

STN	Systemy na akumuláciu elektrickej energie (EES) Časť 2-1: Parametre a skúšobné metódy Všeobecná špecifikácia	STN EN IEC 62933-2-1 36 4400
------------	---	--

Electrical energy storage (EES) systems - Part 2-1: Unit parameters and testing methods - General specification

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. 01/19

Obsahuje: EN IEC 62933-2-1:2018, IEC 62933-2-1:2017

127840

EUROPEAN STANDARD

EN IEC 62933-2-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2018

ICS 13.020.30

English Version

Electrical energy storage (EES) systems - Part 2-1: Unit parameters and testing methods - General specification (IEC 62933-2-1:2017)

Systèmes de stockage d'énergie électrique - Partie 2-1 :
Paramètres d'unité et méthodes d'essai - Spécification
générale
(IEC 62933-2-1:2017)

Elektrische Energiespeichersysteme - Teil 2-1:
Einheitsparameter und Prüfverfahren - Allgemeine
Festlegungen
(IEC 62933-2-1:2017)

This European Standard was approved by CENELEC on 2018-01-17. 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, 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 62933-2-1:2018 (E)**European foreword**

The text of document 120/109/FDIS, future edition 1 of IEC 62933-2-1, prepared by IEC/TC 120 "Electrical energy storage (EES) systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62933-2-1:2018.

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) 2018-10-17
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2021-01-17

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 62933-2-1:2017 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 62620	NOTE	Harmonized as EN 62620.
IEC 62933-3-1 ¹	NOTE	Harmonized as EN 62933-3-1 ² .
IEC 60060-1	NOTE	Harmonized as EN 60060-1.
IEC 60068-2(series)	NOTE	Harmonized as EN 60068-2 (series).
IEC 60721-2-2	NOTE	Harmonized as EN 60721-2-2.
IEC 60721-2-4	NOTE	Harmonized as HD 478.2.4 S1.
IEC 60146-1-1	NOTE	Harmonized as EN 60146-1-1.
IEC 60146-1-3	NOTE	Harmonized as EN 60146-1-3.
IEC 60146-2	NOTE	Harmonized as EN 60146-2.
IEC 62109-1	NOTE	Harmonized as EN 62109-1.
IEC 62109-2	NOTE	Harmonized as EN 62109-2.
IEC 62116	NOTE	Harmonized as EN 62116.
IEC 62477-1:2012	NOTE	Harmonized as EN 62477-1:2012 (not modified).
IEC 62909-1	NOTE	Harmonized as EN 62909-1.
IEC 60947-1	NOTE	Harmonized as EN 60947-1.
IEC 60947-2	NOTE	Harmonized as EN 60947-2.
IEC 60947-3	NOTE	Harmonized as EN 60947-3.
IEC 60947-4-1	NOTE	Harmonized as EN 60947-4-1.
IEC 61439-1	NOTE	Harmonized as EN 61439-1.
IEC 61439-2	NOTE	Harmonized as EN 61439-2.
IEC 61439-3	NOTE	Harmonized as EN 61439-3.

¹ Under development. Stage at the time of publication: IEC CDM 62933-3-1:2017.

² Under development. Stage at the time of publication: prEN 62933-3-1:2016.

