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Fuel cell technologies

Part 8.102: Energy storage systems using fuel cell modules in reverse mode — Test procedures for the performance of single cells and stacks with proton exchange membrane, including reversible operation



AS IEC 62282.8.102:2025

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Australian Hydrogen Council
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(ii) The Scope states what the Standard is about, what it covers and what it does not cover.

(iii) The Normative references clause lists other documents that are referenced in the Standard as part of requirements.

(iv) The Terms and definitions clause defines important terms to help with understanding the Standard.

A Standard may also include other parts, such as the following:

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(2) An informative appendix provides additional information or guidance. An informative appendix provides additional information or guidance. They usually do not contain requirements. If an informative appendix does contain requirements, the Standard will explain when those requirements apply.

(3) A Bibliography lists documents referenced in the Standard but not as part of requirements.

Many Standards include notes. Notes provide recommendations and/or guidance only. They never contain requirements.

Preface

This Standard prepared by the Standards Australia Committee ME-093, Hydrogen Technologies.

The objective of this document is to specify requirements for PEM cell/stack assembly units, testing systems, instruments and measuring methods, and test methods to test the performance of PEM cells and stacks in fuel cell mode, electrolysis and/or reversible mode.

This document is identical to, and has been reproduced from, IEC 62282-8-102:2019, *Fuel cell technologies — Part 8-102: Energy storage systems using fuel cell modules in reverse mode — Test procedures for the performance of single cells and stacks with proton exchange membrane, including reversible operation.*

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FOREWORD

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International Standard IEC 62282–8–102 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
105/763/FDIS	105/776/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.

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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.

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INTRODUCTION

This part of IEC 62282 describes test methods for a single cell and stack (denoted as "cell/stack" hereafter) that are intended for use in energy storage systems that use proton exchange membrane fuel cells (PEMFC) in combination with proton exchange membrane water electrolysers (PEMWE), or directly using proton exchange membrane cells (Re-PEM).

This document is intended to be used for data exchanges in commercial transactions between cell/stack manufacturers and system developers or for acquiring data on a cell or stack in order to estimate the performance of a system based on it. Users of this document can selectively execute test items suitable for their purposes from those described in this document.

PEMFCs, PEMWEs and Re-PEMs have a broad range of geometry and size. As such, in general, peripherals like current collectors and gas manifolds are unique to each cell or stack and are often incorporated into a cell or stack to form one integrated unit. In addition, they tend to have a significant effect on the power generation characteristics of the cell or stack. This document therefore introduces as its subject "cell/stack assembly unit", which are defined as those units containing not only a cell or a stack, but also peripherals.

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 fuel 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 62282–8–300 (all parts)[3]: *Power-to-substance systems*

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 as a priority. These parts are presented as a package to highlight the need for an integrated approach as regards the system 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, IEC 62282–8–202 and IEC 62282–8–300 (all parts) are suggested but are left for initiation at a later stage.

1 Under consideration.

2 Under consideration.

3 Under consideration.

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Fuel cell technologies

Part 8.102: Energy storage systems using fuel cell modules in reverse mode — Test procedures for the performance of single cells and stacks with proton exchange membrane, including reversible operation

1 Scope

This part of IEC 62282 deals with PEM cell/stack assembly units, testing systems, instruments and measuring methods, and test methods to test the performance of PEM cells and stacks in fuel cell mode, electrolysis and/or reversible mode.

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 60050–485:—, [4] *International Electrotechnical Vocabulary – Part 485: Fuel cell technologies*

IEC TS 62282–7–1:2017, *Fuel cell technologies – Part 7-1: Test methods – Single cell performance tests for polymer electrolyte fuel cells (PEMFC)*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050–485 and the following 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

3.1.1
active electrode area
geometric area of the electrode perpendicular to the direction of the current flow

[SOURCE: IEC 60050–485:—, 485-02-08, modified – "electrode" added to the term, the term "effective area" has been deleted, and the notes to entry have been replaced with a new note to entry.]

Note 1 to entry: Usually this corresponds to the smaller of the two areas of negative electrode or positive electrode.

3.1.2
area-specific resistance
ASR
internal resistivity with respect to the active electrode area, including the change of potential due to the electrochemical reaction

Note 1 to entry: This note applies to the French language only.

[4] Under preparation. Stage at the time of preparation: IEC FDIS 60050-485:2019.

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