

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

**Wednesday, November 18, 2020  
TIME: 2:00 – 3:00 pm (Eastern Standard Time)**

**Minutes**

**Attendees**

**Christina Daniels  
Connor Dolan  
Eric Prause  
Ian McIntire  
Jay Keller  
Jennifer Hamilton  
Juana Williams**

**Karen Quackenbush  
Kelvin Hecht  
Laura Hill  
Mark Siira  
Mike Steele  
Owen Hopkins  
Quailan Homann**

**Rob Early  
Will James  
Sara Marxen  
Jennifer Gangi  
Bob Boyd  
Antonio Ruiz  
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 – Deferred to next meeting.

**II. DOE/HQ Update**

**Laura Hill**

The Hydrogen Program Plan across all of DOE was released last week.

<https://www.energy.gov/articles/energy-department-releases-its-hydrogen-program-plan>

Jesse Adams will be stepping in as the Manager for Technology Acceleration, replacing Fred Joseck who has retired.

**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)).

**Confirmed:** The December ISO TC 197 plenary will begin at 8:30 AM US Eastern and end at noon US Eastern.

**IV. Global Technical Regulations**

**Ian MacIntire**

Online informal working group meeting was held on 23<sup>rd</sup>, 26<sup>th</sup>, and 27<sup>th</sup> for a few hours each day.

Not a lot of change in official stances other than China agreeing to proposed permeation limits and rationale for heavy-duty vehicles, which all contracting parties had already agreed to other than European Commission, who was unable to attend the meeting. Hopefully EU agrees and this is agreed to with all parties.

The proposed sled test for heavy-duty vehicles, in place of crash test for light-duty vehicles. NHTSA has stated previously they did not support the proposal and a research study is being conducted on the proposed acceleration limits to determine if it is realistic or not.

Requirements for hydrogen receptacles within GTR 13 was discussed. NHTSA stated we do not currently support that requirement in GTR 13 as we do not feel the receptacle design is sufficiently mature to standardize it.

Possibility of material compatibility tests was also discussed. Another item that NHTSA does not support. Expect will be an issue with continued discussion moving forward.

Proposed change of design table would allow manufacturers in a type approval system to qualify a similar container to one that is already qualified. NHTSA does not support at this time.

Mandate for GTR 13 has been extended until May 2022 for final draft submission to GRSP. An informal draft will likely be released in December 2021.

#### Task Force updates

TF 3 (test procedures) – issue on how to account for conformable tanks that are not standard cylinders but have flat shapes or composed of many mini tanks that are interconnected and how the definitions in GTR 13 do not exclude these types of tanks. The tests will allow for these new designs to not be inadvertently blocked. Still working on how best to do that.

TF 4 – issue of discussion on how fire test is different for conformable tank and how it should/may need to be changed. Potential for withstand option, current requirements for vent through TPRD, but in phase two propose possibility for container to time out the test if it survives exposure for certain time frame.

TF 0 – drafting agreed on changes for Phase 2 and drafting into redlined version for GTR 13 for approval at higher levels, the WP 29 and GRSP at the UN. Identified items that are ready to go for first draft, aiming for redline for completion at next IWG meeting scheduled for March 2021.

## V. Codes and Standards Organization Updates

**Institute of Electrical and Electronics Engineers**

**Mark Siira**

**PowerPoint Presentation link will be added here.**

There is a group of standards for standalone systems that are written for solar PV for energy storage but get into a lot of system sizing information that could be useful to be aware of for the fuel cell community as many of those constraints are the same for battery storage as for a fuel cell.

If there is interest, can report on new areas we are looking at establishing working groups on for electrical inverters and remote systems that are not connected to a distribution network.

Is there a generic number for these set of standards? Mark Siira will follow-up by email.

**International Electrotechnical Commission IEC TC 105**

**Kelvin Hecht**

Plenary in 2022 will be held in San Francisco. Will work over the next year or so to determine potential sponsors of this event.

