

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

**Wednesday, October 11, 2023  
TIME: 2:00 PM ET**

**Minutes**

**Claire Behar  
Christina Daniels  
Connor Dolan  
Rob Early  
Brian Ehrhart  
Mike Force  
Jennifer Gangi  
Jennifer Hamilton  
Tobias Hanson**

**Kelvin Hecht  
Laura Hill  
Ian MacIntire  
Sara Marxen  
Norm Newhouse  
Douglas Olenick  
Haboon Osmond  
Rino Pinti  
Eric Prause**

**Karen Quackenbush  
Spencer Quong  
Ray Rahaman  
Mike Steele  
Kelvin Sumba  
Svetlana Ulemek  
Christine Watson  
Juana Williams**

**I. Welcome and Housekeeping Items**

- a. The NHFCCSCC reviewed FCHEA's Anti-trust Guidelines, approved previous minutes, and approved the meeting agenda.

**II. DOE/HQ Update**

**Christine Watson**

- **Happy Hydrogen and Fuel Cell Week!** [At the Department of Energy, It's Hydrogen Day ... All Week Long | Department of Energy](#)
- **U.S. Department of Energy Announces \$20 Million to Explore Potential of Geologic Hydrogen.** ARPA-E Unveils Two Initiatives Focused on Low-Cost, Low-Greenhouse Gas Emissions Hydrogen Production: [ARPA-E eXCHANGE: Funding Opportunity \(energy.gov\)](#)
  - G. Production of Geologic Hydrogen Through Stimulated Mineralogical Processes; FA Deadline 9:30 AM ET 10/24/2023
  - H. Subsurface Engineering for Hydrogen Reservoir Management; FA Deadline 9:30 AM ET 10/24/2023

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

**Karen Quackenbush**

- Calendar of events: <https://www.hydrogenandfuelcellsafety.info/safety-report-calendar>
- Any committee members with materials they would like hosted on the website can send them to Karen Quackenbush ([kquackenbush@fchea.org](mailto:kquackenbush@fchea.org)) or Haboon Osmond ([hosmond@fchea.org](mailto:hosmond@fchea.org)).

**IV. Global Technical Regulations**

**Ian MacIntire**

- No significant update since the last meeting. GTR No. 13 Phase 2 has been published. NHTSA continues to work on an NPRM to propose FMVSS requirements that align with GTR No. 13. The NPRM has not yet been published.

## V. Codes and Standards Organization Updates

### **Institute of Electrical and Electronics Engineers**

**Mark Siira**

- The revision process for the 2027 edition of IEEE 1547 continues.

### **International Electrotechnical Commission IEC TC 105**

**Kelvin Hecht**

- IEC TC105 Chair
  - Hong Ki Lee from South Korea will be the next chair. He was supported by both the US and Canada
- IEC 62282-6-101: Micro Fuel Cell Power Systems – Safety – General Requirements
  - FDIS has been posted for a final vote
  - Scope: This part of IEC 62282 covers micro fuel cell power systems and fuel cartridges that are wearable or easily carried by hand, providing direct current outputs that do not exceed 60 V DC and power outputs that do not exceed 240 VA. Portable fuel cell power systems that provide output levels that exceed these electrical limits are covered by IEC 62282-5-100.
    - Will replace IEC 62282-6-100
- IEC 62282-3-100: Stationary Fuel Cell Power System – Safety
  - Met in Germany
  - Harmonization with FC1 continues
- 2023 TC105 Plenary – Paris November 13-17
  - A draft agenda is available

### **International Standards Organization ISO/TC 197**

**Karen Quackenbush**

- TC 197 and SC 1 Plenary will meet in Vienna, Austria, from November 13th to November 17th.
  - WG 22 (Gaseous hydrogen fueling station hoses) will be meeting there and will discuss the break-away force.
  - WG 5 (Gaseous hydrogen land vehicle refuelling connection devices) and WG 21 (Gaseous hydrogen fueling station compressors) are meeting as well.
  - There will be a prep meeting for the US TAG on November 3<sup>rd</sup>.

### **National Fire Protection Association NFPA 2**

**Chris LaFleur**

- NFPA 2 will have a pre-first draft meeting on Tuesday, November 7<sup>th</sup> from 11-4 PM US Eastern Time.

### **International Codes Council (ICC)**

**Mark Fasel**

- No updates.

