

STN	Technológia palivových článkov Časť 3-201: Malé stacionárne výkonové systémy palivových článkov Prevádzkové skúšobné metódy	STN EN 62282-3-201 36 4512
------------	--	--

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

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 07/18

Obsahuje: EN 62282-3-201:2017, IEC 62282-3-201:2017

Oznámením tejto normy sa od 14.09.2020 ruší
STN EN 62282-3-201 (36 4512) z apríla 2014

126555

EUROPEAN STANDARD

EN 62282-3-201

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2017

ICS 27.070

Supersedes EN 62282-3-201:2013

English Version

**Fuel cell technologies - Part 3-201: Stationary fuel cell power systems - Performance test methods for small fuel cell power systems
(IEC 62282-3-201:2017)**

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
(IEC 62282-3-201:2017)

Brennstoffzellentechnologien - Teil 3-201: Stationäre
Brennstoffzellen-Energiesysteme -
Leistungskennwerteprüfverfahren für kleine
Brennstoffzellen-Energiesysteme
(IEC 62282-3-201:2017)

This European Standard was approved by CENELEC on 2017-09-14. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

EN 62282-3-201:2017**European foreword**

The text of document 105/564/CDV, future edition 2 of IEC 62282-3-201, prepared by IEC TC 105 "Fuel cell technologies" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62282-3-201:2017.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2018-06-14
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2020-09-14

This document supersedes EN 62282-3-201:2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 62282-3-201:2017 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61672-1	NOTE	Harmonized as EN 61672-1.
IEC 61672-2	NOTE	Harmonized as EN 61672-2.
ISO 6060	NOTE	Harmonized as EN ISO 6060.
ISO 6326 (Series)	NOTE	Harmonized as EN ISO 6326 (Series).
ISO 6974 (Series)	NOTE	Harmonized as EN ISO 6974 (Series).
ISO 6975	NOTE	Harmonized as EN ISO 6975.
ISO 6976	NOTE	Harmonized as EN ISO 6976.
ISO 7941	NOTE	Harmonized as EN 27941.
ISO 9000	NOTE	Harmonized as EN ISO 9000.
ISO 10523	NOTE	Harmonized as EN ISO 10523.
ISO 80000 (Series)	NOTE	Harmonized as EN ISO 80000 (Series).
ISO 11541	NOTE	Harmonized as EN ISO 11541.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here:

www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61000-3-2	-	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current \leq 16 A per phase)	EN 61000-3-2	-
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	EN 61000-4-4	-
IEC 61000-4-5	-	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5	-
IEC 61000-4-6	-	Electromagnetic compatibility (EMC) -- Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6	-
IEC 61000-4-8	-	Electromagnetic compatibility (EMC) -- Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test	EN 61000-4-8	-
IEC 61000-4-11	-	Electromagnetic compatibility (EMC) -- Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	EN 61000-4-11	-
IEC 61000-6-2	2005	Electromagnetic compatibility (EMC) -- Part 6-2: Generic standards - Immunity for industrial environments	EN 61000-6-2	2005
-	-		+ corrigendum Sep.	2005
IEC 62282-3-200	2015	Fuel cell technologies - Part 3-200: Stationary fuel cell power systems - Performance test methods	EN 62282-3-200	2016
CISPR 11	-	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement	EN 55011	-



IEC 62282-3-201

Edition 2.0 2017-08

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 © 2017 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 Central Office
 3, rue de Varembe
 CH-1211 Geneva 20
 Switzerland

Tel.: +41 22 919 02 11
 Fax: +41 22 919 03 00
info@iec.ch
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 corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

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

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

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - 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: csc@iec.ch.

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.

Catalogue IEC - webstore.iec.ch/catalogue

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - www.iec.ch/searchpub

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

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

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

65 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.



IEC 62282-3-201

Edition 2.0 2017-08

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 978-2-8322-4632-0

**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.**

CONTENTS

FOREWORD.....	6
INTRODUCTION.....	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.....	19
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/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
15	Type tests on environmental performance	52
15.1	General	52
15.2	Noise test	52
15.2.1	General	52
15.2.2	Test conditions	52
15.2.3	Test method	54
15.2.4	Processing of data	54
15.3	Exhaust gas test	54
15.3.1	General	54
15.3.2	Components to be measured	54

15.3.3	Test method	55
15.3.4	Processing of data	55
15.4	Discharge water test	65
15.4.1	General	65
15.4.2	Test method	65
16	Test reports	65
16.1	General.....	65
16.2	Title page.....	65
16.3	Table of contents	66
16.4	Summary report	66
Annex A (normative)	Heating values for components of natural gases	67
Annex B (informative)	Examples of composition for natural gases and propane gases	69
Annex C (informative)	Example of a test operation schedule	71
Annex D (informative)	Typical exhaust gas components.....	72
Annex E (informative)	Guidelines for the contents of detailed and full reports	73
E.1	General.....	73
E.2	Detailed report	73
E.3	Full report	73
Annex F (informative)	Selected duration of rated power operation	74
Bibliography	75
Figure 1	– Symbol diagram	17
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 15	– Noise measurement points for small stationary fuel cell power systems	53
Table 1	– Symbols and their meanings for electric/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.....	53
Table A.1	– Heating values for components of natural gases at various combustion reference conditions for ideal gas	67
Table B.1	– Example of composition for natural gas (%)	69

Table B.2 – Example of composition for propane gas (%)	70
Table C.1 – Example of a test operation schedule	71
Table D.1 – Typical exhaust gas components to be expected for typical fuels	72
Table F.1 – Selected duration of rated power operation	74

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.

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

This second edition cancels and replaces the first edition published in 2013. This 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).

The text of this International Standard is based on the following documents:

CDV	Report on voting
105/564/CDV	105/623/RVC

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

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 this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document 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.

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 ≤ 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*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN
