

Fuel cell technologies - Part 6-101: Micro fuel cell  
power systems - Safety - General requirements

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>See Eesti standard EVS-EN IEC 62282-6-101:2024 sisaldab Euroopa standardi EN IEC 62282-6-101:2024 ingliskeelset teksti.</p> <p>Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 29.03.2024.</p> <p>Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.</p>	<p>This Estonian standard EVS-EN IEC 62282-6-101:2024 consists of the English text of the European standard EN IEC 62282-6-101:2024.</p> <p>This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.</p> <p>Date of Availability of the European standard is 29.03.2024.</p> <p>The standard is available from the Estonian Centre for Standardisation and Accreditation.</p>
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English Version

Fuel cell technologies - Part 6-101: Micro fuel cell power  
systems - Safety - General requirements  
(IEC 62282-6-101:2024)

Technologies des piles à combustible - Partie 6-101:  
Systèmes à micropiles à combustible - Sécurité - Exigences  
générales  
(IEC 62282-6-101:2024)

Brennstoffzellentechnologien - Teil 6-101:  
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## European foreword

The text of document 105/1010/FDIS, future edition 1 of IEC 62282-6-101, prepared by IEC/TC 105 "Fuel cell technologies" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62282-6-101:2024.

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) 2024-12-22
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In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 31010	NOTE Approved as EN IEC 31010
IEC 60335-1:2020	NOTE Approved as EN IEC 60335-1:2023 (not modified)
IEC 60812	NOTE Approved as EN IEC 60812
IEC 61025	NOTE Approved as EN 61025
IEC 61508 (series)	NOTE Approved as EN 61508 (series)
IEC 62061	NOTE Approved as EN IEC 62061
IEC 62282-5-100	NOTE Approved as EN IEC 62282-5-100
ISO 11114-1	NOTE Approved as EN ISO 11114-1
ISO 11114-2	NOTE Approved as EN ISO 11114-2
ISO 12100	NOTE Approved as EN ISO 12100
ISO 13849-1	NOTE Approved as EN ISO 13849-1

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Fuel cell technologies –  
Part 6-101: Micro fuel cell power systems – Safety – General requirements**

**Technologies des piles à combustible –  
Partie 6-101: Systèmes à micropiles à combustible – Sécurité – Exigences  
générales**



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# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Fuel cell technologies –  
Part 6-101: Micro fuel cell power systems – Safety – General requirements**

**Technologies des piles à combustible –  
Partie 6-101: Systèmes à micropiles à combustible – Sécurité – Exigences  
générales**

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**FUEL CELL TECHNOLOGIES –****Part 6-101: Micro fuel cell power systems –  
Safety – General requirements****FOREWORD**

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IEC 62282-6-101 has been prepared by IEC technical committee 105: Fuel cell technologies. It is an International Standard.

This first edition, together with the other parts of the IEC 62282-6-1XX series, cancels and replaces IEC 62282-6-100:2010 and IEC 62282-6-100:2010/AMD1:2012.

This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 62282-6-100:2010 and IEC 62282-6-100:2010/AMD1:2012:

- a) A new structure has been set up: IEC 62282-6-101 covers the general safety requirements common to all fuel types whereas IEC 62282-6-102 and subsequent parts of the IEC 62282-6-1XX series cover particular requirements for specific fuel types based on the requirements given in IEC 62282-6-101.

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

Draft	Report on voting
105/1010/FDIS	105/1023/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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://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](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

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It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 12 months from the date of publication.

## INTRODUCTION

IEC 62282-6-100 has been restructured to make it more user friendly.

The new IEC 62282-6-1XX series consists of IEC 62282-6-101 and subsequent parts of the IEC 62282-6-1XX series which will replace IEC 62282-100 on a case-by-case basis. Until subsequent specific parts of the IEC 62282-6-1XX series are completed, a suitable transition period will apply.

IEC 62282-6-101 covers general safety requirements common to all fuel types.

