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INTERNATIONAL STANDARD

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Withdrawn

Fuel cell technologies –
Part 6-200: Micro fuel cell power systems – Performance test methods

Technologies des piles à combustible –
Partie 6-200: Systèmes à micro-piles à combustible – Méthodes d'essai des performances

IEC 62282-6-200:2007

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FUEL CELL TECHNOLOGIES –

Part 6-200: Micro fuel cell power systems – Performance test methods

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International Standard IEC 62282-6-200 has been prepared by IEC technical committee 105: Fuel cell technologies.

The text of this standard is based on the following documents:

FDIS	Report on voting
105/151/FDIS	105/165A/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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A list of all parts of the IEC 62282 series, under the general title *Fuel cell technologies*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

With advancements in technology, the expectation or demand for the commercial introduction of fuel cells has increased dramatically in recent years. It is especially strong for micro fuel cell power systems intended for applications in laptop computers, mobile phones, PDAs, cordless home appliances, TV broadcast cameras, autonomous robots, etc. The essential component of a micro fuel cell power system is its power unit. Some micro fuel cell power systems have built-in power units, and others have external power units. The purpose of this international standard is to describe the performance test methods for micro fuel cell power systems with outputs up to 60 V d.c. and 240 VA.

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FUEL CELL TECHNOLOGIES –

Part 6-200: Micro fuel cell power systems – Performance test methods

1 Scope

This part of IEC 62282 provides test methods which are required for the performance evaluation of micro fuel cell power systems for laptop computers, mobile phones, personal digital assistants (PDAs), cordless home appliances, TV broadcast cameras, autonomous robots, etc. This standard describes the performance test methods for power characteristics, fuel consumption and mechanical durability for micro fuel cell power systems with output up to 60 V d.c. and 240 VA. Micro fuel cell power systems evaluated to this part of IEC 62282 have the functional arrangement as shown in Figure 1.

This part of IEC 62282 does not address the safety of micro fuel cell power systems.

This part of IEC 62282 does not address the interchangeability of micro fuel cell power systems.

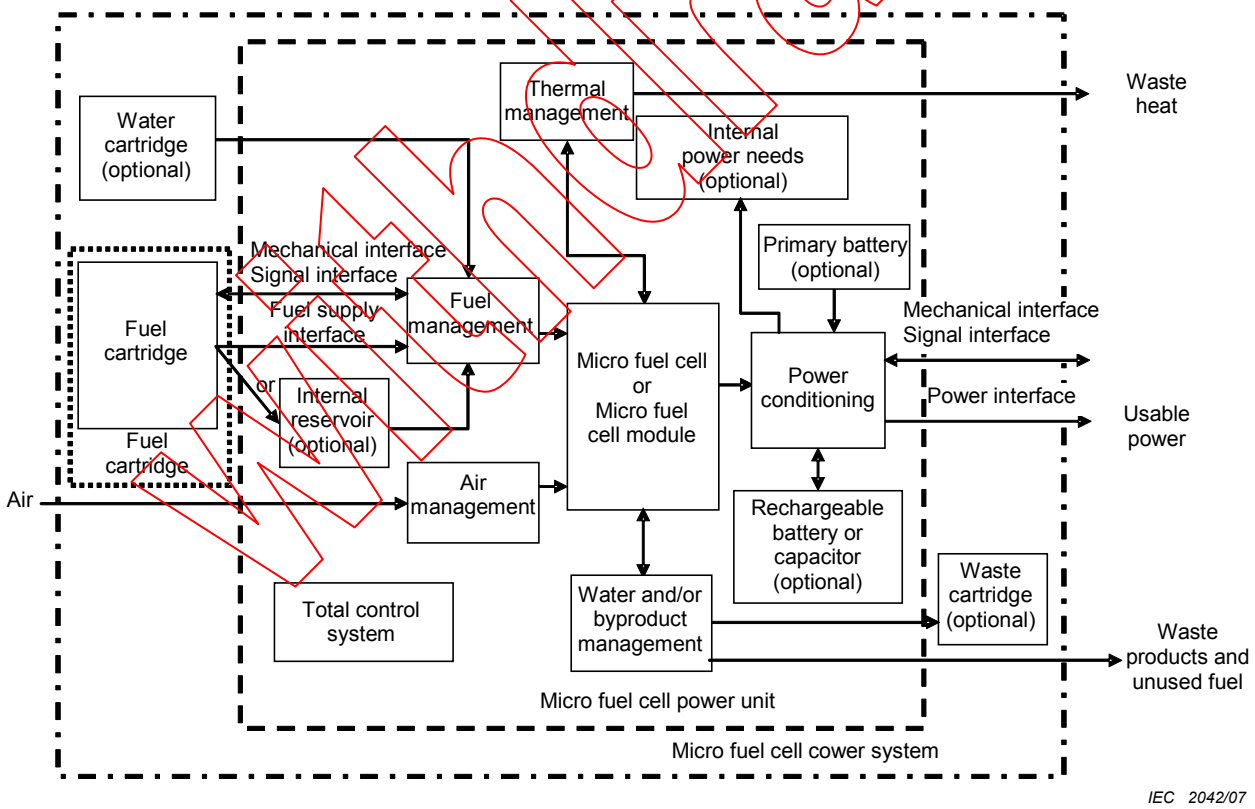

Figure 1 – Functional arrangement addressed in the scope of this standard

NOTE Dotted lines represent conceptual boundaries rather than physical ones.

