

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. TS published in June 2016. Development of IS continues. The draft recently passed CD vote and hasis moved eding to DIS phase.</p>	<p>ISO 19880-2: Gaseous hydrogen filling station dispensers WG 19 met in September to address DIS comments. WG will request 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. DIS2 passed; WG 20 is addressing comments to move to FDIS.</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: Awaiting First Draft Report – anticipated publication February 28, 2018.</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 19880-7 – Hydrogen Fuel – Product Specification. Updating ISO 14687 series of documents. Part 2 and Part 3 are to be folded back into the base document. Circulation of CD2 underway.</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. CD expected first quarter 2018. Call for review of experts issued. Looking for new members to hold a meeting later this year.</p>	<p>IEC 62282-6-400 - Micro Fuel Cells – Power & Data Interchangeability: Project revived with convenor addressing comments from failed CDV in 2012. Extended target date for IEC 62282-6-400 Ed.1 (Power and Data) to 12/2018.</p> <p>IEC 62282-6-300 Ed.2 - Fuel Cartridges – extended publication target date to 2021.</p>	<p>MICRO</p>

		<u>IEC 62282-6-200 Ed.3 - Micro Fuel Cells – Performance – target date for publication is 2021.</u>	
NFPA 2: Hydrogen Technologies Code: Awaiting ballot on First Draft, then publication of First Draft Report.			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 http://www.unece.org/fileadmin/DAM/trans/doc/2017/wp29/ECE-TRANS-WP29-2017-056e.pdf. GTR Phase II meeting on February 5-7 at Toyota in Torrance, California.</p> <p>SAE J2579- H2 Storage Systems (design & performance): revision published 3/2013. Minor revisions under consideration.</p>	<p>ISO 19881 - Gaseous Hydrogen - Land Vehicle Fuel Tanks: DIS was approved. Comments from DIS are to be addressed.</p> <p>ISO 19882: Thermally-activated Pressure Relief Devices (TPRDs) DIS was approved. Comments to be addressed.</p>	<p>SAE J2600 document will be opened up again to discuss heavy-duty nozzle geometry. IEC 62282-4-102 Electrically Powered Industrial Trucks—Performance —Approved FDIS for publication. To be removed next revision of matrix.</p>	VEHICLES
	<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>Ralph needs comments on R139 (2CD) returned to</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</p>	INFRASTRUCTURE

	<p>him by 09 Feb 2018, and then he will send all US comments to the conveners by Feb 25th.</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: I-Codes 2016 Group B completed cycle. 2018 IFC, when published, will include definitions for Vehicle Repair Room, Motor Vehicle Repair Space, and Motor Vehicle Repair Booth, and provisions for repair rooms for vehicles fuelled by lighter than air fuels. Code change proposals for 2018 edition of Group A I-Codes are due online on January 11⁸, 2018.</p>	<p>to address technical comments. DIS planned for late 2017-text has been sent to TC for circulation.</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 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. Open for Public Comment until January 4, 2018.</p>	
		<p>SAE effort materials compatibility for stainless steels. June 17th hydrogen compatibility workshop at MPA Stuttgart, Germany between Sandia, Kyoshu University, MPA Stuttgart, and industry. Goal of workshop to finalize round robin test plan and establish sensitivity study goals between experts.</p>	RESEARCH

		<p>CHMC 2 - Test Methods for Evaluating Material Compatibility in Compressed Hydrogen Applications – Non-Metallics: New effort – met September 20.</p>	GENERAL
	<p>IEC 62282-3-400 Small Stationary Fuel Cells with Combined Heat and Power Output – published Nov 2016. To be removed from matrix next revision.</p> <p><u>IEC 62282-3-300 Stationary Fuel Cells – Installation</u> - Amendment shall begin in the Spring of 2018 with publication in 2020.</p>	<p>IEC 62282-3-100 Stationary Fuel Cells- Safety- <u>•CDV posted for vote and comments Japan proposing new annex for small power systems. In CD stage.</u></p> <p>IEC 62282-3-201 Ed.2 – Stationary Fuel Cells – Performance for small fuel cells: Published August 2017. To be removed in next revision of matrix.</p> <p><u>ISO/DIS 15399/19884, 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 is being prepared and will begin shortly.</u></p> <p>CD 2 versus DIS decision pending.</p> <p>IEC 62282-2:2012 Ed. 2 Fuel Cell Modules (Safety): Comments for edition 3 sent to WG 2. US experts being sought.</p> <p>IEC 62282-2-201 Fuel Cell Modules (Performance) new work starting. <u>granted extension for CD until 4/28/2018 and publication in 2020</u></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. <u>Work to commence in late 2019.</u></p>	STATIONARY

