Recent Development of Portable Fuel Cells and News from Annex 35

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Dr. Maria Wesselmark, Intertek Semko
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Fuel cells for portable applications:

- That the systems are designed to be held by hand during operation.
- To be transported by one person.
- To be transported easily from one location to another (transportable) and for transport purposes (light traction).

Portable fuel cell systems can be found in the leisure, industry and defence markets.
The overall objective of IEA Annex 35 is that through international cooperation, support development of portable fuel cells to commercialization.

Last meeting was held in September 2015 at Next Energy, Oldenburg Germany.

The meeting covered portable fuel cell activities in the participants’ respective countries and their own on-going activities in the area.

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<td>Christina Bock</td>
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<td>Alexander Dyck</td>
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<td>Forschungszentrum Jülich GmbH</td>
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Annex 35, Fuel Cells for Portable Applications

The participants of Annex 35 are mainly research institutes and the activities are often focusing both on fundamental material development but also on larger fuel cell systems for a specific application for military, space and consumer market.

Focus of on-going material research activities:

• Alkaline Alcohol Fuel Cells
• Platinum free catalysts
• Alternative membrane
• Hydrogen storage
Standardization work on portable and micro fuel cells (IEC 62282) has resulted in five documents.

IEC 62282-6-100 will be divided into a number of different standards for the fuel used. Today there are 8 Appendix to the standard which makes it complicated to handle changes and up-dates.

Draft documents:
- IEC 62282-6-101 ed.1 Micro fuel cell power systems - Safety - General Requirements
- IEC 62282-6-400 ed.1 Micro fuel cell power systems - Safety - Power and data inter-changeability
Standardization work on portable and micro fuel cells (IEC 62282) has resulted in five documents:

- IEC 62282-5-1:2012 ed.1 Portable fuel cell power systems – Safety
- IEC 62282-6-100:2010 + AMD1:2012 CSV ed1.1 Micro fuel cell power systems – Safety
- IEC / PAS 62282-6-150:2011 ed1 Micro fuel cell power systems - Safety - Water reactive compounds (UN Division 4.3) in Indirect PEM fuel cells
- IEC 62282-6-200 ed.2 Micro fuel cell power systems - Performance test methods
- IEC 62282-6-300 ed.2 Micro fuel cell power systems - Fuel Cartridge Inter-changeability

IEC 62282-6-100 will be divided into a number of different standards for the fuel used. Today there are 8 Appendix to the standard which makes it cumbersome to update the standard, if any part needs to be changed.

Draft documents:

- IEC 62282-6-101 ed.1 Micro fuel cell power systems - Safety - General Requirements
- IEC 62282-6-400 ed.1 Micro fuel cell power systems - Safety - Power and data inter-changeability
NCs are invited to nominate additional experts (especially for the different fuels and technologies) via the IEC Experts Management System

TC 105 decided to split IEC 62282-6-100 into a general part IEC 62282-6-101 accompanied by fuel type specific parts IEC 62282-6-102, 6-103, 6-104, etc. (currently included in annexes A, B, C, etc. of IEC 62282-6-100). The benefit would be that future additions and revisions could be handled more easily. See also document 105/276/INF, 2010-06. The present RR is intended to initiate project 62282-6-101. Other RRs will be circulated in due time for other fuel type specific parts 62282-6-102, -6-103, etc.

The existing IEC 62282-6-100 will be withdrawn at a future date as and when all its contents have been published in the new format IEC 62282-6-101, -6-102,-6-103, etc.
A selection of fuel cells is already available on the market!
A Selection of Micro Fuel Cell Products

- Portable chargers are addressing cost-sensitive customers (<<100 €)
- Cartridge access is important to the end user
- Latest products: JAQ by MyFC/ Kraftwerk by Ezelleron
myFC Launching JAQ

myFC PowerTrekk 1.0
Hybrid system
Charger system
Output Power: 2.5 W
(1500 mAh in battery)
Output voltage: 5 V
Weight: 173 g
Cartridge system
Output Power: 1200 mAh

myFC PowerTrekk 2.0
Hybrid system
Charger system
Output Power: 6.5 W
(3800 mAh in battery)
Output voltage: 5 V
Weight: 290 g
Cartridge system
Output Power: 1400 mAh

myFC JAQ
Fuel Cell only
Charger system
Output Power: 5 W
Output voltage: 5 V
Weight: 200 g
Cartridge system
Output Power: 1800 mAh

Zero CO2 emissions - end to end.
A Selection of Military Portable Products

- Propane and methanol fuels
- HTPEM, DMFC and SOFC system
- 50 – 300 W system
- Serial Production by UltraCell and SFC Energy
- Protonex in acquisition by Ballard
- SAFCell and UltraCell have signed a worldwide licensing agreement
A Selection of Consumer Portable Products

- Silent operation and no particulate emissions
- Longer runtimes than batteries
- SFC in serial production, launching EFOY GO and EFOY Pro 12000 Duo
Summary: Portable Fuel Cell Trends

- A branded, more thought-out concept is presented and products are better tailored to meet the market needs.
- Standards and regulations for micro fuel cells and fuel cell cartridges is in place to facilitate product launch.
- A wide range of new products are launched and serial production has started.
- Several of the companies working on military applications broadens their product portfolio with industrial and commercial applications.
- PEMFC is the key technology used for portable and micro fuel cell systems, however different fueling solutions are used.
Questions

Contact Info:

Maria.wesselmark@intertek.com
+46 708 752002
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Working Group Structure IEC 62282

WG1: FC Definitions
   IEC/TS 62282-1 ed 3.0 (2013-11-04)

WG2: FC Module
   IEC 62282-2 ed. 2 (2012-03-26)

Stationary FC System
   IEC 62282-3-XXX

Portable FC System
   IEC 62282-4-XXX

Micro FC Systems
   IEC 62282-6-XXX

Single Cell Test Method for Polymer Electrolyte Fuel Cell (PEFC) WG11
   IEC/TS 62282-7-1 TS 2010-06-10

Single cell/stack performance test methods for SOFC WG11
   IEC 62282-7-2 ed. 1.0 (2014)

WG3: Safety
   IEC 62282-3-100 (2012-02)

WG4: Performance
   IEC 62282-3-200 (2011-10)

WG5: Installation
   IEC 62282-3-300 (2012-06)

WG7: FC System for Propulsion
   IEC 62282-4-101

WG12: Small stationary fuel cell power systems with combined heat and power output (based on EN 50465)
   IEC 62282-3-400 (previously 3-150)

WG6: FC System Integration into Road Vehicles

WG8: FCPS for industrial electrically driven forklift trucks – Safety
   IEC 62282-4-101

WG9: MFC Safety
   IEC 62282-6-100
   IEC 62282-6-100 (2006-02/2010-03/2011-04)

WG10: MFC Performance
   IEC 62282-6-200 ed. 2.0 (2012-07)

WG12: MFC Interchangeability
   IEC 62282-6-300 ed. 2.0 (2012-12)

Source: Dr. Alexander Dyck, NextEnergy