IEC/PAS 62282-6-150

Edition 1.0 2011-04

PUBLICLY AVAILABLE SPECIFICATION

PRE-STANDARD



Fuel cell technologies –
Part 6-150: Micro fuel cell power systems – Safety – Water reactive (UN Division 4.3) compounds in indirect PEM fuel cells

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE XC

ICS 27.070

ISBN 978-2-88912-470-1

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CONTENTS

FOREWORD 5
1 Scope 7
1.1 General 7
1.2 Fuels and technologies covered 7
1.3 Equivalent level of safety 9
2 Normative references 10
3 Terms and definitions 11
4 Materials and construction of micro fuel cell power systems, micro fuel cell power units and fuel cartridges 16
4.1 General 16
4.2 FMEA / hazard analysis 16
4.3 General materials 17
4.4 Selection of materials 17
4.5 General construction 18
4.6 Fuel valves 18
4.7 Materials and construction – system 18
4.8 Ignition sources 19
4.9 Enclosures and acceptance strategies 19
4.9.1 Parts requiring a fire enclosure 19
4.9.2 Parts not requiring a fire enclosure 20
4.9.3 Materials for components and other parts outside fire enclosures 21
4.9.4 Materials for components and other parts inside fire enclosures 22
4.9.5 Mechanical enclosures 23
4.10 Protection against fire, explosion, corrosivity and toxicity hazard 23
4.11 Protection against electrical hazards 24
4.12 Fuel supply construction 24
4.12.1 Fuel cartridge construction 24
4.12.2 Fuel cartridge fill requirement 25
4.13 Protection against mechanical hazards 25
4.13.1 Piping and tubing other than fuel or hydrogen lines 25
4.13.2 Exterior surface and component temperature limits 26
4.13.3 Motors 26
4.14 Construction of electric device components 27
4.14.1 Limited power sources 27
4.14.2 Devices that use electronic controllers 28
4.14.3 Electrical conductors/wiring 28
4.14.4 Output terminal area 29
4.14.5 Electric components and attachments 29
4.14.6 Protection 29
5 Abnormal operating and fault conditions testing and requirements 29
5.1 General 29
5.2 Compliance testing 30
5.3 Passing criteria 30
5.4 Simulated faults and abnormal conditions for limited power and SELV circuits 31
5.5 Abnormal operation – electromechanical components 31
5.6 Abnormal operation of micro fuel cell power systems or units with integrated batteries 31

5.7 Abnormal operation – simulation of faults based on hazard analysis 32
6 Instructions and warnings for micro fuel cell power systems, micro fuel cell power units and fuel cartridges 32
6.1 General 32
6.2 Minimum markings required on the fuel cartridge 32
6.3 Minimum markings required on the micro fuel cell power system or micro fuel cell power unit 33
6.4 Additional information required either on the fuel cartridge or on accompanying written information or on the micro fuel cell power system or micro fuel cell power unit 33
6.5 Technical documentation 34
7 Type tests for micro fuel cell power systems, micro fuel cell power units and fuel cartridges 34
7.1 General 34
7.2 Leakage, hydrogen leakage, and hydrogen gas loss, and hydrogen emission measurement and the measuring procedures 36
7.2.1 Leakage test and measuring procedure 36
7.2.2 Hydrogen leakage measurement from fuel cartridges and/or fuel management systems and measuring procedure 36
7.2.3 Hydrogen gas loss measurements from micro fuel cell power systems and micro fuel cell power units and measuring procedures 37
7.3 Type tests 44
7.3.1 Pressure differential tests 44
7.3.2 Vibration test 48
7.3.3 Temperature cycling test 49
7.3.4 High temperature exposure test 50
7.3.5 Drop test 51
7.3.6 Compressive loading test 51
7.3.7 External short-circuit test 52
7.3.8 Surface, component and exhaust gas temperature test 53
7.3.9 Long-term storage test 54
7.3.10 High temperature connection test 58
7.3.11 Connection cycling tests 59
7.3.12 Emission test 65
7.3.13 Hydrogen point source gas loss detection test 74
Bibliography 77

Figure 1.1 – Micro fuel cell power system block diagram for UN Division 4.3 (water reactive) compound fuel in indirect PEM fuel cell system; fuel management system in micro fuel cell power unit 8
Figure 1.2 – Micro fuel cell power system block diagram for UN Division 4.3 (water reactive) compound fuel in indirect PEM fuel cell system; fuel management system in fuel cartridge 9
Figure 2 – Fuel cartridge leakage test flow chart for pressure differential, vibration, drop, and compressive loading tests 38
Figure 3 – Fuel cartridge leakage test flow chart for temperature cycling test and high temperature exposure test 39
Figure 4 – Micro fuel cell power system or micro fuel cell power unit leakage and hydrogen gas loss test flow chart for vibration, temperature cycling, drop and compressive loading tests 40

