Hydrogen, HyCO production and Carbon Capture
16. **DOC 235** – Industrial Gas Pipeline Integrity Management
17. **DOC 220** – Environmental Guidelines for Permitting Hydrogen plants producing less than 2 tonnes per day
18. **DOC 215** – HYCO Plant Gas Leak Detection and Response Practices
19. **DOC 211** – Hydrogen Vent Systems for Customer Applications
20. **DOC 210** – Hydrogen Pressure Swing Adsorber (PSA) Mechanical Integrity Requirements
21. **DOC 204** – Code of Practice – Hydrogen Selenide
22. **DOC 185** – Safe Start Up and Shutdown Practices for Steam Reformers
23. **DOC 186** – Guideline for Process Safety Management
24. **DOC 171** – Storage of Hydrogen in Systems Located Underground
25. **DOC 155** – Best Available Techniques for Hydrogen Production by Steam Methane Reforming

26. **DOC 121** – Hydrogen Pipeline Systems
27. **DOC 102** – Safety Audit / Assessment Tool – Hydrogen Compression, Purification and Cylinder Filling
28. **DOC 100** – Hydrogen Cylinders and Transport Vessels
29. **DOC 15** – Gaseous Hydrogen Installations
30. **DOC 6** – Safety in Storage, Handling and Distribution of Liquid Hydrogen
31. **DOC 051** – Hydrogen Interface for Trailer to Hydrogen Refueling Station
32. **EIGA DOC 24/18** – Vacuum insulated cryogenic storage tank systems pressure protection devices.
33. **DOC 59/98/E** – Prevention of excessive pressure in cryogenic tanks during filling.
34. **DOC 77/01/E** – Protection of cryogenic transportable tanks against excessive pressure during filling.
35. **DOC 114/03/E** – Operation of static cryogenic vessels.
36. **DOC 121/14** – Hydrogen pipeline systems.
37. **DOC 122/18** – Environmental impacts of hydrogen plants.
38. **DOC 134/21** – Potentially explosive atmospheres **EU Directive 1999/92/EC**.
39. **DOC 151/23** – Prevention of excessive pressure during filling of cryogenic vessels.

International Electrotechnical Commission (IEC)

1. **IEC 63341-1** – Railway applications rolling stock fuel cell systems
2. **IEC 63341-2** – Railway applications rolling stock fuel cell systems
3. **IEC 62282-6-401** – Micro fuel cell power systems power
4. **IEC/TS 62282-8-301** – Energy storage systems using fuel cell modules
5. **IEC 62282-2-100** – Fuel cell modules
6. **IEC 62282-3-100** – Stationary fuel cell power systems safety
7. **IEC 62282-3-200** – Test method performance stationary fuel cell power
8. **IEC 62282-3-201** – Small stationary polymer electrolyte fuel cell power
9. **IEC 62282-3-300** – Stationary fuel cell power systems installation
10. **IEC 62282-3-400** – Stationary fuel cell power systems small stationary
11. **IEC 62282-4-101** – Fuel cell power systems propulsion other road
12. **IEC 62282-4-102** – Fuel cell power systems industrial electric trucks
13. **IEC 62282-4-202** – Fuel cell power system unmanned aircraft systems
14. **IEC 62282-4-600** – Fuel cell and battery hybrid power pack systems

