



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

**Wednesday, March 16, 2022  
TIME: 2:00 – 3:00 pm (Eastern Standard Time)**

**Minutes  
Attendees**

**Mark Luth  
Jay Keller  
Karen Quackenbush  
Christine Watson  
Douglas Olenick  
Mike Steele  
Heath Plagmann  
Laura Hill  
Ian MacIntire  
Kelvin Hecht**

**Rob Early  
Juana Williams  
Eric Prause  
Spencer Quong  
Sara Marxen  
Jennifer Gangi  
Shawn Cole  
Rob Kaminsky  
Rudolf Coertze  
Kelly O'Connell**

**Alan Lang  
Nick Barilo  
Christina Daniels  
Brian Zupancic  
Rino Pinti  
Michael Cox  
Chris LaFleur  
Shawn Cole  
Yuk Wong**

**I. Welcome and Housekeeping Items**

- FCHEA's anti-trust guidelines
- Meeting agenda
- Previous meeting minutes

**II. DOE/HQ Update**

**Laura Hill**

The Clean Hydrogen Manufacturing and Electrolysis RFI deadline is March 29<sup>th</sup>. The Regional Clean Hydrogen Hubs RFI deadline has been extended to March 21<sup>st</sup>. Previous webinars are available [here](#).

DOE has begun the office re-entry process this week, with some employees starting to go into the office once per week.

A restructuring of the DOE tech teams is underway, no hydrogen-specific tech team meetings will happen until the overall restructuring is complete.

The Annual Merit Review is scheduled for June 6-8<sup>th</sup> and will be held virtually. Click here for more information: <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 ([kquackenbush@fchea.org](mailto:kquackenbush@fchea.org)) or Connor Dolan ([cdolan@fchea.org](mailto:cdolan@fchea.org)).

**IV. Global Technical Regulations**

**Ian MacIntire**

IWG meeting for GTR 13 is ongoing this week. The work for phase two is nearly complete, with the current focus on full harmonization.

Individual task forces have now completed their work, the drafting task force and overall work is near finalization.

## V. Codes and Standards Organization Updates

### Institute of Electrical and Electronics Engineers

Mark Siira

Written Update: IEEE P1547.2, IEEE P1547.3, and IEEE P1547.9 are all in the ballot process and should be approved by 3Q2022. IEEE P2800 is also going through the ballot process.

New standards being formulated in the areas of Energy Storage and Grid-Forming inverters.

### International Electrotechnical Commission IEC TC 105

Kelvin Hecht

IEC TC 105 has a proposed new work item (proposed by Korea) on **Performance Test of Fuel Cell Based Tri-generation System – combined Cooling, Heating, and Power Generation**.

Comments are invited until 6/3/22. This part of IEC 62282 covers the requirements for the electric/thermal and environmental performance test methods applied to stationary fuel cell systems with tri-generation systems expressed as combined cooling, heating and power generation (CCHP).

This document applies to both gaseous hydrogen-fueled fuel cell, liquid hydrogen-fueled fuel cell systems that have a heat input based on lower heating value of less than or equal to 70 kW. Fuel cell systems are integrated with heat-driven chillers or heat pumps, such as absorption heat pumps and chillers to produce cooling energy in addition to heating energy. The stationary fuel cell system and the heat driven chillers are not installed in one enclosure but connected by pipelines for the heat transfer fluid.

For this purpose, the following test methods under specified operating and transient conditions are considered within the scope of this document

- electric power output;
- electrical efficiency and heat recovery efficiency of cooling and heating
- environmental performance of exhaust gas emissions, noise, vibration and discharge water quality.

This standard does not cover additional auxiliary heat generators that produce thermal energy. This standard describes type tests and their test methods only. No routine tests are required or identified, and no performance targets are set in this standard

This standard is focused on fuel cell based trigeneration system (CCHP) in order to increase the utilization rate of thermal energy discharged from the fuel cell stack.

### International Standards Organization ISO/TC 197

Karen Quackenbush/Jay Keller

Working groups are still holding virtual meetings. WG 24 will be meeting on March 22<sup>nd</sup> and April 25<sup>th</sup>. WG 5 will meeting on March 24. H2 Quality meetings April 12-13 and April 19-20.

The technical advisory board previews proposals, one current proposal from China

**Commented [ML1]:** I missed what this proposal was about, if someone can fill in the details.

WG 29 is having some difficulties scheduling meetings, the meeting scheduled for March 17<sup>th</sup> was cancelled.

A specific difficulty with meeting notices not taking into account daylight savings time was highlighted.

**National Fire Protection Association NFPA 2**

**Chris LaFleur**

Liquid Hydrogen Bulk Storage setback distances has passed a verbal vote to change the basis of setback distances to scientific, repeatable procedures. It will go to formal balloting next.

Due to ballot counting issues, the standard will be pushed to the 2024 edition, publishing in 2023.

