

**November 2006**



## **The Newest Codes and Standards for Hydrogen and Fuel Cells**

***Presented by Patrick Serfass, National Hydrogen Association***



# Why Hydrogen?

▶ **ENVIRONMENTAL STEWARDSHIP**

▶ **ENERGY SECURITY**

▶ **ECONOMIC STRENGTH**





# Who is the National Hydrogen Association?







# Who is the National Hydrogen Association?

## ▶ **Mission**

- ” Promoting the transition to hydrogen in the energy field.”

## ▶ **Membership**

- More than 100 companies and organizations (energy companies, auto manufacturers, small business, universities, laboratories, government and non-profit organizations)

## ▶ **Program Priorities**

- **Safety, Codes & Standards** development
- **Education & Outreach** to media, policymakers, safety and permitting officials, educators, students and the public
- **Policy** advocacy and advising government leadership

## ▶ **Leading information resource** on hydrogen and hydrogen technologies



# Codes and Standards

- ▶ Hydrogen Safety, Codes and Standards Workshops
- ▶ *Hydrogen and Fuel Cell Safety Report*
- ▶ Provide technical guidance and facilitate information sharing for the development of hydrogen codes and standards, with efforts focused on:
  - International Standards and Global Regulations
  - US Model Code Support
  - Domestic Standard Development







# Hydrogen and Fuel Cell Safety Report ( [www.HydrogenandFuelCellSafety.info](http://www.HydrogenandFuelCellSafety.info) )

Hydrogen and Fuel Cell Safety - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Refresh Mail Print

Address <http://www.hydrogenandfuelcellsafety.info/> Go Links Groupwise on the Web NetStorage

## Hydrogen and Fuel Cell Safety

An Online Resource for the National Hydrogen and Fuel Cells Codes & Standards Coordinating Committee  
Produced by the National Hydrogen Association in association with the US Department of Energy and US Fuel Cell Council

- Latest Issue
- Archives
- Committee Resources
  - Next Committee Meeting
  - In-Person Proceedings
  - Issues for Review
  - Documents for Review
  - Committee Roster
  - Mission Statement
  - Members Only
- HIPOC
  - Meetings/Minutes
  - ICC Proposals
  - NFPA Proposals
  - Submitting a Proposal
  - Key Dates
  - About the HIPOC
- Technical Resources
  - NHA Safety Workshops
  - Hydrogen Safety Training
- Meetings/Events
- About this Site
- Contact Us

Your email

Join our Mailing List

You are here: Latest Issue

### Latest Issue: October 2006

- Results of the ICC Code Development Hearings**  
*Patrick Serfass, National Hydrogen Association*
- First Week-Long Training Course Dedicated to Hydrogen Storage**  
*Karen Hall, National Hydrogen Association*
- ISO TC 197 Update**  
*Bob Mauro, US TAG Chair, and Debbie Angerman, US TAG Administrator*
- NFPA 52: Input sought regarding the Vehicular Fuel Systems Code**  
*Patrick Serfass, National Hydrogen Association*
- NFPA 2 Hydrogen Technology TC Will Hold First Meeting at NREL**  
*Karen Hall, National Hydrogen Association*
- Wake Up to Hydrogen: ICC Hearing Workshop Report**  
*Patrick Serfass, National Hydrogen Association*
- Michigan Conference Tracks Hydrogen Fleet Progress**  
*Karen Hall, National Hydrogen Association*

Hydrogen Energy Technologies Workshop: Safety, Installations, and Permitting  
In conjunction with the 2007 Fuel Cell Seminar  
November 13, 2006  
Honolulu, Hawaii

US Fuel Cell Council  
Codes and Standards

FUEL CELL STANDARDS

Department of Energy

start | Hydrogen a... | 3 Windows... | 2 Microsoft... | Novell Group... | Microsoft Po... | 5:22 PM



# Hydrogen Here and Now!



**NHA Annual Hydrogen Conference 2007**  
With Hydrogen Expo US  
**March 19-22, 2007 • San Antonio, Texas**

- ▶ The largest hydrogen conference in the US
- ▶ The longest running annual hydrogen conference in the world.
- ▶ Presentations by International Corporate Executives and Government Officials
- ▶ U.S. State Activities
- ▶ Interactive Idea Forums
- ▶ Press Conferences and Events
- ▶ Ride n Drives and Industry Tours

**Sacramento, CA: March 12-15, 2008**

**Columbia, SC: March 9-13, 2009**





# What are Codes and Standards?

- ▶ Documents that establish a basis for “technical communication”
- ▶ Provisions for assessing technology safety and performance
- ▶ The basis for “Building Construction Regulations” or other rules addressing public health and life-safety
- ▶ They govern public spaces, for example:
  - ▶ Location of fire suppression systems
  - ▶ Room capacity and exits
  - ▶ Signage
  - ▶ And more ...







