

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

**Wednesday, August 2, 2023
TIME: 2:00 PM ET**

Minutes

**Andrew Adkins
William Chernicoff
Christina Daniels
Rob Early
Brian Ehrhart
John Eihusen
Mark Fasel
Mike Force
Jennifer Gangi
Jennifer Hamilton**

**Tobias Hanson
Kelvin Hecht
Laura Hill
Owen Hopkins
Jay Keller
Ian MacIntire
Oliver Martinez
Sara Marxen
Norm Newhouse
Douglas Olenick**

**Haboon Osmond
Eric Prause
Jeff Puckett
Karen Quackenbush
Spencer Quong
Amy Ryan
Mike Steele
Kelvin Sumba
Juana Williams**

I. Welcome and Housekeeping Items

- a. The NHFCSCC reviewed FCHEA's anti-trust guidelines, approved previous minutes, and approved the meeting agenda.

II. DOE/HQ Update

Christine Watson

- FCHEA hosted a Hydrogen Permitting Listening Session on 07/26/2023, with support and participation by U.S. DOE HFTO. If you were unable to join or would like to update or amend your responses from the session, you can still provide your input through **Friday, August 4, 2023**. To view the materials and questions, as well as submit further input, please visit www.menti.com and use the passcode 9535 1045 to participate.
- Zero-Emissions Shipping Mission (ZESM): Progression to Net-Zero Emission Fuels State of the Industry: Request for Information **deadline extended to August 18**. More information can be found here: <https://eere-exchange.energy.gov/Default.aspx#Foalda6c86548-3308-4e47-ae8f-83114d0de608>
- PHMSA Advanced Notice of Proposed Rulemaking: Hazardous Materials: Modernizing Regulations to Improve Safety and Efficiency. **Comment period ends 10/3/2023**. [Federal Register :: Hazardous Materials: Modernizing Regulations To Improve Safety and Efficiency](https://www.federalregister.gov/d/2023-08-01)

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) or Haboon Osmond (hosmond@fchea.org).

IV. Global Technical Regulations

Ian MacIntire

- GTR 13 Phrase 2 has been adopted at the last WP 29 meeting.

V. Codes and Standards Organization Updates

Institute of Electrical and Electronics Engineers

Mark Siira

- The revision process for the 2027 edition of IEEE 1547 is underway. If any members are interested in revising IEEE 1547 to allow hydrogen storage, full cell technologies, and electrolyzers to be grid connected in the process, please reach out to Karen Quackenbush via email at kquackenbush@fchea.org.

International Electrotechnical Commission IEC TC 105

Kelvin Hecht

- Major USA Interest
 - TC105 – Chair
 - Two candidates have been nominated to be the next Chair of TC105
 - Hong-Ki Lee (Korea): Professor, Woosuk University Energy & Electric Engineering
 - Pierre Serre-Combe (France): Deputy Director, Energies Program Division French Atomic & Alternates Energies Commission (CEA)
 - Resumes are available
 - 2023 TC 105 Plenary will be held in Paris November 13-17
- Minor USA Interest
 - IEC 62282-4-202 1st edition: *Fuel cell power systems for propulsion and auxiliary power units - Unmanned aircrafts - Performance test methods*
 - FDIS posted

International Standards Organization ISO/TC 197

Karen Quackenbush

- WG 22 (Gaseous hydrogen fuelling station hoses) is working on revising ISO 19880-5 (Gaseous hydrogen — Fuelling stations — Part 5: Dispenser hoses and hose assemblies). WG 22 met on July 14th to request to relaunch the project. A ballot to relaunch the project is out for vote now.
 - WG 24 is going through the same situation.
- WG 18's ISO 19881:2018 (Gaseous hydrogen — Land vehicle fuel containers and ISO 19882:2018 Gaseous hydrogen — Thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers) went to CD and is working on resolving comments and then will go to ballot by November.
- WG 29: the ballot is out for ISO/TR 15916 (Basic considerations for the safety of hydrogen systems) to determine if it should be TR or TS.
- ISO/TC 197 U.S. TAG is meeting on August 15th
- TC 197 and SC 1 Plenary will meet in Vienna, Austria, from November 13th to November 17th.

