

Significance to Commercialization

⇐ More Critical
Highest Effort

A. Essential To or Enables Commercialization	B. Important to Commercialization	C. Supports Commercialization	
<p>ISO 19880-1 Gaseous Hydrogen Filling Stations. Currently out for DIS vote and comments <u>was unanimously approved. WG 24 to meet July 10-12 in Hamburg, Germany.</u></p>	<p>ISO 19880-2: Gaseous hydrogen filling station dispensers WG 19 met in September to address DIS comments. WG will <u>requested</u> TC 197 suspend this activity until ISO 19880-1 moves to FDIS in order to ensure critical harmonization.</p> <p>HGV 4.3 Fueling Parameters Work on the next edition has begun to align with SAE J2601.</p> <p>ISO 17268 Gaseous Hydrogen Land Vehicle Refuelling Connection Devices is developing a revised standard. The DIS was approved. Moving to FDIS.</p>	<p>ISO/CD 19880-3 Gaseous hydrogen -- Fueling stations -- Valves Covers the safety performance of valves over 1MPa for gaseous hydrogen fueling stations. FDIS is out for vote. <u>Passed FDIS and was published June 15, 2018.</u></p> <p>CSA HPRD1: Work on the next revision of Pressure Relief Devices is pending.</p> <p>NFPA 55: Compressed Gases and Cryogenic Fluids Code: First <u>Second</u> Draft <u>Report is open for Public Comment until May 9th meeting will take place July 24-25, 2018, in Warwick, RI.</u></p>	<p>INFRASTRUCTURE</p>
	<p>ISO 19880-8- Gaseous hydrogen -- Fueling stations -- Part 8: Hydrogen quality control. DIS was approved. WG is moving to FDIS.</p> <p>ISO 14687.2 – Hydrogen Fuel – Product Specification. Updating ISO 14687 series of documents. Part 2 and Part 3 are to behave been folded back into the base document. Circulation of CD2-DIS <u>underway. Note this will be numbered ISO 14687.2, rather than ISO 19880-7.</u></p>		<p>FUELS</p>
	<p>IEC 62282-6-101 Micro Fuel Cell Power Systems – Safety- General Requirements •Only one Part 2, for methanol, associated with IEC 62282-6-101 will be created at this time. IEC TC 105 has asked all WG convenors to research EU Regulations relating to the developing IEC documents, and add an Annex to facilitate</p>	<p>IEC 62282-6-400 - Micro Fuel Cells – Power & Data Interchangeability: CDV is out for vote and comment.</p> <p>IEC 62282-6-300 Ed.2 - Fuel Cartridges – extended publication target date to 2021.</p>	<p>MICRO</p>

	<p>harmonization. This work is ongoing. WG to meet in conjunction with IEC/TC 105 Plenary in November.</p>	<p>IEC 62282-6-200 Ed.3 - Micro Fuel Cells – Performance – target date for publication is 2021.</p>	
<p>NFPA 2: Hydrogen Technologies Code: First Draft Report is now open for Public Comment until May 9th. Second Draft meeting to take place at NFPA Headquarters in Quincy, MA from August 13-17.</p>			GENERAL

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⇐ More Critical

Moderate Effort

A. Essential To or Enables Commercialization	B. Important to Commercialization	C. Supports Commercialization	
<p>Cargo Shipping regulations of Fuel Cells, Fuel Cell Cartridges, Fuel Cell Engines and Fuel Cell Vehicles: in force now, revised periodically</p> <ul style="list-style-type: none"> ICAO Dangerous Goods Panel IMO Dangerous Goods Code ADR/ADN Joint Meeting US DOT Transport Canada 	<p>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.</p> <p>http://www.imo.org/en/OurWork/Safety/Pages/Default.aspx</p>		TRANSPORTATION
<p>Global Technical Regulations (GTRs) for Vehicles: GTR for H2 and FC vehicles Phase II underway</p> <p>http://www.unece.org/fileadmin/DAM/trans/doc/2017/wp29/ECE-TRANS-WP29-2017-056e.pdf. GTR Phase II met on February 5-7 at Toyota in Torrance, California. 5 task forces were formed to address specific items:</p> <ol style="list-style-type: none"> 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 	<p>ISO 19881 - Gaseous Hydrogen - Land Vehicle Fuel Tanks: DIS was approved. Comments from DIS are being addressed.</p> <p>ISO 19882: Thermally-activated Pressure Relief Devices (TPRDs) DIS was approved. Comments are being addressed. <u>is currently out for vote.</u></p>	<p>SAE J2600 - document will be opened up again to discuss heavy-duty nozzle geometry.</p>	VEHICLES

