## Significance to Commercialization

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<td>ISO 19880-1 Gaseous Hydrogen Filling Stations. The document has passed FDIS vote unanimously. Editorial issues are being addressed prior to publication. Future plans are to remove annexes and turn them into stand-alone docs through NWIPs. However this would not necessarily be through the existing WG 24.</td>
<td>ISO 19880-2: Gaseous hydrogen filling station dispensers. Now that ISO 19880-1 has reached the FDIS stage, WG19 continues to work to address the comments on their DIS, and prepare a document for a CIB within ISO TC 197. ISO 17268 Gaseous Hydrogen Land Vehicle Refuelling Connection Devices. Revision 3 has been published. This document defines the design, safety and operation characteristics of gaseous hydrogen land vehicle (GHLV) refuelling connectors. GHLV refuelling connectors consist of the following components, as applicable: — receptacle and protective cap (mounted on vehicle); — nozzle; — communication hardware. This document is applicable to refuelling connectors which have nominal working pressures or hydrogen service levels up to 70 MPa. This document is not applicable to refuelling connectors dispensing blends of hydrogen with natural gas. ISO/TC 197 agrees to extend the work of WG 5 to work toward the next revision and agrees to limit the focus of the revision to H70 high flow.</td>
<td>CSA HPRD1: Thermally activated pressure relief devices. Content development is completed. Draft document for Industry/Public review expected. The Technical Subcommittee continues to meet for content development.</td>
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<td>CSA HGV 4.4 – Breakaway Devices, HGV 4.6 Manual Valves, and HGV 4.7 Automatic Valves. The draft HGV 4.4 document has been posted at the CSA Public Review website for industry feedback. Please click here to access the file.</td>
<td>CSA HGV 4.1 Hydrogen dispensing systems. The document has been published in March 2020. To be removed in the next revision of the matrix.</td>
<td>INFRASTRUCTURE: CSA HGV 4.9 Hydrogen Fueling Stations. The Technical Committee ballot closed. The standard was published in March 2020. To be removed in next revision of the matrix.</td>
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The draft document will be available through the link for Public Review until May 24, 2020. The TSC has taken a decision to adopt ISO 19880-3 with national deviations, and is currently developing those deviations, to supersede HGV 4.4, HGV 4.6, and HGV 4.7.


ISO 19880-8 - Gaseous hydrogen -- Fueling stations -- Part 8: Hydrogen quality control. The International Standard was published in October 2019; however it is active again as WG 28 expects to modify the document based on a new version of ISO 14687:2019 Hydrogen fuel quality – Product specification. They plan to start right away.

CSA FC 5 (Hydrogen generators) is an international adoption of ISO 16110-1. The document is still pending ANSI BSR-9 approval.

IEC 62282-6-101 Micro Fuel Cell Power Systems – Safety - General Requirements. WG met in conjunction with IEC/TC 105 Plenary in October to continue to prepare a CD for circulation for Part 1, and two Part 2 documents. The following documents were delivered to IEC for CIB processing:

- Part 6-101: Micro fuel cell power systems – Safety – General requirements
- IEC 62282-6-106 Micro fuel cell power systems – Safety – Indirect Class 8 (corrosive) compounds
- IEC 62282-6-107 Micro fuel cell power systems – Safety – Indirect water-reactive (Division 4.3) compounds

Drones/UAS
Commercial drones must be registered with the FAA. Non-commercial drones (hobby) no longer need to be registered.

IEC 62282-6-300 Ed.2 - Fuel Cartridges – extended publication target date to 2021.

IEC 62282-6-200 Ed.3 - Micro Fuel Cells – Performance – target date for publication is 2021.


BVLOS (Beyond Visual Line of Sight) UAV flight. Currently covered by the FAA’s ‘Part 107’ certification for flying a UAV in the USA. Special waivers can be given by the FAA for BVLOS flight, but this is rare at the moment.
need to be registered with the FAA, but rules are in flux.

Further FAA guidance for UAS: [https://www.faa.gov/uas/resources/uas_regulations_policy/](https://www.faa.gov/uas/resources/uas_regulations_policy/)

ISO/DIS 21895, Categorization and classification of civil unmanned aircraft systems: in Final Draft International Standard (FDIS) phase was published in February 2020. To be removed in the next revision of the matrix.

ISO/DIS 21384-4, Unmanned aircraft systems -- Part 4: Vocabulary – Waiting for FDIS.

