

USFCC Codes and Standards Priorities

Nov. 16, 2005

Codes & Standards Task Force

- **Formed at the direction of the Executive Committee Strategic Planning Meeting**
- **Members Include:**
 - **Power Generation Chair, Richard Shaw**
 - **Transportation Chair, Glenn Scheffler**
 - **Portable Power Chair, Jerry Hallmark**
 - **Materials & Components Chair, Mike Hicks**
 - **Codes & Standards Chair, Sondra Ullman**

Codes & Standards Task Force

- **Required to establish priorities and recommend policies to increase effectiveness of Codes & Standards efforts.**
- **Face-To-Face meeting and conference calls held periodically.**

Codes & Standards Priority

- I) Essential to or enables commercialization and requires additional resources**
- II) Essential to or enables Commercialization with an appropriate level of resources being applied**
- III) Important to commercialization and requires additional resources**
- IV) Important to commercialization with an appropriate level of resources being applied.**
- V) Supports commercialization and requires additional resources**
- VI) Supports commercialization with an appropriate level of resources being applied.**
- VII) Too many resources applied or Not Urgent**

Prioritization

Enables Commercialization



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	Essential	Important	Supports
Needs more attention	A1	B1	C1
Appropriate Level of Attention	A2	B2	C2
Resources Beyond Needs or Not Important	A3	B3	C3

SIGNIFICANCE TO COMMERCIALIZATION
 ← *More Critical*

	A: Essential To or Enables Commercialization	B: Important to Commercialization	C: Supports Commercialization
<p>1: Requires Additional Resources to Succeed</p>	<p>Global Technical Regulations (GTRs) for Vehicles*</p> <p>Model Building Codes: ICC, NFPA, NEC, NYCBC, etc.</p> <p>NFPA 55 (issued)</p> <p>NFPA 52 (issued)</p> <p>Hydrogen Quality Standards* (ASTM, CGA, ISO, SAE)</p> <p>IEC Micro Fuel Cell Standards*</p> <p>Stack Material & Components Protocols /Round Robins / Standardization / Investigations*</p> <p>(FCTESTNET)</p>	<p>IEEE 1547.XX, Interconnection of Distributed Generation – Application Guides</p> <p>Hydrogen Sensor Standards*</p>	<p>Propane Quality (Odorant) Standards</p> <p>ASME B31.12 H2 Piping and Pipeline Code</p>

FUNDING

Requires Additional Resources →

<p>2: An Appropriate Level of Resources are Being Applied</p>	<p>International Electrotechnical Commission Standards</p> <p>Micro Fuel Cell Regulations</p> <p>UL 2075, ANSI/ISA 12.13.01/02 - Sensor Standards</p> <p>CSA/ANSI FC.1, Fuel Cell Power Systems</p> <p>NFPA 853, Fuel Cell Installation</p> <p>NFPA 70 (National Electrical Code) Article 692, Fuel Cell Systems</p> <p>Revision to FMVSS 305 and SAE J1766, Post Collision Electrical Safety in Vehicles</p> <p>FMVSS for High-Pressure Compressed Hydrogen Storage in Vehicles, CSA NGV/HGV, and SAE J2579 for vehicle hydrogen systems</p>	<p>California Air Resources Board Emissions Regulations for Stationary Generation</p> <p>Portable Fuel Cell Regulations</p> <p>UL 2266 on Fuel Cells in Telecomm applications</p> <p>UL 2265 - Micro Fuel Cell Standards,</p> <p>CSA/ANSI FC.1 - Portable Fuel Cell Standard</p> <p>IEEE 1547 - Interconnection of Distributed Generation</p> <p>ISO TC 197 WG#9 – Hydrogen Generators</p> <p>Revision to J2578, FCVs</p> <p>SAE J2572 Fuel Economy, fuel mileage, and fuel performance</p> <p>UL 2267 on Fuel Cells in Lift Truck applications</p>	<p>EC TC 105 WG#9 – Micro Fuel Cell Performance</p> <p>IEC TC 105 WG#4 – Fuel Cell Performance</p> <p>IEC TC 105 WG#7 – Portable Fuel Cell Performance</p> <p>ASME PTC 50 – Fuel Cell Performance</p> <p>ASME Materials for a Hydrogen Economy</p>
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Lowest Priority

3: Resources Beyond Needs are Being Applied or Activity not Urgent			Standardized Industry Error Codes Performance based standard for approving Hydrogen components Performance Standards NFPA Consolidation of NFPA Hydrogen Standards into NFPA 2
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TIER I - Essential or Enabling Needs Additional Attention

- **Global Technical Regulations for Vehicles**
 - **Cathy Gregorie-Padro (LANL) and Martin Koubek delivered updates to US TAG TEAM Meetings and Monthly Codes & Standards Conference Calls.**
 - **US TAG TEAM Meetings have resulted in a planned GTR update at the upcoming NHA meeting.**
 - **US TAG TEAM Meetings have stressed performance based standards development.**

