

Developing International Codes and Standards for the Safe Production, Storage, and Use of Hydrogen

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National Hydrogen Association

DOE Fuel Cells Summit IV

05/11/00

NHA Membership

- Over 70 Members
- Diverse Membership
 - Large Companies
 - Small Businesses
 - Universities, Institutes, National Labs
- Dedicated to commercializing hydrogen-related energy systems

Background

- Hydrogen is quickly moving toward commercialization
- Industry uses and processes hydrogen safely
- Need safe use of hydrogen for fuel cell systems
- In many cases standards do not exist

NHA C&S Process

- Identify areas where codes and standards for the safe use of hydrogen energy systems are needed
- Determine if adequate codes and standards exist
- Identify other stakeholder and expertise
- Develop new draft standards through the NHA, only when the work is needed but not being accomplished elsewhere in a timely way.

NHA C&S Process

- Poll membership for Hydrogen C&S Issues perceived as a need in the 2-5 year time-frame
- Identify other entities which may be stakeholders
- Rank C&S issues based on highest need, interest from members, and requiring NHA lead or coordination
- Based on funding, work on those items with the highest ranking
- Utilize support from members, other C&S organizations, and other identified experts to develop a draft document
- Advance the draft through a larger standard organization, such as NFPA, ISO, etc.

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ISO/TC-197 Standards

- International standards already published are:
 - ISO 13984: *Liquid Hydrogen - Land vehicle fuelling system interface*
 - ISO 14687: *Hydrogen Fuel - Product specification*
- Standards under development are:
 - ISO/CD 13985: *Liquid hydrogen - Land vehicle fuel tanks*
 - ISO/WD 13986: *Tank containers for multimodal transportation of liquid hydrogen*
 - ISO/WD 15594: *Airport hydrogen fuelling facility*
 - ISO/WD 15866: *Gaseous hydrogen blends and hydrogen fuel - Service stations*
 - ISO/WD 15869: *Gaseous hydrogen and hydrogen blends - Land vehicle fuel tanks*
 - ISO/WD 15916: *Basic requirements for the safety of hydrogen systems*
 - ISO/AWI 17268: *Gaseous hydrogen - Land vehicle fuelling connectors*

WG 1: Connectors

- Due to the international interest in blends and portable power, it was suggested the group look at development of standards for these.
- Refilling of hydrides
- Now that the connectors work is an ISO work item, being advanced by the same working group as the refueling station item, this may be done through ISO.

WG 2: Containers

- NHA Item based on CNGV Standard
- Item Accepted and Advanced through ISO/TC-197
- NHA interested in looking at Hydrides
- NHA C&S Group formed to continue this work

WG 3 : Refueling Stations

- National database for hydrogen fueling experience
- Incident reports and data needed
- Technical Issues Remaining
- Work being advanced through ISO/TC-197

New Work Items

- C&S for the use of electrolysers and fuel cells at customer sites, including homes.
- C&S for safe self-service refueling of vehicles with H₂.
- Certification program for hydrogen vehicle fuel systems.
- C&S for maritime unique applications of hydrogen (identify unique applications).

WG 4: Electrolyzers

- Scope: To develop a standard for installation, safety and use of electrolyser hydrogen generators in end use applications, including residential, commercial, and industrial.
- Activities for this group include:
 - Identify other group participants
 - Assess relevant codes
 - Parameter review; determine technical envelope
 - Develop draft standard
 - Code/Building & Zoning review
 - Template document
 - Specific Document Scope

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WG 5: Self-service Refueling

- Scope: Specify design criteria (vehicle grounding, venting of fuel lines, eliminating ignition sources, other safety precautions etc.) for refueling with:
 - Gaseous Hydrogen
 - Liquid Hydrogen

WG 5 - Self-service refueling - Cont..

- WG5 Actions:
 - Review existing draft standards for refueling stations and connectors - identify any deficiencies for public use.
 - Specify design criteria - fold output into ongoing NFPA and ISO activities
 - Coordinate with DOT and SAE (and others)

WG 6 - SAE Coordination

- Scope : Verify that the On-Board Hydrogen system (storage, generation, distribution, power source, controls, etc.) is safe and performs to specified vehicle standards
- Actions:
 - NHA is actively working with SAE C&S safety task force

WG 7 - Maritime Applications

- **Scope:** To identify maritime unique applications of hydrogen.
- Coordinate efforts being accomplished under the Maritime Hydrogen Technology Development Group (MHTDG), led by DCH Technology, into the NHA C&S process. The NHA WG 7 will identify standards and needs for new C&S for unique applications of maritime hydrogen use.

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Codes

- **Issues**
 - Most jurisdictions have multiple requirements - (building code, fire code local ordinances)
 - Some codes might restrict the use of hydrogen as a fuel
 - This could prevent the widespread use of hydrogen as a fuel
- **Suggested Work**
 - Identify key codes and standards affecting hydrogen use
 - Evaluate if a change to the document is warranted
 - Propose revision to key codes and standards
 - Work with codes and standards organizations to implement the changes
- **The NHA is proud to be hosting an International Codes Council (ICC) meeting with the hydrogen community in June.**

Sourcebook for Hydrogen Applications

- Funded by Natural Resources Canada and U.S. Department of Energy
- Current state of knowledge and experience with using hydrogen safely in emerging applications, especially the transportation sector
- Compiles key materials to provide an overview of the prevailing practices and applicable standards and codes for using hydrogen as a fuel