

**National Hydrogen and Fuel Cell Codes and Standards Coordinating Committee  
(NHFCSCC)**

**Wednesday, March 3, 2020  
TIME: 2:00 – 3:00 pm (Eastern Standard Time)**

**Minutes**

**Attendees**

**Antonio Ruiz  
Christina Daniels  
Connor Dolan  
Douglas Olenick  
Jay Keller  
Karen Quackenbush  
Kelvin Hecht  
Laura Hill  
Mark Richards  
Mike Steele**

**Morry Markowitz  
Eric Nelson  
Juana Williams  
Norman Newhouse  
Sara Marxen  
Eric Prause  
Amy Ryan  
Spencer Quong  
Bob Boyd  
Jennifer Gangi**

**William Chernicoff  
Yuk Wong  
Owen Hopkins  
Quailan Homann  
David Farese  
John Eihusen  
Will James  
Kevin Harris  
Mark Duda**

**I. Welcome and Housekeeping Items**

- FCHEA's anti-trust guidelines - Available on FCHEA's members only website and a copy can be provided to you on request
- Review Agenda
- Approve Minutes

**II. DOE/HQ Update**

**Laura Hill**

Secretary Granholm was officially sworn in last week. We can expect to see acceleration on demonstration and deployment activities.

Our latest FOA closes applications on March 8<sup>th</sup>.

Annual Merit Review is coming up the week of June 7<sup>th</sup>. It will be virtual and registration is free. For reviewers, please complete your sign up soon and indicate your availability to get that process going.

More details are available online at <https://www.annualmeritreview.energy.gov/>.

**III. Codes & Standards Events and Fuel Cell Safety Information**

<http://www.hydrogenandfuelcellsafety.info/events/>

**Karen Quackenbush**

**Request:** technical resource updates for the Hydrogen and Fuel Cell Safety website. Any committee members who have materials they would like hosted on the website can send them to Karen Quackenbush ([khall@fchea.org](mailto:khall@fchea.org)) or Connor Dolan ([cdolan@fchea.org](mailto:cdolan@fchea.org)).

ICHS – in organizational stage for meeting in the Fall. We have received 140 abstracts and proceeding to review phase.

#### IV. Global Technical Regulations

Ian MacIntire

Amy Ryan – the next informal working group of the GTR 13 Phase 2 will be online over the course of three days (two hours each). The dates are March 23, 25, 26. We will be asking those interested in register. You can send an email to [Amy.Ryan@toyota.com](mailto:Amy.Ryan@toyota.com) if you are interested and not registered.

#### V. Codes and Standards Organization Updates

##### Institute of Electrical and Electronics Engineers

Mark Siira

Connor Dolan / Karen Quackenbush – We have been meeting with IEEE and understand that there are some anticipated new requirements for grid interconnected devices that will be coming out in the next few years. FCHEA will be discussing these activities within our Stationary Power Working Group meeting.

##### International Electrotechnical Commission IEC TC 105

Kelvin Hecht

- Recent Publication
  - IEC TS 62282-9-102:2021
    - Evaluation methodology for the environmental performance of fuel cell power systems based on the life-cycle thinking – Product category rules for environmental product declarations for stationary fuel cell power systems and alternative systems for residential applications
- Active Working Groups
  - PNW 105-844 ED1 *New Work*
    - Micro fuel cell power systems- Power, data, interchangeability and performance test methods for laptop computers
  - IEC 62282-3-201 *Amendment*
    - Stationary fuel cell power systems – Performance test methods for small fuel cell power systems
  - IEC 62282-4-1000 ED1 *New Work*
    - Fuel cell power systems for rolling stock – Performance requirements and test methods
  - IEC 62282-4-101 ED2 *Second Edition*
    - Fuel cell power systems for electrically powered industrial trucks (*forklifts*) – Safety
  - IEC 62282-4-202 *New Work*
    - Fuel cell power systems for unmanned aircraft systems (*drones*) – Performance test methods
  - IEC 62282-4-600 *New Work*
    - Fuel cell / battery hybrid power pack systems performance test methods for excavators
  - IEC 62282-6-101 *New Work*
    - Micro fuel cell power systems – Safety – General requirements
  - IEC 62282-6-106 *New Work*
    - Micro fuel cell power systems – Indirect Class 8 compounds
  - IEC 62282-6-107 *New Work*