Figure 5 – Micro fuel cell power system or micro fuel cell power unit leakage and hydrogen gas loss test flow chart for external short-circuit test 41
Figure 6 – Micro fuel cell power system or micro fuel cell power unit leakage and hydrogen gas loss test flow chart for 68 kPa low external pressure test 42
Figure 7 – Micro fuel cell power system or micro fuel cell power unit leakage and hydrogen gas loss test flow chart for 11,6 kPa low external pressure test 43
Figure 8 – Temperature cycling 50
Figure 9 – Fuel cartridge leakage and hydrogen gas loss test flow chart for long-term storage test. 58
Figure 10 – Operational emission rate testing apparatus 65
Figure 11 – Operational emission concentration testing apparatus 66
Figure 12 – Hydrogen emission test procedure for operating micro fuel cell power system 73
Figure 13 – Fuel cartridge leakage test flow chart for low external pressure test 74

Table 1 – Summary of material flammability requirements 21
Table 2 – Temperature limits 26
Table 3 – Limits for inherently limited power sources 27
Table 4 – Limits for power sources not inherently limited (over-current protection required) 27
Table 5 – List of type tests 35
Table 6 – Laboratory standard conditions 36
Table 7 – Emission limits 72

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FUEL CELL TECHNOLOGIES –

Part 6-150: Micro fuel cell power systems – Safety – Water reactive (UN Division 4.3) compounds in indirect PEM fuel cells

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IEC-PAS 62282-6-150 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**
105/309/PAS	105/321/RVD

Following publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned may transform it into an International Standard.

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FUEL CELL TECHNOLOGIES –

Part 6-150: Micro fuel cell power systems – Safety – Water reactive (UN Division 4.3) compounds in indirect PEM fuel cells

1 Scope

1.1 General

a) This consumer safety PAS covers micro fuel cell power systems using hydrogen produced from the reaction of an aqueous solution with solid UN Division 4.3 (water-reactive) compounds in indirect PEM fuel cell systems 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. Portable fuel cell power systems that provide output levels that exceed these electrical limits are covered by IEC 62282-5-1.

b) Externally accessible circuitry is therefore considered to be safety extra low voltage (SELV) circuitry as defined in IEC 60950-1:2005, and as limited power circuits if further compliance with 2.5 of IEC 60950-1:2005 is demonstrated. Micro fuel cell power systems or units that have internal circuitry exceeding 60 V d.c. or 240 VA should be appropriately evaluated in accordance with the separate criteria of IEC 60950-1:2005.

c) This consumer safety PAS establishes requirements for micro fuel cell power systems, micro fuel cell power units and fuel cartridges using hydrogen produced from the reaction of an aqueous solution with solid UN Division 4.3 (water-reactive) compounds for use in indirect PEM fuel cell systems to ensure a reasonable degree of safety for normal use, reasonably foreseeable misuse, and consumer transportation of such items. The fuel cartridges covered by this PAS are not intended to be refilled by the consumer. Fuel cartridges refilled by the manufacturer or by trained technicians shall meet all requirements of this PAS.

d) These products are not intended for use in hazardous areas as defined by IEV 426-03-01.

1.2 Fuels and technologies covered

a) This PAS covers micro fuel cell power systems, micro fuel cell power units and fuel cartridges using hydrogen produced from the reaction of an aqueous solution with solid UN Division 4.3 (water reactive) solid compounds as fuel. These systems and units use polymer electrolyte membrane fuel cell technologies. The designs may include fuel processing subsystems to derive hydrogen gas from the water-reactive solid fuel.

b) Micro fuel cell power system block diagrams for covered systems are shown in Figures 1.1 and 1.2.

c) All portions of this PAS apply to micro fuel cell power systems, micro fuel cell power units and fuel cartridges as defined in 1.1 above.

Clauses 1 through 7 of this PAS parallel the general safety requirements given in IEC 62282-6-100, considered relevant to micro fuel cell systems of all types and further includes requirements specific to water reactive solid fuels as included in Annex F of IEC 62282-6-100:2010.

