



BSI Standards Publication

Electrical energy storage (EES) systems

Part 5-2: Safety requirements for grid-integrated EES systems — Electrochemical-based systems

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National foreword

This British Standard is the UK implementation of EN IEC 62933-5-2:2020. It is identical to IEC 62933-5-2:2020.

The UK participation in its preparation was entrusted to Technical Committee ESL/120, Electrical Energy Storage.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

Electrical energy storage (EES) systems - Part 5-2: Safety requirements for grid-integrated EES systems - Electrochemical-based systems
(IEC 62933-5-2:2020)

Systèmes de stockage de l'énergie électrique (EES) - Partie 5-2: Exigences de sécurité pour les systèmes EES intégrés dans un réseau - Systèmes électrochimiques
(IEC 62933-5-2:2020)

Elektrische Energiespeichersysteme (EES-Systeme) - Teil 5-2: Sicherheitsanforderungen an netzintegrierte EES-Systeme elektrochemische Systeme
(IEC 62933-5-2:2020)

This European Standard was approved by CENELEC on 2020-05-21. 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.

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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

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European foreword

The text of document 120/173/FDIS, future edition 1 of IEC 62933-5-2, 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 62933-5-2:2020.

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) 2021-02-21
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-05-21

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The text of the International Standard IEC 62933-5-2:2020 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 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 60721 (series)	NOTE	Harmonized as EN 60721 (series)
IEC 60896-21	NOTE	Harmonized as EN 60896-21
IEC 60896-22	NOTE	Harmonized as EN 60896-22
IEC 61140	NOTE	Harmonized as EN 61140
IEC 61427-1	NOTE	Harmonized as EN 61427-1
IEC 61427-2	NOTE	Harmonized as EN 61427-2
IEC 61508 (series)	NOTE	Harmonized as EN 61508 (series)
IEC 61511-1:2016	NOTE	Harmonized as EN 61511-1:2017 (not modified)
IEC 62040-1	NOTE	Harmonized as EN IEC 62040-1
IEC 62040-2	NOTE	Harmonized as EN IEC 62040-2
IEC 62116:2014	NOTE	Harmonized as EN 62116:2014 (not modified)
IEC 62351 (series)	NOTE	Harmonized as EN 62351 (series)
IEC 62381:2012	NOTE	Harmonized as EN 62381:2012 (not modified)
IEC 62443-2-4	NOTE	Harmonized as EN IEC 62443-2-4
IEC 62485-1	NOTE	Harmonized as EN IEC 62485-1
IEC 62909-1	NOTE	Harmonized as EN IEC 62909-1
IEC 62932-1:2020	NOTE	Harmonized as EN IEC 62932-1:2020 (not modified)
ISO 1182	NOTE	Harmonized as EN ISO 1182
ISO 9241 (series)	NOTE	Harmonized as EN ISO 9241 (series)
ISO 13732-1:2006	NOTE	Harmonized as EN ISO 13732-1:2008 (not modified)
ISO 13850:2015	NOTE	Harmonized as EN ISO 13850:2015 (not modified)

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(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 60068-2-52	-	Environmental testing - Part 2-52: Tests - Test Kb: Salt mist, cyclic (sodium chloride solution)	EN IEC 60068-2-52	-
IEC 60079-7	2015	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"	EN 60079-7	2015
+ A1	2017		+ A1	2018
IEC 60079-13	-	Explosive atmospheres - Part 13: Equipment protection by pressurized room "p" and artificially ventilated room "v"	EN 60079-13	-
IEC 60079-29	series	Explosive atmospheres - Gas detectors	EN 60079-29	series
IEC 60364	series	Low-voltage electrical installations	-	-
IEC 60364-4-44	-	Low-voltage electrical installations - Part 4-44: Protection for safety - Protection against voltage disturbances and electromagnetic disturbances	HD 60364-4-442	-
IEC 60364-6	2016	Low voltage electrical installations - Part 6: Verification	HD 60364-6	2016
			+ A11	2017
			+ A12	2017
IEC 60529	-	Degrees of protection provided by enclosures (IP Code)	-	-
IEC 60664-1	2007	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests	EN 60664-1	2007
IEC 60812	-	Failure modes and effects analysis (FMEA and FMECA)	EN IEC 60812	-