15. **IEC 62282-5-100** – Portable fuel cell appliances safety
16. **IEC 62282-6-100** – Micro fuel cell power system safety
17. **IECpas 62282-6-150** – Micro fuel cell power systems safety water
18. **IEC 62282-6-200** – Micro fuel cell power systems performance
19. **IEC 62282-6-300** – Micro fuel cell power system fuel cartridge
20. **IEC/TS 62282-7-2** – Single cell and stack performance test methods solid
21. **IEC/TS 62282-8-102** – Energy storage systems using fuel cell modules
22. **IEC/TS 62282-8-201** – Energy storage systems using fuel cell modules
23. **IEC/TS 62282-9-101** – Evaluation methodology environmental performance
24. **IEC/TS 62282-9-102** – Evaluation methodology environmental performance
25. **IEC 62282-6-401** – Micro fuel cell power systems power and
26. **IEC 62282-4-1000** – Fuel cell power systems rolling stock performance
27. **IEC/TS 62282-1** – Terminology
28. **IEC 62282-6-400** – Micro fuel cell power systems power and
29. **IEC/TS 62282-7-1** – Single cell test method polymer electrolyte fuel
30. **IEC/TS 62282-8-101** – Energy storage systems using fuel cell modules
31. **IEC 62932-1** – Flow battery systems stationary applications part 1
32. **IEC 62932-2-1** – Flow battery systems stationary applications part 2 1
33. **IEC 62932-2-2** – Flow battery systems stationary applications part 2 2
34. **IEC 62932-2-3** – Flow battery systems stationary applications
35. **IEC 60079-29-1** – Explosive atmospheres part 29 1 gas detectors
36. **IEC 60079-29-2** – Explosive atmospheres part 29 2 gas detectors
37. **IEC 60079-10-1:** – Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres
38. **IEC 60079-10.2:** – Classification of areas - Combustible dust atmospheres
39. **IEC 63341-1** – Railway applications – Rolling stock – Fuel cell systems for propulsion -Part 1: Fuel cell power system
40. **IEC 63341-2** – Railway applications – Rolling stock – Fuel cell systems for propulsion -Part 2: Hydrogen storage system
41. **IEC 62282-6-401** – Micro Fuel Cell Power Systems – Power, data, interchangeability and performance test methods for laptop computers

42. **IEC/TS 62282-8-301** – Energy storage systems using fuel cell modules in reverse mode – Power to methane energy systems based on solid oxide cell including reversible operation – Performance test method
43. **IEC 62282-2-100** – Fuel Cell Modules
44. **IEC 62282-3-100** – Stationary Fuel Cell Power Systems - Safety
45. **IEC 62282-3-200** – Test Method for the Performance of Stationary Fuel Cell Power Plants
46. **IEC 62282-3-201** – Small stationary polymer electrolyte fuel cell power system – Performance test method
47. **IEC 62282-3-300** – Stationary Fuel Cell Power Systems - Installation
48. **IEC 62282-3-400** – Stationary fuel cell power systems - Small stationary fuel cell power systems with combined heat and power output
49. **IEC 62282-4-101** – Fuel cell power systems for propulsion other than road vehicles and auxiliary power units (APU) - Safety of electrically powered industrial trucks
50. **IEC 62282-4-102** – Fuel cell power systems for industrial electric trucks - Performance test methods
51. **IEC 62282-4-202** – Fuel Cell Power System for Unmanned Aircraft Systems – Performance test method
52. **IEC 62282-4-600** – Fuel cell and battery hybrid power pack systems for excavators - Performance test methods
53. **IEC 62282-5-100** – Portable Fuel Cell Appliances - Safety
54. **IEC 62282-6-100** – Micro Fuel Cell Power System - Safety
55. **IEC 62282-6-106:2024** – Fuel cell technologies. Part 6-106: Micro fuel cell power systems -Safety - Indirect Class 8 (corrosive) compounds.
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58. **IEC 62282-6-300** – Micro Fuel Cell Power System - Fuel Cartridge Interchangeability
59. **IEC TS 62282-7-2** – Single Cell and Stack Performance Test Methods for Solid Oxide Fuel Cells
60. **IEC/TS 62282-8-102** – Energy storage systems using fuel cell modules in reverse mode – **PEM** single cell and stack performance including reversing operation

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73. **IEC 62932-2-2** – Flow Battery Systems for Stationary Applications – Part 2-2 Safety Requirements
74. **IEC 62932-2-3** – Flow Battery Systems for Stationary Applications – Installation requirements
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76. **IEC 60079-29-2** – Explosive atmospheres – Part 29-2: Gas detectors- Selection, installation, use and maintenance of detectors for flammable gases and oxygen

