SLOVENSKI STANDARD
oSIST prEN IEC 62282-8-201:2023

01-maj-2023

Tehnologija gorivnih celic - 8-201. del: Sistemi za shranjevanje energije, ki uporabljajo module gorivnih celic v obrnjeni smeri - Preskusni postopki za delovanje elektroenergetskih sistemov

Fuel cell technologies - Part 8-201: Energy storage systems using fuel cell modules in reverse mode - Test procedures for the performance of power-to-power systems

Brennstoffzellentechnologien - Teil 8-201: Energiespeichersysteme mit Brennstoffzellenmodulen im reversiblen Betrieb - Prüfverfahren zum Leistungsverhalten von Power-to-Power-Systemen

Technologies des piles à combustible - Partie 8-201: Systèmes de stockage de l'énergie à partir de modules de piles à combustible réversibles - Procédures d'essai pour la performance des systèmes de conversion électrochimiques électriques à électriques

Ta slovenski standard je istoveten z: **prEN IEC 62282-8-201:2023**

ICS:

27.070	Gorilne celice	Fuel cells

oSIST prEN IEC 62282-8-201:2023 **en**

105/962/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 62282-8-201 ED2**	
DATE OF CIRCULATION: **2023-03-03**	CLOSING DATE FOR VOTING: **2023-05-26**
SUPERSEDES DOCUMENTS: **105/908/CD, 105/934A/CC**	

IEC TC 105 : FUEL CELL TECHNOLOGIES

SECRETARIAT: Germany	SECRETARY: Mr David Urmann
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 120	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY

☒ SUBMITTED FOR CENELEC PARALLEL VOTING	☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING
Attention IEC-CENELEC parallel voting The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of

- any relevant patent rights of which they are aware and to provide supporting documentation,
- any relevant “in some countries” clauses to be included should this proposal proceed. Recipients are reminded that the enquiry stage is the final stage for submitting "in some countries" clauses. See AC/22/2007.

TITLE:

Fuel cell technologies - Part 8-201: Energy storage systems using fuel cell modules in reverse mode - Test procedures for the performance of power-to-power systems

PROPOSED STABILITY DATE: 2027

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FUEL CELL TECHNOLOGIES –

Part 8-201: Energy storage systems using fuel cell modules in reverse mode – Test procedures for the performance of power-to-power systems

FOREWORD

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International Standard IEC 62282-8-201 has been prepared by IEC technical committee 105: Fuel cell technologies.

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

FDIS	Report on voting
105/XX/FDIS	105//RVD

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 describes performance evaluation methods for electric energy storage systems using hydrogen that employ electrochemical reactions both for water/steam electrolysis and electric generation.

This document is intended for power-to-power systems which typically employ a set of electrolyser and fuel cell, or a reversible cell for devices of electric charge and discharge.

A typical targeting application of the electric energy storage systems using hydrogen is in the class of energy intensive electric energy storage. The systems are recognized as critically useful for the relatively long-term power storage operation, such as efficient storage and supply of the renewable power derived electric energy and grid stabilization.

IEC 62282-8 (all parts) aims to develop performance test methods for power storage and buffering systems based on electrochemical modules (combining electrolysis and fuel cells, in particular reversible cells), taking into consideration both options of re-electrification and substance (and heat) production for sustainable integration of renewable energy sources.

Under the general title *Energy storage systems using fuel cell modules in reverse mode*, the IEC 62282-8 series consists of the following parts:

- IEC 62282-8-101: *Test procedures for the performance of solid oxide single cells and stacks, including reversible operation*
- IEC 62282-8-102: *Test procedures for the performance of single cells and stacks with proton exchange membranes, including reversible operation*
- IEC 62282-8-103[1]: *Alkaline single cell and stack performance including reversible operation*
- IEC 62282-8-201: *Test procedures for the performance of power-to-power systems*
- IEC 62282-8-202[2]: *Power-to-power systems – Safety*
- IEC 62282-8-301[3]: *Power to methane energy systems based on solid oxide cells including reversible operation - Performance test methods*

As a priority dictated by the emerging needs for industry and opportunities for technological development, IEC 62282-8-101, IEC 62282-8-102 and IEC 62282-8-201 have been initiated jointly and firstly. These parts are presented as a package to highlight the need for an integrated approach as regards the system's application (i.e. a solution for energy storage) and its fundamental constituent components (i.e. fuel cells operated in reverse or reversing mode).