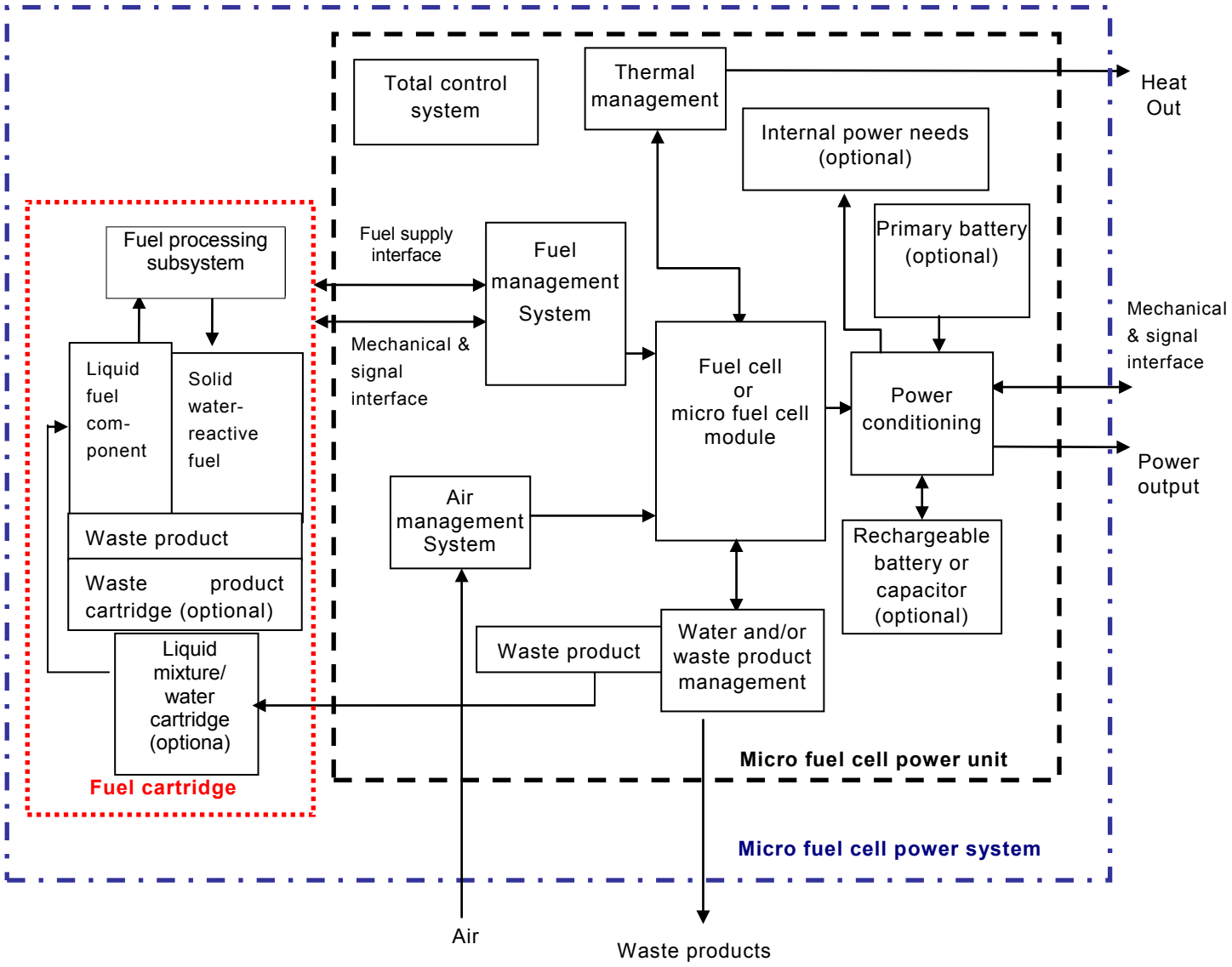


Figure 1.1 – Micro fuel cell power system block diagram for UN Division 4.3 (water reactive) compound fuel in indirect PEM fuel cell system – Fuel management system in micro fuel cell power unit