National Fire Protection Association NFPA 2

Chris LaFleur

- NFPA Technical Committee on Hydrogen Technology (HYD-AAA) had its NFPA 2 Pre-First Draft Meeting on July 18th
- The 2023 edition of NFPA 2 is open for public input until January 4th, 2024

International Codes Council (ICC)

Mark Fasel

- The Hydrogen Fuel Gas WG's goal is to move forward all proposals to the ICC plumbing and mechanical fuel gas code action committee no later than October.
- The deadline for proposal submissions for the 2027 edition of the international codes depends on the code group.
 - Code A deadline is January 8th, 2024.
 - Code B deadline is January 10th, 2025.
- The last Hydrogen Fuel Gas WG meeting updates:
 - A California fire chief representative will be working with the fire code action committee to deal with hydrogen mobile fueling and intends to place requirements in chapter 23 of international fuel gas code
 - A report from someone who served in ASME B31.12 shared that ASME B31.12 provisions will be relocated into ASME B31.3 and B31.8, with ASME B31.12 eventually being repealed 5 to 10 years.
 - The WG continues to look into hydrogen add mixtures with natural gas and work on how to address hydrogen add mixtures with natural gas.
- The Hydrogen Fuel Gas WG will meet August 10th from 12:00 PM – 2:00 PM US Eastern Time. The WG will meet every two weeks. The goal is to have any proposed revisions to the 2027 edition of its international codes completed and approved by the code action committee by November 2023.
- If any committee members are interested in participating in the WG, please contact Mark Fasel (mfasel@iccsafe.org)

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 required
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	Comment reconciliation required
Safety	J3294	TIR	Guidance for Material Selection for use in Hydrogen Systems	20-Apr-23	Draft posted
Fuel Economy	J3202	RP	Recommended Practice for Measuring and Simulating Fuel Consumption and Range of Heavy Duty Fuel Cell Hybrid Road Vehicles Fueled by Compressed Gaseous Hydrogen	25-Apr-19	Being developed. No draft posted
Fuel Economy	J2572_201410	RP	Recommended Practice for Measuring Fuel Consumption and Range of Fuel Cell and Hybrid Fuel Cell Vehicles Fuelled by Compressed Gaseous Hydrogen	16-Oct-14	Stabilization project initiated

CSA

Sara Marxen

Technical Committee Meetings		
<ul style="list-style-type: none"> CSA Group's U.S. Committee Week is planned for October 2-5 in Cleveland, Ohio. US Committee Week Details 		
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. Meetings are being planned for TSC to discuss.
HGV 5	HGV 5.1, Residential hydrogen fuelling appliances	This project is to develop a NEW standard for Residential fueling appliances. Project was kicked off in October. Content development continues.
HGV 2	HGV 2, Compressed hydrogen gas vehicle fuel containers	This project is a revision of an existing standard. This standard published in June.