IEC 62282-8-103 and IEC 62282-8-202 are suggested but are left for initiation at a later stage. IEC 62282-8-301, which is the first one of the IEC 62282-8-300 series, is under development.

This document is the second edition of the IEC 62282-8-201.

[1] Future project

[2] Future project

[3] Under development.

FUEL CELL TECHNOLOGIES –

Part 8-201: Energy storage systems using fuel cell modules in reverse mode – Test procedures for the performance of power-to-power systems

1 Scope

This part of IEC 62282 defines the evaluation methods of typical performances for electric energy storage systems using hydrogen. This is applicable to the systems that use electrochemical reaction devices for both power charge and discharge. This document applies to systems that are designed and used for service and operation in stationary locations (indoor and outdoor).

The conceptual configurations of the electric energy storage systems using hydrogen are shown in Figure 1 and Figure 2.

Figure 1 shows the system independently equipped with an electrolyser module and a fuel cell module.

Figure 2 shows the system equipped with a reversible cell module.

There is an electrolyser module and a fuel cell module, or a reversible cell module, an overall management system (which includes a data interface and may include a pressure management), a thermal management system (which may include a heat/cold storage), a water management system (which may include a water storage) and a purge gas supply (inert gas, practically neither oxidising nor reducing) as indispensable components.

NOTE Indispensable components are indicated by bold lines in Figure 1 and Figure 2

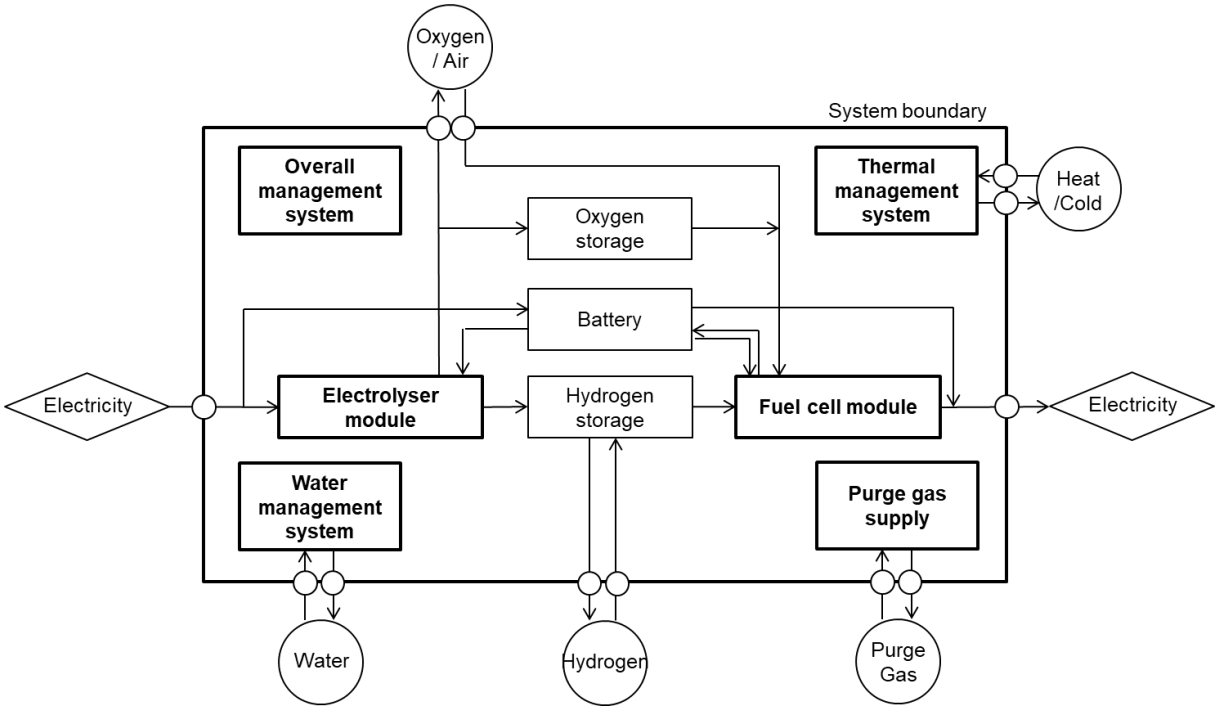
The system may be equipped with either a hydrogen storage or a connection to an external hydrogen supply infrastructure or a combination of both. There may be a battery and an oxygen storage, as optional components.

