SVENSK STANDARD SS-EN 62282-3-200

Fastställd	Utgåva	Sida	Ansvarig kommitté
2016-06-29	2	1 (1+76)	SEK TK 105

Bränsleceller – Del 3-200: Stationära system – Bestämning av prestanda

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

Som svensk standard gäller europastandarden EN 62282-3-200:2016. Den svenska standarden innehåller den officiella engelska språkversionen av EN 62282-3-200:2016.

Nationellt förord

Europastandarden EN 62282-3-200:2016

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 62282-3-200, Second edition, 2015 - Fuel cell technologies - Part 3-200: Stationary fuel cell power systems - Performance test methods**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 62282-3-200, utgåva 1, 2012, gäller ej fr o m 2018-12-24.

ICS 27.070.00

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 62282-3-200

March 2016

ICS 27.070

Supersedes EN 62282-3-200:2012

English Version

Fuel cell technologies - Part 3-200: Stationary fuel cell power systems - Performance test methods (IEC 62282-3-200:2015)

Technologies des piles à combustible - Partie 3-200: Systèmes à piles à combustible stationnaires - Méthodes d'essai des performances (IEC 62282-3-200:2015)

Brennstoffzellentechnologien - Teil 3-200: Stationäre Brennstoffzellen-Energiesysteme - Leistungskennwerteprüfverfahren (IEC 62282-3-200:2015)

This European Standard was approved by CENELEC on 2015-12-24. 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, 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

Ref. No. EN 62282-3-200:2016 E

SEK Svensk Elstandard

European foreword

The text of document 105/547/FDIS, future edition 2 of IEC 62282-3-200, prepared by IEC TC 105 "Fuel cell technologies" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62282-3-200:2016.

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)	2016-09-24
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2018-12-24

This document supersedes EN 62282-3-200:2012.

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

Endorsement notice

The text of the International Standard IEC 62282-3-200:2015 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:

ISO 9000	NOTE	Harmonized as EN ISO 9000.
ISO 6976:1995	NOTE	Harmonized as EN ISO 6976:2005.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

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.

Publication	Year	Title	EN/HD	Year
IEC 60051	series	Direct acting indicating analogue electrical measuring instruments and their accessories	EN 60051	series
IEC 60359	-	Electrical and electronic measurement equipment - Expression of performance	EN 60359	-
IEC 60688	-	Electrical measuring transducers for converting A.C. and D.C. electrical quantities to analogue or digital signals	EN 60688	-
IEC 61000-4-7	-	Electromagnetic compatibility (EMC) -- Part 4-7: Testing and measurement techniques - General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto	EN 61000-4-7	-
IEC 61000-4-13	-	Electromagnetic compatibility (EMC) -- Part 4-13: Testing and measurement techniques - Harmonics and interharmonics including mains signaling at a.c. power port, low frequency immunity tests	EN 61000-4-13	-
IEC 61028	-	Electrical measuring instruments - X-Y recorders	EN 61028	-
IEC 61143	series	Electrical measuring instruments - X-t recorders	EN 61143	series
IEC 61672-1	-	Electroacoustics - Sound level meters -- Part 1: Specifications	EN 61672-1	-
IEC 61672-2	-	Electroacoustics - Sound level meters -- Part 2: Pattern evaluation tests	EN 61672-2	-
IEC 62052-11	-	Electricity metering equipment (AC) - General requirements, tests and test conditions -- Part 11: Metering equipment	EN 50470-1	-
IEC 62053-22	-	Electricity metering equipment (a.c.) - Particular requirements -- Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)	EN 62053-22	-
IEC 62282-3-201	-	Fuel cell technologies -- Part 3-201: Stationary fuel cell power systems -- Performance test methods for small fuel cell power systems	EN 62282-3-201	-
ISO 3648	-	Aviation fuels - Estimation of net specific energy	-	-

