

# 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**



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2022 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Secretariat  
3, rue de Varembé  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

#### IEC publications search - [webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [sales@iec.ch](mailto:sales@iec.ch).

#### IEC Products & Services Portal - [products.iec.ch](http://products.iec.ch)

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

### A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

### A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

#### Recherche de publications IEC -

[webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, ...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

#### Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [sales@iec.ch](mailto:sales@iec.ch).

#### IEC Products & Services Portal - [products.iec.ch](http://products.iec.ch)

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 300 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 19 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.



IEC 62282-3-201

Edition 2.1 2022-02  
CONSOLIDATED VERSION

# 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**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 27.070

ISBN 978-2-8322-5292-5

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**



## REDLINE VERSION

## VERSION REDLINE



**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**

## 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 electric 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 .....	18
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

ITih STANDARD PREVIEW  
(standards.iteh.ai)

[IEC 62282-3-201:2017](https://standards.iteh.ai/catalog/standards/sist/1cac4eac-9acc-4c71-987c-5fbd9f04fda7/iec-62282-3-201-2017)

<https://standards.iteh.ai/catalog/standards/sist/1cac4eac-9acc-4c71-987c-5fbd9f04fda7/iec-62282-3-201-2017>

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### FUEL CELL TECHNOLOGIES –

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

#### FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

**This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.**

**IEC 62282-3-201 edition 2.1 contains the second edition (2017-08) [documents 105/564/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

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

**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.**

## 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.

[IEC 62282-3-201:2017](https://standards.iteh.ai/catalog/standards/sist/1cac4eac-9acc-4c71-987c-5fbd9f04fda7/iec-62282-3-201-2017)

<https://standards.iteh.ai/catalog/standards/sist/1cac4eac-9acc-4c71-987c-5fbd9f04fda7/iec-62282-3-201-2017>

## 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*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

IEC 61000-4-11, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

IEC 61000-6-1:2005, *Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity for residential, commercial and light-industrial environments*

IEC 62282-3-200:2015, *Fuel cell technologies – Part 3-200: Stationary fuel cell power systems – Performance test methods*

### 3 Terms and definitions

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

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

##### **noise level**

sound pressure level produced by the fuel cell power system

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 auxiliary machines and equipment necessary to operate the fuel cell power system 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**

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

[SOURCE: IEC TS 62282-1:2013, 3.110.1, modified — "ready for start-up" added.]

### 3.5

#### **mass 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 including waste water and condensate

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

[SOURCE: IEC TS 62282-1:2013, 2.2, modified — Note 1 to entry added.]

### 3.7

#### **electrical efficiency**

ratio of the average net electric power output produced by a fuel cell power system to the average fuel power input supplied to the fuel cell power system

Note 1 to entry: Lower heating value (LHV) is assumed unless otherwise stated

[SOURCE: IEC TS 62282-1:2013, 3.30.1, modified — "average" added to "net electric power output"; "average fuel power input" instead of "total enthalpy flow".]

### 3.8

#### **electric energy input**

integrated value of electric power input at the electric input terminal

### 3.9

#### **electric energy output**

integrated value of electric power output at the electric output terminal

### 3.10

#### **electric power input**

electric power input at the electric input terminal of the fuel cell power system

### 3.11

#### **electric power output**

electric power output at the electric output terminal of the fuel cell power system

### 3.12

#### **fuel cell power system**

generator system that uses one or more fuel cell module(s) to generate electric power and heat

[SOURCE: IEC TS 62282-1:2013, 3.49, modified — Note 1 to entry deleted.]

### 3.13

#### **fuel input**

amount of natural gas, hydrogen, methanol, liquid petroleum gas, propane, butane, or other material containing chemical energy entering the fuel cell power system while it is working at the specified operating conditions

### 3.14

#### **fuel power input**

fuel energy input per unit of time