SLOVENSKI STANDARD
oSIST prEN IEC 62286-6-401:2022

01-julij-2022

Tehnologije gorivnih celic - 6-401. del: Elektroenergetski sistemi z mikro gorivnimi celicami - Izmenljivost moči in podatkov - Preskusne metode delovanja prenosnih računalnikov

Fuel cell technologies - Part 6-401: Micro fuel cell power systems - Power and data interchangeability - Performance test methods for laptop computers

Ta slovenski standard je istoveten z: **prEN IEC 62286-6-401:2022**

ICS:

27.070 Gorilne celice Fuel cells

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105/902/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:	
IEC 62282-6-401 ED1	
DATE OF CIRCULATION:	CLOSING DATE FOR VOTING:
2022-05-06	**2022-07-29**
SUPERSEDES DOCUMENTS:	
105/871/CD, 105/890A/CC	

IEC TC 105 : FUEL CELL TECHNOLOGIES

SECRETARIAT:	SECRETARY:
Germany	Mr David Urmann
OF INTEREST TO THE FOLLOWING COMMITTEES: TA 19	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY

☒ SUBMITTED FOR CENELEC PARALLEL VOTING ☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

Attention IEC-CENELEC parallel voting

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.

The CENELEC members are invited to vote through the CENELEC online voting system.

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Fuel cell technologies – Part 6-401: Micro fuel cell power systems – Power and data interchangeability – Performance test methods for laptop computers

PROPOSED STABILITY DATE: 2026

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FUEL CELL TECHNOLOGIES –

Part 6-401: Micro fuel cell power systems – Power and data Interchangeability – Performance test of fuel cell systems for laptop computer

FOREWORD

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International Standard IEC 62282-6-401 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/XX/FDIS	105/XX/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.

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

The committee has decided that the contents of this publication will remain unchanged until the stability 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.

The National Committees are requested to note that for this publication the stability date is ....

THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE PUBLICATION STAGE.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

FUEL CELL TECHNOLOGIES –

Part 6-401: Micro fuel cell power systems – Power and data Interchangeability - Performance test of fuel cell systems for laptop computer

1 Scope

This document covers the requirements for the performance test methods between micro fuel cell power systems and notebook powered systems with unassuming built-in battery powered systems

For this purpose, this document covers electrical performance test for the fuel cell/battery hybrid system. This document also covers performance test methods which focus on the power and data interchangeability with the micro fuel cell power system and laptop computer and other characteristics for BOP installed for laptop computer applications with fuel cell/battery hybrid system. For the power and data interchangeability with the micro fuel cell power system and laptop computer, this document applies to both gaseous hydrogen-fuelled fuel cell power, liquid hydrogen-fuelled fuel cell power, direct methanol fuel cell power and battery hybrid power pack systems.

The following fuels are considered within the scope of this standard:

– gaseous hydrogen, and

- methanol.

This document does not apply to reformer-equipped fuel cell power systems.

Block diagram of micro fuel cell power system is shown in Figure 1. This document covers configuration, the mode of hybridization, operation mode for fuel cell/battery power system