ISO 3744	-	Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane	EN ISO 3744	-
ISO 4677-1	-	Atmospheres for conditioning and testing; Determination of relative humidity; Part 1 : Aspirated psychrometer method	-	-
ISO 4677-2	-	Atmospheres for conditioning and testing; Determination of relative humidity; Part 2 : Whirling psychrometer method	-	-
ISO 5167	series	Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full	EN ISO 5167	series
ISO 5348	-	Mechanical vibration and shock- Mechanical mounting of accelerometers	-	-
ISO 5815-2	-	Water quality- Determination of biochemical oxygen demand after ndays (BOD<(Index)n>)- Part2: Method for undiluted samples	-	-
ISO 6060	-	Water quality; determination of the chemical oxygen demand	-	-
ISO 6326	series		EN ISO 6326	series
ISO 6974	series	Natural gas - Determination of composition and associated uncertainty by gas chromatography	EN ISO 6974	series
ISO 6975	-	Natural gas - Extended analysis - Gas-chromatographic method	EN ISO 6975	-
ISO 7934	-	Stationary source emissions; determination of the mass concentration of sulfur dioxide; hydrogen peroxide/barium perchlorate/thorin method	-	-
ISO 7935	-	Stationary source emissions - Determination of the mass concentration of sulfur dioxide - Performance characteristics of automated measuring methods	-	-
ISO 8217	-	Petroleum products- Fuels (classF)- Specifications of marine fuels	-	-
ISO 10101	series		EN ISO 10101	series
ISO 10396	-	Stationary source emissions- Sampling for the automated determination of gas emission concentrations for permanently-installed monitoring systems	-	-
ISO 10523	-	Water quality -- Determination of pH	EN ISO 10523	-
ISO 10849	-	Stationary source emissions- Determination of the mass concentration of nitrogen oxides- Performance characteristics of automated measuring systems	-	-
ISO 11042-1	-	Gas turbines - Exhaust gas emission -- Part 1: Measurement and evaluation	-	-
ISO 11042-2	-	Gas turbines - Exhaust gas emission -- Part 2: Automated emission monitoring	-	-
ISO 11541	-	Natural gas - Determination of water content at high pressure	EN ISO 11541	-
ISO 11564	-	Stationary source emissions - Determination of the mass concentration of nitrogen oxides - Naphthylethylenediamine photometric method	-	-
ISO 11632	-	Stationary source emissions - Determination of mass concentration of sulfur dioxide - Ion chromatography method	-	-

ISO 14687-1	-	Hydrogen fuel - Product specification - Part 1: All applications except proton exchange membrane (PEM) fuel cell for road vehicles	-	-
ISO 16622	-	Meteorology - Sonic anemometers/thermometers - Acceptance test methods for mean wind measurements	-	-
ISO/TR 15916	-	Basic considerations for the safety of hydrogen systems	-	-
ISO/IEC Guide 98-3	-	Uncertainty of measurement -- Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)	-	-
ASTM D4809-00	-	Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method)	-	-
ASTM F2828	-	Standard test method for assessing carpet cleaning effectiveness in terms of visual appearance change when cleaned with a wet extraction cleaning system	-	-

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FUEL CELL TECHNOLOGIES –

Part 3-200: Stationary fuel cell power systems – Performance test methods

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.
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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 62282-3-200 has been prepared by IEC technical committee 105: Fuel cell technologies.

This second edition cancels and replaces the first edition of IEC 62282-3-200, published in 2011. This edition constitutes a technical revision.

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

a) a stabilization zone of ± 10 % for thermal output of 100 % response time is provided instead of the tests for thermal output of 90 % response time, while the tests for electric output of 90 % response time remain as an option;
b) the calculations for the ramp rate in kW/s are deleted and only the calculations for the response time (s) remain;

c) the procedures, criteria and figures of 9.3, Electric power and thermal power response characteristics test, are modified to ensure they produce accurate and consistent results;

d) maximum acceptable instantaneous electric power output transient is moved to informative Annex D.

IEC has published a related but independent standard IEC 62282-3-201 on performance test methods of small stationary fuel cell power systems which is harmonized with this standard.

The text of this standard is based on the following documents:

FDIS	Report on voting
105/547/FDIS	105/555/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 the 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 publication will remain unchanged until the stability date indicated on the IEC website 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.

INTRODUCTION

This part of IEC 62282 describes how to measure the performance of stationary fuel cell power systems for residential, commercial, agricultural and industrial applications.

