

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**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 .....	6
INTRODUCTION .....	8
INTRODUCTION to Amendment 1 .....	8
1 Scope .....	9
2 Normative references .....	9
3 Terms and definitions .....	10
4 Symbols .....	15
5 Configuration of small stationary fuel cell power system .....	20
6 Reference conditions .....	20
7 Heating value base .....	20
8 Test preparation .....	21
8.1 General .....	21
8.2 Uncertainty analysis .....	21
8.3 Data acquisition plan .....	21
9 Test set-up .....	21
10 Instruments and measurement methods .....	23
10.1 General .....	23
10.2 Measurement instruments .....	24
10.3 Measurement points .....	24
10.4 Minimum required measurement systematic uncertainty .....	26
11 Test conditions .....	26
11.1 Laboratory conditions .....	26
11.2 Installation and operating conditions of the system .....	27
11.3 Power source conditions .....	27
11.4 Test fuel .....	27
12 Operating process .....	27
13 Test plan .....	29
14 Type tests on electrical and thermal performance .....	30
14.1 General .....	30
14.2 Fuel consumption test .....	30
14.2.1 Gaseous fuel consumption test .....	30
14.2.2 Liquid fuel consumption test .....	33
14.3 Electric power output test .....	34
14.3.1 General .....	34
14.3.2 Test method .....	34
14.3.3 Calculation of average net electric power output .....	34
14.4 Heat recovery test .....	34
14.4.1 General .....	34
14.4.2 Test method .....	35
14.4.3 Calculation of average recovered thermal power .....	35
14.5 Start-up test .....	36
14.5.1 General .....	36
14.5.2 Determination of state of charge of the battery .....	36
14.5.3 Test method .....	37

14.5.4	Calculation of results .....	39
14.6	Ramp-up test .....	40
14.6.1	General .....	40
14.6.2	Test method .....	41
14.6.3	Calculation of results .....	41
14.7	Storage state test .....	42
14.7.1	General .....	42
14.7.2	Test method .....	42
14.7.3	Calculation of average electric power input in storage state .....	42
14.8	Electric power output change test .....	42
14.8.1	General .....	42
14.8.2	Test method .....	42
14.8.3	Calculation of electric power output change rate .....	44
14.9	Shutdown test .....	45
14.9.1	General .....	45
14.9.2	Test method .....	45
14.9.3	Calculation of results .....	46
14.10	Computation of efficiency .....	47
14.10.1	General .....	47
14.10.2	Electrical efficiency .....	47
14.10.3	Heat recovery efficiency .....	47
14.10.4	Overall energy efficiency .....	48
14.11	Rated operation cycle efficiency .....	48
14.11.1	General .....	48
14.11.2	Calculation of the operation cycle fuel energy input .....	48
14.11.3	Calculation of the operation cycle net electric energy output .....	49
14.11.4	Calculation of the operation cycle electrical efficiency .....	50
14.12	Electromagnetic compatibility (EMC) test .....	50
14.12.1	General requirement .....	50
14.12.2	Electrostatic discharge immunity test .....	51
14.12.3	Radiated, radio-frequency, electromagnetic field immunity test .....	51
14.12.4	Electrical fast transient/burst immunity test .....	51
14.12.5	Surge immunity test .....	51
14.12.6	Immunity test of conducted disturbances induced by radio-frequency fields .....	51
14.12.7	Power frequency magnetic field immunity test .....	51
14.12.8	Voltage dips and voltage interruptions .....	51
14.12.9	Radiated disturbance (emission) measurement test .....	52
14.12.10	Conducted disturbance (emission) measurement test .....	52
14.12.11	Power line harmonics emission measurement test .....	52
14.13	Estimation of electric and heat recovery efficiency up to ten years of operation .....	52
14.13.1	General .....	52
14.13.2	Test method .....	53
14.13.3	Calculation of estimated electric efficiency .....	54
14.13.4	Calculation of estimated heat recovery efficiency .....	56
14.14	Electric demand-following test .....	56
14.14.1	General .....	56
14.14.2	Electric demand profile .....	56