IEC 62282-6-102 and subsequent parts in the IEC 62282-6-1XX series will cover detailed requirements for specific fuel cartridges based on the requirements of IEC 62282-6-101, as shown in Table 1: Technology specific parts.

## FUEL CELL TECHNOLOGIES –

### Part 6-101: Micro fuel cell power systems – Safety – General requirements

## 1 Scope

### 1.1 General

- a) This part of IEC 62282 covers micro fuel cell power systems and fuel cartridges that are wearable or easily carried by hand, providing direct current outputs that do not exceed 60 V DC and power outputs that do not exceed 240 VA. Portable fuel cell power systems that provide output levels that exceed these electrical limits are covered by IEC 62282-5-100.
- b) Externally accessible circuitry is therefore considered to be ES1 energy source as defined in IEC 62368-1, and as limited power source if further compliance with IEC 62368-1:2023, Annex Q is demonstrated. Micro fuel cell power systems that have internal circuitry exceeding 60 V DC or 240 VA are addressed with the separate criteria of IEC 62368-1.
- c) This document covers micro fuel cell power systems and fuel cartridges. This document establishes the requirements for micro fuel cell power systems and fuel cartridges to ensure a reasonable degree of safety for normal use, reasonably foreseeable misuse, and cargo and consumer transportation and storage of such items. Fuel cartridges refilled by the manufacturer or by trained technicians are covered by this document. The fuel cartridges covered by this document are not intended to be refilled by the consumer.
- d) Micro fuel cell power systems and fuel cartridges that are covered by this document are not intended for use in hazardous areas as defined by IEC 60079-10-1.

### 1.2 Fuels and technologies covered

- a) A micro fuel cell power system block diagram is shown in Figure 1.
- b) This document, including all annexes, apply to micro fuel cell power systems and fuel cartridges as defined in 1.1 above.
- c) Clause 4 to Clause 8 cover the general safety requirements for all micro fuel cell power systems. IEC 62282-6-101 together with the appropriate technology specific parts shown in Table 1 cover the requirements for the specific technologies in the IEC 62282-6-1XX series.

**Table 1 – Technology specific parts**

Specific technology supplement standard	Title
IEC 62282-6-106	Fuel cell technologies – Part 6-106: Micro fuel cell power systems – Safety – Indirect Class 8 (corrosive) compounds
IEC 62282-6-107	Fuel cell technologies – Part 6-107: Micro fuel cell power systems – Safety – Indirect water reactive (Division 4.3) compounds