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

The following fuel cell types have been considered:

– alkaline fuel cells (AFC);
– phosphoric acid fuel cells (PAFC);
– polymer electrolyte fuel cells (PEFC);
– molten carbonate fuel cells (MCFC);
– solid oxide fuel cells (SOFC).

FUEL CELL TECHNOLOGIES –

Part 3-200: Stationary fuel cell power systems – Performance test methods

1 Scope

This part of IEC 62282 covers operational and environmental aspects of the stationary fuel cell power systems performance. The test methods apply as follows:

– power output under specified operating and transient conditions;

– electrical and heat recovery efficiency under specified operating conditions;

– environmental characteristics; for example, exhaust gas emissions, noise, etc. under specified operating and transient conditions.

This standard does not provide coverage for electromagnetic compatibility (EMC).

This standard does not apply to small stationary fuel cell power systems with electric power output of less than 10 kW which are dealt with IEC 62282-3-201.

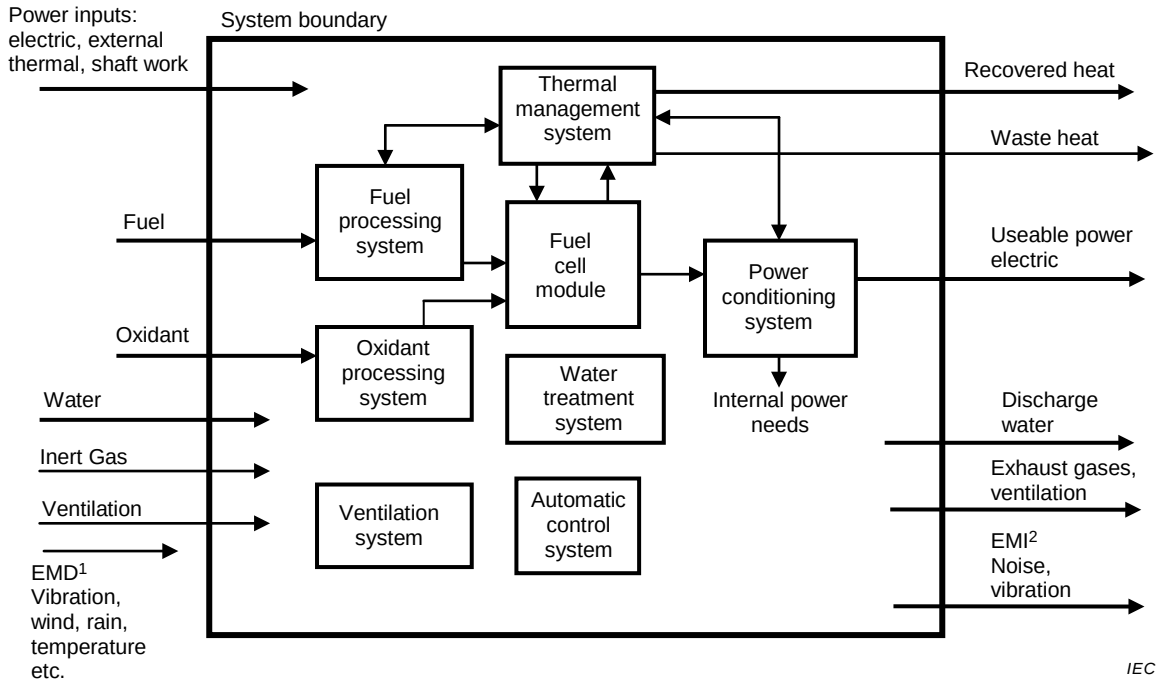
Fuel cell power systems may have different subsystems depending upon types of fuel cell and applications, and they have different streams of material and energy into and out of them. However, a common system diagram and boundary has been defined for evaluation of the fuel cell power system (see Figure 1).

The following conditions are considered in order to determine the system boundary of the fuel cell power system:

– all energy recovery systems are included within the system boundary;

– all kinds of electric energy storage devices are considered outside the system boundary;

– calculation of the heating value of the input fuel (such as natural gas, propane gas and pure hydrogen gas, etc.) is based on the conditions of the fuel at the boundary of the fuel cell power system.



