

<b>STN</b>	<b>Systémy prietokových batérií na stacionárne používanie</b> <b>Časť 2-1: Všeobecné požiadavky na prevádzkové vlastnosti a skúšobné metódy</b>	<b>STN</b> <b>EN IEC 62932-2-1</b>  36 4396
------------	--	--

Flow battery energy systems for stationary applications - Part 2-1: Performance general requirements and test methods

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. 09/20

Obsahuje: EN IEC 62932-2-1:2020, IEC 62932-2-1:2020

**131666**

EUROPEAN STANDARD

**EN IEC 62932-2-1**

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2020

ICS 29.220.99

English Version

**Flow battery energy systems for stationary applications - Part 2-1: Performance general requirements and test methods  
(IEC 62932-2-1:2020)**

Systèmes de production d'énergie de batteries  
d'accumulateurs à circulation d'électrolyte pour applications  
stationnaires - Partie 2-1: Exigences générales de  
performances et méthodes d'essai  
(IEC 62932-2-1:2020)

Flussbatterie-Systeme für stationäre Anwendungen - Teil 2-1 : Allgemeine Leistungsanforderungen und Prüfverfahren  
(IEC 62932-2-1:2020)

This European Standard was approved by CENELEC on 2020-03-24. 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.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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 62932-2-1:2020 (E)****European foreword**

The text of document 21/1028/FDIS, future edition 1 of IEC 62932-2-1, prepared by IEC/TC 21 "Secondary cells and batteries" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62932-2-1:2020.

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) 2020-12-24
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-03-24

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 62932-2-1:2020 was approved by CENELEC as a European Standard without any modification.

## 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](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61427-2	-	Secondary cells and batteries for renewable energy storage - General requirements and methods of test - Part 2: On-grid applications	EN 61427-2	-
IEC 62932-1	-	Flow battery energy systems for stationary applications - Part 1: Terminology and general aspects	-	-
IEC 62932-2-2	-	Flow battery energy systems for stationary applications - Part 2-2 Safety requirements	-	-



IEC 62932-2-1

Edition 1.0 2020-02

# INTERNATIONAL STANDARD

---

**Flow battery energy systems for stationary applications –  
Part 2-1: Performance general requirements and test methods**



**THIS PUBLICATION IS COPYRIGHT PROTECTED****Copyright © 2020 IEC, Geneva, Switzerland**

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

**About the IEC**

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

**About IEC publications**

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

**IEC publications search - [webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)**

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

**IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)**

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

**IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)**

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [sales@iec.ch](mailto:sales@iec.ch).

**Electropedia - [www.electropedia.org](http://www.electropedia.org)**

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

**IEC Glossary - [std.iec.ch/glossary](http://std.iec.ch/glossary)**

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.



IEC 62932-2-1

Edition 1.0 2020-02

# INTERNATIONAL STANDARD

---

**Flow battery energy systems for stationary applications –  
Part 2-1: Performance general requirements and test methods**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

---

ICS 29.220.99

ISBN 978-2-8322-7853-6

**Warning! Make sure that you obtained this publication from an authorized distributor.**

## CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references .....	6
3 Terms, definitions and abbreviated terms .....	6
3.1 Terms and definitions.....	6
3.2 Abbreviated terms.....	6
4 General requirements .....	7
5 General test conditions.....	7
5.1 Accuracy of measuring instruments.....	7
5.1.1 Voltage measurement.....	7
5.1.2 Current measurement.....	7
5.1.3 Electric energy measurement .....	7
5.1.4 Temperature measurement.....	7
5.1.5 Time measurement.....	7
5.2 Ambient temperature.....	7
5.3 Point of connection (POC) and point of measurement (POM).....	8
5.4 Test object.....	9
5.5 Test object unit (TOU) selection.....	9
6 Test methods.....	9
6.1 Determination of energy at a constant power .....	9
6.1.1 General .....	9
6.1.2 Test procedures.....	9
6.2 Determination of maximum deliverable output power .....	10
6.2.1 General .....	10
6.2.2 Test procedures.....	10
6.3 Determination of maximum receivable input power.....	11
6.3.1 General .....	11
6.3.2 Test procedures.....	11
6.4 Determination of energy efficiency at a constant power level .....	12
6.4.1 General .....	12
6.4.2 Test procedures.....	12
6.5 Determination of cycle life.....	13
Annex A (informative) Testing of discharge power vs energy or energy efficiency .....	14
Figure 1 – Flow battery energy system.....	5
Figure 2 – POM/POC interconnection cases a), b), c) .....	8



## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FLOW BATTERY ENERGY SYSTEMS FOR STATIONARY APPLICATIONS –****Part 2-1: Performance general requirements and test methods**

## 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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62932-2-1 has been prepared by IEC technical committee 21: Secondary cells and batteries, in collaboration with IEC technical committee 105: Fuel cell technologies.

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

FDIS	Report on voting
21/1028/FDIS	21/1036/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 62932 series, published under the general title *Flow battery energy systems for stationary applications*, 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.

## INTRODUCTION

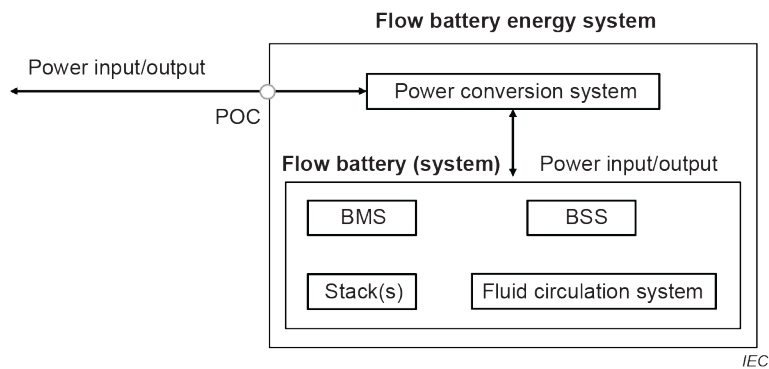
A flow battery system (FBS) can be utilized as a main part of a flow battery energy system (FBES). Such an FBES can consist of:

- a flow battery system,
- a power conversion system,
- other equipment and surroundings.

The FBES is connected to the external power input or output via a point of connection (POC).

This document includes the domain of the FBES, as shown in Figure 1. Auxiliary energy to the battery management system (BMS), battery support system (BSS), and power conversion system (PCS) may be supplied by one of the following:

- direct connection to the external power source;
- the internal power source of the FBES or FBS itself.



**Figure 1 – Flow battery energy system**

# **FLOW BATTERY ENERGY SYSTEMS FOR STATIONARY APPLICATIONS –**

## **Part 2-1: Performance general requirements and test methods**

### **1 Scope**

This part of IEC 62932 specifies methods of test and requirements for the flow battery system (FBS) and the flow battery energy system (FBES) for the verification of their performances.

This document is applicable to FBES or FBS which are designed and used for service in stationary locations (i.e. not generally to be moved from place to place).

This document does not cover testing of the system for electromagnetic compatibility (EMC).

### **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 62932-1, *Flow battery energy systems for stationary applications – Part 1: Terminology and general aspects*

IEC 62932-2-2, *Flow battery energy systems for stationary applications – Part 2-2: Safety requirements*

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

**koniec náhľadu – text ďalej pokračuje v platenej verzii STN**