**International Standards Organization ISO/TC 197**

**Karen Quackenbush/Jay Keller**

Jay Keller – Second week in December will hold plenary meeting virtually. We have had a couple of practice runs. The US TAG had a practice run earlier this week. Andrie at the TC leadership has also had a practice run as we go forward. This will have a traditional structure for the plenary. Each TAB member will report out and discuss the activities under their responsibilities and drill down into the work of their working groups.

19880-1 fueling stations has been published after many years of hard work. Credit to Jessy Schnieder, Guy Dang-Nhu (conveyors for the first half of the effort) and Glenn Schleffer, Guy deReals (co-conveyors for the second half of the effort) and of course Nick Hart secretary for the entire process. All did an incredible job.

New activities to revisit materials compatibility in TR for safety. Jay is compiling first round of comments and drafting a meeting just before the plenary to move this effort along.

The fast fill heavy-duty NWIP passed the US TAG and will be brought up to the floor for discussion at the plenary. Anticipate that this activity will pass a floor vote. Because of issues at the ISO level, they changed some of their language in protocol, the leadership of the NWIP has been approved at the US TAG level and will go forward at the next level. The convener is unnamed as an ISO rule. The new secretary will work to ensure that the administrator work is in play to satisfy any final issues. The NWIP leadership will be Antonio Ruiz (Nikola), Jackie Birdsall (Toyota), and Sara Marxen (CSA).

Karen Quackenbush - Now that ISO 19880-1 has been published we are seeing more activity for the development of ISO 19880-2 on dispensers. The hose document was published in November 2019, although a revision is underway. Since the seed document came from CSA and they are updating their document, we are working to harmonize as much as possible. The rest of the component standards that are unpublished are moving, though slowly given difficulty of holding international meetings. Although the TC/197 plenary is a meeting traditionally held across several days, it will take place as a ZOOM meeting for a 3.5-hour virtual meeting. The US Administrator is Jill Thompson if you are interested in participating.

**National Fire Protection Association NFPA 2**

**Chris LaFleur**

We have completed the First Draft Meeting marathon sessions. There was a controversial Public Input approved during the meeting that made a move to remove all the extract tags from NFPA 55. A Task Group was created to work on this issue and its implications. Stay tuned! Several other Task Groups were created to address specific issues between now and the Second Draft meeting including Ventilation requirements, Fire Extinguishers, Bulk storage definitions, and NFPA 1 Life Safety Code extracts, etc. Any person can participate in Task Group work, no need to be on the committee. If anyone has specific interest, please email me. ([aclafle@sandia.gov](mailto:aclafle@sandia.gov))

## International Codes Council (ICC)

Spencer Quong

The International Codes Council (ICC) revises their model international codes (i-Codes) in two groups. The 2021 Group A Codes, which includes the International Fire Code (IFC), International Building Code (IBC), and International Fuel Gas Code (IFGC) to name a few, is open for public comment until January 11, 2021. For reference, the 2021/2022 ICC Code development schedule is attached.

Anyone can submit a new proposal online at <https://www.cdpassess.com/proposal/new/>. FCHEA is polling our members to determine if there is industry interest in making any code change proposals to any open i-Codes. In particular, we would like to hear from you if you have experienced any difficulties having hydrogen energy equipment or fuel cells cited due to i-Code interpretation issues. We are also interested in any proposals to harmonize the i-Codes with other requirements, such as NFPA 2.

If we receive any responses to this poll, FCHEA's Hydrogen Codes Task Force will meet in December to determine how best to address the concerns in the current proposal period. Please send any comments or concerns to [kquackenbush@fchea.org](mailto:kquackenbush@fchea.org) no later than Monday, November 30<sup>th</sup>.

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	IEC TC 105 Plenary 2020 was held virtually Nov. 16 and Nov. 17. The US TAG to IEC TC 105 is considering hosting TC 105 Plenary meeting to coincide with 2022 General Meeting in San Francisco. Currently gathering information from ANSI regarding IEC TC 105 funding guidance. Contact: <a href="mailto:mark.duda@csagroup.org">mark.duda@csagroup.org</a>	
Active Projects		
TSC	Title	Status
HGV 4.4	Gaseous hydrogen – Fuelling stations – Valves	This is an adoption of ISO 19880-3 valve standard with North American deviations. The TSC has completed disposition of public review comments. The deviations are being prepared for ballot to the H <sub>2</sub> TTC.
HGV 2	Compressed hydrogen gas vehicle fuel containers	The TC ballot has closed. Publication is planned for December 2020, but may be pushed to January 2021 pending review of ballot comments.
HPRD 1	Thermally activated pressure relief devices for compressed	Industry/public review is in progress. <i>Click here to access the draft:</i> <a href="https://publicreview.csa.ca/Home/Details/3961">https://publicreview.csa.ca/Home/Details/3961</a>