IEC 61439-5	NOTE	Harmonized as EN 61439-5.
IEC 61439-6	NOTE	Harmonized as EN 61439-6.
IEC 62271-1	NOTE	Harmonized as EN 62271-1.
IEC 62271-100	NOTE	Harmonized as EN 62271-100.
IEC 62271-102	NOTE	Harmonized as EN 62271-102.
IEC 62271-103	NOTE	Harmonized as EN 62271-103.
IEC 62271-105	NOTE	Harmonized as EN 62271-105.
IEC 62271-200	NOTE	Harmonized as EN 62271-200.
IEC 62271-202	NOTE	Harmonized as EN 62271-202.
IEC 60076-1	NOTE	Harmonized as EN 60076-1.
IEC 60076-2	NOTE	Harmonized as EN 60076-2.
IEC 60076-3	NOTE	Harmonized as EN 60076-3.
IEC 60076-5	NOTE	Harmonized as EN 60076-5.
IEC 60076-10	NOTE	Harmonized as EN 60076-10.
IEC 60076-11	NOTE	Harmonized as EN 60076-11.
IEC 60076-13	NOTE	Harmonized as EN 60076-13.
IEC 61558-1	NOTE	Harmonized as EN 61558-1.
IEC 60038	NOTE	Harmonized as EN 60038.
IEC 60071-1	NOTE	Harmonized as EN 60071-1.
IEC 60364-1	NOTE	Harmonized as HD 60364-1.
IEC 60364-4-41	NOTE	Harmonized as HD 60364-4-41.
IEC 60364-4-42	NOTE	Harmonized as HD 60364-4-42.
IEC 60364-4-43	NOTE	Harmonized as HD 60364-4-43.
IEC 60364-4-44	NOTE	Harmonized as HD 60364-4-442 and HD 60364-4-444.
IEC 60364-5-52	NOTE	Harmonized as HD 60364-5-52.
IEC 60364-5-53	NOTE	Harmonized as HD 60364-5-53.
IEC 60364-5-54	NOTE	Harmonized as HD 60364-5-54.
IEC 60364-7-712	NOTE	Harmonized as HD 60364-7-712.
IEC 62305-1	NOTE	Harmonized as EN 62305-1.
IEC 62305-2	NOTE	Harmonized as EN 62305-2.
IEC 62305-3	NOTE	Harmonized as EN 62305-3.
IEC 62305-4	NOTE	Harmonized as EN 62305-4.
IEC 62446-1	NOTE	Harmonized as EN 62446-1.
IEC 61672-1	NOTE	Harmonized as EN 61672-1.
IEC 61672-2	NOTE	Harmonized as EN 61672-2.
IEC 61000-2-2	NOTE	Harmonized as EN 61000-2-2.
IEC 61000-3-2	NOTE	Harmonized as EN 61000-3-2.
IEC 61000-3-3	NOTE	Harmonized as EN 61000-3-3.
IEC 61000-3-11	NOTE	Harmonized as EN 61000-3-11.
IEC 61000-3-12	NOTE	Harmonized as EN 61000-3-12.
IEC 61000-6-1	NOTE	Harmonized as EN 61000-6-1.
IEC 61000-6-2	NOTE	Harmonized as EN 61000-6-2.

EN IEC 62933-2-1:2018 (E)

IEC 61000-6-3	NOTE	Harmonized as EN 61000-6-3.
IEC 61000-6-5	NOTE	Harmonized as EN 61000-6-5.

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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60364-6	-	Low-voltage electrical installations - Part 6: Verification	HD 60364-6	-
IEC 61000-4-7	-	Electromagnetic compatibility (EMC) -- Part 4-7: Testing and measurement techniques - General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto	EN 61000-4-7	-
IEC 61400-21	-	Wind turbines -- Part 21: Measurement and assessment of power quality characteristics of grid connected wind turbines	EN 61400-21	-
IEC TR 61850-90-7	-	Communication networks and systems for power utility automation - Part 90-7: Object models for power converters in distributed energy resources (DER) systems	-	-
IEC 61936-1	-	Power installations exceeding 1 kV a.c. - Part 1: Common rules	EN 61936-1	-
IEC 62933-1 ³	-	Electrical energy storage (EES) systems – Part 1: Vocabulary	EN 62933-1 ⁴	-

³ Under preparation. Stage at the time of publication: IEC FDIS 62933-1:2017.

⁴ Under preparation. Stage at the time of publication: FprEN 62933-1:2017



IEC 62933-2-1

Edition 1.0 2017-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Electrical energy storage (EES) systems –
Part 2-1: Unit parameters and testing methods – General specification**

**Systèmes de stockage de l'énergie électrique (EES) –
Partie 2-1: Paramètres unitaires et méthodes d'essai – Spécifications générales**



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2017 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.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

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

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
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 corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

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

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

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions 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

65 000 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 Customer Service Centre - 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: csc@iec.ch.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - www.iec.ch/searchpub

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

65 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.



IEC 62933-2-1

Edition 1.0 2017-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Electrical energy storage (EES) systems –
Part 2-1: Unit parameters and testing methods – General specification**

**Systèmes de stockage de l'énergie électrique (EES) –
Partie 2-1: Paramètres unitaires et méthodes d'essai – Spécifications générales**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 13.020.30

