

# NATIONAL HYDROGEN AND FUEL CELLS CODES AND STANDARDS COORDINATING COMMITTEE

Wednesday, May 4th, 2011  
TIME: 3:00 – 4:30 pm (Eastern Daylight Time)  
CALL-IN NUMBER: (641) 594-7000 Passcode: 824011#  
WEBINAR: <https://www1.gotomeeting.com/register/240979817>

## 1 Roll Call

Chad Blake	Bill Collins	Bob Boyd
Kelvin Hecht	David McCloskey	Karen Hall
Norm Newhouse	Mike Steele	Andre Tchouvelev
Josip Novkovic	Steve Weiner	Catherine Padro
Juana Williams	Thomas Prevish	Mike Steele
Anthony Androsky	Glenn Scheffler	James Grieve
Jackie Button	Anthony Amato	Larry Moulthrop
Andrea Zajac	Aaron Harris	Spencer Quong
Mike Veenstra		

2 Review of Anti-Trust Guidelines  
[http://www.usfcc.com/members/antitrust\\_guidelines\\_rev.pdf](http://www.usfcc.com/members/antitrust_guidelines_rev.pdf)

3 Review of/Corrections to April Draft Minutes (attached and can be found at [www.hydrogenandfuelcellsafety.info/](http://www.hydrogenandfuelcellsafety.info/))  
Approved as written

4 DOE/HQ Update Antonio Ruiz  
Chad Blake provided an update: The FY 2011 budget that was enacted will have “some impact” on the hydrogen programs, including the Codes and Standards program.

Antonio Ruiz provided an update. The DOE hydrogen budget has been reduced significantly, but the funding changes have not been finalized. The cuts may be severe.  
International coordination will occur next week at the AMR regarding high pressure tanks.  
There will be an IPHE meeting in Vancouver after the AMR on high pressure tanks.  
The Codes & Standards Tech Team will meet during the AMR.

5 Calendar of C&S Events and Fuel Cell Safety Information  
[http://www.fuelcellstandards.com/calendar\\_new.html](http://www.fuelcellstandards.com/calendar_new.html)  
<http://www.hydrogenandfuelcellsafety.info/>  
<http://www.h2incidents.org/>  
Kelvin Hecht  
Karen Hall  
Steve Weiner/Linda Fassbender  
Steve Weiner reported on collaboration with the IEA Hydrogen Implementing Agreement Task 31 (Hydrogen Safety) members as well as the European Commission’s Joint Research Centre, currently responsible for the Hydrogen Incident and Accident Database (HIAD). It is expected that the respective incident database work and collaboration will be presented on the program of the International Conference on Hydrogen Safety, San Francisco, CA, September 12-14, 2011.

FCHEA Priority Matrix (Attached at end) Robert Wichert

5 Discussion Topics Discussion Leader

Hydrogen Fuel Quality Jim Ohi (Not present)  
ASTM - Matrix has not changed; attached at end Jackie Button  
Jackie Button provided an update. The next ASTM meeting is now scheduled for June 21, 22 in Baltimore Md.

# AGENDA

Continued

NIST

Juana Williams

**NIST Weights and Measures Division (WMD) on the  
Development of Commercial Hydrogen Measurement Standards  
NHFCCSCC May 4, 2011**

by Juana Williams and Marc Buttler

## **U.S. Weights and Measures Standards Development Process**

### **Commercial Device Type Evaluation Criteria**

The NCWM NTETC-Measuring Sector Subgroup met on April 21, 2011 and plans to hold a web/teleconference meeting at 11:00 a.m. to noon [EDT] on May 19, 2011. The Subgroup is gathering information on the operation of the zero-setback-interlock feature and automatic and manual shut off mechanisms on hydrogen refueling dispensers as part of its work on the draft Hydrogen Gas-Measuring Devices Checklist. The Subgroup anticipates it will make a final draft of the checklist available to the USNWG for review and comment by late July 2011.

## **U. S. National Work Group (USNWG) for the Development of Commercial Hydrogen Measurement Standards**

### ***Device Test Procedures***

The USNWG held a web/teleconference meeting on April 19, 2011. The USNWG discussed the work to refine and develop test procedures (gravimetric, volumetric, and master meter test methods) and the progress of work to develop the type evaluation checklist for hydrogen dispensers. The USNWG has tentative plans for a meeting the second week of August 2011 to discuss the final draft of the type evaluation checklist.

