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**Fuel cell technologies –**

**Part 6-1:**

**Micro fuel cell power systems – Safety**

Withdrowm

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FUEL CELL TECHNOLOGIES –**

**Part 6-1: Micro fuel cell power systems – Safety**

FOREWORD

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A PAS is a technical specification not fulfilling the requirements for a standard, but made available to the public.

IEC-PAS 62282-6-1 has been processed by IEC technical committee 105: Fuel cell technologies.

The text of this PAS is based on the following document:

This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document

Draft PAS	Report on voting
105/96/PAS	105/104/RVD

Following publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned will transform it into an International Standard. Its structure will then be adapted to the IEC rules.

This PAS shall remain valid for an initial maximum period of three years starting from 2006-02. The validity may be extended for a single three-year period, following which it shall be revised to become another type of normative document or shall be withdrawn.

The contents of the corrigendum of April 2007 have been included in this copy.

## FUEL CELL TECHNOLOGIES –

### Part 6-1: Micro fuel cell power systems – Safety

#### 1 Scope

##### 1.1 System boundary

**1.1.1** This consumer safety PAS covers fuel cell power systems, power units and fuel cartridges that are wearable or easily carried by hand, providing d.c. outputs that do not exceed 60 V d.c. and power outputs that do not exceed 240 VA. As such, the externally accessible circuitry is considered as circuits that are “SELV” as defined in IEC 60950-1, and as limited power circuits if further compliance with IEC 60950-1, 2.5 is demonstrated. Systems that have internal systems exceeding 60 V d.c. or 240 VA should be appropriately evaluated in accordance with the separate criteria of IEC 60950-1.

**1.1.2** This consumer safety PAS covers all fuel cell power systems, units and cartridges. This PAS establishes requirements for all fuel cell power systems, units and cartridges to ensure a reasonable degree of safety for normal use, reasonably foreseeable misuse, and consumer transportation of such items. The cartridges covered by this PAS are not intended to be refilled by the consumer. Cartridges refilled by the manufacturer or by trained technicians should meet all the requirements of this PAS as unused cartridges.

**1.1.3** This PAS also covers compatible and separately transported fuel storage fuel cartridges for supplying fuel to the fuel cell power unit.

**1.1.4** Fuel cell power systems that provide output levels that exceed electrical limits specified in 1.1.1 are covered by IEC 62282-5.

**1.1.5** These products are not intended for use in hazardous areas.

##### 1.1.6 Fuels and technologies covered

**1.1.6.1** This PAS includes methanol or methanol and water solutions as fuels.

**1.1.6.2** This PAS includes equipment designs that include proton exchange membrane (PEM) fuel cell stacks and direct methanol fuel cell stacks (DMFC).

**1.1.6.3** This PAS includes requirements for other fuels and the associated systems in the annexes, formatted as deviations or additional requirements to the main body of this PAS.

**1.1.6.4** It is understood that all fuel cartridges, power units and fuel cell systems should comply with applicable country and local requirements including transportation, child-resistance, and storage, where required.