ISO/CD 21384-2, Unmanned aircraft systems -- Part 2: Product systems – in ballot

ISO/TC 14 SC 16 is working on many documents for UAV’s. Beginning with June edition of the matrix, ONLY UAV activities specific to fuel cells will be tracked in this matrix.

Airworthiness certification guidelines: To fly a UAV above 55lbs in FAA airspace requires three types of additional certification. These include airworthiness certification of the aircraft. Guidelines exist for this but they are designed for manned airplanes and rotorcraft. Monitor for hydrogen and/or fuel cell applicability. See CFR, Title 14: Aeronautics and Space, PART 21—CERTIFICATION PROCEDURES FOR PRODUCTS AND ARTICLES


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<tr>
<td>International Maritime Organization (IMO) SUB-COMMITTEE ON CARRIAGE OF CARGOES AND CONTAINERS: Developing Requirements for use of low flashpoint fuels on marine vessels – including provisions for fuel cells, bulk liquid hydrogen storage, and other fuels. <a href="http://www.imo.org/en/OurWork/Safety/Pages/Default.aspx">http://www.imo.org/en/OurWork/Safety/Pages/Default.aspx</a></td>
<td>SAE AIR-6464 EUROCAE/SAE-WG80/AE-7AFC Hydrogen Fuel Cells Aircraft Fuel Cell Safety Guidelines AIR6464 This document defines the technical guidelines for the safe integration of Proton Exchange Membrane (PEM) Fuel Cell Systems (FCS); fuel (considered to be liquid and compressed hydrogen storage types only), fuel storage, fuel distribution and appropriate electrical systems into the aircraft. Note: Today PEM systems and fuel storage represent the most mature FCS technology and currently forms the basis for this standard. Other types of fuel cell systems and fuels (including reforming technologies and electrolyzers), may be covered by a further update to this document. Reaffirmed February 2020. To be removed next version of the matrix.</td>
<td>SAE AS6858-Installation of Fuel Cell Systems in Large Civil Aircraft AS6858 This is a joint SAE/EUROCAE development. This document will be released as both an SAE Aerospace Specification (AS) and a EUROCAE Minimum Aviation System Performance Standard (MASPS). This document defines the technical requirements for the safe integration of gaseous hydrogen fueled Proton Exchange Membrane (PEM) Fuel Cell Systems (FCS) within the aircraft. Published 2017 – no recent activity. To be removed next revision of the matrix.</td>
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**TRANSPORTATION**

**VEHICLES**
Global Technical Regulations (GTRs) for Vehicles: GTR for H2 and FC vehicles Phase II underway

http://www.unece.org/fileadmin/DAM/trans/doc/2017/wp29/ECE-TRANS-WP29-2017-056e.pdf. 5 task forces to address specific items:

1. Task Force #1 - Heavy duty vehicles and buses
2. Task force #2 - Fueling receptacle requirements
3. Task force #3 - Recommendations for test procedures
4. Task force #4 - Fire test
5. Task force #5 - Recommendations from ISO TC 197

SAE J2600: Compressed Hydrogen Surface Vehicle Fueling Connection Devices - document has been opened up again to discuss heavy-duty nozzle geometry.

SAE J2990/1: Gaseous Hydrogen and Fuel Cell Vehicle First and Second Responder Recommended Practice – Undergoing its first revision to harmonize with the latest version of the parent document J2990, along with J2578 and the GTR.

SAE J2572: Recommended Practice for Measuring Fuel Consumption and Range of Fuel Cell and Hybrid Fuel Cell Vehicles Fuelled by Compressed Gaseous Hydrogen is expected to go to affirmation ballot soon.


SAE J2601 Fueling Protocols is nearly ready for publication. Has been published. To be removed in next edition of the matrix.

SAE J2601-4 Ambient Temperature Fixed Orifice Fueling is anticipated for completion in March ballot in advance of next meeting.

ISO/TC 197 WG 21: Gaseous hydrogen fueling station compressors. Work continues to develop a CD. WG 21 meeting scheduled for April 2020 has been cancelled.


WG 23: Gaseous hydrogen fueling station fittings. WG 23 continues development of a CD, expected early 2020. CD is out for review.

ICC International Fire Code: The 2021 IFC has been published at www.iccsafe.org. There are two work groups of interest. One is working on hydrogen mobile fueling (in sync with NFPA 2). A separate work group from energy storage systems on electric vehicles to modify the code to clarify where different vehicles belong. This will address a variety of vehicles including hydrogen, battery, and conventional fuels. They will be working to divide and fine tune efforts to identify where regulations for certain types of vehicles belong. Anyone interested in participating in these groups should contact Beth Tubbs at ICC. Public comment on this latest version has not yet opened.