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2. **NFPA 2** – Hydrogen Technologies Code
3. **NPR 8099** – on Hydrogen fuelling stations – Guide for safe application of installations for delivery of hydrogen to vehicles and boats with respect to fire, workplace and environment. (NEN standard)
4. **NFPA 67** – Guide on Explosion Protection for Gaseous Mixtures in Pipe Systems
5. **NFPA 68** – Standard on Explosion Protection by Deflagration Venting
6. **NFPA 69** – Standard on Explosion Prevention Systems
7. **NFPA 30A** – Code for Motor Fuel Dispensing Facilities and Repair Garages
8. **NFPA 497** – Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas Deflagration Venting
9. **NFPA 70 Article 692** – National Electrical Code - Fuel Cell Systems
10. **NFPA 110** – Emergency and Standby Power Systems
11. **NFPA 853** – Installation of Stationary Fuel Cell Power Plants
12. **NFPA 855** – Standard for the Installation of Stationary Energy Storage Systems
13. **NFPA 55** – Compressed Gases and Cryogenic Fluids Code.
14. **NFPA 50A** – Standard for Gaseous Hydrogen Systems at Consumer Sites.
15. **NFPA 50B** – Standard for Liquefied Hydrogen Systems at Consumer Sites.
16. **NFPA 221** – Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls.
17. **NFPA 853** – Standard for the Installation of Stationary Fuel Cell Power Systems.

Publication Series on Hazardous Substances (PGS)-35

1. **PGS 35** Guidelines “Hydrogen: installations for delivery of hydrogen to road vehicles”. Hazardous Substances Publication Series 35.

American Society of Mechanical Engineers (ASME)

1. **ASME STP-PT-006** – Design Guidelines for Hydrogen Piping and Pipelines ASME Boiler and Pressure Vessel Code
2. **ASME STP-PT-006** – Design Guidelines for Hydrogen Piping and Pipelines
3. **ASME B31.12** – Hydrogen Piping and Pipelines (American Society of Mechanical Engineers) [Note: B31.12 will be superseded by B31.3 en B31.8]
4. **ASME B31.3** – Process Piping (American Society of Mechanical Engineers)

5. **American Society of Mechanical Engineers**
6. **ASME B31.1** – Power Piping
7. **ASME B31.4** – Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids
8. **ASME B31.8** – Gas Transmission and Distribution Piping Systems
9. **ASME B31.8S** – Managing System Integrity of Gas Pipelines
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11. **ASME BPVC Section VIII, Division 2** – Rules for Construction of Pressure Vessels Division 2, Alternate Rules
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17. **ASME STP-PT-017-2008** – Properties for Composite Materials in Hydrogen Service.

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Underwriters Laboratories (UL)

2. **ANSI/NACE TM0284-2016** – Evaluation of Pipeline and Pressure Vessel Steels for Resistance
3. **UL Subject 1741** – Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
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5. **UL Subject 2262** – Fuel Cell Modules for Use in Portable and Stationary Equipment
6. **UL Subject 2262A** – Borohydride Fuel Cartridges with Integral Fuel Processing for Use with Portable Fuel Cell Power Systems or Similar Equipment
7. **UL Subject 2264 B** – Hydrogen Generators Using Water Reaction
8. **UL Subject 2264 D** – Portable Water Electrolysis Type Hydrogen Generators