# What are HYDROGEN Codes and Standards?

- ▶ The same, but for hydrogen-specific applications, including:
- ▶ Emergency shut-offs
- ▶ Signage
- ▶ Redundant safety systems
- ▶ Material specifications
- ▶ Setback distances
- ▶ Standardized sizes
- ▶ Testing requirements
- ▶ Pressure relief devices
- ▶ And more ...





# Why do we develop codes and standards?

- ▶ Hydrogen powered products are moving to market
- ▶ Safe hydrogen use by industry needs to transfer to use by the public
- ▶ In many cases standards do not exist
- ▶ In some cases codes do not address hydrogen uses that are only now becoming common







# How do we develop C&S?

- ▶ Scenario A (US - standard? code)
  - Standard (international or domestic) created by working group, reviewed and approved by standard development organization (SDO)
  - Finished standard referenced into a code by a code development organization (CDO)
  - Code adopted by a local jurisdiction (eg., State of Michigan Department of XYZ)
  - Code enforced by local official (probably a fire marshal/inspector)
- ▶ Scenario B (US – code only)
  - CDO creates a working group to write specific language into the code about the safety issue
  - Code adopted by a local jurisdiction (eg., State of Michigan Department of XYZ)
  - Code enforced by local fire marshal





# How do we develop C&S?

- ▶ Scenario C (Int'l - standard? code)
  - Standard (international or domestic) created by working group, reviewed and approved by standard development organization (SDO)
  - Finished standard referenced into a global technical regulation (GTR) by the UN
  - GTR adopted by individual countries
  - GTR enforced by local official
- ▶ Scenario D (Int'l - GTR)
  - UN creates a working group to write specific language into a GTR about the safety issue
  - GTR adopted by individual countries
  - GTR enforced by local official



# Existing Hydrogen C&S: [www.FuelCellStandards.com](http://www.FuelCellStandards.com)

**FUEL CELL/HYDROGEN INFRASTRUCTURE CODES & STANDARDS**

Home | Mission | Codes & Standards Matrix | Calendar | Services & Products Job Postings | Bulletin Board (new message waiting) | Players (members only)

**By Application**

1.0	<a href="#">Stationary Fuel Cell Applications</a>
2.0	<a href="#">Transportation Fuel Cell Applications</a>
3.0	<a href="#">Portable / Micro Fuel Cell Applications</a>
4.0	<a href="#">Hydrogen Infrastructure</a>
5.0	<a href="#">Miscellaneous (Other Fuels, Definitions)</a>

**By Geographic Location & Organization**

A.	<a href="#">International</a>
B.	<a href="#">North America</a>
C.	<a href="#">Europe</a>
D.	<a href="#">Pacific Rim</a>

**Stationary Fuel Cell Applications**

1.0	<b>Stationary Fuel Cell Applications</b>	
1.1	<b>Hardware / System Design Power Systems</b>	
	ANSI/ISA America FC1-2004 Fuel Cell Power Systems	US National Standard Published
	ISA America FC2 Residential Fuel Cell Power System	holding location for future US standard
	IEA TC 105 Working Group #2 Stationary Fuel Cell Power Systems-Safety	International Standard draft in progress
	REN/GENELEC Fuel Cell Gas Fueling Appliances	E.U. Standard draft in progress
	JSC-C 0001 Phosphoric Acid Fuel Cell Power Generating System	Japanese Standard English Translation Available
	<b>Accessories</b>	
	JSC-C 0002 Indication of Fuel Cell Power Facility (nomenclature)	Japanese Standard published
	UL 2675 Gas and Vapor Detectors and Sensors	ANSI/UL Standard





# What's New?

- ▶ International Fire Code (ICC)
  - Fork lift trucks: contents of their fueling tanks do not count towards the MAQ limits
  - Separation distances & barrier walls: For sites constrained by lot size, barrier walls can be used to separate fuel storage and other equipment from buildings and protected areas
  - Nomenclature: In many cases where the code previously referred to “natural gas,” the IFC now refers to “flammable gas” (to include hydrogen)