- Micro fuel cell power systems – Indirect water reactive compounds
- IEC 62282-7-2 *TS to Standard*
  - Single cell and stack performance test for solid oxide fuel cells
- IEC 62282-8-301 *New Work*
  - Energy storage systems using fuel cell modules in reverse mode – Power to methane energy systems based on solid oxide cells in reversible operation – Performance test methods

**International Standards Organization ISO/TC 197**      **Karen Quackenbush/Jay Keller**

There is a pause in TC 197 activities at present. The plenary happened and we are acting on those items now. There is a number of requests from ISO for experts to participate in a number of new WGs including O-Rings, General Safety, Liquid Hydrogen. If you are interested, please contact Karen, Jay, or Jill Thompson.

This month will have the first meeting on heavy-duty fueling protocol. Kickoff meeting on March 16<sup>th</sup>. There is a lot of interest in this WG and we encourage those who are interested in contact your TAG. The intent is to pursue a broader fueling protocol approach, starting with reviewing what is required in a protocol and then developing a specific protocol for heavy-duty vehicles.

WG 28 – ISO 19880-8 is hydrogen quality control. We are working on an amendment to align the document with the current version of ISO 14687 hydrogen quality requirements. That amendment is going to FDIS. Translation and other developments should take a month or two and then it should be out for a final vote.

**National Fire Protection Association NFPA 2**      **Chris LaFleur**

NFPA 2 is going through revision right now and the second revision / public comment period should begin soon.

FCHEA has assembled our comments on the first revision ballots to take forward as appropriate. Those votes are due by the end of the week.

**International Codes Council (ICC)**      **Spencer Quong**

The proposals of the first round of commenting is complete. The only topics are regarding mobile fueling and we are working on that with the fire code action committee who coordinate with AHJs and other entities. There was another hydrogen proposal submitted regarding defueling requirements for indoor events and display for things like auto shows or trade events. There were a lot of issues with some jurisdictions requiring full defueling which can damage the tank, we propose similar activities to gasoline cars which is defueling to a quarter of a tank.

Link to code changes <https://www.iccsafe.org/products-and-services/i-codes/code-development-process/2021-2022-group-a/>.

**CSA Group**      **Sara Marxen/Brent Hartman**

**Technical Committees**

Fuel Cell Technical Committee	Actively seeking participation for Regulatory Authority and User Interest categories. Contact: <a href="mailto:mark.duda@csagroup.org">mark.duda@csagroup.org</a>	
U.S. TAG to IEC/TC 105	The US TAG to IEC TC 105 is considering hosting TC 105 Plenary meeting to coincide with 2022 General Meeting in San Francisco and seeking interest from members and stakeholders to support the event. Contact: <a href="mailto:mark.duda@csagroup.org">mark.duda@csagroup.org</a> if you are interested in becoming a sponsor for this TC 105 Plenary in 2022.	
<b>Active Projects</b>		
<b>TSC</b>	<b>Title</b>	<b>Status</b>
HGV 4.4	Gaseous hydrogen – Fuelling stations – Valves	This is an adoption of ISO 19880-3 valve standard with North American deviations. H <sub>2</sub> TTC ballot closed with a negative vote regarding the breakaway device separation value. A TSC meeting was held to discuss the concern and the TSC agreed to revise the deviation (see below). <b>A new ballot will be posted this week for TC voting members.</b> <b>ISO Published 19880-3</b> <b>9.1.4 Separation</b> <i>The hose breakaway device shall separate upon application of a maximum pull force of 1 000 N but not less than 220 N when the device is installed as specified by the manufacturer.</i> <b>Balloted Proposed Deviation – Add the following to Clause 9.1.4</b> <i>For pressure classes H35 and lower, the hose breakaway device shall separate upon application of a maximum pull force of 667 N.</i> <b>New Proposed Deviation – Replace Clause 9.1.4 with the following</b> <i>The hose breakaway device shall separate upon application of a maximum pull force of 667 N but not less than 220 N when the device is installed as specified by the manufacturer.</i>
HGV 2	Compressed hydrogen gas vehicle fuel containers	The HGV 2 document published in January 2021.
HPRD 1	Thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers	Industry/public review closed. TSC has met to discuss comments. TC Ballot closed. Expect the standard to be published by end of March.