### ***Fuel Quality Regulation***

NIST WMD has prepared a new amendment to NCWM Laws & Regulations Committee Agenda Item 237-1 (a proposal for a hydrogen gas fuel quality specification) that includes updates on the latest progress by ASTM and restructures the presentation of the information for greater clarity and alignment. This modification to Agenda Item 237-1 will be distributed at the July 2011 NCWM Annual Meeting. The amended item is also being presented at the two spring regional weights and measures association annual meetings (NEWMA and CWMA), and is pending ballot by the USNWG.

SAE J2719

Mike Steele

Mike Steele provided an update. J2719 passed ballot. The comments will be addressed and the document will move to publication.

ISO TC 197 WG 12

Jim Ohi (not present)

# AGENDA

## Continued

No change.  
ISO TC 197 WG 14  
Meeting in June.

Karen Hall

### Fuel Cell Forklifts/Indoor Fueling

Aaron Harris

Aaron Harris provided an update. Adjustments to NFPA 505 have been discussed. This standard includes guidance on using forklifts in classified areas and how to convert forklifts from other types to “Compressed Gas Hydrogen” (CGH) forklifts.

Other work continues to update UL 2267 with proposals to the STP.

Further proposals are being considered.

HPIT1 is also being worked. It is completed everything with the exception of the tanks.

### Tank Testing

SNL

No Sandia staff present.

Tank testing may stop in May, before the expected data is provided and before the data necessary to prepare design guidance is obtained. The tank testing must be continued to finalize the needed data. This will be added to the Regulatory Matrix.

### Sandia Modeling

SNL/Aaron

No Sandia staff present. Aaron Harris provided an update. The failure modes and leak rates found during the Sandia tank testing has been passed to the Sandia modeling group.

### Matrix of Leak Sizes – Risk Informed Standards

The new NFPA Task Force on indoor refueling will need to cover this topic.

### CSA

Josip Novkovic

HPIT1 – Work continues

HPIT2 – Meeting later in May. Membership is being finalized.

FC1 – Proposals have been distributed for review and comment.

HGV 4.10 – Meeting on May 6

FC3 – Will adopt IEC 62282-5-1

IEC 62282-6-100 has been sent to the FC Committee

Component TAGs will meet during the week of August 8, 2011

### Hydrogen Sensors

Robert Wichert

Hydrogen Sensor Task Force meeting tomorrow at 11:00 AM EDT.

Hydrogen Sensor Workshop will be held by NREL in June.

### 6 Codes and Standards Organizations

All

This is the opportunity for CDOs, SDOs, Panels, Committees, etc. to provide updates and issues to the group.

# AGENDA

Continued

US TAG

**May 2011 Update**  
**ANSI-Accredited U.S. TAG for ISO/TC 197, *Hydrogen technologies***

**1. Comments submitted**

- **N486**, ISO/CD 14687-3, *Hydrogen Fuel — Product Specification — Part 3: Proton exchange membrane (PEM) fuel cell applications for stationary appliances*  
The U.S. TAG submitted comments on the draft of ISO/CD 14687-3 on March 8.

**2. Pending ballots**

- Systematic review of ISO 22734-1:2008, *Hydrogen generators using water electrolysis process — Part 1: Industrial and commercial applications*  
The U.S. TAG is requested to vote by **August 26**.
- ISO/DIS 20100, *Gaseous hydrogen — Fuelling stations*  
The U.S. TAG is requested to vote by June 17.

**3. Ballot recently closed**

- ISO/DIS 14687-2, *Hydrogen fuel — Product specification — Part 2: Proton exchange membrane (PEM) fuel cell applications for road vehicles*  
The U.S. TAG was requested to vote by April 11.  
A TAG webconference has been scheduled for Tuesday, May 10, from 10:00 AM to 12:00 PM EDT to review the comments and prepare a consensus list for submission with the U.S. position.  
The ISO ballot ends on June 5.