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3. **ASTM D7550-09** (Withdrawn 2017) – Standard Test Method Standard for Determination of Ammonium, Alkali and Alkaline Earth Metals in Hydrogen and Other Cell Feed gases by Ion Chromatography
4. **ASTM D7606 - 24** – Standard Practice for Sampling of High-Pressure Hydrogen and Related Fuel Cell Feed Gases
5. **ASTM D7634 - 17** (2017) – Standard Test Method for Visualizing Particulate Sizes and Morphology of Particles Contained in Hydrogen Fuel by Microscopy
6. **ASTM D7649-19** – Standard Test Method for Determination of Trace Carbon Dioxide, Argon, Nitrogen, Oxygen and Water in Hydrogen Fuel by Jet Pulse Injection and Gas Chromatography/Mass Spectrometer Analysis
7. **ASTM D7650-21** – Standard Test Method for Sampling of Particulate Matter in High Pressure Hydrogen used as Gaseous Fuel with an In-Stream Filter
8. **ASTM D7651 - 24** – Standard Test Method for Gravimetric Measurement of Particulate Concentration of Hydrogen Fuel
9. **ASTM D7652 - 11** – Hydrogen Sulfide, Carbonyl Sulfide, Methyl Mercaptan, Carbon Disulfide and Total Sulfur in Hydrogen
10. **ASTM D7653 - 24** – Standard Test Method for Determination of Trace Gaseous Contaminants in Hydrogen Fuel by Fourier Transform Infrared (FTIR) Spectroscopy

11. **ASTM D7676-23** – Standard Practice for Screening Organic Halides Contained in Hydrogen or Other Gaseous Fuels
12. **ASTM D7941/7941M-14** – Standard Test Method for Hydrogen Purity Analysis Using a Continuous Wave Cavity Ring-Down Spectroscopy Analyzer
13. **ASTM D7675-22** – Standard Test Method for the Determination of Total Hydrocarbons in Hydrogen by FID Based Total Hydrocarbon (THC) Analyzer
14. **ASTM D7892-22** – Standard Test Method for Determination of Total Organic Halides, Total Non-Methane Hydrocarbons and Formaldehyde in Hydrogen Fuel by Gas Chromatography (GC) and Mass Spectrometry (MS)
15. **ASTM Committee F07** on Aerospace and Aircraft / Committee F07.04 Hydrogen Embrittlement
16. **ASTM F326-23** – Standard Test Method for Electronic Measurement For Hydrogen Embrittlement from Cadmium-Electroplating Processes
17. **ASTM F519-23** – Standard Test Method for Mechanical Hydrogen Embrittlement Evaluation of Plating/Coating Processes and Service Environments
18. **ASTM F1113-87** (2017) – Standard Test Method for Electrochemical Measurement of Diffusible Hydrogen in Steel
19. **ASTM F1459-06** (2024) – Standard Test Method for Determination of the Susceptibility of Metallic Materials to Hydrogen Gas Embrittlement
20. **ASTM F1624-12** (2024) – Standard Test Method for Measurement of Hydrogen Embrittlement Threshold in Steel by the Incremental Step Loading Technique
21. **ASTM F2078-22** – Standard Terminology Relating to Hydrogen Embrittlement Testing
22. **ASTM WK17123** – Test Method for Carbon Monoxide ChemISOrption on Supported Platinum on Alumina Catalysts Using Dynamic Flow Method
23. **ASTM Committee F38** on Unmanned Aircraft Systems / Committee F38.01 Airworthiness
24. **ASTM WK 60937** – Design of Fuel Cells for Use in Unmanned Aircraft Systems
25. **ASTM A962/A962M-23a** – Standard Specification for Common Requirements for Steel Fasteners or Fastener Materials, or Both, Intended for Use at Any Temperature from Cryogenic to the Creep Range
26. **ASTM C740-97** (2019) – Standard Practice for Evacuated Reflective Insulation in Cryogenic Service

