<table>
<thead>
<tr>
<th>A. Essential To or Enables Commercialization</th>
<th>B. Important to Commercialization</th>
<th>C. Supports Commercialization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ISO 19880-1 Gaseous Hydrogen Filling Stations</strong> - The document has been published in March 2020. To be removed in the next revision of the matrix.</td>
<td><strong>ISO 19880-2: Gaseous hydrogen filling station dispensers</strong> - WG19 continues to work to address the comments on their DIS, and prepare a document for a CIB within ISO TC 197. <strong>ISO 17268 Gaseous Hydrogen Land Vehicle Refuelling Connection Devices</strong> - 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><strong>CSA HPRD1: Thermally activated pressure relief devices</strong> - Content development is completed. Draft document for Industry/Public review expected. <strong>NFPA 55: Compressed Gases and Cryogenic Fluids Code</strong> - Latest edition of document has been issued 4/28/19. Public input for the 2023 edition closed on June 30, 2020 has been reviewed in the NFPA 55 First Draft meeting, held in September. First Draft posting deadline is March 2, 2021.</td>
</tr>
</tbody>
</table>
is currently developing those deviations, to supersede HGV 4.4, HGV 4.6, and HGV 4.7.

**CSA HGV 4.10 – Fittings** – Draft document completed industry review on 5/20/2020- and public review on 06/20/2020. [TSC is addressing comments.](#)

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.

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** The following documents were delivered to IEC for recently completed CIB processing:

- IEC 62282-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

Comments were received only on IEC 62282-6-101. Those are in review.

**Drones/UAS**

Commercial drones must be registered with the FAA. Non-commercial drones (hobby) no longer 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**

ISO/DIS 21384-1, Unmanned aircraft systems -- Part 1: General specification – in DIS ballot. Deleted by ISO – to be removed with the next revision of the matrix.