**4. Future meeting**

- WG 14, *Hydrogen fuel — Product Specification — Proton exchange membrane (PEM) fuel cell applications for stationary appliances*  
June **27-28** in Grenoble, France

# AGENDA

Continued

TC 105

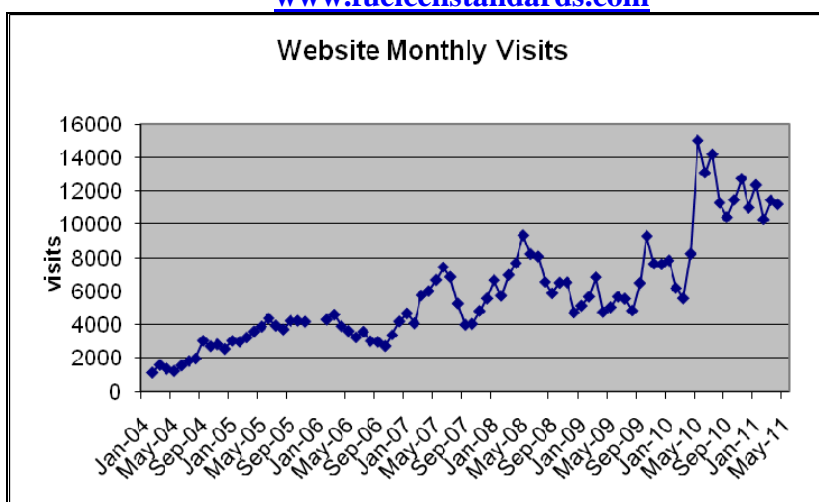
## May 2011 Meeting of the DOE Hydrogen Codes & Standards Coordinating Committees

Kelvin Hecht

### TC105 – Fuel Cell Technologies

- **WG#2 (IEC 62282-2 Ed. 2– Fuel Cell Modules)**
  - Approved with comments
  - FDIS by January 1, 2012
- **WG#5 (IEC 62282-3-3 Ed.2 – Stationary Fuel Cells – Installation)**
  - Approved with comments
  - FDIS by January 1, 2012
- **WG#6 (IEC 62282-4-100 Fuel cell systems for forklift applications –Safety requirements, environmental aspect and test procedures and IEC 62282-4-200 Fuel cell systems for forklift applications – Performance requirements and test procedures)**
  - Approved (Denmark, Finland, Italy, Japan, Spain, USA)
  - US experts – Chirdon, Florence, Harris, Milas, Steele, Wichert also Baumgartner, Dunn, Medwin from the trucking industry)
- **WG#11 (NWIP – Single Cell/Stack Performance – Solid Oxide Fuel Cells)**
  - Vote by May 6<sup>th</sup>

[www.fuelcellstandards.com](http://www.fuelcellstandards.com)



#### Monthly visits > 11,000

- **National origin of visitors**
  - USA - 67%
  - China - 8%
  - Russia - 5%
  - France - 2%
  - Japan - 2%
  - Germany - 2%
- **Major referring sites**
  - [hydrogenandfuelcellsafety.info](http://hydrogenandfuelcellsafety.info)
  - [1.eere.energy.gov](http://1.eere.energy.gov)
  - [fchea.org](http://fchea.org)
  - [h2bestpractices.org](http://h2bestpractices.org)

# AGENDA

Continued

NFPA

Not on the call.

ICC

Not on the call.

CSA

See above.

Others

None

7 Open Discussion & Other Issues

Possible periodic international meeting times was discussed.

Meet at AMR next week?

Informal only. Wichert will coordinate.