INFRASTRUCTURE
CGA G-5.5 – Hydrogen Vent Systems: Being updated. Vent stack testing underway for G-5.5, which will be conducted in May in Minnesota. This standard will affect the size of stacks and separation distances.

NIST: The 2020 editions of NIST Handbooks 44 the device code and 130 which has the hydrogen method of sale are now available online. The permanent code adopted in July of this year are included in these editions.

The website for NIST publications is https://www.nist.gov/pml/weights-and-measures/publications.


To be removed in the next edition of the matrix.

SAE J2601/4: Ambient Temperature Fixed Orifice Fueling – establishes the protocol and process limits for hydrogen fueling of light duty vehicles when the fuel delivery temperature is not pre-cooled, so called “ambient fueling” designated by Table 1 of SAE J2601-2014. Preparing for vote.

NFPA 853: Standard for the Installation of Stationary Fuel Cell Power Systems. 2020 version has been posted on www.NFPA.org and is available for purchase. To be removed next revision of the matrix.

GENERAL

Cybersecurity – Placeholder for activities relating to cybersecurity for fuel cells and FCEVs.

CSA HGV 2 – Containers – The Technical Content development is completed. Draft document for Industry/Public review expected. Subcommittee continues to meet for content development.

ISO TR 15916: Basic considerations for the safety of hydrogen systems, is open for revision under WG 29.
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<tr>
<td>IEC 62282-3-300 Stationary Fuel Cells – Installation - Amendment underway with publication targeted in 2020.</td>
<td>IEC/TC 105 AHG 13: New Work Item Proposal on FC applications for notebooks (safety and performance) - Call for Experts phase</td>
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<tr>
<td>IEC 62282-3-100:2019 RLV Stationary fuel cell power systems – Safety – Published – to be removed in the next edition of the matrix.</td>
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<tr>
<td>CSA FC 1 – Stationary fuel cell power systems – Content development for the adoption of IEC 62282-3-100 in the United States and in Canada continues. The Technical Subcommittee continues to meet for content development for the next revision.</td>
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<td>ISO/DIS 19884. Gaseous hydrogen — Cylinders and tubes for stationary storage: The document has been cancelled. New Work Item Proposal is underway are encouraged to start a new effort to develop a standard in this area.</td>
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<td>IEC 62282-2-201 Fuel Cell Modules Performance publication anticipated in 2020</td>
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<td><strong>SAE J3040 Crash Testing Safety</strong> – new activity to include FCVs: SAE International is actively recruiting technical committee members to participate in the development of an industry recommended practice for Hydrogen Fuel Cell Vehicle Crash Testing Safety Guidelines. The SAE Impact and Rollover Test Procedure Standards Committee’s objective is to establish a SAE Recommended practice for laboratory procedures to mitigate the risks associated with conducting Hydrogen Fuel Cell Vehicle Crash Tests.**</td>
<td><strong>SAE J2719/1: Application Guideline for Use of Hydrogen Quality Specification. Passed vote as TIR with substantial comments. These are to be addressed over the next several months. Published in March 2020. To be removed in the next revision to the matrix. SAE Emissions task force was recently reactivated. Antonio Ruiz of Nikola Motors will chair to develop fuel economy standards on heavy-duty vehicles.</strong></td>
<td><strong>CSA HGV 3.1 – Fuel system components for compressed hydrogen gas powered vehicles will be launching soon. IEC/TC 105 AHG 12: New Work Item Proposal on Railway FC Applications - Call for Experts phase.</strong></td>
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<tr>
<td><strong>CNG and Hydrogen Vehicle System Leak Inspection</strong> - New effort - call for experts open - CSA will develop a &quot;special publication&quot; to address requirements and procedures for commissioning and in-service inspections. Anyone interested in participating, please contact <a href="mailto:mark.duda@csagroup.org">mark.duda@csagroup.org</a>.**</td>
<td><strong>SAE J2719 Hydrogen Fuel Quality for Fuel Cell Vehicles has been published (March 2020). To be removed in the next update to the matrix. CSA HGV 3.1 – Fuel system components for compressed hydrogen gas powered vehicles will be launching soon.</strong></td>
<td><strong>CGA H-3 cryogenic hydrogen storage recently opened for revision.</strong></td>
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<td><strong>OSHA Requirements for Hydrogen</strong> At the present time, 29 CFR has a long list of requirements for hydrogen systems and also provides guidance for hydrogen pressure vessels and associated equipment that is long out of date.**</td>
<td><strong>CGA H-5 standard for bulk storage systems has gone past council for CGA.</strong></td>
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It is recommended that these requirements be replaced by the up-to-date requirements of NFPA 2. This will require cooperation between DOE and OSHA.

