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

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NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 62282-3-200:2025 sisaldab Euroopa standardi EN IEC 62282-3-200:2025 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 62282-3-200:2025 consists of the English text of the European standard EN IEC 62282-3-200:2025.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 14.11.2025.	Date of Availability of the European standard is 14.11.2025.
Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 27.070

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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English Version

Fuel cell technologies - Part 3-200: Stationary fuel cell power systems - Performance test methods (IEC 62282-3-200:2025)

Technologies des piles à combustible - Partie 3-200: Systèmes à piles à combustible stationnaires - Méthodes d'essai des performances (IEC 62282-3-200:2025)

Brennstoffzellentechnologien - Teil 3-200: Stationäre Brennstoffzellen-Energiesysteme - Leistungskennwerteprüfverfahren (IEC 62282-3-200:2025)

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN IEC 62282-3-200:2025 E

European foreword

The text of document 105/1124/FDIS, future edition 3 of IEC 62282-3-200, prepared by TC 105 "Fuel cell technologies" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62282-3-200:2025.

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) 2026-11-30
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2028-11-30

This document supersedes EN 62282-3-200:2016 and all of its amendments and corrigenda (if any).

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The text of the International Standard IEC 62282-3-200:2025 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

ISO 9000 NOTE Approved as EN ISO 9000

IEC 62282-3-200

Edition 3.0 2025-09

INTERNATIONAL STANDARD

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

FOREWORD

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IEC 62282-3-200 has been prepared by IEC technical committee 105: Fuel cell technologies. It is an International Standard.

This third edition cancels and replaces the second edition published in 2015. This edition constitutes a technical revision.

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

a) revision of the Introduction, Scope and Clause 3;
b) revision of the symbols in Table 1;
c) revision of Figure 2 (symbol diagram);
d) revision of measurement methods (8.3);
e) revision of the efficiency test (10.2);

f) revision of the electric power and thermal power response characteristics test (10.3);

g) revision of the start-up and shutdown characteristics test (10.4);

h) revision of Annex C.

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

Draft	Report on voting
105/1124/FDIS	105/1134/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

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

A related but independent standard IEC 62282-3-201 on the performance test methods of small stationary fuel cell power systems has been aligned with this document.

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, under specified operating and transient conditions.

This document applies to all kinds of stationary fuel cell technologies, such as:

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

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

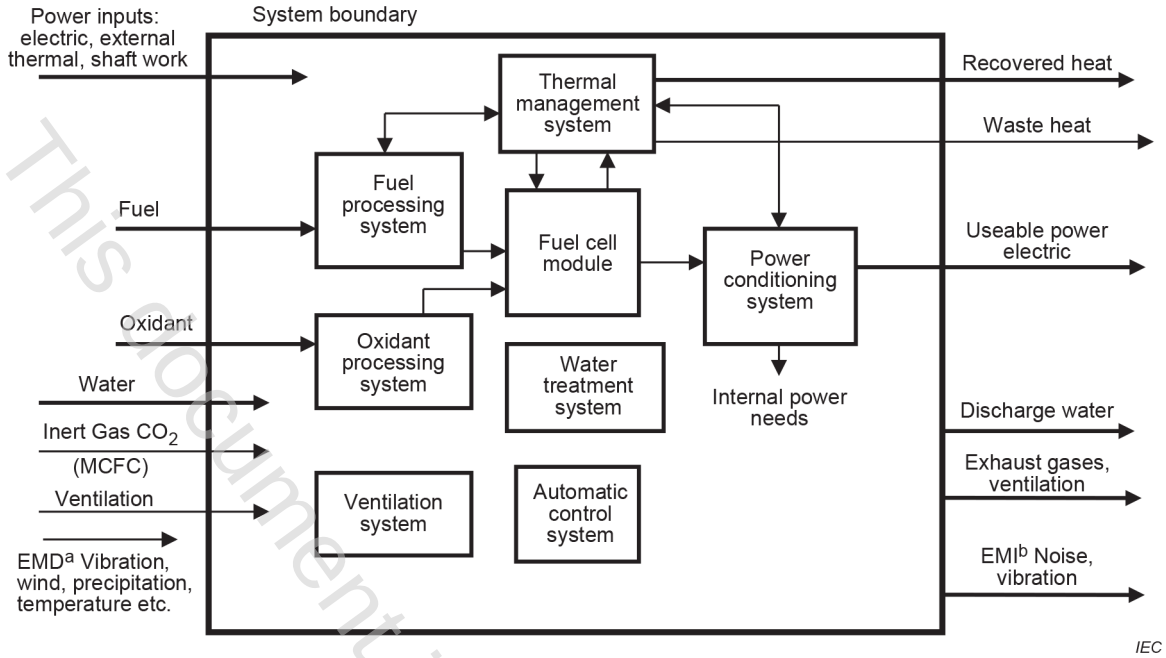
This document does not apply to small stationary fuel cell power systems with rated electric power output of less than 10 kW which are dealt with in IEC 62282-3-201.

Fuel cell power systems can 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) is based on the conditions of the fuel at the boundary of the fuel cell power system.

The document does not provide safety requirements for the testing of stationary fuel cell power systems. Details on safe operation of the tested system can be obtained from the manufacturers instructions.



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.

[a] EMD electromagnetic disturbance

[b] EMI electromagnetic interference

Figure 1 – Fuel cell power system diagram

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.

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 AC and DC 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 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 - General requirements, tests and test conditions - Part 11: Metering equipment*

IEC 62053-22, *Electricity metering equipment - Particular requirements - Part 22: Static meters for AC active energy (classes 0,1S, 0,2S and 0,5S)*

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 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*[1]

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

ISO 6975, *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 in flue gases - Performance characteristics of automated measuring systems*

ISO 8217:2024, *Products from petroleum, synthetic and renewable sources - Fuels (class F) - Specifications of marine fuels*

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

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1 This publication was withdrawn.

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 11626, *Natural gas - Determination of sulfur compounds - Determination of hydrogen sulfide content by UV absorption method*

ISO 10849, *Stationary source emissions - Determination of the mass concentration of nitrogen oxides in flue gas - 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, *Hydrogen fuel - Product specification*

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

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

ISO 16960, *Natural gas - Determination of sulfur compounds - Determination of total sulfur by oxidative microcoulometry method*

ISO 19739, *Natural gas - Determination of sulfur compounds using gas chromatography*

ISO 20729, *Natural gas - Determination of sulfur compounds - Determination of total sulfur content by ultraviolet fluorescence method*

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

3 Terms, definitions and symbols

3.1 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp