

INTERNATIONAL STANDARD

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Fuel cell technologies –

Part 3-201: Stationary fuel cell power systems – Performance test methods for small fuel cell power systems

Technologies des piles à combustible –

Partie 3-201: Systèmes à piles à combustible stationnaires – Méthodes d'essai des performances pour petits systèmes à piles à combustible



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CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	8
3 Terms and definitions	9
4 Symbols	13
5 Configuration of small stationary fuel cell power system and test boundary	16
6 Reference conditions.....	16
7 Heating value base	17
8 Test preparation	17
8.1 General	17
8.2 Uncertainty analysis	17
8.3 Data acquisition plan.....	17
9 Test set-up	18
10 Instruments and measurement methods	19
10.1 General	19
10.2 Measurement instruments	19
10.3 Measurement points	20
10.4 Minimum required measurement systematic uncertainty	22
11 Test conditions	22
11.1 Laboratory conditions	22
11.2 Installation and operating conditions of the system	22
11.3 Power source conditions	23
11.4 Test fuel	23
12 Operating process	23
13 Test plan	25
14 Type tests on electric/thermal performance	25
14.1 General	25
14.2 Fuel consumption test	26
14.2.1 Gaseous fuel consumption test.....	26
14.2.2 Liquid fuel consumption test	28
14.3 Electric power output test	29
14.3.1 General	29
14.3.2 Test method	29
14.3.3 Calculation of average net electric power output.....	30
14.4 Heat recovery test	30
14.4.1 General	30
14.4.2 Test method	30
14.4.3 Calculation of average recovered thermal power	30
14.5 Start-up test	32
14.5.1 General	32
14.5.2 Determination of state of charge of battery	32
14.5.3 Test method	32
14.5.4 Calculation of results	34
14.6 Storage state test.....	36

14.6.1	General	36
14.6.2	Test method	37
14.6.3	Calculation of average electric power input in storage state	37
14.7	Electric power output change test	37
14.7.1	General	37
14.7.2	Test method	37
14.7.3	Calculation of electric power output change rate	39
14.8	Shutdown test	39
14.8.1	General	39
14.8.2	Test method	40
14.8.3	Calculation of results	40
14.9	Computation of efficiency	41
14.9.1	General	41
14.9.2	Electric efficiency	41
14.9.3	Heat recovery efficiency	42
14.9.4	Overall energy efficiency	42
15	Type tests on environmental performance	42
15.1	General	42
15.2	Noise test	42
15.2.1	General	42
15.2.2	Test conditions	43
15.2.3	Test method	44
15.2.4	Processing of data	44
15.3	Exhaust gas test	44
15.3.1	General	44
15.3.2	Components to be measured	44
15.3.3	Test method	45
15.3.4	Processing of data	45
15.4	Discharge water test	50
15.4.1	General	50
15.4.2	Test method	50
16	Test reports	51
16.1	General	51
16.2	Title page	51
16.3	Table of contents	51
16.4	Summary report	51
Annex A (informative)	Heating values for components of natural gases	52
Annex B (informative)	Examples of composition for natural gases	54
Annex C (informative)	Exemplary test operation schedule	56
Annex D (informative)	Typical exhaust gas components	57
Annex E (informative)	Guidelines for the contents of detailed and full reports	58
Bibliography		59
Figure 1	– Symbol diagram	15
Figure 2	– General configuration of small stationary fuel cell power system	16
Figure 3	– Small stationary fuel cell power system fed with gaseous fuel	18
Figure 4	– Small stationary fuel cell system fed with gaseous fuel, air cooled and no valorization of the by-product heat	19

Figure 5 – Operating states of stationary fuel cell power system without battery	24
Figure 6 – Operating states of stationary fuel cell power system with battery	25
Figure 7 – Example of electric power chart at start-up for system without battery.....	33
Figure 8 – Example of electric power chart at start-up for system with battery.....	34
Figure 9 – Examples of liquid fuel supply systems	35
Figure 10 – Electric power output change pattern for system without battery	38
Figure 11 – Electric power output change pattern for system with battery	38
Figure 12 – Example for electric power change stabilization criteria.....	39
Figure 13 – Electric power chart at shutdown.....	40
Figure 14 – Noise measurement points for small stationary fuel cell power systems	43
Table 1 – Symbols and their meanings for electric/thermal performance	13
Table 2 – Symbols and their meanings for environmental performance	15
Table 3 – Compensation of readings against the effect of background noise.....	43
Table A.1 – Heating values for components of natural gases at various combustion reference conditions for ideal gas.....	52
Table B.1 – Example of composition for natural gas (%)	54
Table B.2 – Example of composition for propane gas (%)	55
Table C.1 – Exemplary test operation schedule	56
Table D.1 – Typical exhaust gas components to be expected for typical fuels.....	57

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FUEL CELL TECHNOLOGIES –

**Part 3-201: Stationary fuel cell power systems –
Performance test methods for small fuel cell power systems**

FOREWORD

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International Standard IEC 62282-3-201 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
105/444/FDIS	105/454/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 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 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.

