SLOVENSKI STANDARD
oSIST prEN IEC 62282-4-102:2022

01-april-2022

Tehnologije gorivnih celic - 4-102. del: Elektroenergetski sistemi z gorivnimi celicami za pogone, razen pogonov cestnih vozil in pomožnih elektroenergetskih enot (APU) - Elektroenergetski sistemi z gorivnimi celicami za električno gnane industrijske kamione - Preskusne metode zmogljivosti

Fuel cell technologies - Part 4-102: Fuel cell power systems for propulsion other than road vehicles and auxiliary power units (APU) - Fuel cell power systems for electrically powered industrial trucks - Performance test methods

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Ta slovenski standard je istoveten z: prEN IEC 62282-4-102:2022

ICS:

27.070	Gorilne celice	Fuel cells
43.080.10	Tovornjaki in priklopniki	Trucks and trailers

oSIST prEN IEC 62282-4-102:2022 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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105/894/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:	
IEC 62282-4-102 ED2	
DATE OF CIRCULATION:	CLOSING DATE FOR VOTING:
2022-02-04	**2022-04-29**
SUPERSEDES DOCUMENTS:	
105/865/CD, 105/886A/CC	

IEC TC 105 : FUEL CELL TECHNOLOGIES	
SECRETARIAT:	SECRETARY:
Germany	Mr David Urmann
OF INTEREST TO THE FOLLOWING COMMITTEES:	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

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☒ 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.

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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.

TITLE:

Fuel cell technologies – Part 4-102: Fuel cell power systems for propulsion other than road vehicles and auxiliary power units (APU) – Fuel cell power systems for electrically powered industrial trucks – Performance test methods

PROPOSED STABILITY DATE: 2025

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FUEL CELL TECHNOLOGIES –

Part 4-102: Fuel cell power systems for propulsion other than road vehicles and auxiliary power units (APU) – Fuel cell power systems for electrically powered industrial trucks – Performance test methods

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International Standard IEC 62282-4-102 has been prepared by IEC technical committee 105: Fuel cell technologies.

This second edition cancels and replaces the first edition published in 2017. This edition constitutes a technical revision.

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

a) Change the title and scope in accordance with that of IEC 62282-4-101 Ed.2,
b) Deletion of definitions (previous 3.5, 3.10, and 3.15),
c) Add new terms for "3.14 Delivered power" and "3.15 Regenerated power" in clause 3,
d) Revision of symbols and their meanings in accordance with that of IEC 62282-3-201 Ed.2,

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e) Replace "reference condition" with "standard condition" as see in clause 5,

f) Revision of the test method for Accessory load voltage spike test (13.3.2),

g) Clarification of 14. Power stability under the operation,

h) Any editorial corrections.

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

FDIS	Report on voting
105/XXX/FDIS	105/XXX/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 parts of the IEC 62282 series, 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.

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INTRODUCTION

This part of IEC 62282-4 provides consistent and repeatable test methods for the electric/thermal and environmental performance of fuel cell power systems for electrically powered industrial trucks.

The IEC 62282-4 series deals with categories such as safety, performance, and interchangeability of fuel cell power systems for propulsion other than road vehicles and auxiliary power units (APUs). Among the categories mentioned above, this document (IEC 62282-4-102) focuses on fuel cell power systems for electrically powered industrial trucks because such an application is urgently demanded in the world.

This part of IEC 62282-4 describes type tests and their test methods only. No routine tests are required or identified, and no performance targets are set in this standard.

Fuel cells used in electrically powered industrial trucks, such as forklift trucks, are hybrids and so operate in several different modes. Similarly, forklift trucks operate in different modes. The purpose of this document is to evaluate the fuel cell system in the various combinations of fuel cell modes and forklift truck modes. This document will break down these different modes and provide a framework for designing and evaluating a fuel cell system for use specifically in a forklift truck.

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This part of IEC 62282-4 is to be used by manufacturers of fuel cell power systems used for electrically powered industrial trucks and/or those who evaluate the performance of their systems for certification purposes.

Users of this document 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.

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24

25 # 1 Scope

26 This document covers performance test methods of fuel cell power systems intended to be
27 used for electrically powered industrial trucks as defined in ISO 5053-1:2020, except for:

28 – rough-terrain trucks (3.7);
29 – non-stacking low-lift straddle carrier (3.18);
30 – stacking high-lift straddle carrier (3.19);
31 – rough-terrain variable-reach truck (3.21);
32 – slewing rough-terrain variable-reach truck (3.22);
33 – variable-reach container handler (3.23);
34 – pedestrian propelled trucks (3.27, 3.28, 3.29 and 3.30).

35 This document applies to gaseous hydrogen-fuelled fuel cell power systems and direct
36 methanol fuel cell power systems for electrically powered industrial trucks.
37 The following fuels are considered within the scope of this standard:

38 – gaseous hydrogen, and
39 – methanol.

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40 This document covers the fuel cell power system as defined in 3.7 and Figure 1.

41 This document applies to DC type fuel cell power systems, with a rated output voltage not
42 exceeding DC 150 V for indoor and outdoor use.