**SIGNIFICANCE TO COMMERCIALIZATION**

← *More Critical*

	<b>A: Essential To or Enables Commercialization</b>	<b>B: Important to Commercialization</b>	<b>C: Supports Commercialization</b>
<b>Highest Effort</b>	<p><b>ICAO Technical Instructions</b></p> <p><b>IEC Micro Fuel Cell Safety Standards</b></p> <p><b>Indoor refueling (fork lifts and other applications)</b></p> <p><b>US DOT Harmonization NPRM – HM215K</b></p> <p><b>ICC Model Codes</b></p> <p><b>NFPA 52</b> Vehicle Fuel Systems Code</p> <p><b>UL 2267</b> Fuel Cell Power Systems for Installation in Industrial Trucks</p> <p><b>CSA America HGV 4</b> Series for Fuel Dispensing Equipment and Components</p> <p>Modeling of a spectrum of fork lift hydrogen leak sizes and frequencies</p> <p><b>CSA America HPIT 1</b> Hydrogen Powered Industrial Trucks</p> <p>Fracture mechanics data suitable to develop design standards similar to ASME KD-10 with a suitable factor of safety for fuel cell fork lift tanks.</p> <p><b>CSA America HPIT 2</b> Fuelling Hydrogen Powered Industrial Trucks</p> <p><b>SAE J 2919</b> Compressed Hydrogen Fuel Systems in Fuel Cell Powered Industrial Trucks</p> <p><b>SAE 2600 &amp; 2601</b> increased activity due to specialty vehicle use</p> <p><b>Hydrogen Dispenser Metrology</b></p> <p><b>Inter-Laboratory Testing to validate ASTM protocols</b></p> <p><b>International Organization for Legal Metrology (IOML) OIML R 81</b> Dynamic Measuring Devices and</p>	<p>Micro Fuel Cell Interchangeability Standards IEC 62282-6-300</p> <p><b>UL 1741</b> Inverters, Converters and Controllers for Use in Independent Power Systems</p> <p><b>IEEE 1547.XX</b>, Interconnection of Distributed Generation – Application Guides</p> <p>State Permitting Templates (C&amp;S Gaps Analysis): California</p> <p><b>ISO/NP 14687-3</b> Hydrogen Fuel – Product specification – Part 3: proton exchange membrane (PEM) fuel cell application for stationary applications</p> <p><b>CSA America HGV 3.1</b> Fuel System Components for Hydrogen Gas Powered Vehicles</p> <p><b>SAE J 2600</b> Compressed Hydrogen Vehicle Fueling Connection Devices</p> <p><b>SAE J 2799 - TIR</b> 70 MPa Compressed Hydrogen Surface Vehicle Refueling Connection Device and Optional vehicle to Station Communication</p> <p><b>SAE J 2783</b> Liquid Hydrogen Surface Vehicle Refueling Connection Devices</p>	<p><b>ASME B31.12 H2</b> Piping and Pipeline Code</p> <p><b>SAE J 2572</b> Recommended Practice for Measuring the Exhaust Emissions, Energy Consumption and Range of Fuel Cell Powered Electric Vehicles using Compressed Gaseous Hydrogen</p>

Systems for Cryogenic Liquids

**International Organization for Legal Metrology (OIML) OIML R 139** Compressed Gaseous Fuel Measuring Systems for Vehicles

**ISO/CD 14687-2** Hydrogen Fuel - Product Specification Part 2: PEM fuel cell applications for road vehicles

**SAE J 2719** Hydrogen Quality Guideline for Fuel Cell Vehicles

**ASTM D7550-09** Standard Test Method for Ion Chromatography Based Determination of Cations in Hydrogen and Other Fuel Cell Feed Gases

**ASTM WK4548** Standard Test Method for Determination of Trace Contaminants in Hydrogen and Related Fuel Cell Feed Gases

**ASTM WK5847** Standard Practice for Sampling of High Pressure Hydrogen and Related Fuel Cell Feed Stocks

**ASTM WK6527** Standard Test Method for Ion Selective Electrode Based Determination of Ammonia in Hydrogen

**ASTM WK6624** Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Hydrogen

**ASTM WK8150** Standard Test method for Determination of Ammonia in Hydrogen by Gas Chromatography and Nitrogen Chemiluminescence

**ASTM WK9688** Standard Test Method for Determination and Sampling of Particulate Matter in High Pressure Hydrogen Gaseous Fuel with In-Stream Filter

**ASTM WK10196** Standard Test Method for Determination of Ammonia and Trace Water in Hydrogen and Other Fuel Cell Gaseous Fuels by Infrared Spectroscopy

**ASTM WK21162** Standard Test Method for the Characterization of Particles from Hydrogen Fuel Streams by Scanning Electron Microscope