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IEC 61000-1-2	-	Electromagnetic compatibility (EMC) - Part 1-2: General - Methodology for the achievement of functional safety of electrical and electronic systems including equipment with regard to electromagnetic phenomena	EN 61000-1-2	-
IEC 61000-6-7	-	Electromagnetic compatibility (EMC) - Part 6-7: Generic standards - Immunity requirements for equipment intended to perform functions in a safety-related system (functional safety) in industrial locations	EN 61000-6-7	-
IEC 61025	-	Fault tree analysis (FTA)	-	-
IEC 61660-1	-	Short-circuit currents in d.c. auxiliary installations in power plants and substations - Part 1: Calculation of short-circuit currents	EN 61660-1	-
IEC 61660-2	-	Short-circuit currents in d.c. auxiliary installations in power plants and substations - Part 2: Calculation of effects	EN 61660-2	-
IEC 61882	-	Hazard and operability studies (HAZOP studies) - Application guide	EN 61882	-
IEC 61936-1 (mod)	2010	Power installations exceeding 1 kV a.c. - Part 1: Common rules	EN 61936-1	2010
			+ AC	2013
+ A1	2014		+ A1	2014
IEC 62305-2	-	Protection against lightning - Part 2: Risk management	-	-
IEC 62368-1	-	Audio/video, information and communication technology equipment - Part 1: Safety requirements	EN IEC 62368-1	-
IEC 62477-1	2012	Safety requirements for power electronic converter systems and equipment - Part 1: General	EN 62477-1	2012
			+ A11	2014
+ A1	2016		+ A1	2017
IEC 62485-2	-	Safety requirements for secondary batteries and battery installations - Part 2: Stationary batteries	EN IEC 62485-2	-
IEC 62619	2017	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications	EN 62619	2017

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IEC 62933-1	-	Electrical energy storage (EES) systems - Part 1: Vocabulary	EN IEC 62933-1	-
IEC/TS 62933-5-1	2017	Electrical energy storage (EES) systems - Part 5-1: Safety considerations for grid integrated EES systems - General specification	-	-
ISO/IEC Guide 51	2014	Safety aspects - Guidelines for their inclusion in standards	-	-

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CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	8
3 Terms and definitions	9
4 Basic guidelines for safety of BESS.....	11
4.1 General.....	11
4.2 Approach to BESS safety.....	12
4.3 BESS changes in ownership, control or use.....	14
5 Hazard considerations.....	14
6 BESS system risk assessment.....	15
6.1 BESS structure	15
6.1.1 General characteristics.....	15
6.1.2 Specific characteristics.....	16
6.2 Description of BESS conditions.....	16
6.3 Risk analysis	16
6.3.1 General	16
6.3.2 Hazard identification specific to BESS.....	17
6.3.3 Risk consideration	17
6.3.4 System level risk analysis.....	17
6.4 System level risk assessment	17
7 Requirements necessary to reduce risks	17
7.1 General measures to reduce risks.....	17
7.2 Preventive measures against damage to neighbouring inhabitants.....	18
7.3 Preventive measures against physical injury or damage to the health of workers and residents.....	18
7.4 Overcurrent protection design.....	18
7.5 BESS disconnection and shutdown	18
7.6 Operation and maintenance	18
7.7 Staff training	18
7.8 Safety design.....	19
7.9 General requirements for BESS safety.....	19
7.10 Inherently safe design of BESS.....	19
7.10.1 Protection from electrical hazards.....	19
7.10.2 Protection from mechanical hazards	20
7.10.3 Protection from explosion	21
7.10.4 Protection from hazards arising from electric, magnetic, and electromagnetic fields.....	21
7.10.5 Protection from fire hazards.....	21
7.10.6 Protection from temperature hazards.....	21
7.10.7 Protection from chemical effects	22
7.10.8 Protection from hazards arising from auxiliary, control and communication system malfunctions.....	22
7.10.9 Protection from hazards arising from environments.....	22
7.11 Guards and protective measures.....	23
7.11.1 General	23
7.11.2 BESS disconnection and shutdown.....	23

This is a preview of "BS EN IEC 62933-5-2:....". [Click here to purchase the full version from the ANSI store.](#)