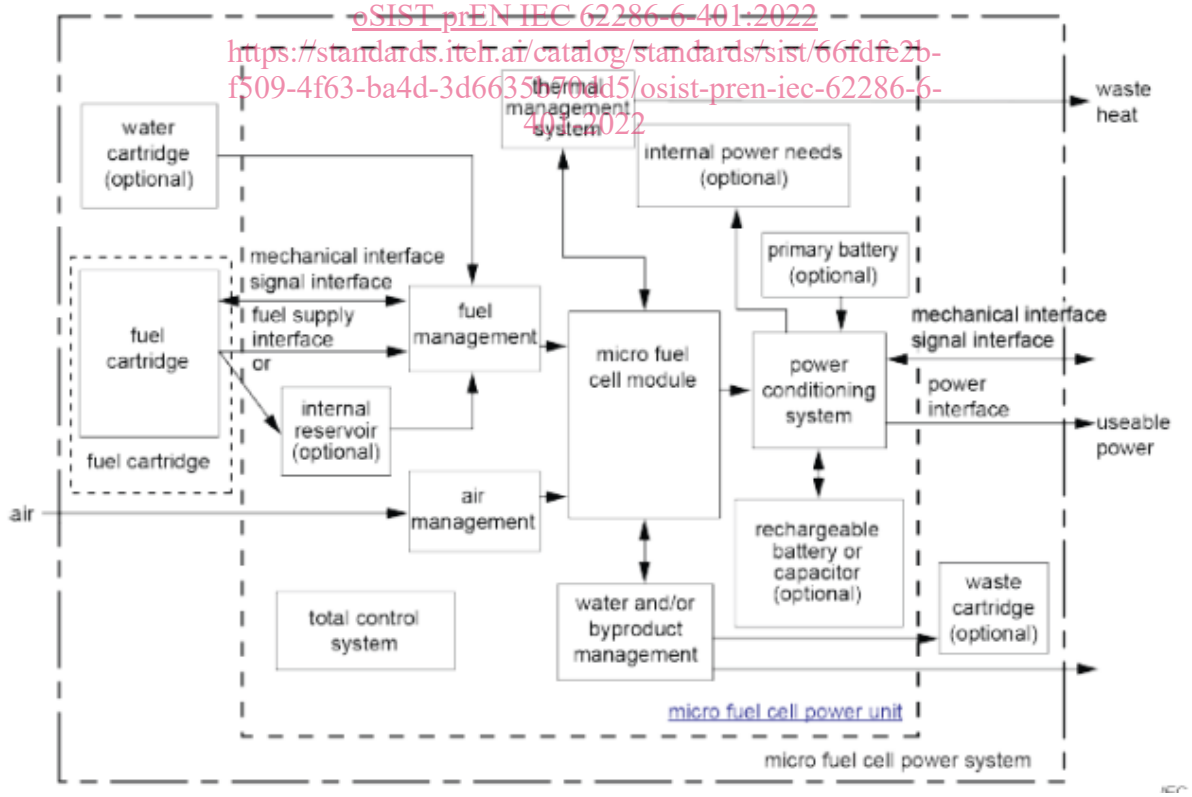

Figure 1 – Micro fuel cell power systems block diagram

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 TS 60050-485 International Electrotechnical Vocabulary (IEV) – Part 485: Fuel cell technologies
IEC 62282-3-201, Fuel cell technologies – Part 3-201: Small stationary fuel cell power systems – Performance test methods for small fuel cell power systems
IEC 62282-4-101, Fuel cell technologies – Part 4-101: Fuel cell power systems for propulsion other than road vehicles and auxiliary power units (APU)
IEC 62282-4-102, Fuel cell technologies – Part 4-102: Fuel cell power systems for industrial electric trucks-performance test methods
IEC 62282-1, Fuel cell technologies - Part 1: Terminology
IEC 62282-6-100, Fuel cell technologies –Part 6-100: Micro fuel cell power systems - safety
IEC 62282-6-200, Fuel cell technologies - Part 6-200: Micro fuel cell power systems - Performance test methods
IEC 62282-6-300- Fuel cell technologies - Part 6-300: Micro fuel cell power systems - Fuel cartridge interchangeability
IEC 62282-6-400, Fuel cell technologies - Part 6-400: Micro fuel cell power systems - Power and data interchangeability
IEC 61204
ISO 14687:2019, Hydrogen fuel quality — Product specification

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given IEC TS 60050-485 and the following apply.

Note to entry: ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1 fuel cell/battery hybrid system

fuel cell power system combined with a battery, for delivering useful electric power
Note 1 to entry: The fuel cell power system can deliver electric power, charge the battery, or both. The system can deliver and accept electric energy.

[Source: IEV 60050-485-09-18]

3.1.2 fuel cell power system

generator system that uses one or more fuel cell modules (IEV 485-09-03) to generate electric power and heat

[Source: IEV 60050-485-09-03]

3.1.3 micro fuel cell power system

micro fuel cell power unit and associated fuel cartridges that is wearable or easily carried out by hand.

3.1.4 DC output voltage

Output voltage that can be continuously supplied to the load side.

78 **3.1.5 DC output current**

79 Output current that can be continuously supplied to the load side.

80 **3.1.6 DC output power**

81 Output that can be continuously supplied to the load side. That is expressed as a product of
82 output voltage and output current.