ISBN 978-2-8322-5146-1

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references	7
3 Terms, definitions, abbreviated terms and symbols.....	7
3.1 Terms and definitions.....	7
3.2 Abbreviated terms.....	8
3.3 Symbols.....	8
4 Classification of EES system	8
4.1 General.....	8
4.2 Categorizing the application of EES system	9
4.3 Class A applications	9
4.3.1 Frequency regulation	9
4.3.2 Fluctuation reduction	9
4.3.3 Voltage regulation	9
4.4 Class B – Peak shaving/peak shifting.....	10
4.5 Class C – Back-up power	10
5 Unit parameters	10
5.1 General.....	10
5.1.1 Overview	10
5.1.2 Reference environmental conditions	10
5.1.3 Standard testing conditions	11
5.1.4 Typical architecture	11
5.2 List of unit parameters	12
5.2.1 Nominal energy capacity.....	12
5.2.2 Input and output power rating	12
5.2.3 Roundtrip efficiency.....	14
5.2.4 Expected service life.....	15
5.2.5 System response	15
5.2.6 Auxiliary power consumption	16
5.2.7 Self- discharge of EES system.....	17
5.2.8 Rated voltage range	17
5.2.9 Rated frequency range	17
6 Testing methods and procedures.....	17
6.1 General.....	17
6.2 Parameter test	18
6.2.1 Actual energy capacity test.....	18
6.2.2 Input and output power rating test.....	19
6.2.3 Roundtrip efficiency test	20
6.2.4 Expected service life test.....	21
6.2.5 System response test, step response time and ramp rate	21
6.2.6 Auxiliary power consumption test.....	24
6.2.7 Self-discharge of EES system test.....	24
6.2.8 Rated voltage and frequency range test.....	25
6.3 Performance test	25
6.3.1 General	25
6.3.2 Performance test for class A applications	26

6.3.3	Performance test for class B applications	26
6.3.4	Performance test for Class C applications	27
6.4	System implementation test	27
6.4.1	Visual inspection	27
6.4.2	Continuity and validity of conductors.....	28
6.4.3	Earthing test.....	28
6.4.4	Insulation test.....	28
6.4.5	Protective and switching device test	28
6.4.6	Equipment and basic function test	29
6.4.7	Grid connection compatibility test	29
6.4.8	Available energy test	30
6.4.9	EMC immunity test.....	30
Annex A (informative)	Duty cycle for efficiency test.....	31
A.1	General.....	31
A.2	Class A application duty cycle.....	31
A.2.1	General	31
A.2.2	Duty cycle.....	31
A.3	Class B application duty cycles	32
A.3.1	General	32
A.3.2	Duty cycle.....	32
Annex B (informative)	Fluctuation reduction test	33
B.1	General.....	33
B.2	Fluctuation reduction test.....	33
Annex C (informative)	Back-to-back test method for EES system.....	35
C.1	Back-to-back test without grid interconnection	35
C.2	Back-to-back test with grid interconnection	36
Bibliography	37
Figure 1	– Example of classification of EES systems	9
Figure 2	– Typical architecture of EES system	12
Figure 3	– Optional architecture of EES system	12
Figure 4	– Sign convention of active power and reactive power	14
Figure 5	– Step response time and ramp rate of EES system	16
Figure 6	– Typical testing points for apparent power	20
Figure 7	– System response test.....	23
Figure A.1	– Class A application duty cycle.....	31
Figure A.2	– Class B application duty cycles	32
Figure B.1	– Power stabilization test	33
Figure B.2	– Report of stabilization test	34
Figure C.1	– Back-to-back test configuration (EESS module type)	35
Figure C.2	– Back-to-back test configuration (AC/DC/AC converter type).....	36
Figure C.3	– Back-to-back test configuration (EESS module type)	36

Table 1 – Example of typical and not exclusive applications classification.....	9
Table 2 – Normal environmental conditions.....	11
Table 3 – Standard testing conditions	11
Table 4 – Document format of roundtrip efficiency	20
Table 5 – Performance test items.....	26

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL ENERGY STORAGE (EES) SYSTEMS –**Part 2-1: Unit parameters and testing methods – General specification**

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 62933-2-1 has been prepared by IEC technical committee TC 120: Electrical energy storage (EES) systems.

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

FDIS	Report on voting
120/109/FDIS	120/115/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 62933 series, published under the general title *Electrical energy storage (EES) systems*, 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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

ELECTRICAL ENERGY STORAGE (EES) SYSTEMS –

Part 2-1: Unit parameters and testing methods – General specification

1 Scope

This part of IEC 62933 focuses on unit parameters and testing methods of EES systems. The energy storage devices and technologies are outside the scope of this document. This document deals with EES system performance defining:

- unit parameters,
- testing methods.

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 60364-6, *Low voltage electrical installations – Part 6: Verification*

IEC 61000-4-7, *Electromagnetic compatibility (EMC) – Part 4-7: Testing and measurement techniques – General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto*

IEC 61400-21, *Wind turbines – Part 21: Measurement and assessment of power quality characteristics of grid connected wind turbines*

IEC TR 61850-90-7, *Communication networks and systems for power utility automation – Part 90-7: Object models for power converters in distributed energy resources (DER) systems*

IEC 61936-1, *Power installations exceeding 1 kV a.c. - Part 1: Common rules*

IEC 62933-11, *Electrical energy storage (EES) systems – Part 1: Vocabulary*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN

¹ Under preparation. Stage at the time of publication: IEC FDIS 62933-1:2017