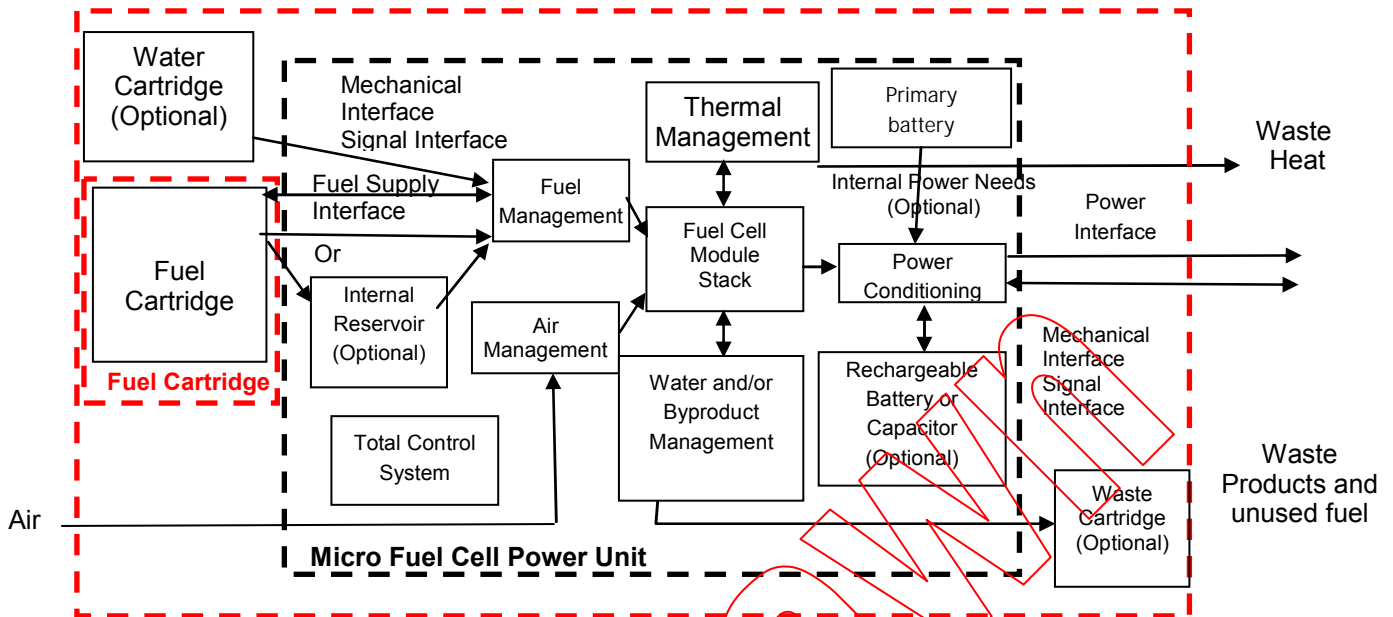


Figure 1 – Micro fuel cell power system

## 1.2 Equivalent Level of Safety

The requirements of this PAS are not intended to constrain innovation. The manufacturer may consider fuels, materials, designs or constructions not specifically dealt with in this PAS. These alternatives should be evaluated as to their ability to yield levels of safety equivalent to those prescribed by this PAS.

## 2 Normative references

The following referenced documents are indispensable for the application of this PAS. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60079-15:2005, *Electrical apparatus for explosive gas atmospheres – Part 15: Construction, test and marking of type of protection 'n' electrical apparatus*

IEC 60086-4:2000, *Primary batteries – Part 4: Safety of lithium batteries*

IEC 60695-2-11, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products*

IEC 60695-2-20, *Fire hazard testing – Part 2-20: Glowing/hot-wire based test methods – Hot-wire coil ignitability – Apparatus, test method and guidance*

IEC 60695-11-10, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 60730-1, *Automatic electrical controls for household and similar use – Part 1: General requirements*

IEC 60950-1, *Information technology equipment – Safety – Part 1: General requirements*

IEC 61025, *Fault tree analysis*

IEC 61032, *Protection of persons and equipment by enclosures – Probes for verification*

IEC 61960, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary lithium cells and batteries for portable applications*

ISO 175, *Plastics – Methods of test for determination of the effects of immersion in liquid chemicals*

ISO 188, *Rubber, vulcanized or thermoplastic – Accelerated ageing and heat resistance tests*

ISO 1817, *Rubber, vulcanized – Determination of the effect of liquids*

ISO 9772, *Cellular plastics – Determination of horizontal burning characteristics of small specimens subjected to a small flame*

ISO 15649, *Petroleum and natural gas industries – Piping*

ISO 16000-3, *Indoor air – Part 3: Determination of formaldehyde and other carbonyl compounds – Active sampling method*

ISO 16000-6, *Indoor air – Part 6: Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax Ta sorbent, thermal desorption and gas chromatography using MS/FID*

ISO 16017-1, *Indoor, ambient and workplace air – Part 1: Sampling and analysis of volatile organic compounds by sorbent tube/thermal desorption/capillary gas chromatography – Part 1: Pumped sampling*

ANSI/ASME B.31.3, *Process piping*

Withholding