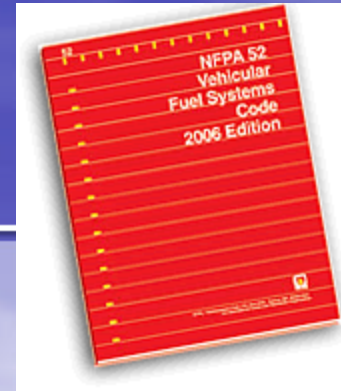


# What's New?

- ▶ International Building Code (ICC)
  - Indoor Fueling/Cut-off rooms: hydrogen systems that are listed and labeled for indoor use to not have to be located in a hydrogen cutoff room. Also allowed if the hydrogen system is inside, in a designated fuel dispensing area, and delivery is  $< 12$  SCFM
  - Indoor Fueling/“Fast Fill”: In the current cycle, industry groups are attempting add requirements so that “fast fill” ( $>12$  SCFM) indoor fueling may be allowed



# What's New?



- ▶ Vehicular Fuel Systems Code (NFPA 52)
  - 2006 Edition now includes hydrogen requirements (code doubled in size from 2002)
  - New Chapters Added:
    - ▶ general gaseous hydrogen requirements and equipment qualifications;
    - ▶ service and maintenance of gaseous hydrogen engine fuel systems;
    - ▶ gaseous hydrogen compression, gas processing, storage, and dispensing systems; and
    - ▶ liquefied hydrogen fueling facilities
  - The 2006 edition is beginning the review cycle:
    - ▶ \*\*\*Now proposals are due May 27, 2007\*\*\* (Not November 23, 2006) see [www.HydrogenandFuelCellSafety.info](http://www.HydrogenandFuelCellSafety.info)



# What's New?

- ▶ National electrical Code (NFPA 70)
  - Now covers the electrical interface between fuel cell and “panel board”
  
- ▶ Storage, Use and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, Equipment and Tanks (NFPA 55)
  - Now incorporates NFPA 50A – 1999; Gaseous Hydrogen Systems at Consumer Sites and NFPA 50B –1999; Liquefied Hydrogen Systems at Consumer Sites





## Recently Published

- ▶ ISO 17268: Compressed hydrogen surface vehicle refueling connection devices
  - An ISO standard created through ISO TC 197 Working Group 5, based on SAE J2600
  - More information:  
<http://www.hydrogenandfuelcellsafety.info/archives/2006/may//isoStandard.asp>
- ▶ NFPA 853: Installation of Stationary Fuel Cell Power Plants
- ▶ CGA G-5.6: Hydrogen Pipeline Systems
- ▶ CGA PS-20: Direct Burial of Gaseous Hydrogen Storage Tanks
- ▶ CGA PS-21: Adjacent Storage of Compressed Hydrogen and Other Flammable Gases
- ▶ CGA H-3: Cryogenic Hydrogen Storage



# What's Coming Next?

- ▶ Late 2006- First quarter of 2007:  
SAE J 2601 and J2600--  
Compressed Hydrogen Vehicle  
Fueling Communication Devices
- ▶ Rest of 2007:
  - ICC Code Revisions (all codes):  
Final Action Hearings, May 2007
    - ▶ For more information on the codes  
up for review, visit  
[www.HydrogenandFuelCellSafety.info](http://www.HydrogenandFuelCellSafety.info)  
and click on “ICC Proposals”  
link on the left
  - NFPA 52, 2008 Edition (visit the  
link above for key dates)
  - NFPA 55, 2008 Edition (visit the  
link above for key dates)





# Where To Find the NHA

***On the Web:***

**[www.HydrogenAssociation.org](http://www.HydrogenAssociation.org)**

**[www.HydrogenandFuelCellSafety.info](http://www.HydrogenandFuelCellSafety.info)**

**[www.HydrogenandFuelCellJobs.com](http://www.HydrogenandFuelCellJobs.com)**

**[www.HydrogenConference.org](http://www.HydrogenConference.org)**

## UNITED STATES

**National Hydrogen Association  
1800 M Street NW  
Suite 300-North  
Washington, DC 20036  
ph: 1.202.223.5547**

**Western Region Office  
35 Seascape Drive  
Sausalito, CA 95965  
Ph: 415.381.7234**

## EUROPE

**Gateshead International  
Business Centre  
Mulgrave Terrace  
Gateshead, Tyne & Wear  
NE8 1AN, United Kingdom  
ph: 44.0.191.490.9440**