The electrolyser module may comprise one or more electrolysers whether or not of same type. Depending on the operating conditions and considering the operation history, the overall management system may command the concurrent operation of the electrolysers. The fuel cell module may comprise one or more fuel cells whether or not of same type. Depending on the operating conditions and considering the operation history, the overall management system may command concurrent operation of the fuel cells. The reversible cell module may comprise one or more reversible cells whether or not of same type. The fuel cell module may comprise one or more fuel cells whether or not of same type. Depending on the operating conditions and considering the operation history, the overall management system may command concurrent operation of the reversible cells.

The performance measurement is executed in the defined area surrounded by the bold outside solid line (system boundary).

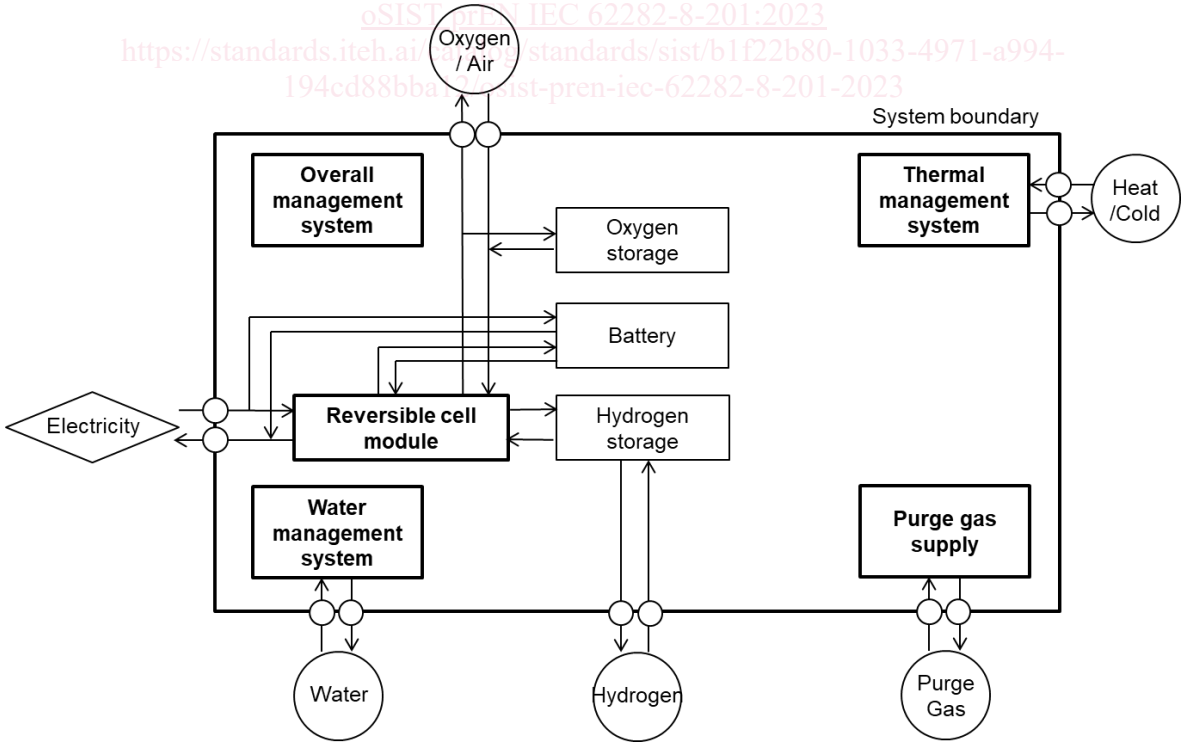
NOTE In the context of this document, the term "reversible" does not refer to the thermodynamic meaning of an ideal process. It is common practice in the fuel cell community to call the operation mode of a cell that alternates between fuel cell mode and electrolysis mode "reversible".