83 **3.1.7 DC output plug**

84 Male DC power supply ~~connection~~ connector~~, DC power supply connector(male)~~

85 **3.1.8 DC output jack**

86 Male DC Power Connector
87

88 **3.1.9 secondary battery(secondary cell)**

89 cell which is designed to be electrically recharged
90
91 Note to entry: The recharge is accomplished by way of a reversible chemical reaction.
92 Secondary battery such as lithium-ion battery, metal-air battery, lead acid battery, nickel-metal
93 hydride battery, etc which are recharged by electric power from fuel cell and/or outside

94 [Source: IEV 482-01-03]

95 **3.1.10 power conditioning system**

96 electric or electronic system able to convert generated power in the requested output conditions.
97

98 **3.1.11 active hybrid system**

99 a hybrid system equipped with a DC/DC converter between the fuel cell and the battery,
100 adjusting the voltage of each power source to the bus voltage and managing the power sharing
101 between each power source.
102

103 **3.1.12 state of charge**

104 available capacity in a battery pack or system expressed as a percentage of rated capacity
105

106 **3.2 Abbreviations**

107

TERM	Definition
BMS	Battery management system
FMS	Fuel cell management system
BOP	Balance of plant
SOC	State of charge

108 # 4 General principles for measurements

109 ## 4.1 Test environments

110 Unless otherwise specified, performance shall be tested in the environment specified below:
111 The controlled ambient test conditions shall be as follows:

112 – temperature: 20 °C ± 5 °C;

113 – humidity: 65 % ± 20 % relative humidity;

114 – pressure: between 91 kPa (abs) and 106 kPa (abs).

115 For each test run, the laboratory conditions shall be measured. As air quality may affect fuel
116 cell power system performance, laboratory air composition (CO_2, CO, SO_2 and so forth) shall
117 be reported with the test result.

118

4.2 Measurement accuracy

4.2.1
The measurement parameters and minimum measurement accuracies shall be as follows:
- voltage: ±1 %;
- current: ±1 %;
- time: ±1 %;
- weight: ±1 %;
- temperature: ±2 °C;
- humidity: ±5 percentage points; • pressure: ±5 %;
- vibration frequency: ±1 Hz (5 Hz < frequency ≤ 50 Hz) or ±2 % (frequency > 50 Hz);
- volume: ±2 %.

4.2.2 Minimum required measurement systematic uncertainty

4.5.1 Minimum required accuracy

Test equipment should be chosen in a way that the systematic uncertainty of measurement is below ±1 % system except ±5 of relative humidity for electrical efficiency.

In order to reach the desired efficiency uncertainties, the following systematic measurement uncertainties of the equipment are recommended. They are given in percentage of measured/calculated values or as absolute values:

– electric power: ±1 %;
– electric energy: ±1 %;
– fuel gas flow rate: ±1 %;
– integrated gas flow: ±1 %;
– liquid flow rate: ±1 %;
– mass: ±1 % of the mass to be determined (not including the tare weight);
– relative humidity: ±5 %;
– absolute pressure: ±1 %;
– fuel gas and discharge water temperature: ±1 K;

4.3 Measuring instruments

4.3.1 General

Measurement instruments and measurement methods shall conform to the relevant international standards. They shall be selected to meet the measurement range specified by the manufacturer and the required accuracy of measurements

Measuring instruments are listed according to their intended use:
a) apparatus for measuring the electric power output, electric power input, electric energy input, and electric energy output:
   – electric power meters, electric energy meters, voltmeters, ammeters;
   – for systems that include batteries, a high-speed voltage recorder such as an oscilloscope is required for measuring the increase rate of electric power because the rate is extremely rapid in general (in the order of milliseconds).
b) apparatus for measuring fuel input:
   – flowmeters, integrating flowmeters, scales, pressure sensors, temperature sensors;
c) apparatus for measuring ambient conditions:
   – barometers, hygrometers, and temperature sensors;
d) apparatus for measuring the noise level:
   – sound level meters as specified in IEC 61672-1 or other measuring instruments of equivalent or better accuracy;

   The settings of the measuring instruments ~~are as follows~~:
   – frequency-weighted characteristic: A;
   – time-weighted characteristic: S;
   – unit: dB (for characteristic A, the display of the frequency-weighted characteristic may be omitted);