<p>5. Task force #5 - Recommendations from ISO TC197</p> <p>The IWG is making good progress and on track to complete its work by the WP.29 mandate of 2020. The next meeting is being scheduled for June 2018 in Korea.</p> <p>SAE J2579- H2 Storage Systems (design & performance): <u>passed the Motor Vehicle Council vote and has been published, revision published 3/2013. Minor revisions under consideration. SAE J2579 is going to ballot, which includes materials qualification language. Presented the test method to the GTR in February. To be removed with the next revision of this matrix.</u></p>			
<p><u>NFPA 855: Standard for the Installation of Stationary Energy Storage Systems: NEW ACTIVITY: This new Standard is being developed to define the design, construction, installation, commissioning, operation, maintenance and decommissioning of stationary energy storage systems (ESS).</u></p>	<p>OIML R 139 – Compressed gaseous fuel measuring systems for vehicles. OIML R139, published in 2014, is undergoing revision focused on expanding the application of the recommendation to hydrogen systems.</p> <p>Major changes in the document – two new MPEs for hydrogen systems (accuracy classes that are significantly higher than those for CNG systems). Minimal measured quantity is 1 kilogram. The durability test was revised so that now only meters with moving parts need to be tested. Sections of the R139 testing procedures were re-written to make to make them applicable specifically to hydrogen systems.</p> <p>ICC International Fire Code: Code change proposals for 2018 edition of Group A I-Codes were due online on January 11, 2018. The proposed changes <u>to the Group A codes, to be presented relating to hydrogen</u> at the Committee</p>	<p>ISO/TC 197 WG 21: Gaseous hydrogen fueling station compressors. Work continues to develop a CD.</p> <p>WG 22: Gaseous hydrogen fueling station hoses. CD2 passed. WG 22 met in September to address technical comments. DIS text has been sent to TC for circulation. The ballot will officially start on 2018-04-30 and end 2018-07-23. A meeting is planned in Troy, MI on September 13-14 to address comments received.</p> <p>WG 23: Gaseous hydrogen fueling station fittings. Call for manufacturer participation. Work continues to develop a CD. Efforts underway to harmonize with valves document.</p> <p>SAE J2601/4: Ambient Temperature Fixed</p>	<p>INFRASTRUCTURE</p>

	<p>Action Hearings on April 15-25, 2018, have been posted at http://www.hydrogenandfuelcellsafety.info/s/2018-ICodes-HydrogenRelated-Results.pdf. https://www.icesafe.org/codes-tech-support/codes/code-development-process/2018-2019-group-a/.</p> <p><u>CGA 5.5 – Hydrogen Vent Systems: Revising this CGA standard. Testing radiation to actual vs. test to enable better siting assistance. Long-range goal to be completed by year end.</u></p>	<p>Orifice Fueling – NEW EFFORT: 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. These process limits (including the fuel delivery temperature, the maximum fuel flow rate, the rate of pressure increase and the ending pressure) are affected by factors such as ambient temperature, fuel delivery temperature and initial pressure in the vehicle’s compressed hydrogen storage system.</p> <p>NFPA 853: Standard for the Installation of Stationary Fuel Cell Power Systems. Public Input Closing Date: January 4, 2018. First Draft Report Posting Date: September 6, 2018</p>	
		<p>CHMC 2 - Test Methods for Evaluating Material Compatibility in Compressed Hydrogen Applications – Non-Metallics: New effort – meets monthly. Expected to be available for public review in October 2018.</p>	GENERAL
	<p>IEC 62282-3-300 Stationary Fuel Cells – Installation - Amendment shall begin in the Spring of 2018 with publication in 2020.</p>	<p>IEC 62282-3-100 Stationary Fuel Cells-Safety- •Awaiting results of CDV posted for vote and comments</p> <p>ISO/DIS 19884, Gaseous hydrogen — Cylinders and tubes for stationary storage: The CD2 Ballot was cancelled and there was a decision to go to DIS rather than a CD2. The DIS ballot has gone out. <u>Awaiting results-passed with many comments received.</u></p> <p>IEC 62282-2:2012 Ed. 2 Fuel Cell Modules</p>	STATIONARY

		<p>(Safety): Comments for edition 3 sent to WG 2. US experts being sought.</p> <p>IEC 62282-2-201 Fuel Cell Modules (Performance) granted extension for CD until 4/28/2018 and publication in 2020</p> <p>SOFC single cell/stack performance - PEM single cell/stack performance – power-to-power performance – Technical Specification TS 62282-7-2 to be developed by IEC/TC 105 WG 11. Work to commence in late 2019. Extended target date for next edition of IEC TS 62282-7-2 (Solid Oxide) to 2020. Extended target date for IEC 62282-8-101 (Solid Oxide Single Cell Performance) to 2/2018. Extended target date for IEC 62282-8-102 (PEM Single Cell Performance) to 2/2018. Extended target date for IEC 62282-8-201 (Power to Power Performance)</p>	
	<p>IEC 62282-5-100 Portable Fuel Cell Power Systems – Safety: Ed 3 under development. Convenor: Toshiki Shimizu (JP)</p>		<p>PORTABLE</p>