NFPA is working on documents to track pressures and exposure groups for the future.

**International Codes Council (ICC)**

**Spencer Quong**

No updates at this time.

**Society of Automotive Engineers (SAE)**

**Mike Steele**

A meeting of the ITF will take place this afternoon, March 16<sup>th</sup> on 2601.

Awaiting the completion of WG 5's work.

**CSA**

**Sara Marxen**

**Technical Committee Activity – Call for Participation**

**CSA Fuel Cell Technical Committee:**

**CSA Group, an ANSI-accredited SDO, is seeking additional experts to serve on the bi-national Fuel Cell**

**Technical Committee. The Fuel Cell Technical Committee develops and maintains minimum safety standards and**

**essential requirements for the design construction and maintenance of:**

- a) stationary, portable, and micro fuel cells;
- b) hydrogen generation technologies using all fuels (e.g., electrolysis, coal, natural gas);
- c) related components and equipment for stationary, portable and micro fuel cells; and
- d) related components and equipment installed for hydrogen generation technologies using all fuels.

**We are seeking interested stakeholders who will actively participate and contribute to the development and**

**maintenance of these important standards through CSA's accredited Standards Development Process(es).**

**The Technical Committee is seeking members in the following categories:**

**User interest** — those who predominantly represent consumer interests or end users of the subject product(s), material(s), or service(s), and who are not involved in any way in production or distribution of the subject product(s), material(s), or service(s).

**Regulatory authority** — those who are predominantly involved in regulating the use of the subject product(s), material(s), or service(s).

**What is expected?**

- Strong interest and knowledge of the subject matter
- Active participation and willingness to work on a Technical Committee electronically and in-person
- Ability to represent a stakeholder category outlined above
- Ability to work in a multi-stakeholder environment, following the principles of consensus

**If you are interested in participating as a new member of the CSA Fuel Cell Technical Committee, please submit a brief bio along with a statement outlining your interest and ability to contribute to the work to Mark Duda at [mark.duda@csagroup.org](mailto:mark.duda@csagroup.org). If you know of a colleague who may be interested in this project, feel free to have them contact CSA Group.**

**Active / Recently Published Projects**

TSC	Designation/Title	Status
HGV 4.3	HGV 4.3, Test methods for hydrogen fueling parameter evaluation	This project is a revision of an existing standard, and will include content related to MC formula. The new edition was published in February 2022.
HGV 4.2	HGV 4.2, Hoses for dispensing compressed gaseous hydrogen	This project is a revision of an existing standard, and will update to align with current hose technology, and remove requirements for on-board vehicle hoses (content will be transferred to HGV 3.1). The new edition was published in February 2022.
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). The TSC completed content development. The draft was available for public review (closed January 18, 2022). The Technical Subcommittee Chairs are working to pre-disposition comments, and additional TSC meetings to review the comment will be scheduled for March.
HGV 3	HGV 3.1, Onboard vehicle components for hydrogen gas vehicles	This project is a revision of an existing standard for technology updates, as well as inclusion of the on-board vehicle hose requirements (transferred from HGV 4.2). The Technical Subcommittee is currently working through the public review comments received.
HGV 2	HGV 2, Compressed hydrogen gas vehicle fuel containers	This project is a revision of an existing standard. Content development meetings continue to be held on a bi-weekly basis.
HGV 4.1	HGV 4.5, Priority and	This project is to develop a standard to REINSTATE an

	sequencing equipment for hydrogen vehicle fueling	updated edition of a Priority and Sequencing standard. A seed document draft has been prepared and a kickoff meeting with the HGV 4.1 TSC is being scheduled for early 2022.
C22.2 No. 22734	Hydrogen generators using water electrolysis	The CSA technical subcommittee continues to work on a binational adoption of ISO 22734. 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

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/Workspac e/Outline.aspx?work_id=22-019">https://portal.cganet.com/Publication/Workspac e/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/Workspac e/Outline.aspx?work_id=22-013">https://portal.cganet.com/Publication/Workspac e/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/Workspac e/Outline.aspx?work_id=24-54">https://portal.cganet.com/Publication/Workspac e/Outline.aspx?work_id=24-54</a>
CGA G-5.5, <i>Hydrogen vent systems</i>	3 <sup>rd</sup> (2014)	The 5 <sup>th</sup> edition has been published and can be found at <a href="https://portal.cganet.com/Publication/Details.aspx?id=G-5.5">https://portal.cganet.com/Publication/Details.aspx?id=G-5.5</a> Deadline to submit proposed changes for next edition is 03/04/2026. <a href="https://portal.cganet.com/Publication/Workspac e/Outline.aspx?work_id=26-3">https://portal.cganet.com/Publication/Workspac e/Outline.aspx?work_id=26-3</a> 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 <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/Workspac e/Outline.aspx?work_id=19-018">https://portal.cganet.com/Publication/Workspac e/Outline.aspx?work_id=19-018</a>
CGA H-1, <i>Service conditions for portable,</i>	2 <sup>nd</sup> (2011)	Deadline to submit proposed changes for next edition is 2/3/2022.