CSA America

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2. **CSA HGV-52** – Compact hydrogen fueling systems
3. **CSA FC4** / **CSA C22.2 No. 22734** – Hydrogen generators using water
4. **ANSI/CSA CHMC-1** – Test method evaluating material compatibility
5. **CSA CHMC2** – Test method evaluating material compatibility compressed
6. **ANSI/CSA FC1-2014** (IEC 62282-3-100:2012,MOD)(formerly ANSI Z21.83) – Fuel cell
7. **ANSI/CSA FC3** – Portable fuel cell power systems
8. **CSA FC5** – Hydrogen generators using fuel processing technologies part 1
9. **ANSI/CSA FC6** – Fuel cell modules
10. **CSA HGV2** – Standards hydrogen vehicle fuel containers
11. **ANSI/CSA HGV3.1** – Fuel system components hydrogen gas powered vehicles
12. **CSA HGV4.1** – Hydrogen dispensers
13. **CSA HGV4.2** – Hose and hose assemblies hydrogen vehicles and dispensing
14. **CSA HGV4.3** – Fueling parameters hydrogen dispensing system
15. **CSA HGV4.4** – Gaseous hydrogen fueling stations valves
16. **CSA HGV4.6** – Manually operated valves used gaseous hydrogen vehicle
17. **CSA HGV4.7** – Automatic pressure operated valves use gaseous hydrogen
18. **CSA HGV4.8** – Hydrogen gas vehicle fueling stations compressor guidelines
19. **CSA HGV4.9** – Fueling system guideline
20. **CSA HGV4.10** – Performance fittings compressed hydrogen gas and hydrogen
21. **CSA HPIT1** – Compressed hydrogen powered industrial trucks (forklifts)
22. **CSA HPIT2** – Dispensing systems and components fueling hydrogen powered
23. **CSA HPRD1** – Basic requirements pressure relief devices compressed
24. **CSA SPE-213** – Best practices defueling decommissioning and disposal
25. **CSA HGV 19880-3** – Gaseous Hydrogen – Fueling stations - Valves
26. **CSA HGV 5.2** – Compact Hydrogen Fueling Systems
27. **CSA FC4** / **CSA C22.2 No. 22734** – Hydrogen Generators using Water Electrolysis - Industrial, Commercial and Residential Applications
28. **ANSI/CSA CHMC 1** – Test Method for Evaluating Material Compatibility in Compressed Hydrogen Applications – Phase I - Metals
29. **CSA CHMC2** – Test Method for Evaluating Material Compatibility in Compressed Hydrogen Applications – Phase 2 – Polymers

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34. **CSA HGV2** – Standards for Hydrogen Vehicle Fuel Containers
35. **ANSI/CSA HGV3.1** – Fuel System Components for Hydrogen Gas Powered Vehicles
36. **CSA HGV4.1** – Hydrogen Dispensers
37. **CSA HGV4.2** – Hose and Hose Assemblies for Hydrogen Vehicles and Dispensing Systems
38. **CSA HGV4.3** – Fueling Parameters for Hydrogen Dispensing System
39. **CSA HGV4.4** – Gaseous Hydrogen – Fueling Stations - Valves
40. **CSA HGV4.8** – Hydrogen Gas Vehicle Fueling Stations Compressor Guidelines
41. **CSA HGV4.9** – Fueling System Guideline
42. **CSA/ANSI HGV 5.2-2024** – Compact hydrogen fuelling systems.
43. **CSA/ANSI HPRD 1:21** – Basic Requirements for Pressure Relief Devices for Compressed Hydrogen Vehicle Fuel Containers.
44. **CSA/ANSI B107-2024** – Enclosed hydrogen equipment – Safety.
45. **CSA HGV4.10** – Performance of Fittings for Compressed Hydrogen Gas and Hydrogen Rich Gas Mixtures
46. **CSA HPIT1** – Compressed Hydrogen Powered Industrial Trucks (forklifts) On- Board Fuel Storage and Handling Components
47. **CSA HPIT2** – Dispensing systems and components for fueling hydrogen powered industrial trucks
48. **CSA HPRD1** – Basic Requirements for Pressure Relief Devices for Compressed Hydrogen Vehicle Fuel Containers
49. **CSA SPE – 2.1.3** – Best practices for defueling, decommissioning, and disposal of compressed hydrogen gas vehicle fuel containers

Others

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2. /code-federal-regulations-49-cfr-parts-171-173-and-175-transport-micro
3. /ec-no792009-type-approval-hydrogen-powered-motor-vehicles