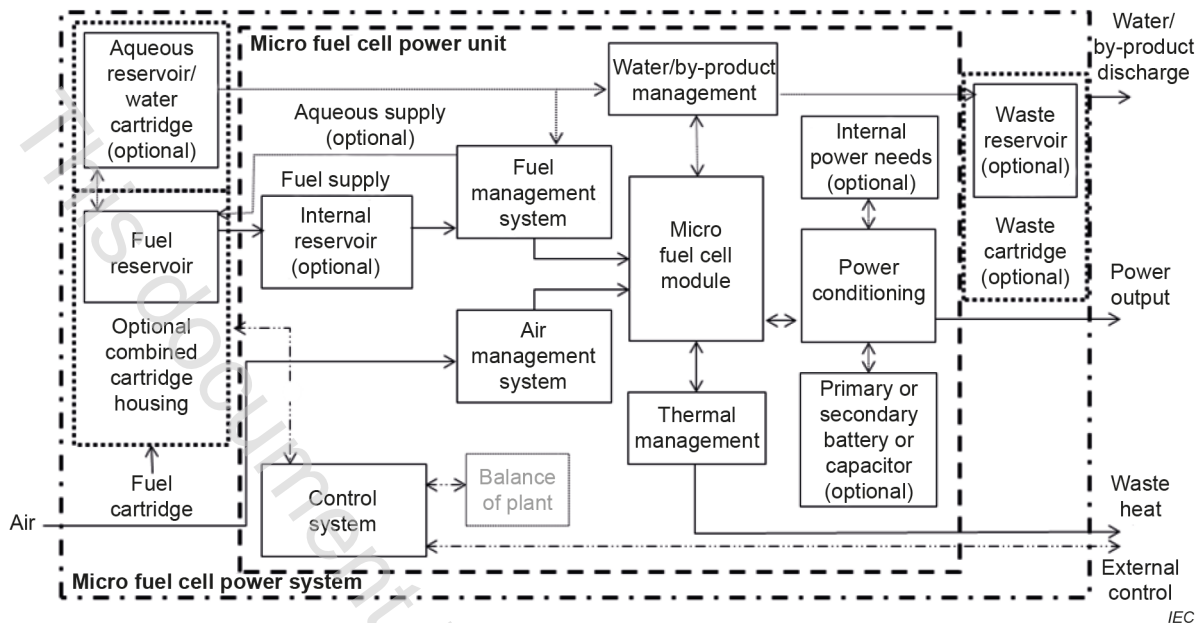


Figure 1 – Micro fuel cell power system block diagram

### 1.3 Equivalent level of safety

- The requirements of this document are not intended to constrain innovation. The manufacturer can consider fuels, materials, designs or constructions not specifically dealt with in this document. These alternatives can be evaluated as to their ability to yield levels of safety equivalent to those specified in this document.
- It is understood that all micro fuel cell power systems and fuel cartridges comply with applicable country and local requirements including, but not limited to, those concerning transportation, child-resistance and storage, where required.

## 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 60086-4, *Primary batteries – Part 4: Safety of lithium batteries*

IEC 60086-5, *Primary batteries – Part 5: Safety of batteries with aqueous electrolyte*

IEC 60730-1:2022, *Automatic electrical controls – Part 1: General requirements*

IEC 61032:1997, *Protection of persons and equipment by enclosures – Probes for verification*

IEC 62133 (all parts), *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications*

IEC 62281, *Safety of primary and secondary lithium cells and batteries during transport*

IEC 62368-1:2023, *Audio/video, information and communication technology equipment – Part 1: Safety requirements*

IEC 62282-6-300:2012, *Fuel cell technologies – Part 6-300: Micro fuel cell power systems – Fuel cartridge interchangeability*

ISO 175, *Plastics – Methods of test for the determination of the effects of immersion in liquid chemicals*

ISO 188, *Rubber, vulcanized or thermoplastic – Accelerated ageing and heat resistance tests*

ISO 1817, *Rubber, vulcanized or thermoplastic – Determination of the effect of liquids*

ISO 7010:2019, *Graphical symbols – Safety colours and safety signs – Registered safety signs*

ISO 11114-4, *Transportable gas cylinders – Compatibility of cylinder and valve materials with gas contents – Part 4: Test methods for selecting steels resistant to hydrogen embrittlement*

ISO 16000-3, *Indoor air – Part 3: Determination of formaldehyde and other carbonyl compounds in indoor and test chamber air – Active sampling method*

ISO 16000-6, *Indoor air – Part 6: Determination of organic compounds (VVOC, VOC, SVOC) in indoor and test chamber air by active sampling on sorbent tubes, thermal desorption and gas chromatography using MS or MS FID*

ISO 16017-1, *Indoor, ambient and workplace air – Part 1: Sampling and analysis of volatile organic compounds by sorbent tube/thermal desorption/capillary gas chromatography – Part 1: Pumped sampling*

*United Nations Recommendations on the Transport of Dangerous Goods: Model Regulations Twentieth revised edition, Manual of Tests and Criteria: Seventh revised edition, available at [https://unece.org/fileadmin/DAM/trans/danger/publi/manual/Rev7/Manual\\_Rev7\\_E.pdf](https://unece.org/fileadmin/DAM/trans/danger/publi/manual/Rev7/Manual_Rev7_E.pdf) (viewed 2023-08-08)*

### 3 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>

#### 3.1

##### **air management system**

set of components that can be used to control air properties, if necessary, to support the micro fuel cell power system operation

#### 3.2

##### **attached cartridge**

fuel cartridge, which has its own enclosure that connects to the device powered by the micro fuel cell power system