**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.

**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
<table>
<thead>
<tr>
<th>ISO/DIS 21384-4, Unmanned aircraft systems -- Part 4: Vocabulary – Waiting for FDIS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO/CD 21384-2, Unmanned aircraft systems -- Part 2: Product systems – in ballot</td>
</tr>
<tr>
<td>ISO/TC 14 SC 16 is working on many documents for UAVs. Beginning with June edition of the matrix, ONLY UAV activities specific to fuel cells will be tracked in this matrix.</td>
</tr>
<tr>
<td>cell applicability. See CFR, Title 14: Aeronautics and Space, PART 21—CERTIFICATION PROCEDURES FOR PRODUCTS AND ARTICLES</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>A. Essential To or Enables Commercialization</th>
<th>B. Important to Commercialization</th>
<th>C. Supports Commercialization</th>
</tr>
</thead>
<tbody>
<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.</td>
<td>TRANSPORTATION</td>
<td></td>
</tr>
<tr>
<td>ISO/TC 197 New Work Item Proposal for fuel system components for onboard the vehicle. There is an arrangement in place with ISO TC 22 SC 41 that allows TC 197 to lead this effort specifically for hydrogen fuel system components.</td>
<td>SAE J2600: Compressed Hydrogen Surface Vehicle Fueling Connection Devices - document has been opened up again to discuss heavy-duty nozzle geometry.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td>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 in development.</td>
<td></td>
</tr>
<tr>
<td>Document</td>
<td>Title</td>
<td>Source</td>
</tr>
<tr>
<td>----------</td>
<td>-------</td>
<td>--------</td>
</tr>
<tr>
<td>SAE J2601 Fueling Protocols</td>
<td>has been published. To be removed in next edition of the matrix.</td>
<td></td>
</tr>
<tr>
<td>SAE J2601-4 Ambient Temperature Fixed Orifice Fueling</td>
<td>is anticipated for ballot in advance of next meeting.</td>
<td></td>
</tr>
<tr>
<td>ICC International Fire Code</td>
<td>The 2021 IFC has been published at <a href="http://www.iccsafe.org">www.iccsafe.org</a>. 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.</td>
<td></td>
</tr>
<tr>
<td>CGA G-5.5 – Hydrogen Vent Systems</td>
<td>Next step for 4th edition is review by CGA Standards Council. Heat radiation testing will take place late October at Chart Industries in New Prague, MN. 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.</td>
<td></td>
</tr>
<tr>
<td>ISO/TC 197 WG 21: Gaseous hydrogen fueling station compressors</td>
<td>Work continues to develop a CD.</td>
<td></td>
</tr>
<tr>
<td>WG 22: ISO 19880-5 Gaseous hydrogen fueling stations - Dispenser hoses and hose assemblies</td>
<td>Published in November 2019. First revision is already underway.</td>
<td></td>
</tr>
<tr>
<td>ISO 19880-6 WG 23: Gaseous hydrogen fueling station fittings</td>
<td>CD is out for review and ballot. Passed CD ballot with many comments, particularly relating to scope. CD 2 to be developed to resolve comments.</td>
<td></td>
</tr>
<tr>
<td>SAE J2601/4: Ambient Temperature Fixed Orifice Fueling</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Cybersecurity</td>
<td>CSA HGV 2 — Containers</td>
<td>ISO DIS 19884</td>
</tr>
<tr>
<td>Cybersecurity — Placeholder for activities relating to cybersecurity for fuel cells and FCEVs.</td>
<td>CSA HGV 2 — Containers — The Technical Content development is completed. Draft document for TSC is working through comments from Industry/Public review expected.</td>
<td>ISO DIS 19884, Gaseous hydrogen — Cylinders and tubes for stationary storage: The document has been cancelled. New Work Item Proposal is underway to start a new effort to develop a standard in this area following cancellation of an earlier effort has been approved.</td>
</tr>
<tr>
<td>SAE TIR J3202: Recommended Practice for Measuring and Simulating Fuel Consumption and Range of Heavy Duty Fuel Cell Hybrid Road Vehicles Fueled by Compressed Gaseous Hydrogen</td>
<td></td>
<td>IEC 62282-2-201 Fuel Cell Modules Performance publication anticipated in 2020</td>
</tr>
<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. Public review finished, and the North American experts are addressing comments received.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*/Workspace/Outline.aspx?work_id=22-012*
| IEC/TC 105 AHG 13: New Work Item Proposal on FC applications for notebooks (safety and performance) - Call for Experts phase Planning a virtual meeting in early November. | PORTABLE |
## Significance to Commercialization

![More Critical](left)