TIER I - Essential or Enabling Needs Additional Attention

- **Model Building Codes**
 - **Members participate on the ICC Ad Hoc Hydrogen Committee - Glenn Scheffler, Gary Howard, DOE.**
 - **USFCC arranged and participated in an industry feedback session with Sandia National Labs February 24, 2005.**
 - **Members and Staff participate on NFPA Committees - Robert Wichert, Laurie Florence, Andy Skok, Bill Collins**

TIER I - Essential or Enabling Needs Additional Attention

- NFPA 55 - Compressed and liquid hydrogen
 - **Members filed comments and track progress.**
 - **Staff did not participate.**
 - **Standard issued as NFPA 55: Standard for the Storage, Use and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders and Tanks – 2005 Edition.**
 - **Continue to monitor for issues with new edition. Look for opportunities to improve siting distances.**

TIER I - Essential or Enabling Needs Additional Attention

- **NFPA 52**
 - **Reviewed by Transportation Working Group and SAE during the comment period. Numerous comments were submitted prior to the comment deadline. NFPA comment review meeting was held, resulting in changes to the proposed amendment to remove manufactured vehicles from the scope.**
 - **Members and Anthony Androsky participate.**
 - **Standard issued on August 25, 2005 as NFPA 52: Vehicular and Fuel Systems Code – 2006 Edition**
 - **Continue to monitor**

TIER I - Essential or Enabling Needs Additional Attention

- **Hydrogen Quality Standards**
 - **ISO, ASTM, CGA, SAE**
 - **ISO TC 197 Working Group decided to pursue a Technical Specification rather than an amendment to avoid an amendment being pulled into international regulations.**
 - **Sylvia Wessel, Jim Ohi, William Collins and Robert Wichert participate.**
 - **Members and Staff Actively Participate**

TIER I - Essential or Enabling Needs Additional Attention

- IEC Micro Fuel Cell Safety Standards
 - This is a key part of obtaining a **Passenger Exception** for carry-on luggage.
 - Robert Wichert picked up responsibility for **Secretary duties** when DOE ended program funding.
 - Many members participate.

TIER I - Essential or Enabling Needs Additional Attention

- **Stack Materials and Components**
 - Recent activity by FCTESTNET proposing work that is duplicative of USFCC Stack Materials and Components Work Group activities on protocols, round robins and standardization.

TIER II - Essential or Enabling

Adequate Resources Applied

- International Electrotechnical Commission Standards
 - Numerous members, and Robert Wichert, all participate.
 - WG#1 - Nomenclature
 - WG#2 - Standard Module
 - WG#3, #4, #5 - Stationary Fuel Cell Safety, Performance, and Installation
 - WG#7 - Portable Fuel Cell Safety
 - WG#8, #9, #10 - Micro Fuel Cell Safety, Performance, and Interchangeability

TIER II - Essential or Enabling

Adequate Resources Applied

- **Micro Fuel Cell Regulations**
 - **Successful adoption of naming designators at UN in December, 2004.**
 - **Much work remains to be done with FAA, ICAO, IATA, UN, DOT, EPA and others.**
 - **Budget expanded to allow continuing work.**
 - **Brian Walsh and many members have supported this effort.**
 - **New efforts are getting started with formic acid, butane, metallic hydrides and borohydride fuels.**
 - **USFCC developed a successful workshop in April.**



TIER II - Essential or Enabling

Adequate Resources Applied

- **Sensor Standards, UL 2075, ANSI/ISA 12.13.01/02, IEC 61779, ISO TC 197 NWIP**
 - **The availability of hydrogen sensors is imperative since FC.1, FC.3, and NFPA 853 all require them.**
 - **UL 2075 published**
 - **UL representative is reviewing differences between the various standards.**
 - **Neither members nor staff participate in either effort.**
 - **Japanese delegation to ISO TC 197 submitted a NWIP to create a new standard for hydrogen detectors.**
 - **Seen as overlapping with UL 2075 (Gas and Vapor Detectors and Sensors) and IEC 61779 (Electrical Apparatus for the Detection and Measurement of Flammable Gases)**
 - **Working via US TAG to monitor and influence the direction of this effort.**

TIER II - Essential or Enabling Adequate Resources Applied

- **CSA/ANSI FC.1, Fuel Cell Power Systems**
 - **Issued for use**
 - **Some areas for improvement remain (e.g. use of plastics, dielectric strength)**
 - **Robert Wichert and many members participate.**
 - **FC.1 has been used as a seed document for IEC TC 105 WG#3 - Safety.**

TIER II - Essential or Enabling

Adequate Resources Applied

- NFPA 853, Fuel Cell Installation
 - Members and staff worked successfully on recent revisions.
- NFPA 70 (National Electrical Code) Article 692, Fuel Cell Systems
 - **New requirements are being reviewed by members and staff**