### **Society of Automotive Engineers (SAE)**

**Mike Steele**

Task Force	Document	*	Title	Date	Status
Interface	J2600_201510	S	Compressed Hydrogen Surface Vehicle Fueling Connection Devices	21-Oct-15	Being revised in conjunction with ISO 17268
Interface	J2601_202005	S	Fueling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles	29-May-20	Being revised
Interface	J2601/4	TIR	Ambient Temperature Refueling	21-Nov-16	Comment reconciliation under way
Interface	J2799_201912	S	Hydrogen Surface Vehicle to Station Communications Hardware and Software	13-Dec-19	Being revised
Interface	J2601/5	TIR	MC Formula High Flow General (MCF-HF-G) <i>(title may change)</i>	1-Jul-22	Draft posted
Safety	J1766_201401	RP	Recommended Practice for Electric, Fuel Cell and Hybrid Electric Vehicle Crash Integrity Testing	10-Jan-14	Revised - Action required. Awaiting GTR 13 Phase 2
Safety	J2990/1_201606	RP	Gaseous Hydrogen and Fuel Cell Vehicle First and Second Responder Recommended Practice	3-Jun-16	Meeting scheduled to address comments
Safety	J3294	TIR	Guidance for Material Selection for use in Hydrogen Systems	20-Apr-23	Soliciting comments

CSA

Sara Marxen

Technical Committee Meetings		
<ul style="list-style-type: none"> <li>If you are interested in joining hydrogen standards development committees with CSA, please contact Iris Monner (<a href="mailto:iris.monner@csagroup.org">iris.monner@csagroup.org</a>)</li> </ul>		
Active Projects		
TSC	Designation/Title	Status
HGV 5	HGV 5.2, Compact hydrogen fueling systems	This project is to develop a NEW standard for Compact Hydrogen Fueling Systems (HGV 5.2). Working with the TC and TSC Chairs to disposition ballot comments. A second ballot is being planned.
HGV 5	HGV 5.1, Residential hydrogen fuelling appliances	This project is to develop a NEW standard for Residential fueling appliances. Content development continues.
HGV 4.1	HGV 4.5, Priority and sequencing equipment for hydrogen vehicle fueling	This project is to develop a standard to REINSTATE an updated edition of a Priority and Sequencing standard. Document was published in late September 2023.
HGV 4.3	HGV 4.3, Test methods for hydrogen fueling parameter evaluation	This project is a revision of an existing standard. Document has been revised for use as a certification document. Public review closed October 8, 2023. Meeting with TSC Chairs will be scheduled soon to review comments.

HGV 4.8	HGV 4.8, Compressors	This project is to revise an existing edition of HGV 4.8 compressor standard to address updates in compressor technology. Contact Sara Marxen ( <a href="mailto:sara.marxen@csagroup.org">sara.marxen@csagroup.org</a> ) if interested in joining this work.
B107	Enclosed Hydrogen Equipment	Work has begun on a new standard that will address safety requirements related to hydrogen equipment use inside an enclosure. Contact Mark Duda ( <a href="mailto:mark.duda@csagroup.org">mark.duda@csagroup.org</a> ) with questions or for additional information.
FC 6	Fuel cell/water electrolysis module	CSA Group is developing the first edition of the binational CSA FC 6 * C22.2 No. 62282-2-100 – Fuel Cell Technologies – Part 2-100: Fuel cell modules – Safety (IEC 62282-2-100, MOD). This project will be adopting IEC 62282-2-100 - Fuel Cell Technologies – Part 2-100: Fuel cell modules – Safety for US and Canada. The committee will be expanding the scope of the adoption to include water electrolysis modules including cell stacks as the requirements will be similar to fuel cell modules and there is an immediate industry need for a water electrolysis module safety standard. Contact Mark Duda ( <a href="mailto:mark.duda@csagroup.org">mark.duda@csagroup.org</a> ) with questions or for additional information.
TS-701	SPE-701 – Hydrogen fuel storage containers for aviation applications	The project is to develop a new document for requirements and recommendations for the material, design, manufacture, marking, and testing of serially produced, refillable hydrogen fuel storage containers intended only for the storage of compressed hydrogen gas or liquid hydrogen fuel for aviation applications. Contact Mark Duda ( <a href="mailto:mark.duda@csagroup.org">mark.duda@csagroup.org</a> ) with questions or for additional information.

## Compressed Gas Association (CGA)

Rob Early

*Updates from last month's report are highlighted.*

Status of current and future publications:

Standard	Current edition	Status
CGA G-5, <i>Hydrogen</i>	8 <sup>th</sup> (2017)	The ANS committee has resolved all proposed changes. Next step is a 45-day public review. <a href="https://portal.cganet.com/WorkItem/Details.aspx?id=22-019">https://portal.cganet.com/WorkItem/Details.aspx?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 was 5/1/2023. A total of 7 PCs have