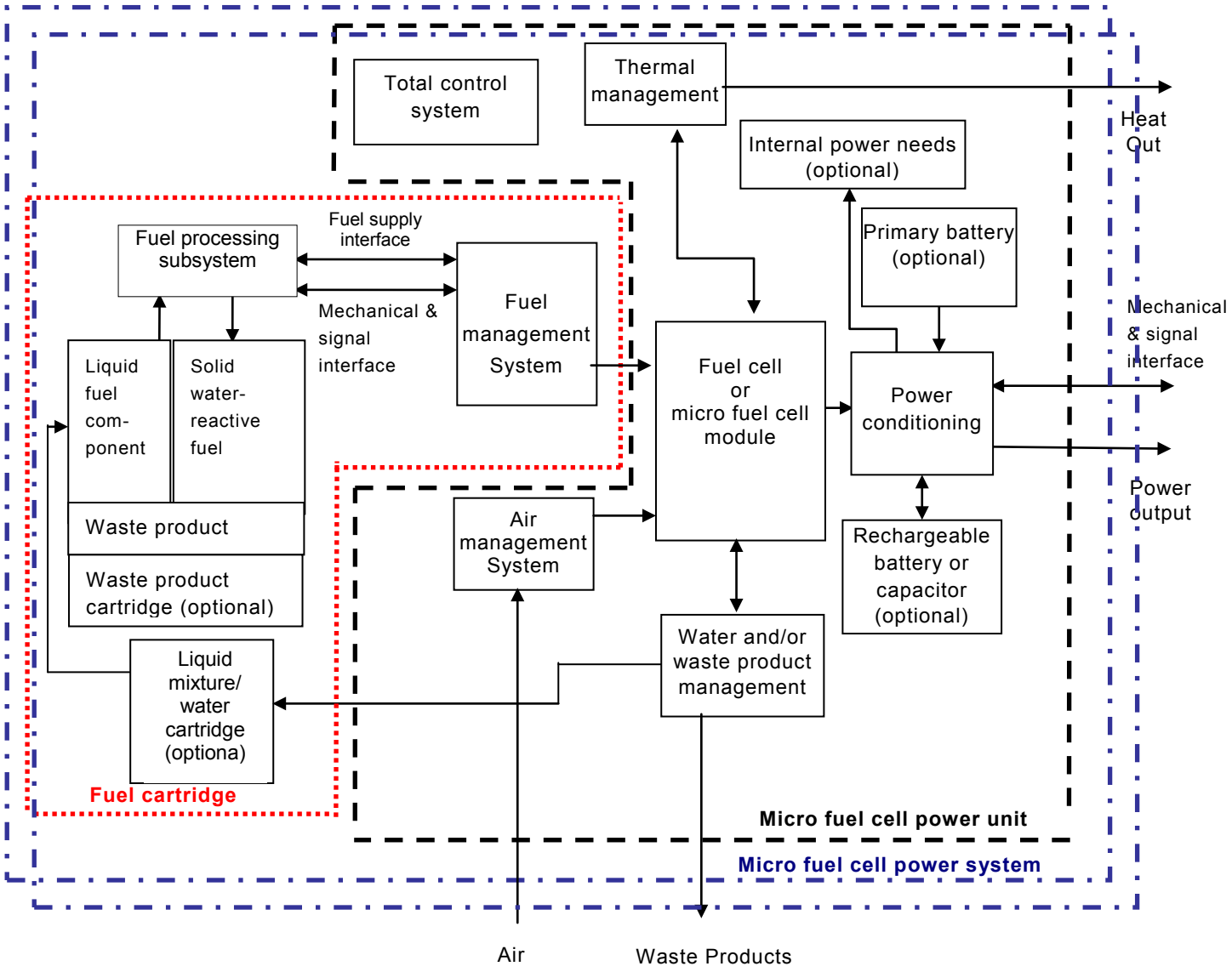


Figure 1.2 – Micro fuel cell power system block diagram for UN Division 4.3 (water reactive) compound fuel in indirect PEM fuel cell system – Fuel management system in fuel cartridge

1.3 Equivalent level of safety

a) 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.

b) It is understood that all micro fuel cell power systems, micro fuel cell power units and fuel cartridges shall comply with applicable country and local requirements including, but not limited to, those concerning transportation, child-resistance and storage, where required.

2 Normative references

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

IEC 60050-426:2008, *International Electrotechnical Vocabulary – Part 426: Equipment for explosive atmospheres*

IEC 60079-15, *Explosive atmospheres – Part 15: Equipment protection by type of protection "n"*

IEC 60086-4, *Primary batteries – Part 4: Safety of lithium batteries*IEC 60086-5, *Primary batteries – Part 5: Safety of batteries with aqueous electrolyte*

IEC 60695-1-10: *Fire hazard testing – Part 1-10: Guidance for assessing the fire hazard of electrotechnical products – General guidelines*

IEC 60695-1-11: *Fire hazard testing – Part 1-11: Guidance for assessing the fire hazard of electrotechnical products – Fire hazard assessment*

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

IEC 60730-1:2010, *Automatic electrical controls for household and similar use – Part 1: General requirements*

IEC 60950-1:2005, *Information technology equipment – Safety – Part 1: General requirements*

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

IEC 62133, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications*

IEC 62281, *Safety of primary and secondary lithium cells and batteries during transport*

ISO 175, *Plastics – Methods of test for the 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 – Sampling and analysis of volatile organic compounds by sorbent tube/thermal desorption/capillary gas chromatography – Part 1: Pumped sampling*

ISO 16111:2008, *Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride*

United Nations Recommendations on the Transport of Dangerous Goods – Model Regulations; Sixteenth revised edition

United Nations Recommendations on the Transport of Dangerous Goods – Manual of Tests and Criteria; Fifth revised edition