ICS 27.070 SLOVENSKÁ TECHNICKÁ NORMA Október 2021

| STN | **Technológia palivových článkov<br>Časť 7-2: Skúšky<br>Skúšky na overenie funkčných vlastností jednotlivých článkov a komínov palivových článkov na tuhý oxid (SOFCs)** | **STN<br>EN IEC 62282-7-2**<br><br>36 4512 |
|---|---|---|

Fuel cell technologies - Part 7-2: Test methods - Single cell and stack performance tests for solid oxide fuel cells (SOFCs)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 09/21

Obsahuje: EN IEC 62282-7-2:2021, IEC 62282-7-2:2021

**133543**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN IEC 62282-7-2

July 2021

ICS 27.070

English Version

# Fuel cell technologies - Part 7-2: Test methods - Single cell and stack performance tests for solid oxide fuel cells (SOFCs) (IEC 62282-7-2:2021)

Technologies des piles à combustible - Partie 7-2: Méthodes d'essai - Essais de performance de cellule élémentaire et de pile pour les piles à combustible à oxyde solide (SOFC) (IEC 62282-7-2:2021)

Brennstoffzellentechnologien - Teil 7-2: Prüfverfahren - Prüfungen zum Nachweis des Einzelzellen- und Stackleistungsverhaltens von Festoxid-Brennstoffzellen (SOFC) (IEC 62282-7-2:2021)

This European Standard was approved by CENELEC on 2021-06-25. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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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**

**EN IEC 62282-7-2:2021 (E)**

# European foreword

The text of document 105/847/FDIS, future edition 1 of IEC 62282-7-2, prepared by IEC/TC 105 "Fuel cell technologies" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62282-7-2:2021.

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) 2022-03-25
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2024-06-25

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

## Endorsement notice

The text of the International Standard IEC 62282-7-2:2021 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

| | | |
|---|---|---|
| IEC 60352 (series) | NOTE | Harmonized as EN 60352 (series) |
| IEC 60359 | NOTE | Harmonized as EN 60359 |
| IEC 60512-1-1 | NOTE | Harmonized as EN 60512-1-1 |
| IEC 60512-8-1 | NOTE | Harmonized as EN 60512-8-1 |
| IEC 60512-8-2 | NOTE | Harmonized as EN 60512-8-2 |
| IEC 62282-2-100 | NOTE | Harmonized as EN IEC 62282-2-100 |
| IEC 62282-8-101 | NOTE | Harmonized as EN IEC 62282-8-101 |

# Annex ZA
(normative)

## Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60050-485 | - | International Electrotechnical Vocabulary (IEV) - Part 485: Fuel cell technologies | - | - |
| IEC 60584-1 | - | Thermocouples - Part 1: EMF specifications and tolerances | EN 60584-1 | - |
| IEC 60584-3 | - | Thermocouples - Part 3: Extension and compensating cables - Tolerances and identification system | EN IEC 60584-3 | - |
| IEC 61515 | - | Mineral insulated metal-sheathed thermocouple cables and thermocouples | EN 61515 | - |
| ISO 5168 | - | Measurement of fluid flow - Procedures for the evaluation of uncertainties | - | - |
| ISO 6141 | - | Gas analysis - Contents of certificates for calibration gas mixtures | EN ISO 6141 | - |
| ISO 6142-1 | - | Gas analysis - Preparation of calibration gas mixtures - Part 1: Gravimetric method for Class I mixtures | EN ISO 6142-1 | - |
| ISO 6143 | - | Gas analysis - Comparison methods for determining and checking the composition of calibration gas mixtures | EN ISO 6143 | - |
| ISO 6145-7 | - | Gas analysis - Preparation of calibration gas mixtures using dynamic methods - Part 7: Thermal mass-flow controllers | EN ISO 6145-7 | - |
| ISO 6974 | series | Natural gas - Determination of composition with defined uncertainty by gas chromatography | EN ISO 6974 | series |
| ISO 7066-2 | - | Assessment of uncertainty in the calibration and use of flow measurement devices - Part 2: Non-linear calibration relationships | - | - |
| ISO 8573-1 | - | Compressed air - Part 1: Contaminants and purity classes | - | - |