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5. http://www.imo.org/environment/mainframe.asp?topic_id=995
6. http://www.unece.org/trans/danger/publi/adr/adr_e.html
7. http://www.otif.org/en/law.htmlhttp://www.unece.org/trans/danger/publi/adn/adn_e.htmlhttp://www.imo.org/safety/mainframe.asp?topic_id=158/ieee-p15479-guide-using-ieee-standard-1547-interconnection-energy/ansiisa-60078-29-1-121301-2003-explosive-atmospheres-part-29-1-gas International Fire code, by International Code Council.
8. **GTR No.13** – Global Technical Regulation (GTR) on hydrogen and fuel cell vehicles.
9. **OSHA 29 CFR 1910.103** – 29 CFR 1910 Subpart H – Hazardous Materials
10. **Code of Federal Regulations 49 CFR Parts 171, 173 and 175** – Transport of Micro Fuel Cells on Passenger Aircraft
11. **JARI S001** – Technical standard for containers of compressed hydrogen vehicle fuel devices
12. **IGF International Code of Safety for Ships Using Gases or Other Low-flashpoint Fuels: Part E**
13. **IGC Code,** produced by the IMO International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code)
14. **ADR** – **UNECE** Agreement concerning the International Carriage of Dangerous Goods by Road
15. **RID** – The European Agreement on the International Carriage of Dangerous Goods by Rail. The regulations appear as Appendix C to the Convention concerning International Carriage by Rail (COTIF) concluded at Vilnius on 3 June 1999
16. **ADN** – The European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways concluded at Geneva on 26 May 2000
17. **The International Maritime Dangerous Goods (IMDG) Code** – Covers the transport of dangerous goods by sea
18. **UN Recommendations on the Transport of Dangerous Goods, Model Regulations.** These are updated every two years. Recommendations relevant to hydrogen are UN 1049 (Hydrogen, Compressed), UN 1066 (Hydrogen, refrigerated liquid) and UN 3468 (hydrogen in a metal hydride storage system)
19. **IEEE P1547.9** – Guide to Using IEEE Standard 1547 for Interconnection of Energy Storage Distributed Energy Resources with Electric Power Systems

20. **ANSI/ISA-60078-29-1** – Explosive Atmospheres Part 29-1: Gas detectors - Performance requirements of detectors for flammable Gases
21. **UNECE R134,** – Uniform provisions concerning the approval of motor vehicles and their components with regard to the safety-related performance of hydrogen-fuelled vehicles (HFCV)
22. **DI 99/92/CE DU PARLEMENT EUROPÉEN ET DU CONSEIL (ATEX 137)** – Concernant les prescriptions minimales visant à améliorer la protection en matière de sécurité et de santé des travailleurs susceptibles d'être exposés au risque d'atmosphères explosives

Technical Committee

1. **CEN TC 305** – "Potentially explosive atmospheres - Explosion prevention and protection", including the various working groups:
2. **CEN TC 305 WG1** – Test methods for determining the flammability characteristics of substances in potentially explosive atmospheres.
3. **CEN TC 305 WG2** – Equipment for use in potentially explosive atmospheres
4. **CEN TC 305 WG3** – Devices and systems for explosion prevention and protection
5. **CEN TC 305 WG4** – Terminology and methodology
6. **CEN TC 305 WG5** – Equipment and protection systems for mining
7. **CEN TC 305 WG6** – Flame arresters

Additional references

An additional list of RCS is provided by FCHO standards database [1] and H2tools [2]. The FCHO database is structured along the different categories e.g., transport, applications, stationary applications, portable applications, hydrogen generation and infrastructure hydrogen demand. These categories encompass a vast array of standards related to fuel cell and hydrogen space. H2tools database on another hand provide various standards application types, e.g., electrical interfaces, embrittlement tests, fuel cell modules, fuel cell power systems, fuelling systems, fuelling station design and fuel specifications etc.

[1]. https://www.fchobservatory.eu/reports

[2]. https://h2tools.org/