	<p><b>ASTM WK21597</b> Microscopic Measurement of Particulates in Hydrogen Fuel</p> <p><b>ASTM WK21611</b> Gravimetric Measurement of Particulate Concentration in Hydrogen Fuel</p> <p><b>ASTM WK22378</b> Standard Test Method for Analysis of Total Hydrocarbon Content in Hydrogen Fuel Using a THC Analyzer</p> <p><b>ASTM WK23815</b> Standard Test Method for Determination of Total Halocarbons Contained in Hydrogen and Other Gaseous Fuels</p> <p><b>ASTM WK24073</b> Standard Test Method for Determination of Trace Hydrogen Sulfide, Methyl Mercaptan and Carbonyl Sulfide in Hydrogen Fuel</p>		
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	<b>A: Essential To or Enables Commercialization</b>	<b>B: Important to Commercialization</b>	<b>C: Supports Commercialization</b>
<b>Moderate Effort</b>	<p><b>CSA HGV 4.X Series</b></p> <p><b>NFPA 2</b> Hydrogen Technologies</p> <p><b>NFPA 55</b> Storage, Use and Handling of Compressed Gases and Cryogenic Fluids in Portable in Portable and Stationary Containers, Cylinders and Tanks</p> <p><b>Global Technical Regulations (GTRs) for Vehicles</b></p> <p><b>Micro Fuel Cell Transportation Regulations</b></p> <p><b>ANSI/CSA America FC1-2001</b> Fuel Cell Power Systems (Safety)</p> <p><b>IEC 62282-3-1 (2007-04)</b> Stationary Fuel Cell Power Systems - Safety</p> <p><b>NFPA 853</b>, Fuel Cell Installation</p> <p><b>NFPA 70</b> (National Electrical Code) <b>Article 692</b>, Fuel Cell Systems</p> <p>Revision to <b>FMVSS 305</b> and <b>SAE J1766</b>, Post Collision Electrical Safety in Vehicles</p> <p><b>FMVSS</b> for High-Pressure Compressed Hydrogen Storage in Vehicles, <b>CSA NGV/HGV</b>,</p> <p><b>SAE J2579- H2 Storage Systems (design &amp; performance)</b></p> <p><b>SAE J 2578</b> Recommended Practice for General Fuel Cell Vehicle Safety</p> <p><b>IEC 62282-6-300 (2009-06)</b> Micro Fuel Cell Power Systems - Fuel Cartridge Interchangeability</p> <p><b>HIPOC</b> (Hydrogen Industry Panel on Codes) Hydrogen Quality Standards(<b>ASTM, CGA, ISO, SAE</b>)</p> <p><b>New York City Construction &amp; Fire Codes</b></p> <p><b>Cargo Shipping regulations of Fuel Cells, Fuel Cell</b></p>	<p>California Air Resources Board Emissions Regulations for Stationary Generation</p> <p>Portable Fuel Cell Regulations</p> <p><b>UL 2266</b> on Fuel Cells in Telecomm applications</p> <p><b>UL 2265</b> - Micro Fuel Cell Safety</p> <p><b>ANSI/CSA America FC3-2004</b> Portable Fuel Cell Power Systems (Safety)</p> <p><b>IEEE 1547</b> - Interconnection of Distributed Generation</p> <p><b>ISO TC 197 WG#9</b> – Hydrogen Generators</p> <p><b>ISO TC 22 SC21</b> Hydrogen Vehicle Standards</p> <p>Hydrogen Sensor Standards – <b>ISO TC 197, UL 2075, ANSI/ISA 12.13.01/02</b></p> <p><b>IEC 62282-5-1 (2007-02)</b> Portable Fuel Cell Appliances – Safety</p> <p><b>IEC/PAS 62282-6-1</b> (2006-02) Micro Fuel Cell Power Systems - Safety</p> <p><b>IEC 62282-6-100</b> Micro Fuel Cell Power Systems – Safety</p> <p><b>ISO 13985</b> Liquid Hydrogen, Land Vehicle Fuel Tanks</p> <p><b>ISO/TS 15869</b> Gaseous Hydrogen Blends &amp; Hydrogen Fuels - Land Vehicles Fuel Tanks</p> <p><b>ISO TS 20100</b> Gaseous Hydrogen - Service Stations</p> <p><b>ISO 26142</b> Hydrogen Detector Apparatus</p> <p><b>SAE J 2601</b> Compressed Hydrogen Vehicle Fueling Communication Devices</p> <p><b>SAE J 2615</b> Performance Test Procedure of Fuel Cell Systems for Automotive Applications</p> <p><b>SAE J 2616</b> Performance Test Procedure of Fuel Processor Subsystem of Automotive Fuel Cell System</p>	<p><b>Stack Material &amp; Components</b> Protocols / Round Robins / Standardization / Investigations</p> <p><b>IEC 62282-3-2 (2006-03)</b> Stationary Fuel Cell Power Systems - Performance Test Methods</p> <p><b>ASME PTC 50</b> – Fuel Cell Performance</p> <p><b>ASME</b> Materials for a Hydrogen Economy</p> <p><b>FCTESTNET/QA</b></p> <p><b>IEC 62282-3-201</b> Small stationary polymer electrolyte fuel cell power system – Performance test method</p> <p><b>IEC/TS 62282-1 (2005-03)</b> Terminology</p> <p><b>IEC 62282-2 (2004-03)</b> Fuel Cell Modules</p> <p><b>IEC 62282-3-3 (2007-11)</b> Stationary Fuel Cell Power Systems - Installation</p> <p><b>IEC 62282-6-200 (2007-11)</b> Micro Fuel Cell Power Systems - Performance</p> <p><b>IEC 62282-7-1 TS Ed.1</b> Single Cell Test method for Polymer Electrolyte Fuel Cells</p> <p>IEC TC 105 Ad Hoc Group #1 Identification of the market needs for standardization work of fuel cell systems for propulsion and auxiliary power units</p> <p><b>ASTM WK7637</b> Measurement of Electrochemical Performance of Single Cell Planar Solid Oxide Fuel Cells</p> <p><b>UL 2075</b> Gas and Vapor Detectors and Sensors</p> <p><b>Outline of Investigation UL Subject 2264 B</b> Gaseous Hydrogen Generation Appliances - Water Reaction</p> <p><b>Outline of Investigation UL Subject 2265 A</b> Hand</p>