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INTRODUCTION

This part of IEC 62282 provides consistent and repeatable test methods for the electric/thermal and environmental performance of small stationary fuel cell power systems.

This international standard limits its scope to small (below 10 kW electric power output) stationary fuel cell power systems and provides test methods specifically designed for them in detail. It is based on IEC 62282-3-200, that generally describes performance test methods that are common to all types of fuel cells.

This standard describes type tests and their test methods only. No routine tests are required or identified, and no performance targets are set in this standard.

This standard is to be used by manufacturers of small stationary fuel cell power systems and/or those who evaluate the performance of their systems for certification purposes.

Users of this standard may selectively execute test items that are suitable for their purposes from those described in this standard. This standard is not intended to exclude any other methods.

FUEL CELL TECHNOLOGIES –

Part 3-201: Stationary fuel cell power systems – Performance test methods for small fuel cell power systems

1 Scope

This part of IEC 62282 provides test methods for the electric/thermal and environmental performance of small stationary fuel cell power systems that meet the following criteria:

- output: nominal electric power output of less than 10 kW;
- output mode: grid-connected/independent operation or stand-alone operation with single-phase AC output or 3-phase AC output not exceeding 1 000 V, or DC output not exceeding 1 500 V;

NOTE The limit to 1 000 V comes from the definition for "low voltage" given in IEC 601-01-26.

- operating pressure: maximum allowable working pressure of less than 0,1 MPa (gauge) for the fuel and oxidant passages;
- fuel: gaseous fuel (natural gas, liquefied petroleum gas, propane, butane, hydrogen, etc.) or liquid fuel (kerosene, methanol, etc.);
- oxidant: air.

This standard covers fuel cell power systems whose primary purpose is the production of electric power and whose secondary purpose may be the utilization of by-product heat. Accordingly, fuel cell power systems for which the use of heat is primary and the use of by-product electric power is secondary are outside the scope of this standard.

All systems with integrated batteries are covered by this standard. This includes systems where batteries are recharged internally or recharged from an external source.

This standard does not cover additional auxiliary heat generators that produce thermal energy.

2 Normative references

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

IEC 61672-1, *Electroacoustics – Sound level meters – Part 1: Specifications*

IEC 62282-3-200, *Fuel cell technologies – Part 3-200: Stationary fuel cell power systems – Performance test methods*

ISO 5815 (all parts), *Water quality – Determination of biochemical oxygen demand after n days (BOD_n)*

ISO 6060, *Water quality – Determination of the chemical oxygen demand*

ISO 6798, *Reciprocating internal combustion engines – Measurement of emitted airborne noise – Engineering method and survey method*

ISO 9000, *Quality management systems – Fundamentals and vocabulary*

ISO 10523, *Water quality – Determination of pH*

ASTM F2602, *Standard Test Method for Determining the Molar Mass of Chitosan and Chitosan Salts by Size Exclusion Chromatography with Multi-angle Light Scattering Detection (SEC MALS)*

3 Terms and definitions

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

3.1

noise level

sound pressure level produced by the fuel cell power system measured at a specified distance in all operation modes

Note 1 to entry: Expressed as decibels (dB) and measured as described in 15.2.

3.2

background noise level

sound pressure level of ambient noise at the measurement point

Note 1 to entry: This measurement is taken as described in 15.2 with the fuel cell power system in the cold state.

3.3

battery

electrochemical energy storage device that provides energy input to support parasitic loads and/or provides electric energy output

Note 1 to entry: Back-up batteries for control software memory and similar applications are not included.

3.4

cold state

condition of a fuel cell power system at ambient temperature with no power input or output, ready for start-up

[SOURCE: IEC/TS 62282-1:2010, definition 3.110.1, modified – addition of "ready for start-up"]

3.5

discharge rate

mass of discharged exhaust gas component per unit of time

3.6

discharge water

water that is discharged from the fuel cell power system

Note 1 to entry: Discharge water does not constitute part of a thermal recovery system.

3.7

electric efficiency

ratio of the average net electric power output of a fuel cell power system at a given duration to the average fuel power fed to the same fuel cell power system at the same duration

[SOURCE: IEC/TS 62282-1:2010, definition 3.30.1 modified – original definition has been modified and the NOTE dropped]