	hydrogen vehicle fuel containers	
HGV 4.10	Fittings for use in compressed gaseous hydrogen fuelling stations	H <sub>2</sub> TTC ballot closed with no negative votes. Comments were addressed by TSC, and TC chair. The document is being prepared for publication.
HGV 4.3	Test methods for hydrogen fueling parameter evaluation	Poll of TSC members shows interest in HGV 4.3 as a certification standard. Draft standard has been sent to TSC members for review and comment with deadline of December 7. <i>Click here to access the draft:</i> <a href="https://community.csagroup.org/docs/DOC-134298">https://community.csagroup.org/docs/DOC-134298</a>
HGV 4.2	Hoses for dispensing compressed gaseous hydrogen	TSC continues to meet to align content with ISO 19880-5, hose standard. The draft is being prepared for Public Review.
FC 1	Stationary fuel cell power systems	This is an adoption of IEC 62282-3-100. The TSC has completed the disposition of Public review comments. The document is being prepared to be balloted by the CSA Fuel Cell TC.
HGV 5.X	Hydrogen Refueling Appliances	Forming TSC membership now. Expect project to kick-off in December 2020.
HGV 3.1	Fuel system components for compressed hydrogen gas powered vehicles	Project kick-off scheduled for January 2021.

**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.
Interface	TIR J2601/4	Ambient Temperature Refueling		Being developed -Work slowed because of conflicts with other CDO meetings. Anticipate voting on current draft early 2021.

<b>Interface</b>	TIR J3219	Hydrogen Fuel Quality Screening Test of Chemicals for Fuel Cell Vehicle		Being developed - Presentations show document to be on track. Barring complications, draft document should circulate late 2021.
<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 (Boyd) has opened the document for technical revision. Contact the sponsor to participate.

<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 - No report at this time.
<b>Fuel Economy</b>	J2572_201410	Recommended Practice for Measuring Fuel Consumption and Range of Fuel Cell and Hybrid Fuel Cell Vehicles Fuelled by Compressed Gaseous Hydrogen	16-Oct-14	Sponsor (Steele) to initiate an affirmation of existing content ballot in Nov/Dec timeframe.

<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
<b>Safety</b>	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

**Compressed Gas Association (CGA)**

**Rob Early**

CGA continues to work on expanding its scope of support of the hydrogen economy by identifying and filling gaps where appropriate. The Hydrogen Strategy Task Force has been established and has met three times to focus on long range plans. The Hydrogen Gap Analysis Task Force has met once to identify gaps in CGA's portfolio of standards and training materials and will meet again in December.

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)	Next step for 4 <sup>th</sup> edition is 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>
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>

Standard	Current edition	Status
ANSI/CGA H-5, <i>Standard for bulk hydrogen supply systems</i>	3 <sup>rd</sup> (2020)	The 3 <sup>rd</sup> edition has been released. 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. <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-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/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</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>



Standard	Current edition	Status
<i>compressed hydrogen storage buffers</i>		
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>

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

**Jennifer Hamilton**

Interlaboratory studies are finishing up.

Planning on having another workshop that may or may not be virtual on the inline hydrogen sampling at stations.

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

**Ray Rahaman**

No updates at this time.

**VI. Discussion Topics**

Deferred to next meeting.

**Facilitating Deployment**

**All**

**Center for Hydrogen Safety**

**Nick Barilo**

**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**

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

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

**Juana Williams/Ralph Richter**

**VII. Open Discussion & Other Issues**

No additional business at this time.

**VIII. Next Meeting** – Wednesday, December 2<sup>nd</sup> at 2:00 PM US Eastern