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. Draft document is being prepared to publish.
HGV 4.3	HGV 4.3, Test methods for hydrogen fueling parameter evaluation	This project is a revision of an existing standard. TSC meetings will be scheduled to review the draft document as a certification standard.
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 (mark.duda@csagroup.org) with questions or for additional information.
FC 6	Fuel cell/water electrolysis module	CSA Group is seeking volunteers to develop 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). The new edition will supersede CSA / ANS FC 6 – Fuel cell technologies – Part 2: Fuel cell modules (IEC 62282-2:2012, MOD) and CAN / CSA C22.2 No. 62282-2 - Fuel cell technologies – Part 2: Fuel cell modules (IEC 62282-2:2012, MOD). Volunteers will be participating on the CSA Fuel Cell / Water Electrolysis Module Technical Subcommittee. 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 (mark.duda@csagroup.org) with questions or for additional information.
SPE-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 (mark.duda@csagroup.org) 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 th (2017)	The ANS committee has resolved all propose changes, and the update is moving through the ANSI review process. For updates on the work item progress see https://portal.cganet.com/WorkItem/Details.aspx?id=22-019
CGA G-5.3, <i>Commodity specification for hydrogen</i>	7 th (2017)	Deadline to submit proposed changes for next edition was 5/1/2023. A total of 7 PCs have been submitted. The next step is to resolve the PCs. https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=22-013
CGA G-5.4, <i>Standard for hydrogen piping systems at user locations</i>	6 th (2019)	Deadline to submit proposed changes for next edition is 12/22/2024. https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=24-54
CGA G-5.5, <i>Hydrogen vent systems</i>	3 rd (2014)	The 5 th edition has been published and can be found at https://portal.cganet.com/Publication/Details.aspx?id=G-5.5 Deadline to submit proposed changes for next edition is 03/04/2026. https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=26-3 Heat radiation testing at Chart Industries in New Prague, MN date is ongoing. The goal is for the task force to review test results as soon as they are completed.
CGA G-5.6, <i>Hydrogen pipeline systems</i>	1 st (2005 – reaffirmed 2013)	Deadline to submit proposed changes for next edition is 8/1/2023. https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=19-018
CGA H-3, <i>Standard for cryogenic hydrogen storage</i>	3 rd (2019)	The ANS consensus body finished resolving PCs on 28 February 2023. Members who did not attend the final meeting were given 2 weeks to vote, concluding on 17 March 2023. This publication is now in staff review prior to Council Ballot.
CGA H-4, <i>Terminology associated with hydrogen fuel technologies</i>	3 rd (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:

Standard	Current edition	Status
		https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=24-59
ANSI/CGA H-5, <i>Standard for bulk hydrogen supply systems</i>	3 rd (2020)	The deadline to submit proposed changes for the next edition is 2/26/2024. https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=24-010
CGA H-10, <i>Combustion safety for steam reformer operation</i>	2 nd (2018)	Deadline to submit proposed changes for next edition is 12/1/2023. https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=23-038
CGA H-11, <i>Safe start-up and shutdown practices for steam reformers</i>	2 nd (2020)	Deadline to submit proposed changes for next edition is 8/11/2025. https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=25-30
CGA H-12, <i>Mechanical integrity of syngas outlet systems</i>	1 st (2016)	Deadline to submit proposed changes for next edition is 6/1/2023. https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=21-016
CGA H-13, <i>Hydrogen pressure swing adsorber (PSA) mechanical integrity requirements</i>	1 st (2017)	Deadline to submit proposed changes for next edition was 11/12/2022. Publication is in staff review. https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=22-027
CGA H-14, <i>HYCO plant gas leak detection and response practices</i>	1 st (2018)	Deadline to submit proposed changes for next edition is 12/8/2023. https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=23-045
CGA H-15, <i>Safe catalyst handling in HYCO plants</i>	1 st (2020)	Deadline to submit proposed changes for next edition is 9/1/2025. https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=25-59
CGA H-17, <i>Small scale hydrogen production and delivery</i>	New publication not released yet	Task force has created the first draft that is out for proposed changes; the deadline to submit proposed changes was 12/15/2022. Publication is in final staff review. https://portal.cganet.com/WorkItem/Details.aspx?id=18-093
CGA P-28, <i>OSHA process safety management and EPA risk management plan guidance document for bulk liquid hydrogen supply systems</i>	5 th (2022)	Deadline to submit proposed changes for next edition is 08/01/2027. https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=25-49

Standard	Current edition	Status
CGA PS-31, <i>Position statement on cleanliness for proton exchange membranes hydrogen piping / components</i>	1 st (2007 – reaffirmed 2019)	Deadline to submit proposed changes for next edition is 6/12/2025. https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=25-16
CGA PS-33, <i>Position statement on the use of LPG or propane tanks as compressed hydrogen storage buffers</i>	1 st (2008 – reaffirmed 2020)	Deadline to submit proposed changes for next edition is 12/10/2026. https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=25-41
CGA PS-46, <i>Position statement on roofs over hydrogen storage systems</i>	1 st (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: https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=23-012
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 st (2016)	The ad hoc committee will meet 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: https://portal.cganet.com/WorkItem/Details.aspx?id=21-062
PS-69, <i>Liquid Hydrogen Supply Systems Separation Distances</i>	1 st (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 https://www.cganet.com/wp-content/uploads/PS-69_1.pdf
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.