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Lowest Effort

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<p>ISO 16111 Transportable Gas Storage Devices - Hydrogen Absorbed in Reversible Metal Hydrides: DIS was approved. WG addressed technical comments received. This document is now in FDIS stage <u>Document passed FDIS, with some editorial comments to be addressed prior to publication.</u> In parallel, the information on larger systems (outside the scope of the original documents) are being moved into a new Technical Report and removed completely from ISO 16111. Preliminary DRAFT TR 16113 - MH applications not covered by ISO 16111 has been circulated for comment.</p>			TRANSPORTATION
	<p>SAE J3040 FCV Crash Testing Safety – new activity <u>to include FCVs</u>: 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.</p> <p>SAE J3089: Characterization of On-board Vehicular Hydrogen Sensors <u>TIR vote passed. Minor comments to be addressed in September meeting—In progress. Resolving comments from</u></p>	<p>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.</p>	VEHICLES

	<p>discussion in November SAE meeting.</p> <p>ISO 22734-1: The ISO-TC197 Secretary reports the request by WG26 to skip the CD stage and proceed to a DIS ballot has passed a CIB (Committee Interim Ballot) vote by TC197 members. DIS (v1.2) has been submitted for balloting. The DIS passed ballot unanimously.</p> <p>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: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9749</p> <p>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.</p> <p>OMB Circular A-119 Revision: Federal Participation in the Development and Use of Voluntary Consensus Standards may provide a timely opportunity to engage.</p>	<p>The Telecommunications Industry Association (TIA) focus group drafted a guideline for fuel stationary cell use for backup power. – 1st doc, focused on regulatory compliance, has been published. Second guide is a reference document to complement the first doc. Group is seeking additional experts to help complete the draft.</p> <p>ASME B31.12 hydrogen piping to pipeline committee met on September 21st in Orlando. The committee is actively balloting the non-mandatory appendix for guidance on system cleanliness, as well as Part CR for commercial and residential pipelines. Plan for new B31.12 publication standard in 2018.</p> <p>Revised ASME Standards that support hydrogen infrastructure that were published in 2014, to be monitored: B31.1-2014 Power Piping B31.8-2014 Gas Transmission and Distribution Piping Systems B31.8S-2014 Managing System Integrity of Gas Pipelines</p>	<p>INFRASTRUCTURE</p>
	<p>ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air: published every two years. 2013 edition includes references to IEC 62282 – 6 – 100 for both carry on and checked baggage, October 2012, inclusion of A1 approved for inclusion by addendum. Publication of addendum 3 occurred June 10, 2013. (micro fuel cell applications)</p> <p>Work commencing to clarify restrictions on charging of batteries by fuel cell devices. Future work anticipated as edition 2 of IEC 62282-6-101 nears completion to more explicitly include new technologies in the regulations.</p> <p>ICAO technical instructions took effect 21 June</p>		<p>CARGO</p>

	<p>2017 January, 2015.</p> <p>Addenda to the Technical Instructions, approved by the Council of ICAO, are issued to reflect recommendations by the Dangerous Goods Panel. These can be downloaded here: http://www.icao.int/safety/DangerousGoods/Pages/technical-instructions.aspx</p> <p>Further information on changes and previous versions can be found here: https://www.icao.int/safety/DangerousGoods/Pages/technical-instructions.aspx</p>		
	<p>IEC TS 62282-9-102 ED1 Fuel cell technologies - Part 102: Evaluation methodology for the environmental performance of fuel cell power systems based on life cycle thinking - Product category rules for environmental product declarations of stationary fuel cell power systems and alternative systems for residential applications. CD to be out any day.</p>		STATIONARY
	<p>IEEE P2025 Series On Saturday, January 13, 2018, IEEE held a meeting to explore the need for standards for consumer drones as a potential new activity within the IEEE P2025 Standards Series. The meeting took place in Las Vegas, Nevada. The following preliminary activities were discussed:</p> <ul style="list-style-type: none"> • IEEE P2025.1 - "Standard for Consumer Drones: Taxonomy and Definitions" • IEEE P2025.2 - "Standard for Consumer Drones: Privacy and Security" <p>The scale of the drones under discussion involved drones that could carry a human as a passenger; although the passenger would not have control of the drone; i.e., a drone taxi. Such drones might also be used in rescue operations.</p>	<p>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.</p> <p>Further FAA guidance for UAS: https://www.faa.gov/uas/resources/uas_regulations_policy/</p>	MICRO

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