Key

Fuel cell power system including subsystems. The interface is defined as a conceptual or functional one instead of hardware such as a power package.

Subsystems; fuel cell module, fuel processor, etc. These subsystem configurations depend on the kind of fuel, type of fuel cell or system.

The interface points in the boundary to be measured for calculation data.

[1] EMD electromagnetic disturbance

[2] EMI electromagnetic interference

Figure 1 – Fuel cell power system diagram

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 60051 (all parts), *Direct acting indicating analogue electrical measuring instruments and their accessories*

IEC 60359, *Electrical and electronic measurement equipment – Expression of performance*

IEC 60688, *Electrical measuring transducers for converting A.C. and D.C. electrical quantities to analogue or digital signals*

IEC 61000-4-7, *Electromagnetic compatibility (EMC) – Part 4-7: Testing and measurement techniques – General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto*

IEC 61000-4-13, *Electromagnetic compatibility (EMC) – Part 4-13: Testing and measurement techniques – Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests*

IEC 61028, *Electrical measuring instruments – X-Y recorders*

IEC 61143 (all parts), *Electrical measuring instruments – X-t recorders*

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

IEC 61672-2, *Electroacoustics – Sound level meters – Part 2: Pattern evaluation tests*

IEC 62052-11, *Electricity metering equipment (AC) – General requirements, tests and test conditions – Part 11: Metering equipment*

IEC 62053-22, *Electricity metering equipment (a.c.) – Particular requirements – Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)*

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

ISO/IEC Guide 98-3, *Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM: 1995)*

ISO 3648, *Aviation fuels – Estimation of net specific energy*

ISO 3744, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for an essentially free field over a reflecting plane*

ISO 4677-1, *Atmospheres for conditioning and testing – Determination of relative humidity – Part 1: Aspirated psychrometer method*

ISO 4677-2, *Atmospheres for conditioning and testing – Determination of relative humidity – Part 2: Whirling psychrometer method*

ISO 5167 (all parts), *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full*

ISO 5348, *Mechanical vibration and shock – Mechanical mounting of accelerometers*

ISO 5815-2, *Water quality – Determination of biochemical oxygen demand after n days (BODn) – Part 2: Method for undiluted samples*

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

ISO 6326 (all parts), *Natural gas − Determination of sulfur compounds*

ISO 6974 (all parts), *Natural gas − Determination of composition and associated uncertainty by gas chromatography*

ISO 6975 (all parts), *Natural gas − Extended analysis – Gas chromatographic method*

ISO 7934, *Stationary source emissions – Determination of the mass concentration of sulfur dioxide – Hydrogen peroxide/barium perchlorate/Thorin method*

ISO 7935, *Stationary source emissions – Determination of the mass concentration of sulfur dioxide – Performance characteristics of automated measuring methods*

ISO 8217, *Petroleum products – Fuel (class F) – Specifications of marine fuels*

ISO 10101 (all parts), *Natural gas − Determination of water by the Karl Fisher method*

ISO 10396, *Stationary source emissions – Sampling for the automated determination of gas emission concentrations for permanently installed monitoring systems*

ISO 10523, *Water quality – Determination of pH*

ISO 10849, *Stationary source emissions – Determination of the mass concentration of nitrogen oxides – Performance characteristics of automated measuring systems*

ISO 11042-1, *Gas turbines – Exhaust gas emission – Part 1: Measurement and evaluation*

ISO 11042-2, *Gas turbines – Exhaust gas emission – Part 2: Automated emission monitoring*

ISO 11541, *Natural gas – Determination of water content at high pressure*

ISO 11564, *Stationary source emissions – Determination of the mass concentration of nitrogen oxides – Naphthylethylenediamine photometric method*

ISO 11632, *Stationary source emissions – Determination of mass concentration of sulfur dioxide – Ion chromatography method*

ISO 14687-1, *Hydrogen fuel – Product specification – Part 1: All applications except proton exchange membrane (PEM) fuel cell for road vehicles*

ISO/TR 15916, *Basic consideration for the safety of hydrogen systems*

ISO 16622, *Meteorology – Sonic anemometers/thermometers – Acceptance test methods for mean wind measurements*

ASTM D4809, *Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method)*

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)*