14.14.3	Test method .....	57
14.14.4	Calculation of results .....	58
14.14.5	Calculation of efficiencies .....	59
15	Type tests on environmental performance .....	59
15.1	General.....	59
15.2	Noise test .....	59
15.2.1	General .....	59
15.2.2	Test conditions .....	59
15.2.3	Test method .....	60
15.2.4	Processing of data.....	61
15.3	Exhaust gas test .....	61
15.3.1	General .....	61
15.3.2	Components to be measured .....	61
15.3.3	Test method .....	61
15.3.4	Processing of data.....	62
15.4	Discharge water test .....	71
15.4.1	General .....	71
15.4.2	Test method .....	71
16	Test reports .....	72
16.1	General.....	72
16.2	Title page.....	72
16.3	Table of contents .....	72
16.4	Summary report .....	72
Annex A	(normative) Heating values for components of natural gases .....	74
Annex B	(informative) Examples of composition for natural gases and propane gases .....	76
Annex C	(informative) Example of a test operation schedule .....	78
Annex D	(informative) Typical exhaust gas components.....	79
Annex E	(informative) Guidelines for the contents of detailed and full reports .....	80
E.1	General.....	80
E.2	Detailed report .....	80
E.3	Full report .....	80
Annex F	(informative) Selected duration of rated power operation .....	81
Bibliography	.....	82
Figure 1	– Symbol diagram .....	18
Figure 2	– General configuration of small stationary fuel cell power system .....	20
Figure 3	– Test set-up for small stationary fuel cell power system fed with gaseous fuel which supplies electricity and useful heat.....	22
Figure 4	– Test set-up for small stationary fuel cell power system fed with gaseous fuel which supplies only electricity .....	23
Figure 5	– Operating states of stationary fuel cell power system without battery .....	28
Figure 6	– Operating states of stationary fuel cell power system with battery .....	29
Figure 7	– Example of electric power chart during start-up time for system without battery .....	37
Figure 8	– Example of electric power chart during start-up time for system with battery .....	38
Figure 9	– Example of liquid fuel supply systems .....	39
Figure 10	– Example of electric power chart during ramp-up for system without battery .....	41

Figure 11 – Electric power output change pattern for system without battery .....	43
Figure 12 – Electric power output change pattern for system with battery .....	44
Figure 13 – Example for electric power change stabilization criteria.....	44
Figure 14 – Electric power chart during shutdown time .....	46
Figure 16 – Example of electric efficiency during ten years of operation .....	53
Figure 17 – Example of the electric demand of a residential application.....	57
Figure 15 – Noise measurement points for small stationary fuel cell power systems .....	60
Table 1 – Symbols and their meanings for electric and thermal performance .....	15
Table 2 – Additional symbols and their meanings for environmental performance .....	3
Table 3 – Compensation of readings against the effect of background noise.....	60
Table A.1 – Heating values for components of natural gases at various combustion reference conditions for ideal gas .....	74
Table B.1 – Example of composition for natural gas (%) .....	76
Table B.2 – Example of composition for propane gas (%) .....	77
Table C.1 – Example of a test operation schedule .....	78
Table D.1 – Typical exhaust gas components to be expected for typical fuels .....	79
Table F.1 – Selected duration of rated power operation .....	81

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### FUEL CELL TECHNOLOGIES –

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

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**IEC 62282-3-201 edition 2.1 contains the second edition (2017-08) [documents 105/64/CDV and 105/623/RVC] and its amendment 1 (2022-02) [documents 105/839/CDV and 105/866/RVC].**

**In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.**

International Standard IEC 62282-3-201 has been prepared by IEC technical committee 105: Fuel cell technologies.

This second edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) Revision of definitions
- b) Revision of symbols (Clause 4, in accordance with ISO/IEC 80000 series and ISO/IEC Directives Part 2);
- c) Revision of Figures 2, 5 and 6;
- d) Revision of test set-up (Clause 9);
- e) Revision of measurement instruments (Clause 10);
- f) Introduction of ramp-up test (14.6);
- g) Introduction of rated operation cycle efficiency (14.11);
- h) Introduction of electromagnetic compatibility (EMC) test (14.12);
- i) Revision of exhaust gas test (15.3);
- j) Introduction of typical durations of operation cycles (Annex F).

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

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

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site under [webstore.iec.ch](http://webstore.iec.ch) in the data related to the specific publication. At this date, the publication will be

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## INTRODUCTION

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

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

This document is intended for manufacturers of small stationary fuel cell power systems and/or those who evaluate the performance of their systems for certification purposes.

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

### INTRODUCTION to Amendment 1

This amendment to IEC 62282-3-201:2017 provides a method of estimating the electric and heat recovery efficiency of small stationary fuel cell power systems for a duration of up to ten years of operation. Furthermore, this amendment to IEC 62282-3-201:2017 provides an evaluation method for electric demand-following small stationary fuel cell power systems, which are operating at changing levels of power output. It has been developed as a reference for the life cycle assessment calculations in IEC TS 62282-9-101.

## 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 electrical, thermal and environmental performance of small stationary fuel cell power systems that meet the following criteria:

- output: rated 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 of 1 000 V for alternating current comes from the definition for "low voltage" given in IEC 60050-601:1985, 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 document describes type tests and their test methods only. No routine tests are required or identified, and no performance targets are set in this document.

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

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

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

#### 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.

CISPR 11, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*

IEC 61000-3-2, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current  $\leq 16$  A per phase)*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*