	<p><b>Cartridges, Fuel Cell Engines and Fuel Cell Vehicles</b></p> <p>UN Sub-Committee of Experts          ICAO Dangerous Goods Panel          IMO Dangerous Goods Code          ADR/ADN Joint Meeting          US DOT          Transport Canada</p> <p><b>IEC 62282-6-100</b> Micro Fuel Cell Safety</p> <p><b>ISO 17268:2006</b> Compressed Hydrogen Surface Vehicle - Refueling Connection Devices</p> <p><b>SAE J 2579</b> Recommended Practice for Fuel Systems in Fuel Cell and Other Hydrogen Vehicles</p> <p><b>SAE J 1766</b> Recommended Practice for Electric and Hybrid Electric Vehicle Battery Systems Crash Integrity Testing</p>	<p><b>SAE J 2617</b> Performance Test Procedure of PEM Fuel Cell Stack Subsystem for Automotive Application</p> <p><b>SAE J 2722</b> Recommended Practice for the Durability Testing of PEM Fuel Cell Stacks</p>	<p>Held or Transportable Fuel Cell Power Units with Fuel Containers - Methanol Fuel Cartridges</p> <p><b>Outline of Investigation UL Subject 2265 C</b> Hand Held or Transportable Fuel Cell Power Units with Fuel Containers - Borohydride Fuel Cartridges</p>
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<b>Low Effort</b>	<p><b>ISO 16111</b> Transportable Gas Storage Devices - Hydrogen Absorbed in Reversible Metal Hydrides</p> <p><b>CSA America HPRD1</b> Basic Requirements for Pressure Relief Devices for Compressed Hydrogen Vehicle Fuel Containers</p> <p><b>UL Subject 2266</b> Electromagnetic Compatibility, Electrical Safety, and Physical Protection of Stationary and Portable Fuel Cell Power Systems for Use with Commercial Network Telecommunication Equipment</p>	<p><b>SAE</b> performance, sustainability, and terminology documents for Fuel Cell Vehicles</p> <p><b>SAE J 2594</b> Fuel Cell Recyclability Guidelines</p> <p><b>SAE J 2760</b> Pressure Terminology Used in Fuel Cells and Other Hydrogen Vehicle Applications</p> <p><b>SAE J 2574</b> Information Report - Fuel Cell Electric Vehicle Terminology</p> <p><b>ISO 22734-1:2008</b> Hydrogen Generators Using Electrolysis Process</p> <p><b>ISO 16110-1</b> Hydrogen Generators Using Fuel Processing Technologies Part 1: Safety</p> <p><b>ISO 16110-2</b> Hydrogen Generators Using Fuel Processing Technologies Part 2: Test Method for Performance</p> <p>CSA America HGV2 Standards for Hydrogen Vehicle Fuel Containers</p>	<p>Standardized Industry Error Codes</p> <p><b>ASME B31.12</b> Performance based standard for approving Hydrogen components</p> <p>Propane Quality (Odorant) Standards</p> <p>IEC TC 105 Working Group #6 Fuel Cell Systems for Propulsion and Auxiliary Power Units</p> <p><b>ISO/PAS 15594</b> Airport Hydrogen Fuelling Facility Operation</p> <p><b>ISO TR 15916:2004</b> Basic Considerations for the Safety of Hydrogen Systems</p> <p><b>CSA America FC4</b> Fuel Cell Modules</p> <p><b>CSA America FC5</b> Hydrogen Generators</p> <p><b>CSA America FC11</b> Hand Held or Hand Transportable Fuel Cell Power Units with Fuel Containers</p> <p><b>UL Subject 2264 A</b> Gaseous Hydrogen Generation Appliances - Electrolyzer Technology Waiting for international standard ISO TC197 WG#8</p> <p><b>UL Subject 2264 C</b> (Joint activity with CSA America; FC5) Gaseous Hydrogen Generation Appliances - Fuel Processing Technology Waiting for international standard ISO TC197 WG#9</p>