HGV 4.10	Fittings for use in compressed gaseous hydrogen fuelling stations	The HGV 4.10 document published in January 2021.
HGV 4.3	Test methods for hydrogen fueling parameter evaluation	TSC members submitted comments on the draft document. The TSC has meetings planned in March (5, 12, 19 & 26) to continue to review and disposition comments.
HGV 4.2	Hoses for dispensing compressed gaseous hydrogen	TSC continues to meet to align content with ISO 19880-5, hose standard. Industry/public review closed. The TSC has meetings scheduled to discuss comments
HGV 5	Hydrogen Refueling Appliances	Project kick-off meeting was held in January to develop <i>compact Hydrogen Fueling Systems</i> (HGV 5.2). TSC meetings are scheduled every three weeks for content development. Next meeting is scheduled for March 10, 2021.
HGV 3	Fuel system components for compressed hydrogen gas powered vehicles	Project kick-off held on February 24 to develop <i>Onboard vehicle components for Hydrogen Gas Vehicles</i> (HGV 3.1). TSC meetings are scheduled every two weeks for content development. Next meeting is scheduled for March 10, 2021.
FC 1	Stationary fuel cell power systems	This is an adoption of IEC 62282-3-100. The document has been approved by the CSA Fuel Cell Technical Committee and is being prepared for final publication.
FC 5	Hydrogen generators using fuel processing technologies – Part 1: Safety	We published the US adoption of ISO 16100-1:2007 as CSA/ANSI FC 5:2021 – ( <i>Adopted ISO 16110 - 1:2007, first edition, with US deviations</i> )

### Society of Automotive Engineers (SAE)

Mike Steele

Task Force	Document	Title	Issue/Revision Date	Status
Interface	J2600_201510	Compressed Hydrogen Surface Vehicle Fueling Connection Devices	21-Oct-15	Final stages of preparation before voting. Anticipate voting before year end.

<b>Interface</b>	TIR J2601/4	Ambient Temperature Refueling		Being developed
<b>Interface</b>	TIR J3219	Hydrogen Fuel Quality Screening Test of Chemicals for Fuel Cell Vehicle		Being developed
<b>Interface</b>	J2601/2_201409	Fueling Protocol for Gaseous Hydrogen Powered Heavy Duty Vehicles	24-Sep-14	Issued - Action Required - Nico
<b>Interface</b>	J2601/3_201306	Fueling Protocol for Gaseous Hydrogen Powered Industrial Trucks	12-Jun-13	Sponsor has opened the document for technical revision.

<b>Fuel Economy</b>	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		Being developed
<b>Fuel Economy</b>	J2572_201410	Recommended Practice for Measuring Fuel Consumption and Range of Fuel Cell and Hybrid Fuel Cell Vehicles Fueled by Compressed Gaseous Hydrogen	16-Oct-14	Sponsor to initiate change of status.

<b>Safety</b>	J1766_201401	Recommended Practice for Electric, Fuel Cell and Hybrid Electric Vehicle Crash Integrity Testing	10-Jan-14	<b>ON HOLD</b> – Waiting resolution of electrical isolation monitoring requirements at GTR #20 - Scheffler
<b>Safety</b>	J2578_201408	Recommended Practice for General Fuel Cell Vehicle Safety	26-Aug-14	<b>ON HOLD</b> – Waiting resolution of electrical isolation requirements at GTR #20 - Scheffler

Safety	J2579_201806	Standard for Fuel Systems in Fuel Cell and Other Hydrogen Vehicles	15-Jun-18	Focused on CHSS fire testing and H2 material compatibility as being defined by GTR #13 - Scheffler
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**Compressed Gas Association (CGA)**

**Rob Early**

CGA will be offering a webinar *Setting the Standard – CGA’s Role in the Hydrogen Revolution* on Wednesday, May 19. It is scheduled for 2:00-4:00 PM EST and will be available to CGA members and non-members. More details will follow at the next web conference.