43 This document covers fuel cell power systems whose fuel source container is permanently
44 attached to either the industrial truck or the fuel cell power system.

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45 All systems with integrated energy storage systems are covered by this document. This
46 includes systems, for example, batteries for internal recharges or recharged from an external
47 source.

48 The followings are not included in the scope of this document:

49 – detachable type fuel source containers;
50 – hybrid trucks that include an internal combustion engine;
51 – reformer-equipped fuel cell power systems;
52 – fuel cell power systems intended for operation in potentially explosive atmospheres;
53 – fuel storage systems using liquid hydrogen.

54

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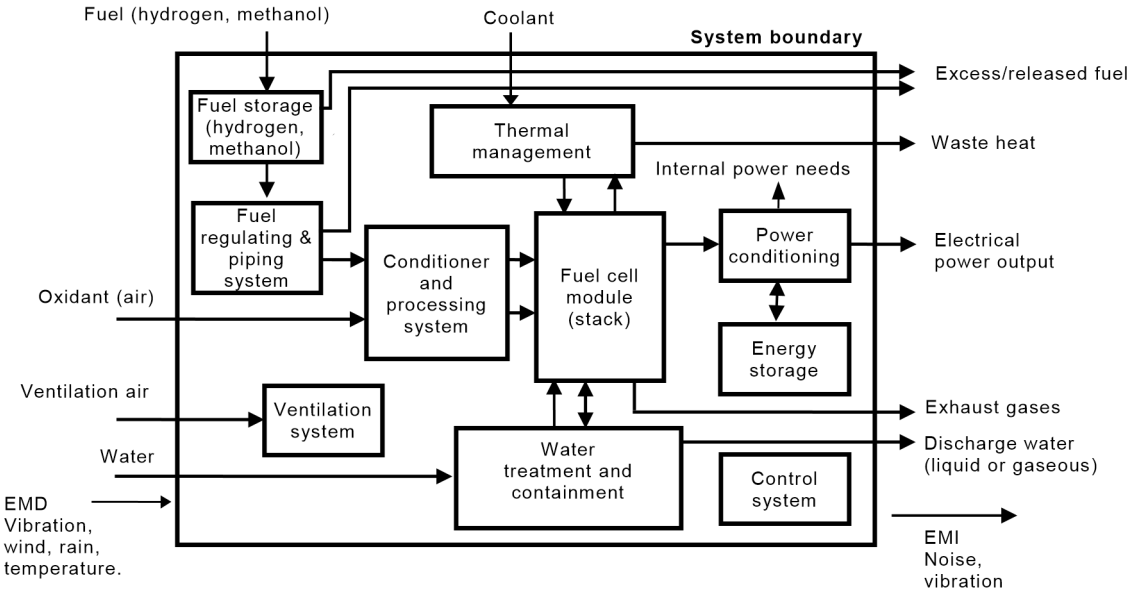

IEC

Key

EMD electromagnetic disturbance.

EMI electromagnetic interference.

NOTE - A fuel cell power system may contain all or some of the above components.

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Figure 1 – Fuel cell power systems for electrically powered industrial trucks

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

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 62282-6-300, *Fuel cell technologies – Part 6-300: Micro fuel cell power systems – Fuel cartridge interchangeability*

ISO 5053-1, *Industrial trucks — Vocabulary — Part 1: Types of industrial trucks*

ISO 6798-1, Reciprocating internal combustion engines — Measurement of sound power level using sound pressure — Part 1: Engineering method

ISO 6798-2, Reciprocating internal combustion engines — Measurement of sound power level using sound pressure — Part 1: Survey method

ISO 9000, *Quality management series of standards*

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ISO 14687, *Hydrogen fuel quality – Product Specification*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardisation 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
noise level
sound pressure level produced by the fuel cell power system measured at a specified distance in all operation modes

Note 1 to entry: Expressed as decibels (dB) and measured as described in 15.2.

3.2
background noise level
sound pressure level of ambient noise at the measurement point

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Note 1 to entry: This measurement is taken as described in 15.2 with the fuel cell power system in the cold state.

3.3
battery
electrochemical energy storage device that provides energy input to support parasitic loads and/or provides electric energy output

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Note 1 to entry: Back-up batteries for control software memory and similar applications are not included.

3.4
cold state
state of a fuel cell power system at ambient temperature with no power input or output

[SOURCE: IEC 60050-485:2020, 485-21-01]

3.5
discharge water
water discharged from the fuel cell power system including waste water and condensate

Note 1 to entry: Discharge water does not constitute part of a thermal recovery system.

3.6
fuel cell system electric efficiency
ratio of the average electric power output of a fuel cell power system at a given duration to the average fuel power fed to the same fuel cell power system at the same duration

3.7
fuel cell power system
generator system that uses one or more fuel cell modules to generate electric power and heat

Note 1 to entry: See Figure 1 for a block diagram of a fuel cell power system.

Note 2 to entry: The fuel cell power system for use with industrial trucks will be in one of the forms as outlined in 3.9 and 3.10 of IEC 62282-4-101.