OMB Circular A-119 Revision: Federal Participation in the Development and Use of Voluntary Consensus Standards may provide a timely opportunity to engage.

**ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air**: published every two years. The 2019-2020 edition of the International Civil Aviation Organization’s (“ICAO”) Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284) (“TIs”), upon which the Dangerous Goods (Consignment by Air) (Safety) Ordinance (CAP. 384) and Air Navigation (Dangerous Goods) Regulations (Schedule 16 to CAP. 448C) are based, has come into effect on 1 January 2019.


**IEC TS 62282-9-102 ED1**

**IEC TS 62282-9-101**
*Evaluation methodology for the environmental performance of fuel cell power systems based on life-cycle thinking – Streamlined life-cycle considered environment performance characterization of stationary fuel cell power systems for residential applications Two environmental aspects considered* - Greenhouse gas emission

**CSA HGV 5.1 – Hydrogen Refueling Appliances** will be launching soon.

**CSA HGV 4.2 – Hoses for compressed hydrogen fuel stations** will be launching soon.

**CSA HGV 4.3 – Fueling parameter evaluation** – Project Planning / Discussion meetings have taken place with TSC, CSA and CARB for next edition.
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<th>IEEE P2025 Series</th>
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<th>MICRO</th>
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<td>IBM P2025.1 - &quot;Standard for Consumer Drones: Taxonomy and Definitions&quot;</td>
<td>New work item in ISO/TC 20 SC 16:</td>
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<td>This standard specifies the taxonomy and definitions for consumer drones. Drones are also known as Unmanned Airborne Vehicles (UAV), Unmanned Aerial Systems (UAS), Remotely Piloted Airborne Vehicles (RPAV), or Remotely Piloted Aircraft Systems (RPAS). This standard focuses on drones that are available in consumer markets and are used for consumer or commercial purposes. Pending administrative withdrawal for lack of activity. To be removed in the next revision of the matrix.</td>
<td>ISO/WD 24352, Technical Requirements for Light and Small Unmanned Aircraft Electric Energy System – under development</td>
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<td><strong>ISO/WD 24354, General Requirements for Civil Small and Light UAS Payload Interface – under development</strong></td>
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<td><strong>ISO/WD 24355, General Requirements of Flight Control System for Civil Small and Light Multirotor UAS – under development</strong></td>
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<td><strong>ISO/WD 24356, General Requirements for Tethered Unmanned Aircraft System – under development</strong></td>
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<td><strong>UASSC Standardization Roadmap for Unmanned Aircraft Systems:</strong> In December 2018, the UASSC published a Standardization Roadmap for Unmanned Aircraft Systems (Version 1.0). Since then, the roadmap has been promoted at industry events and the UASSC Steering Committee has held meetings to outline future work. The 2019 plenary meeting is the official launch of the version 2 roadmap update. Goals for version 2 include expanding the content to include topics such as spectrum, urban air mobility, and recreational operations, etc., bringing in subject matter experts not</td>
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<td>Proposed New Work IEC 62282-4-600: Fuel cell power systems for unmanned aircraft systems (drones) – Performance test methods</td>
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Scope - Unloaded weight < 116 kg and maximum take-off weight < 150 kg. Fuel cell rated output voltage < 220 V DC.

Please note that details of standards and activities that have been published but not currently under revision are no longer shown in the matrix. They are added back to the matrix when the activity enters revision cycle.

List of Frequently-Used Acronyms:
CD - Committee Draft
2CD - Second Committee Draft (Did not reach consensus first time)
CD2 - same as above
CDV - Committee draft for vote (term used by IEC to distinguish between a document out for comment only and one ready for vote)
DIS - Draft International Standard (achieved consensus to move from CD phase)
FDIS - Final Draft International Standard (passed DIS vote)
WG - Working Group
IEC - International Electrotechnical Commission - the international standards body for electrochemical devices, including fuel cells, which is covered by Technical Committee 105 (TC 105)
TC - Technical Committee