		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)	
	IEC 62282-5-100 Portable Fuel Cell Power Systems – Safety: Ed 3 under development. Convenor: Toshiki Shimizu (JP)	ANSI FC 5 – CSA ballot for US adoption of ISO 16110: Portable Hydrogen Generators closed February 13th. Awaiting results completed. To be removed next edition of the Matrix.	PORTABLE

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 More Critical
Lowest Effort

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<p>ISO 16111 Transportable Gas Storage Devices - Hydrogen Absorbed in Reversible Metal Hydrides: DIS was approved. WG is-addressing technical comments received. This document is now in FDIS stage. 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 FCV Crash Testing Safety – new activity: 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 – In progress. Resolving comments from discussion in November SAE meeting.</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>ISO 22734-1:2008 The ISO TC197 Secretary</p>	<p>The Telecommunications Industry</p>	INFRASTRUCTURE

	<p>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. Hydrogen Generators Using Electrolysis Process: published 2008— Began process to be revised and consolidated with ISO 22734 2.3 subgroups recently formed, TG1: confirming applicability of normative references, TG2: Standardizing pressure terminology used, TG3: Arrange risk assessment related sections into a clearer section.</p> <p>OSHA Requirements for Hydrogen</p> <p>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.showdocument?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>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 by the end of the year.</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:</p> <ol style="list-style-type: none"> 2. B31.1-2014 Power Piping 3. B31.8-2014 Gas Transmission and Distribution Piping Systems 4. B31.8S-2014 Managing System Integrity of Gas Pipelines 	
	<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</p>		CARGO

	<p>work anticipated as edition 2 of IEC 62282-6-101 nears completion to more explicitly include new technologies in the regulations. ICAO technical instructions took effect 21 June 2017 January, 2015. 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 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</p>		STATIONARY
		<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>The FAA's Small Unmanned Aircraft System Aviation Rulemaking Committee has proposed a smart step-by-step approach to full UAS integration. The FAA's six designated test sites will help us obtain valuable data to enhance the safety of UAS technical systems and to pinpoint potential safety issues.</p> <p>ISO/TC 20/SC 16: Unmanned aircraft systems - Standardization in the field of unmanned aircraft systems (UAS) including, but not limited to, classification, design, manufacture,</p>	MICRO

		<p>operation (including maintenance) and safety management of UAS operations.</p> <p>The National Aerospace Standards (NAS) collection constitutes one of the largest groups of voluntary standards in the U.S. AIA's National Aerospace Standards Committee (NASC) has been developing standards since 1941.</p> <p>With support from AIA, the Federal Aviation Administration (FAA) on November 7 unveiled a long-awaited milestone for integrating unmanned aircraft systems (UAS) into our national airspace. FAA Administrator Michael Huerta invited AIA to represent industry as his agency released its integration roadmap which addresses current and future policies, regulations, technologies and procedures required to integrate unmanned aircraft on a routine basis.</p> <p>At the event Huerta announced the much anticipated release of three documents that will pave the path forward for companies vying for a stake in the UAS market. They include the UAS Integration Plan, the privacy policy for UAS test sites and the Joint Planning and Development Office (JPDO) comprehensive plan. These documents signal a major step towards enabling civil unmanned aircraft to operate in the domestic air space without unnecessary regulatory oversight.</p> <p>Further FAA guidance for UAS: https://www.faa.gov/uas/resources/uas_regulations_policy/</p>	
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Please note that details of standards and activities that have been published but not currently under revision are no longer shown in the matrix, ~~but are listed on www.fuelcellstandards.com~~. They are added back to the matrix when the activity enters revision cycle.