Most recent changes are **HIGHLIGHTED**.

## ASTM D03.14 Hydrogen and Fuel Cells Update

Work Item	Title	Constituents (DL)	Update
4548	Standard Test Method for Determination of Trace Contaminants in Hydrogen and Related Fuel Cell Feed Gases	CO <sub>2</sub> (0.5 ppm), nitrogen (5 ppm), argon (1 ppm), oxygen (2 ppm), and water (1 ppm)	<b>Published official item: D7649-10</b>
5847	Standard Practice for Sampling of High Pressure Hydrogen and Related Fuel Cell Feed Gases	Gaseous sampling	<b>In publishing: D7606-11</b>
6527	Standard Test Method for Ion Selective Electrode Based Determination of Ammonia in Hydrogen and Other Fuel Cell Feed Gases	Ammonia (unknown)	N/A
6624	Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Hydrogen and Other Fuel Cell Feed Gases	Formaldehyde (unknown)	N/A
9211	Standard Test Method Ion Chromatography Based Determination of Cations in Hydrogen and Other Fuel Cell Feed Gases	Formic Acid (low ppb to ppm)	<i>Published official item: D7550-09</i>
9688	Standard Test Method for Sampling of Particulate Matter in High Pressure Hydrogen used as a Gaseous Fuel with an In-Stream Filter	Particulate sampling	<i>Published official item: D7650-10</i>
10196 (27163)	Standard Test Method for Determination of Ammonia and Trace Water in Hydrogen and Other Gaseous Fuels by Infrared Spectroscopy	Ammonia, CO <sub>2</sub> , CO, formaldehyde, formic acid, and water (defined by EPA 40 CFR part 136 Appendix A "meet detection limits of SAE TIR J2719")	In publishing: D7653-10
21162	Standard Test Method for the Characterization of Particles from Hydrogen Fuel Streams by Scanning Electron Microscope	Particulates	N/A
21597	Standard test method for microscopic measurement of particulates in hydrogen fuel	Particulates	<b>Published official item: D7634-10</b>
21611	Standard test method for gravimetric measurement of particulates in hydrogen fuel	Particulates	<i>Published official item: D7651-10</i>
22378	Determination of Total Hydrocarbons (C1 basis) in Hydrogen by Total Hydrocarbon Analyzer (THC)	Total hydrocarbons (0.1 ppm)	<b>In publishing: D7675-11</b>
23815	Determination of Total Halocarbons contained in Hydrogen and other gaseous fuels	Total halogenated compounds ("halocarbon determination requirements contained in SAE J2719" 0.1 ppb)	Being revised for main ballot (March '11)

24073	Standard Test Method for Determination of Trace Hydrogen Sulfide, Carbonyl Sulfide, Methyl Mercaptan, and Carbon Disulfide in Hydrogen Fuel by Gas Chromatography and Sulfur Chemiluminescence Detection	Total sulfur (0.02 ppb)	<b>In publishing: D7652-11</b>
None	Standard Practice for the Determination of Carbon Monoxide, Formaldehyde, Ammonia and Other Trace Substances in Hydrogen Fuel Streams by Laser Based Spectrometric Methods	CO, formaldehyde, ammonia (unknown)	N/A
None	Field Sampling Apparatus	All	N/A
None	Vehicle Fueling Interface Surface Particulate Matter	Particulates	N/A