This document is intended to be used for data exchanges in commercial transactions between the system manufacturers and customers. Users of this document can selectively execute test items suitable for their purposes from those described in this document.



NOTE Overall management system, thermal management system, water management system and purge gas supply may have the relation with electrolyser, fuel cell, battery, hydrogen storage and oxygen storage, and also may have the relation with one another.

Figure 1 – System configuration of electric energy storage system using hydrogen – Type with electrolyser and fuel cell



NOTE Overall management system, thermal management system, water management system and purge gas supply may have the relation with reversible cell, battery, hydrogen storage and oxygen storage, and also may have the relation with one another.

Figure 2 – System configuration of electric energy storage system using hydrogen – Type with reversible cell

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 61427-1, *Secondary cells and batteries for renewable energy storage – General requirements and methods of test – Part 1: Photovoltaic off-grid application*

IEC 61427-2, *Secondary cells and batteries for renewable energy storage – General requirements and methods of test – Part 2: On-grid applications*

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

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

IEC 62282-8-101, *Fuel cell technologies – Part 8-101: Energy storage systems using fuel cell modules in reverse mode – Solid oxide single cell and stack performance including reversible operation*

IEC 62282-8-102, *Fuel cell technologies – Part 8-102: Energy storage systems using fuel cell modules in reverse mode – Test procedures for PEM single cell and stack performance including reversible operation*

IEC 62933-2-1:2017, *Electrical energy storage (EES) systems – Part 2-1: Unit parameters and testing methods – General specification*

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

ISO 3746, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Survey method using an enveloping measurement surface over a reflecting plane*

ISO 4064-1, *Water meters for cold potable water and hot water – Part 1: Metrological and technical requirements*

ISO 4064-2, *Water meters for cold potable water and hot water – Part 2: Test methods*

ISO 7888, *Water quality – Determination of electrical conductivity*

ISO 9614-1, *Acoustics – Determination of sound power levels of noise sources using sound intensity – Part 1: Measurement at discrete points*

ISO 11204, *Acoustics – Noise emitted by machinery and equipment – Determination of emission sound pressure levels at a work station and at other specified positions applying accurate environmental corrections*

ISO 16111, *Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride*

ISO 19880-1, *Gaseous hydrogen – Fuelling stations – Part 1: General requirements*

ISO 19881, *Gaseous hydrogen – Land vehicle fuel containers*

ISO 19882, *Gaseous hydrogen – Thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers*

ISO 19884, *Gaseous hydrogen – Cylinders and tubes for stationary storage*

ISO 22734, *Hydrogen generators using water electrolysis process – Industrial, commercial, and residential applications*

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

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

3.1.1
electric energy storage
EES

installation able to store electric energy or which converts electric energy into another form of energy and vice versa, while storing energy

Note 1 to entry: EES can be used also to indicate the activity of an apparatus described in the definition during performing its own functionality.

Note 2 to entry: This note applies to the French language only.

[SOURCE: IEC 62933-1:2018, 3.1, modified – Definition revised and example and note 2 deleted.]

3.1.2
electric energy storage system
EES system

installation with defined electrical boundaries, comprising at least one EES, whose purpose is to extract electric energy from the electric power system, store this energy in some manner and inject electric energy into the electric power system and which includes civil engineering works, energy conversion equipment and related ancillary equipment

Note 1 to entry: The EES system is controlled and coordinated to provide services to the electric power system operators or to the electric power system users.

Note 2 to entry: In some cases, an EES system can require an additional energy source during its discharge, providing more energy to the electric power system than the energy it stores.

Note 3 to entry: This note applies to the French language only.

[SOURCE: IEC 62933-1:2018, 3.2, modified – "grid connected" and "internally" deleted, "whose purpose is to" added and note 3 deleted.]