<b>Standard</b>	<b>Current edition</b>	<b>Status</b>
<i>reversible metal hydride systems</i>		<a href="https://portal.cganet.com/Publication/Workspac e/Outline.aspx?work_id=22-033">https://portal.cganet.com/Publication/Workspac e/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/Workspac e/Outline.aspx?work_id=22-012">https://portal.cganet.com/Publication/Workspac e/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/Workspac e/Outline.aspx?work_id=23-036">https://portal.cganet.com/Publication/Workspac e/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/Workspac e/Outline.aspx?work_id=24-59">https://portal.cganet.com/Publication/Workspac e/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/Workspac e/Outline.aspx?work_id=24-010">https://portal.cganet.com/Publication/Workspac e/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/Workspac e/Outline.aspx?work_id=23-038">https://portal.cganet.com/Publication/Workspac e/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/Workspac e/Outline.aspx?work_id=25-30">https://portal.cganet.com/Publication/Workspac e/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/Workspac e/Outline.aspx?work_id=21-016">https://portal.cganet.com/Publication/Workspac e/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/Workspac e/Outline.aspx?work_id=22-027">https://portal.cganet.com/Publication/Workspac e/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/Workspac e/Outline.aspx?work_id=23-045">https://portal.cganet.com/Publication/Workspac e/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/Workspac e/Outline.aspx?work_id=25-59">https://portal.cganet.com/Publication/Workspac e/Outline.aspx?work_id=25-59</a>

<b>Standard</b>	<b>Current edition</b>	<b>Status</b>
CGA H-XXX (TBD), <i>Small scale hydrogen production and delivery</i>	New publication not released yet	Task force has created the 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 publication has been sent to Standards Council for review, where an issue with calculations has been found. The publication will be corrected and sent back to Standards Council.
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)	Deadline to submit proposed changes for next edition is 3/6/2023. <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 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/Workspace/Outline.aspx?work_id=21-062">https://portal.cganet.com/Publication/Workspace/Outline.aspx?work_id=21-062</a>
CGA work item 21-126, <i>Hydrogen system siting and personnel exposures distances</i>		CGA members supported the NFPA 2/55 hydrogen storage task group to update liquid hydrogen system setback distances. The work was not finished before the November 3-5 NFPA 55 second draft meeting but was finished by the NFPA 2 second draft meeting in 1Q 2022. In the meantime, NFPA 55 has added a pointer to NFPA 2 in anticipation of the new distances being added to NFPA 2. CGA supported the new distances going to NFPA 2 and supported the removal of NFPA 55 extract tags for hydrogen separation distances.
CGA work item 21-127,	New	Develop new standard to update traditional

<b>Standard</b>	<b>Current edition</b>	<b>Status</b>
<i>Transfer and unloading of hydrogen at near-consumer use points</i>	publication not released yet	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 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

CGA has launched a “Hydrogen Safety is Step One” campaign – see the attached link:

<https://www.cganet.com/cga-launches-hydrogen-safety-is-step-one-campaign/>

**Upcoming events:**

- CGA’s Role in Hydrogen: Safety is Step One webinar – Thursday, May 5, 2022 at 2:00 PM EDT
- CGA Hydrogen Seminar – fall of 2023 (2 days planned)

CGA will put together a statement pointing to NFPA 2’s changes on the website to help fill the gap this year until the new version of NFPA 2 can be published.

**American Society for Testing & Materials (ASTM) Jennifer Hamilton/Christina Daniels**

A new taskforce for Aviation and Hydrogen is meeting on April 21<sup>st</sup>. At this time the goal is to have a specification for each propulsion technology.

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

No updates at this time. The next ASME meeting will take place March 29, from 1-5pm Eastern.

**VI. Discussion Topics**

**Facilitating Deployment All**

No discussion at this time.

**Center for Hydrogen Safety Nick Barilo**

Center for Hydrogen Safety will be holding a webinar on March 30<sup>th</sup>, 10AM ET, on “Material Compatibility Considerations for Hydrogen”, looking at both polymers and metals. Registration link here: <https://www.aiche.org/academy/webinars/material-compatibility-considerations-hydrogen>

**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).



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

### **California Station Implementation**

**Jennifer Hamilton**

A new station in Baldwin Park opened March 7, a handful more stations are close to opening.

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

Sampling and analysis from stations is on-going. Metrology testing is being done on an as-needed basis for the industry.

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

**Juana Williams/Ralph Richter**

No updates at this time.

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

## **VIII. Next Meeting – April 13, 2022 at 2:00 PM ET**