**EN IEC 62282-7-2:2021 (E)**

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| ISO 8756 | - | Air quality; handling of temperature, pressure and humidity data | - | - |
| ISO 12185 | - | Crude petroleum and petroleum products - Determination of density - Oscillating U-tube method | EN ISO 12185 | - |

# IEC 62282-7-2

Edition 1.0 2021-05

# INTERNATIONAL STANDARD

## Fuel cell technologies –
## Part 7-2: Test methods – Single cell and stack performance tests for solid oxide fuel cells (SOFCs)

IEC 62282-7-2:2021-05(en)

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# IEC 62282-7-2

Edition 1.0 2021-05

# INTERNATIONAL STANDARD

## Fuel cell technologies –
## Part 7-2: Test methods – Single cell and stack performance tests for solid oxide fuel cells (SOFCs)

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 27.070 ISBN 978-2-8322-9805-3

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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# FUEL CELL TECHNOLOGIES –

# Part 7-2: Test methods – Single cell and stack performance tests for solid oxide fuel cells (SOFCs)

## FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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IEC 62282-7-2 has been prepared by IEC technical committee 105: Fuel cell technologies. It is an International Standard.

This first edition cancels and replaces IEC TS 62282-7-2 published in 2014.

This edition includes the following significant technical changes with respect to IEC TS 62282-7-2:2014:

a) users can substitute selected test methods of this document with equivalent test methods of IEC 62282-8-101 for solid oxide cell (SOC) operation for energy storage purposes, operated in reverse or reversible mode;
b) terms and definitions are aligned with the corresponding terms and definitions in IEC 62282-8-101;
c) symbols are aligned with the corresponding symbols in IEC 62282-8-101.

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

| FDIS | Report on voting |
|---|---|
| 105/847/FDIS | 105/851/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/standardsdev/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,
- replaced by a revised edition, or
- amended.

# INTRODUCTION

This part of IEC 62282 specifies test methods for a single cell and stack (denoted as "cell/stack" hereafter) that is required in power generation systems using solid oxide fuel cells (SOFCs).

SOFCs 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 units", which are defined as those units containing not only a cell or stack but also peripherals.

# FUEL CELL TECHNOLOGIES –

# Part 7-2: Test methods – Single cell and stack performance tests for solid oxide fuel cells (SOFCs)

## 1 Scope

This part of IEC 62282 applies to SOFC cell/stack assembly units, testing systems, instruments and measuring methods, and specifies test methods to test the performance of SOFC cells and stacks.

This document is not applicable to small button cells that are designed for SOFC material testing and provide no practical means of fuel utilization measurement.

This document is used based on the recommendation of the entity that provides the cell performance specification 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.

Users can substitute selected test methods of this document with equivalent test methods of IEC 62282-8-101 for solid oxide cell (SOC) operation for energy storage purposes, operated in reverse 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, *International Electrotechnical Vocabulary (IEV) – Part 485: Fuel cell technologies* (available at http://www.electropedia.org)

IEC 60584-1, *Thermocouples – Part 1: EMF specifications and tolerances*

IEC 60584-3, *Thermocouples – Part 3: Extension and compensating cables – Tolerances and identification system*

IEC 61515, *Mineral insulated metal-sheathed thermocouple cables and thermocouples*

ISO 5168, *Measurement of fluid flow – Procedures for the evaluation of uncertainties*

ISO 6141, *Gas analysis – Contents of certificates for calibration gas mixtures*

ISO 6142-1*, Gas analysis – Preparation of calibration gas mixtures – Gravimetric method for Class I mixtures*

ISO 6143, *Gas analysis – Comparison methods for determining and checking the composition of calibration gas mixtures*

ISO 6145-7, *Gas analysis – Preparation of calibration gas mixtures using dynamic methods – Part 7: Thermal mass-flow controllers*

ISO 6974 (all parts), *Natural gas – Determination of composition with defined uncertainty by gas chromatography*

ISO 7066-2, *Assessment of uncertainty in the calibration and use of flow measurement devices – Part 2: Non-linear calibration relationships*

ISO 8573-1, *Compressed air – Part 1: Contaminants and purity classes*

ISO 8756, *Air quality – Handling of temperature, pressure and humidity data*

ISO 12185, *Crude petroleum and petroleum products – Determination of density – Oscillating U-tube method*