Standard	Current edition	Status
		been submitted. A PC resolution meeting is scheduled for 3 November 2023. <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)	Deadline to submit proposed changes for next edition is 03/04/2026. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=26-3">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=26-3</a> The task force will meet 19 and 20 October 2023 to review test results.
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 8/1/2023. <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>
CGA H-3, <i>Standard for cryogenic hydrogen storage</i>	3 <sup>rd</sup> (2019)	This publication is in staff review prior to Council Ballot. After council approval, H-3 will be sent for 45 day public review after council approval to move through the ANS process.
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. However, all the content has been added to the updated version of CGA G-5. Once CGA G-5 has been issued, CGA H-4 will be retired. For updates use the following link: <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>

<b>Standard</b>	<b>Current edition</b>	<b>Status</b>
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 6/1/2023. <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)	Council ballot due 21 Aug 2023, IHC Association approvals due 18 Sept 2023. Pending no comments, estimated publish date by the end of September. <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. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=25-59">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=25-59</a>
CGA H-17, <i>Small scale hydrogen production and delivery</i>	New publication not released yet	Council ballot due 9 Aug 2023, IHC Association approvals due 7 Sept 2023. Pending no comments, estimated publish date by the end of September. <a href="https://portal.cganet.com/WorkItem/Details.aspx?id=18-093">https://portal.cganet.com/WorkItem/Details.aspx?id=18-093</a>
CGA P-28, <i>OSHA process safety management and EPA risk management plan guidance document for bulk liquid hydrogen supply systems</i>	5 <sup>th</sup> (2022)	Deadline to submit proposed changes for next edition is 08/01/2027. <a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=25-49">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=25-49</a>
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/Workspace/Outline.aspx?work_id=25-16">https://portal.cganet.com/Publication/Workspace/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/Workspace/Outline.aspx?work_id=25-41">https://portal.cganet.com/Publication/Workspace/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)	The ad hoc committee will meet on 8 August 2023 to resolve public comments and update PS-46. For updates see the link below:

Standard	Current edition	Status
		<a href="https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=23-012">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=23-012</a>
CGA PS-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)	The ad hoc committee met on 8 August 2023 to resolve public comments and update PS-48 to point to NFPA 2 for hydrogen instead of pointing to NFPA 55. For updates see the link below: <a href="https://portal.cganet.com/WorkItem/Details.aspx?id=21-062">https://portal.cganet.com/WorkItem/Details.aspx?id=21-062</a>
PS-69, <i>Liquid Hydrogen Supply Systems Separation Distances</i>	1 <sup>st</sup> (2022)	CGA has developed a position statement pointing users to the new liquid hydrogen system distances in NFPA 2:2023. The position statement covers the process of requesting a variance to use the numbers from the NFPA 2 section of the NFPA web site. PS-69 is free for downloading at <a href="https://www.cganet.com/wp-content/uploads/PS-69_1.pdf">https://www.cganet.com/wp-content/uploads/PS-69_1.pdf</a>
CGA work item 21-127, <i>Transfer and unloading of hydrogen at near-consumer use points</i>	New publication not released yet	Develop a new standard to update traditional hydrogen delivery practices for industrial users to improve practices for retail applications.
CGA work item 21-128, <i>Noise from hydrogen venting and hydrogen systems operations</i>	New publication not released yet	Develop a new standard to reduce the noise from hydrogen system operations, including venting, particularly at retail applications where hydrogen system noise is greater than ambient noise. The task force held a meeting November 1 and is working on developing content for the publication.
CGA work item 22-107, <i>Hydrogen system best practices</i>	New publication not released yet	Develop a new standard to capture recommended best practices for handling hydrogen, filling containers, starting up systems, maintaining hydrogen systems, and similar topics to ensure safe practices for those new to the hydrogen space and to share best practices from those already experienced with hydrogen. The first draft was sent out for a two-month membership review with a cutoff date of 15 August 2023. No member comments were received. The draft is now out to CGA Standards Council for review with a deadline of 13 September 2023. <a href="https://portal.cganet.com/WorkItem/Details.aspx?id=22-107">https://portal.cganet.com/WorkItem/Details.aspx?id=22-107</a>

Standard	Current edition	Status
CGA work item 22-116, <i>Hydrogen separation distances</i>	New publication not released yet	CGA is developing a globally harmonized standard on the methodology for developing separation distances between hydrogen systems and exposures. The standard will provide details on mitigation techniques for reducing required distances, particularly in near-consumer locations (such as vehicular fueling) where room is limited. The working group has a first outline and continues to add content. The JWG met on 5 April 2023, 4 May 2023, 18 May 2023, and 8 June 2023. Future meetings are scheduled for 7 July 2023, 30 August 2023, 29 September 2023, and 27 October 2023.
CGA work item 22-127, <i>Hydrogen education plan</i>	New publication not released yet	CGA is developing a globally harmonized standard on hydrogen emergency response and safe hydrogen handling training. The JWG met on 17 April 2023, 11 May 2023, and 9 June 2023. Future meetings are scheduled for 27 June 2023, 8 August 2023, and 15 September 2023.

