Workshop

Putting Science into Standards: Power-to-Hydrogen and HCNG

Keynote 3: International Standardization Efforts on Hydrogen Technologies

A. Tchouvelev
Chair ISO TC 197
ISO/TC 197 Scope and Structure

Standardization in the field of systems and devices for the production, storage, transport, measurement and use of hydrogen

Approved by TC197 in February 2013

Approach to BE&S:
- Map knowledge and best practices
- Identify knowledge gaps
- Trigger PNR
- Build international collaboration
- Time: 12 – 24 mo

ISO/TC 197 focus

Components and Vehicular Applications:
- WG 18 On-board St
- WGs 19-20, 22-23

Built Environment and Safety:
- WG16 Safety TR
- WG24 HFS
- WGxx (FP-TBD)

Components and generic protocols

Built environment and safety
International TRs / Guidelines IS

International Standards

Approach to Comp:
- Well developed seed documents
- Industry validation and strong need
- Time: 12 – 36 mo

Stationary and Fuel Cell Applications:
- WG12/14 (H₂ quality)
- WGxx (FQV-TBD)

Production, Storage and Handling:
- WG15 Ground St
- WG17 PSA
- WG21 Compressors
19880 Fueling Family

- ISO/WD 19880-1 Gaseous hydrogen – Fueling stations – General requirements (WG24)
- ISO/WD 19880-2 Gaseous hydrogen – Fueling stations – Dispensers (WG19)
- ISO/WD 19880-3 Gaseous hydrogen – Fueling stations – Valves (WG20)
- ISO/WD 19880-4 Gaseous hydrogen – Fueling stations – Compressors (WG21)
- ISO/WD 19880-5 Gaseous hydrogen – Fueling stations – Hoses (WG22)
- ISO/WD 19880-6 Gaseous hydrogen – Fueling stations – Fittings (WG23)
- ISO 19880-7 Gaseous hydrogen – Fueling stations – Fueling protocols (Proposed TBD)
- ISO 19880-8 Gaseous hydrogen – Fueling stations – Fuel quality verification methods (Proposed TBD)
Other Relevant Standardization Efforts

Components and Vehicular Applications


- ISO/WD 19881 Gaseous hydrogen – Land vehicle fuel tanks (WG18)

- ISO/WD 19882 Gaseous hydrogen – Thermally activated pressure relief devices (WG18)

Built Environment and Safety

- ISO/PDTR 15916:2014 Basic considerations for safety of hydrogen systems (WG16) Publication imminent
  - Will replace the original ISO/TR 15916:2004
Other Relevant Standardization Efforts

**Hydrogen Production, Storage and Handling**

- ISO 22734-1:2008 Hydrogen generators using water electrolysis process – Industrial and commercial applications
  - Proposal for revision pending


- ISO 16110-1:2007 Hydrogen generators using fuel processing technologies – Safety

Other Relevant Standardization Efforts

Hydrogen Production, Storage and Handling (cont.)

- ISO/WD 19883 Safety of pressure swing adsorption system for hydrogen separation and purification (WG17)

- ISO/CD 19884 Gaseous hydrogen – Cylinders and tubes for stationary storage (WG15)

Other Relevant Standardization Efforts

**Stationary and Fuel Cell Applications**

- ISO 14687:1999 Hydrogen fuel – Product specification
  - PWI approved for harmonization of Parts 2 and 3, and potentially fuel quality verification at fueling sites
HCNG ISO TC 197 Initiative

Reason for Action:
HCNG has become a global issue because of P2H that involves the whole economy and multinational stakeholders

P2H Diagram developed by JRC
**HCNG ISO TC 197 Initiative**

**Regulatory Challenge:**
Need to control growing number of feeders (both H2 and SNG) into gas networks as well as gas quality and safety

**Standardization Challenge:**
Need to address HCNG blends properly because their properties change dramatically with addition of hydrogen: H2 and HCNG handling, in most cases, cannot be addressed by the same standard requirements!

**Solution:**
Establish technical and standardization frameworks for handling HCNG blends based on concentration mix / properties range and applications

**Critical:**
Collaboration with technology stakeholders and CEN!
Stage One – Short Term

*Establish international technical framework with the initial objective to determine “safe levels” of H2 in CNG for HCNG to be treated as CNG by RCS*

**Flow:** Determine max acceptable deviation of flow properties via devices like TPRD, flow controllers, pressure regulators

**Mixing and Concentration Control Methods:** Develop reliable methodologies for H2 + CNG homogenous mixing and concentration control at required “safe level”

**Calorific Value:** Establish max acceptable deviation from pure CNG in calorific value with various appliances

**Concentration Tolerance:** Establish max acceptable tolerance of various users to H2 concentration in CNG

**Outcome:**

*Submit findings to appropriate ISO TCs for adoption into existing ISO CNG standards (with parallel adoption by EU via CEN process)*
Stage Two – Longer Term

*Establish an international standardization framework via a new TC or PC within ISO in cohesion with technical framework*

**HCNG Standardization Matrix:** Determine appropriate HCNG concentration ranges for various alternative energy options and applications (see P2H diagram) for the development of standard requirements

**Appropriate TC / PC Structure:** Set up Working Groups and Subcommittees based on the HCNG Standardization Matrix above

**Stakeholders:** Ensure all relevant stakeholders are involved

**Sponsors:** Find government and industry sponsors to fund technical work

**Champion:** Find a champion organization willing to lead and coordinate the work of the new TC / PC

**Outcome:**

*ISO HCNG standards for the full range of HCNG blends and applications covering safety & performance (with parallel adoption by EU via CEN process)*
THANK YOU FOR YOUR ATTENTION!

Andrei V. Tchouvelev, PhD

President & CEO, A.V.Tchouvelev & Associates Inc.
President, HySafe
Chair, ISO/TC 197 Hydrogen Technologies

atchouvelev@tchouvelev.org