TIER II - Essential or Enabling Adequate Resources Applied

- **Federal Motor Vehicle Standards**
 - **The SAE Fuel Cell Standards Forum is working on SAE Recommended Practices for fuel cell vehicles. Many USFCC members and staff participate.**
 - **Recent activism by members has resulted in renewed activity at ISO TC 22 SC21, Electric Road Vehicles.**
 - **Glenn Scheffler, UTCFC is US TAG Chair.**
 - **Anthony Androsky is also a member.**
 - **US TAG TEAM Meetings have stressed performance based standards.**



TIER II - Essential or Enabling Adequate Resources Applied

- Revision to FMVSS 305 and SAE J1766, Post Collision Electrical Safety in Vehicles
 - **Activity continues to resolve these issues at SAE.**
 - **FMVSS revisions will follow.**
 - **Tony Androsky and several members participate as members of the SAE Fuel Cell Forum.**

TIER II - Essential or Enabling Adequate Resources Applied

- FMVSS for High-Pressure Compressed Hydrogen Storage in Vehicles, CSA NGV/HGV, and SAE J2579 for vehicle hydrogen systems.
 - **Conversion of NGV / HGV Standards to performance based standards is supported by industry and DOE funding.**
- SAE J2579, Recommended Practice for Hazardous Fluid Systems in Fuel Cell Vehicles
 - **Continues at SAE**

TIER III - Important to Commercialization Additional Attention Needed

- IEEE 1547.XX
 - **Interconnection of Distributed Generation**
 - **Work on IEEE 1547.XX, Application Guides, has been threatened by DOE funding cuts.**

TIER IV - Important to Commercialization

Adequate Resources Applied

- California Air Resources Board Emissions Regulations for Stationary Generation
 - **Robert Wichert is a member of the CARB DG Working Group, attends meetings, and provides input and feedback.**

TIER IV - Important to Commercialization

Adequate Resources Applied

- Portable Fuel Cell Regulations
- UL 2265, Micro Fuel Cell Safety
 - This is being worked in parallel with IEC TC 105 WG#8 to maintain consistency.
 - CSA and UL are working together on this topic.
 - Robert Wichert and several members participate.
- Portable Fuel Cell Standard, CSA FC.3
 - Recently approved for publication.
 - Robert Wichert led a comments task force immediately prior to publication.

TIER IV - Important to Commercialization

Adequate Resources Applied

- UL 2266 on Fuel Cells in Telecomm applications
 - **Robert Wichert and several members participate.**
 - **Without the participation of USFCC Staff and DOE, this Standards Technical Panel could not have achieved balance, and the work would not proceed. This is a good example of where our close liaison with DOE has paid off well.**

TIER IV - Important to Commercialization

Adequate Resources Applied

- **ANSI / CSA FC.1 - Stationary Fuel Cell Systems**
 - **Published with member and staff input**
- **IEEE 1547**
 - **Interconnection of Distributed Generation**
 - **IEEE 1547 has been published with extensive member and staff input.**
- **ISO TC 197 WG#9**
 - **Hydrogen Generators nearing Final Draft Status**
 - **Members and staff participate**

TIER IV - Important to Commercialization

Adequate Resources Applied

- Revision to J2578, FCVs
- SAE J2572 Fuel Economy, fuel mileage, and fuel performance
- UL 2267 on Fuel Cells in Lift Truck applications

TIER V - Supports Commercialization

Additional Attention Required

- **Propane Quality (Odorant) Standards**
 - **The Power Generation Working Group continues to evaluate this issue.**
 - **No work is in progress.**
 - **Perhaps this should be moved to Codes & Standards Working Group.**
 - **Some work with PERC may be fruitful.**
- **ASME B31.12 - Hydrogen Piping and Pipeline Code**

TIER VI - Supports Commercialization

Adequate Resources Applied

- **Stack Material & Components Efforts**
 - **Fuel Cell Test Station Requirements and Verification Procedure published.**
 - **Protocol on Fuel Cell Component Testing - Primer for Generating Test Plans published.**
 - **Conductivity Testing Protocol nearing publication.**
 - **Single Cell Testing Protocol being revised.**

TIER VI - Supports Commercialization

Adequate Resources Applied

- **Stack Material & Components Efforts**
 - **Single Cell Round-Robin testing nearing completion - Seminar papers presented.**
 - **Literature Survey of Fuel Cell Contaminants available for sale on the USFCC web site**
 - **Durability/Longevity; Gaskets; Contaminants; Hydrogen Quality; and Single Cell Testing Focus Groups are expected to publish additional work.**

TIER VI - Supports Commercialization

Adequate Resources Applied

- **IEC TC 105 WG#9** – Micro Fuel Cell Performance
- **IEC TC 105 WG#4** – Stationary Fuel Cell Performance
- **IEC TC 105 WG#7** – Portable Fuel Cell Performance
- **ASME PTC 50** – Fuel Cell Performance

TIER VII - Supports Commercialization

Too many resources applied or Not Urgent

- **Standardized Industry Error Codes**
 - **No work is in progress, it was considered to infringe upon proprietary information.**
- **Performance based standard for approving Hydrogen components**