#### Upcoming events:

CGA is working on a hydrogen seminar for 17-18 October 2023 with support from CGA members and partners.

CGA has established a new hydrogen membership category for those interested in hydrogen activities and not the whole range of industrial gases. The new membership category has a lower fee structure. More details can be found at <https://www.cganet.com/cga-announces-formation-of-hydrogen-membership/>. Those who are interested are encouraged to review the material at the CGA web site and/or contact Rob Early at [rearly@cganet.com](mailto:rearly@cganet.com).

CGA has launched <https://www.safehydrogenproject.org/> to grow awareness and access to standards and safety information. More details can be found at <https://www.cganet.com/compressed-gas-association-announces-landmark-hydrogen-initiative/>

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

Christina Daniels

- ASTM D03.14 Hydrogen and Fuel Cells Subcommittee ballot closed 10/8/2023.
  - D7653 Standard Test Method for Determination of Trace Gaseous Contaminants in Hydrogen Fuel by Fourier Transform Infrared (FTIR) Spectroscopy – ballot passed with 3 editorial comments
    - Next steps will be a D03 main committee ballot
- ASTM D03 Gaseous Fuels Main Committee ballot closes 10/16/2023
  - Revision of D7676 Standard Practice for Screening Organic Halides Contained in Hydrogen or Other Gaseous Fuels
  - Withdrawal of D7649 Standard Test Method for Determination of Trace Carbon Dioxide, Argon, Nitrogen, Oxygen and Water in Hydrogen Fuel by Jet Pulse Injection and Gas Chromatography/Mass Spectrometer Analysis
- [Registration](#) for the December committee meeting is open. The meeting is in New Orleans, LA from December 5-6 with the [Workshop on Natural Gas Blended with](#)



[Hydrogen: Analytic Challenges and Standardization](#) occurring December 6 from 1:00 – 5:30 p.m. local time.

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

**Ray Rahaman**

- The B31.12 committee met on Tuesday, September 26<sup>th</sup>.
  - Board approved the motion of relevant requirements for hydrogen piping and pipelines from the B31.12 code to B31.3 and B31.8 code books. There are now two task groups to help move those requirements; if any committee members are interested in participating in these groups, please contact Ray Rahaman ([RahamanR@asme.org](mailto:RahamanR@asme.org)).
- The next edition of the B31.12 code is with the ASME editors and can be expected to be published in December 2023.

## **VI. Discussion Topics**

### **Facilitating Deployment**

**All**

### **Center for Hydrogen Safety**

**Jennifer Hamilton**

- No updates.

### **Regulatory Matrix Review and Comment**

**Karen Quackenbush**

- This Matrix is updated quarterly and keeps FCHEA members up-to-date in the development of codes, standards, and regulations.
- As of September 30, 2023:  
<https://static1.squarespace.com/static/5668416ddc5cb4375e2a9ef8/t/6526d8c28822576439a6d948/1697044676664/FCHEA+Regulatory+Matrix+Markup+September+30+2023.pdf>
- Please direct any updates, questions, or comments to Karen Quackenbush via email at [kquackenbush@fchea.org](mailto:kquackenbush@fchea.org) or Haboon Osmond at [hosmond@fchea.org](mailto:hosmond@fchea.org).

## **Permitting and Installation of Hydrogen Fueling Stations**

### **California Station Implementation**

**Ben Xiong**

- No updates.

### **California Div. of Measurement Standards/Fuel Quality / Metrology**

**Yuk Wong**

- No updates.

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

**Juana Williams**

- No updates.

## **VII. Open Discussion & Other Issues**

- ASME BPVC Section VIII

- ASME moved forward with the code case for rules for only electrolyzer cell stack assemblies. The code case has been approved (#3078), but still needs to be published. It is in the editing process, expected to be published by the end of the year.
- ASME launched a virtual working group to work out the technical issues and language of the code case. The group met on the 28th of September. There is a process to join the group. ASME membership is encouraged but optional. To join, please contact Karen Quackenbush for assistance. The second meeting will be either on the 6th or 8th of November.
- ASME is encouraging the electrolyzer and fuel cell community to attend and present the technologies at the following two meetings: the 2024 ASME PVP conference in Bellevue, Washington, and the 2024 National Board of Boiler and Pressure Inspectors' general meeting in Scottsdale, Arizona. Both meetings are in the abstract submission process. Abstracts of the ASME meeting are due on October 16, and the National Board abstracts are due by October 31.

**VIII. Next Meeting** – Wednesday, November 1<sup>st</sup> at 2:00 PM US Eastern Time