CGA continues to make progress on identifying gaps in its portfolio of hydrogen publications. The gaps look to be with support of hydrogen fuel cell electric vehicles. CGA plans to either update its publications, develop new publications, or take more involvement in publications by other organizations, whichever is best for those working in the hydrogen space.

Status of current and future publications:

Standard	Current edition	Status
CGA G-5, <i>Hydrogen</i>	8 <sup>th</sup> (2017)	Deadline to submit proposed changes for next edition is 7/7/2022. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=22-019">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=22-019</a>
CGA G-5.3, <i>Commodity specification for hydrogen</i>	7 <sup>th</sup> (2017)	Deadline to submit proposed changes for next edition is 6/4/2022. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=22-013">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=22-013</a>
CGA G-5.4, <i>Standard for hydrogen piping systems at user locations</i>	6 <sup>th</sup> (2019)	Deadline to submit proposed changes for next edition is 12/22/2024. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=24-54">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=24-54</a>
CGA G-5.5, <i>Hydrogen vent systems</i>	3 <sup>rd</sup> (2014)	The 4 <sup>th</sup> edition is in review by CGA Standards Council. Heat radiation testing at Chart Industries in New Prague, MN date is to be determined.
CGA G-5.6, <i>Hydrogen pipeline systems</i>	1 <sup>st</sup> (2005 – reaffirmed 2013)	Deadline to submit proposed changes for next edition is 8/1/2022. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=19-018">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=19-018</a>



<b>Standard</b>	<b>Current edition</b>	<b>Status</b>
CGA H-1, <i>Service conditions for portable, reversible metal hydride systems</i>	2 <sup>nd</sup> (2011)	Deadline to submit proposed changes for next edition is 2/3/2022. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=22-033">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=22-033</a>
CGA H-2, <i>Guideline for classification and labeling of hydrogen storage systems with hydrogen absorbed in reversible metal hydrides</i>	2 <sup>nd</sup> (2018)	Deadline to submit proposed changes for next edition is 6/4/2022. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=22-012">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=22-012</a>
CGA H-3, <i>Standard for cryogenic hydrogen storage</i>	3 <sup>rd</sup> (2019)	Deadline to submit proposed changes for next edition is 12/1/2023. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=23-036">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=23-036</a>
CGA H-4, <i>Terminology associated with hydrogen fuel technologies</i>	3 <sup>rd</sup> (2020)	Deadline to submit proposed changes for next edition is 12/1/2024. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=24-59">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=24-59</a>
ANSI/CGA H-5, <i>Standard for bulk hydrogen supply systems</i>	3 <sup>rd</sup> (2020)	The deadline to submit proposed changes for the next edition is 2/26/2024. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=24-010">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=24-010</a>
CGA H-10, <i>Combustion safety for steam reformer operation</i>	2 <sup>nd</sup> (2018)	Deadline to submit proposed changes for next edition is 12/1/2023. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=23-038">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=23-038</a>
CGA H-11, <i>Safe start-up and shutdown practices for steam reformers</i>	2 <sup>nd</sup> (2020)	Deadline to submit proposed changes for next edition is 8/11/2025. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=25-30">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=25-30</a>
CGA H-12, <i>Mechanical integrity of syngas outlet systems</i>	1 <sup>st</sup> (2016)	Deadline to submit proposed changes for next edition is 3/1/2022. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=21-016">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=21-016</a>
CGA H-13, <i>Hydrogen pressure swing adsorber (PSA) mechanical integrity requirements</i>	1 <sup>st</sup> (2017)	Deadline to submit proposed changes for next edition is 8/1/2022. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=22-027">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=22-027</a>
CGA H-14, <i>HYCO plant gas leak detection and response practices</i>	1 <sup>st</sup> (2018)	Deadline to submit proposed changes for next edition is 12/8/2023. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=23-045">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=23-045</a>
CGA H-15, <i>Safe catalyst handling in HYCO plants</i>	1 <sup>st</sup> (2020)	Deadline to submit proposed changes for next edition is 9/1/2025.