Standard	Current edition	Status
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 with those already experienced with hydrogen. The first draft is out for a two-month membership review with a cutoff date of 15 August 2023. For updates see the link below: https://portal.cganet.com/WorkItem/Details.aspx?id=22-107
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. A call for papers has gone out. We are seeking technical safety and reliability presentations on the following topics:

- Hydrogen production (including SMR/ATR/POX with renewable gas and electrolyzers)
- Hydrogen liquefaction
- Hydrogen storage (including gaseous and liquid storage)
- Hydrogen material compatibility
- Hydrogen system standard operating procedures and maintenance requirements
- Hydrogen blending
- Hydrogen trailer design and emergency response considerations
- Hydrogen delivery to near consumer locations
- Near consumer hydrogen risk management

- Near consumer hydrogen facility design considerations for safe operation
- Safe design and operation of hydrogen systems
- Carbon capture utilization and sequestration
- New industry research and testing
- Any other topic from which others could benefit

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.

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

- None.

American Society of Mechanical Engineers (ASME)

Ray Rahaman

- FCHEA recently had an opportunity to help develop a panel discussion of the impacts of the draft Code Case relating to ASME BPVC Section VIII requirements for Cell Stack Assemblies (CSAs). The panel discussion took place on Thursday, July 20, at the 2023 ASME PVP Conference in Atlanta, GA.
 - Panelists: Steven C. Roberts, Shell Global Solutions (US), Houston, TX, USA; Kang Xu, Linde Inc., Tonawanda, NY, USA; Jitesh Panicker, Electric Hydrogen Co., San Carlos, CA, USA; Svetlana Ulemek, Plug Power, Lantham, NY, USA
 - In addition to panelists, the audience included four industry experts in fuel cell or electrolyzer technologies, and six active ASME members. Steven Roberts, the Chair of the ASME BPVC Section VIII Committee, led the discussion, followed by Dr. Kang Xu, the project lead developing the code case. They walked through the draft Code Case and noted it is currently being balloted by the Section VIII committee, and could be published in the next month. ASME's goal is to use feedback on the code case to be able to include the requirements as a mandatory appendix in the next revision of Section VIII.
 - The open discussion between industry and ASME leadership increased understanding of all involved and opened a door for further discussion in a task group within the ASME BPV Section VIII committee. Industry members who would like to be part of this task group can e-mail Mr. Roberts at steven.roberts@shell.com with any concerns you may have as well as a request to participate in this proposed task group. Interested parties are also encouraged to CC Karen Quackenbush (kquackenbush@fchea.org) to ensure you receive relevant communications.

VI. Discussion Topics

Center for Hydrogen Safety

Jennifer Hamilton

- CHS held meetings last week to discuss two incidents with its membership (A recent bus fire and CNG Bus being fueled with hydrogen). Good discussions highlight the value of the community and a good way to crowdsource wisdom,” as a coworker shared.
- A Laboratory Hydrogen Safety webinar will be held on September 13th.
- The next CHS conference will be held the week of May 20, 2024, in Las Vegas, NV. Please send an email to chs@aiche.org if you would like to participate in the organizing committee.

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 June 30, 2023:
<https://static1.squarespace.com/static/5668416ddc5cb4375e2a9ef8/t/64a5c9213a13167fb28acb40/1688586529543/FCHEA+Regulatory+Matrix+Markup+June+30+2023.pdf>
- Please direct any updates, questions, or comments to Karen Quackenbush via email at kquackenbush@fchea.org or Haboon Osmond at hosmond@fchea.org.
- H2Tools’ Hydrogen and Fuel Cell Codes and Standards [database](#).

California Station Implementation

Ben Xiong

- None.

California Div. of Measurement Standards/Fuel Quality / Metrology

Yuk Wong

- DMS will start particulate sampling this month or in early September.

Legal Metrology Standards Hydrogen Fuel Quality and Measurement

Juana Williams

- None.

VII. Open Discussion & Other Issues

- None.

VIII. Next Meeting – Wednesday, September 6th at 2:00 PM US Eastern Time