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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 60051-1, *Direct acting indicating analogue electrical measuring instruments and their accessories – Part 1: Definitions and general requirements common to all parts*

IEC 60051-2, *Direct acting indicating analogue electrical measuring instruments and their accessories – Part 2: Special requirements for ammeters and voltmeters*

IEC 60068-2-6, *Environmental testing – Part 2: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60721-3-7, *Classification of environmental conditions – Part 3-7: Classification of groups of environmental parameters and their severities – Portable and non-stationary use*

ISO 4677-1, *Atmospheres for conditioning and testing – Determination of relative humidity – Part 1: Aspirated psychrometer method*

ISO 4677-2, *Atmospheres for conditioning and testing – Determination of relative humidity – Part 2: Whirling psychrometer method*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
fuel
methanol or methanol/water solution regardless of the concentration that is used to produce electricity in a micro fuel cell power unit

3.2
fuel cartridge
removable article that contains and supplies fuel to the micro fuel cell power unit, not to be refilled by the user

3.3
micro fuel cell power system
small DC power source providing electric power from a fuel cell that includes a fuel cartridge, provides not more than 60 Vd.c. output voltage and 240 W output power, and is connected to a hand-held or wearable electronic device such as a laptop computer, mobile phone, PDA, cordless home appliance, TV broadcast camera, autonomous robot, etc., by flexible cord(s) and plug arrangement or termination connectors integrated into the casing of the portable DC electric device

3.4
starting duration
duration of the time interval required for transitioning from the off state, where the system has been started and power interface circuit is electrically interrupted, to reach 90 % of rated voltage of the system after connection to the specified load

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4 General principles

4.1 Testing environment

Unless otherwise specified, performance shall be tested in a controlled environment as specified in this standard. The controlled ambient test conditions shall be as follows:

- Temperature: 22 °C ± 5 °C.
- Pressure: between 86 kPa and 106 kPa.
- Humidity: 60 % ± 20 % relative humidity.
- Volumetric oxygen concentration: 18 % ≤ O_2 ≤ 21 %.

Measurement shall be conducted in a space with no substantial air movement specified by the manufacturer.

4.2 Minimum required measurement accuracy

The measurement parameters and minimum measurement accuracies required as per this standard shall be as follows:

- Voltage: ±1 %.
- Current: ±1 %.
- Time: ±1 %.
- Weight: ±1 %.
- Temperature: ±2° C.
- Relative humidity: ±5 percentage points.
- Pressure: ±5 %.
- Vibration frequency: ±1 Hz (5 Hz < Frequency ≤ 50 Hz) or ±2 % (Frequency > 50 Hz).

4.3 Measuring instruments

4.3.1 General

The measuring instruments shall be selected in accordance with the required accuracies and the range of values to be measured. The instruments shall be calibrated regularly in order to maintain the levels of accuracy described in 4.2.

4.3.2 Voltage

The accuracy specified in 4.2 above shall be maintained. Analogue voltage measurement instruments shall be in compliance with IEC 60051-1 and IEC 60051-2.

4.3.3 Current

The accuracy specified in 4.2 above shall be maintained. Analogue current measurement instruments shall be in compliance with IEC 60051-1 and IEC 60051-2.

4.3.4 Time

Time measurement instruments shall have an accuracy margin of within ±1 s/h or better in order to maintain the measurement accuracy specified in 4.2 above.

4.3.5 Weight

Weight measurement shall be performed in accordance with the relevant government standard or the guideline of a relevant trade association or organization of each country.

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such is not available, an appropriate organization shall create one for the performance tests. Weight may be determined by calculations based on the measured volume and physical properties of the materials involved.

4.3.6 Temperature

Recommended instruments for direct measurements of ambient temperatures are:

a) thermocouples with transducer; or,

b) resistance thermometer with transducer.

Temperature sensors shall have appropriate accuracies.

4.3.7 Humidity

Refer to ISO 4677-1 and ISO 4677-2 for ambient humidity measurements.

4.3.8 Pressure

Pressure measurement shall be performed in accordance with the relevant government standard, industry guideline, or the guideline of the relevant organization of each country. If such is not available, a relevant organization shall create a pressure measurement standard or guideline for the performance tests.

4.3.9 Vibration frequency

Frequency measurement shall be referred to IEC 60068-2-6.

5 Tests

5.1 Test procedure

Each test shall be carried out on three (3) samples. The measurement shall be made at least once for each sample. Unless otherwise indicated, the data taken at the end of each measurement shall be used as a measured value. Measured values shall be averaged to produce an average measured value for each sample. The mean value of average measured values of the three samples shall be reported when a specific value is to be reported as the measured value for the test. The tests may be executed in series using one sample group or in parallel using different sample groups. Electrical measurements shall be taken at the power interface.

5.2 Power generation characteristics

5.2.1 Starting duration

a) The purpose of this test is to verify the starting duration of micro fuel cell power systems.

b) Samples shall be conditioned in the off state under the testing environment for a minimum of 2 h prior to the measurement. The time to reach 90 % of the rated voltage defined by the manufacturer shall be measured from the time when the power interface circuit is electrically connected to the constant resistance specified by the manufacturer. For micro fuel cell power systems with a starting duration of shorter than 100 ms, this test may be skipped.

5.2.2 Rated power test and rated voltage test

a) The purpose of this test is to verify the rated power and the rated voltage of micro fuel cell power systems.

b) Samples shall be conditioned in the off state under the testing environment for a minimum of 2 h prior to the measurement. A voltmeter and a constant power load shall be connected so as to draw the constant rated power (watts) in accordance with the

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