Standard	Current edition	Status
		<a href="https://portal.cganet.com/Publication/Workspac e/Outline.aspx?work_id=25-59">https://portal.cganet.com/Publication/Workspac e/Outline.aspx?work_id=25-59</a>
CGA H-XXX (TBD), <i>Small scale hydrogen production and delivery</i>	New publication not released yet	Task force is creating first draft that will then go to the CGA membership for review.
CGA P-28, <i>OSHA process safety management and EPA risk management plan guidance document for bulk liquid hydrogen supply systems</i>	4 <sup>th</sup> (2014)	The draft of the 5 <sup>th</sup> edition is in staff review before going to Standards Council for final review.
CGA PS-31, <i>Position statement on cleanliness for proton exchange membranes hydrogen piping / components</i>	1 <sup>st</sup> (2007 – reaffirmed 2019)	Deadline to submit proposed changes for next edition is 6/12/2025. <a href="https://portal.cganet.com/Publication/Workspac e/Outline.aspx?work_id=25-16">https://portal.cganet.com/Publication/Workspac e/Outline.aspx?work_id=25-16</a>
CGA PS-33, <i>Position statement on the use of LPG or propane tanks as compressed hydrogen storage buffers</i>	1 <sup>st</sup> (2008 – reaffirmed 2020)	Deadline to submit proposed changes for next edition is 12/10/2026. <a href="https://portal.cganet.com/Publication/Workspac e/Outline.aspx?work_id=25-41">https://portal.cganet.com/Publication/Workspac e/Outline.aspx?work_id=25-41</a>
CGA PS-46, <i>Position statement on roofs over hydrogen storage systems</i>	1 <sup>st</sup> (2017)	Deadline to submit proposed changes for next edition is 3/6/2023. <a href="https://portal.cganet.com/Publication/Workspac e/Outline.aspx?work_id=23-012">https://portal.cganet.com/Publication/Workspac e/Outline.aspx?work_id=23-012</a>
CGA P-48, <i>Position statement on clarification of existing hydrogen setback distances and development of new hydrogen setback distances in NFPA 55</i>	1 <sup>st</sup> (2016)	Deadline to submit proposed changes for next edition is 2/12/2021. <a href="https://portal.cganet.com/Publication/Workspac e/Outline.aspx?work_id=21-062">https://portal.cganet.com/Publication/Workspac e/Outline.aspx?work_id=21-062</a>

### American Society for Testing & Materials (ASTM)

Jennifer Hamilton

Christina Daniels – Wrapping up two ILs that have been working on for several years. Have the data from the last laboratory.

Meeting last week on ASTM and aviation fuels. This group wants to know more information on hydrogen and we are working to inform them and invite them to come to this group.

We also are working with the metro Hyve2 project. They want to come to the US and do sampling then send the cylinders back to Europe and Japan.

Lastly will have a workshop in December (potentially in person, otherwise will be virtual) on inline hydrogen fuel analyzers.

Wrapping up the call for abstracts soon. We are considering whether there is enough interest to host a workshop and are coordinating with Bill Butner.

**American Society of Mechanical Engineers (ASME)**

**Ray Rahaman**

No updates at this time.

**VI. Discussion Topics**

**Facilitating Deployment**

**All**

No updates at this time.

**Center for Hydrogen Safety**

**Nick Barilo**

No updates at this time.

**Regulatory Matrix Review and Comment**

**Karen Quackenbush**

Please direct any updates, questions, or comments to Karen Quackenbush by email at [kquackenbush@fchea.org](mailto:kquackenbush@fchea.org).

A new version of the matrix will be provided on the next meeting.

**Permitting and Installation of Hydrogen Fueling Stations**

**California Station Implementation**

**Jennifer Hamilton**

HyStep is continuing with another station this week. We anticipate a new station in the next two weeks and another station completing its upgrade soon.

**California Div. of Measurement Standards/Fuel Quality / Metrology** **Christina Daniels**

No updates at this time.

**Legal Metrology Standards Hydrogen Fuel Quality and Measurement**

**Juana Williams/Ralph Richter**

No updates at this time.

**VII. Open Discussion & Other Issues**

We have heard requests to revisit hydrogen regulations within OSHA and are having conversations with our membership to discuss industry interest in these activities. Those interested in this activity, please contact Connor Dolan for more details.

**VIII. Next Meeting – Wednesday, April 7<sup>th</sup> at 2:00 PM US Eastern**