*Lowest Effort*

<table>
<thead>
<tr>
<th>A. Essential To or Enables Commercialization</th>
<th>B. Important to Commercialization</th>
<th>C. Supports Commercialization</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAE J3040 Crash Testing Safety – 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.</strong> Published in March 2020. To be removed in the next revision to the matrix.</td>
<td><strong>SAE Emissions task force</strong> was recently reactivated. Antonio Ruiz of Nikola Motors will chair to develop fuel economy standards on heavy-duty vehicles.</td>
</tr>
<tr>
<td>CNG and Hydrogen Vehicle System Leak Inspection - New effort – call for experts open - CSA will develop a “special publication” 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>CSA HGV 3.1 – Fuel system components for compressed hydrogen gas powered vehicles</strong> will be launching soon.</td>
<td><strong>IEC/TC 105 AHG 12: New Work Item Proposal on Railway FC Applications</strong> - Call for Experts phase.</td>
</tr>
<tr>
<td>OSHA Requirements for Hydrogen 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. These requirements can be seen here: <a href="http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&amp;p_id=9749">http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&amp;p_id=9749</a> It is recommended that these requirements be</td>
<td><strong>CGA H-3 cryogenic hydrogen storage:</strong> <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=23-036">Deadline to submit proposed changes for next edition is 12/1/2023.</a> Recently opened for revision.</td>
<td><strong>CGA H-5 standard for bulk storage systems</strong> has gone past council for CGA approval. Because it is an ANSI publication</td>
</tr>
<tr>
<td>Title</td>
<td>Deadline</td>
<td>URL</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>CGA H-XXX (TBD), Small scale hydrogen production and delivery:</td>
<td>New publication not released yet. Task force is creating first draft that will then go to the CGA membership for review.</td>
<td></td>
</tr>
<tr>
<td>CGA P-28, OSHA process safety management and EPA risk management plan guidance document for bulk liquid hydrogen supply systems:</td>
<td>The draft of the 5th edition is in staff review before going to Standards Council for final review.</td>
<td></td>
</tr>
<tr>
<td>CGA PS-33, Position statement on the use of LPG or propane tanks as compressed hydrogen storage buffers:</td>
<td>Deadline to submit proposed changes for next edition is 12/10/2026.</td>
<td></td>
</tr>
<tr>
<td>CSA HGV 5.1 – Hydrogen Refueling Appliances will be launching soon.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSA HGV 4.2 – Hoses for compressed hydrogen fuel stations will be launching soon.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td>Text</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>CGA H-13, Hydrogen pressure swing adsorber (PSA) mechanical integrity requirements</td>
<td>Deadline to submit proposed changes for next edition is 8/1/2022.</td>
<td></td>
</tr>
<tr>
<td>CGA P-48, Position statement on clarification of existing hydrogen setback distances and development of new hydrogen setback distances in NFPA 55</td>
<td>Deadline to submit proposed changes for next edition is 2/12/2021.</td>
<td></td>
</tr>
<tr>
<td>ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>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 - Utilization of mineral resources</td>
<td></td>
</tr>
<tr>
<td>CARGO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEC TS 62282-9-101</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STATIONARY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEEE P2025 Series</td>
<td>Drones/UAS</td>
<td>MICRO</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------</td>
<td>-------</td>
</tr>
<tr>
<td>IEEE P2025.1 “Standard for Consumer Drones: Taxonomy and Definitions”</td>
<td>New work item Many activities in</td>
<td></td>
</tr>
<tr>
<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>
<td></td>
</tr>
<tr>
<td>This standard specifies requirements, systems, methods, testing and verification for consumer drones to preserve the privacy and security of people and properties within range of the 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 24355, General Requirements of Flight Control System for Civil Small and Light Multirotor UAS—under development</td>
<td></td>
</tr>
<tr>
<td>Proposed New Work IEC 62282-4-600: Fuel cell power systems for unmanned aircraft systems (drones) – Performance test methods</td>
<td>ISO/WD 24356, General Requirements for Tethered Unmanned Aircraft System—under development</td>
<td></td>
</tr>
<tr>
<td>Scope - Unloaded weight &lt; 116 kg and maximum</td>
<td>These activities are not specific to fuel cells for drones, but will be applicable to drones using any technologies.</td>
<td></td>
</tr>
<tr>
<td>Publication target: January 2021.</td>
<td>For further information, see <a href="https://www.iso.org/committee/5336224.html">https://www.iso.org/committee/5336224.html</a>.</td>
<td></td>
</tr>
<tr>
<td>IEC/TC 105 AHG 11: New Work Item on accelerated stress testing for SOFCs and PEMs. Call for Experts stage.</td>
<td>UASSC Standardization Roadmap for Unmanned Aircraft Systems:</td>
<td></td>
</tr>
<tr>
<td>In December 2018, the UASSC published a Standardization Roadmap for Unmanned Aircraft Systems (Version 1.0). Version 2 was</td>
<td></td>
<td></td>
</tr>
<tr>
<td>take-off weight &lt; 150 kg. Fuel cell rated output voltage &lt; 220 V DC.</td>
<td>published on June 30, 2020. The roadmap is available here: <a href="https://www.surveymonkey.com/r/WG2RPBR">https://www.surveymonkey.com/r/WG2RPBR</a>. To be removed in the next revision of the matrix.</td>
<td></td>
</tr>
</tbody>
</table>

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