7.11.3	Other guards and protective functions of BESS	24
7.12	Information for end users	28
7.13	Life cycle safety management	28
7.13.1	Operation and maintenance	28
7.13.2	Partial system change	31
7.13.3	Design revision	32
7.13.4	End of service life management	33
7.13.5	Measures for validating life cycle safety management	33
8	System validation and testing	33
8.1	General	33
8.2	Validation and testing of BESS	36
8.2.1	Electrical hazards	36
8.2.2	Mechanical hazards	38
8.2.3	Explosion	38
8.2.4	Hazards arising from electric, magnetic, and electromagnetic fields	39
8.2.5	Fire hazards (propagation)	39
8.2.6	Temperature hazards	40
8.2.7	Chemical effects	41
8.2.8	Hazards arising from auxiliary, control and communication system malfunctions	42
8.2.9	Hazards arising from environments	42
8.2.10	IP rating of BESS enclosure and protective guards	43
9	Guidelines and manuals	43
Annex A (informative) Ownership models of BESS		44
Annex B (informative) BESS hazards and risks		45
B.1	General introduction	45
B.2	Hazard concerns	51
B.2.1	General	51
B.2.2	Fire hazards	51
B.2.3	Chemical hazards	51
B.2.4	Electrical hazards	51
B.2.5	Energy hazards	52
B.2.6	Physical hazards	52
B.2.7	High-pressure hazards	52
B.3	Hazard considerations under normal operating conditions	52
B.3.1	Fire and explosive hazards	52
B.3.2	Chemical hazards	52
B.3.3	Electrical hazards	53
B.3.4	Physical hazards	53
B.4	Hazard considerations under emergency/abnormal conditions	54
B.4.1	Fire hazards	54
B.4.2	Chemical hazards	54
B.4.3	Electrical hazards	55
B.4.4	Physical hazards	56
B.5	Commercially available battery technologies	56
B.5.1	Lithium ion (Li-ion) batteries (C-A)	56
B.5.2	Lead-acid batteries (C-B)	57
B.5.3	Nickel batteries (C-B)	58
B.5.4	High-temperature sodium batteries (C-C)	60

This is a preview of "BS EN IEC 62933-5-2:....". [Click here to purchase the full version from the ANSI store.](#)

B.5.5	Flow batteries (C-D)	61
B.5.6	Lithium metal solid state batteries (C-Z)	63
B.6	Other technologies.....	63
Annex C (informative)	Large-scale fire testing on BESS.....	64
Annex D (informative)	Test methods for protection from hazards arising from environments	65
D.1	General.....	65
D.2	Outdoor installations subject to moisture exposure	65
D.3	Outdoor installation near marine environments	65
Annex E (informative)	Information for validation of BESS life cycle safety management.....	66
E.1	Overview	66
E.2	General introduction	66
E.3	Operation and maintenance process	66
E.4	Preventive maintenance.....	66
E.5	Measuring and monitoring of system soundness	67
E.6	Staff training	67
E.7	Partial system change.....	67
E.8	Design revision	67
Annex F (informative)	BESS safety signage.....	68
Annex G (informative)	Example of testing for verification of thermal control operation.....	69
Bibliography.....		70
Figure 1 – General description for risk assessment and reduction of BESS.....		11
Figure 2 – An example of BESS architecture.....		15
Figure 3 – Example of isolated condition (whole isolation of BESS)		24
Figure 4 – Incompatibility of capacity and/or usage in a BESS		32
Table 1 – BESS categories		13
Table 2 – Examples of BESS use.....		14
Table 3 – Examples of components within subsystems of a BESS		16
Table 4 – Examples of incompatibilities that can arise from system changes		32
Table 5 – Overview of validation and testing for BESS.....		35
Table B.1 – Hazards of BESS in common		47
Table B.2 – Hazards of BESS using non-aqueous electrolyte battery (category "C-A").....		48
Table B.3 – Hazards of BESS using aqueous electrolyte battery (category "C-B").....		49
Table B.4 – Hazards of BESS using high temperature battery (category "C-C")		50
Table B.5 – Hazards of BESS using flow battery (category "C-D")		51

This is a preview of "BS EN IEC 62933-5-2:....". [Click here to purchase the full version from the ANSI store.](#)

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL ENERGY STORAGE (EES) SYSTEMS –

Part 5-2: Safety requirements for grid-integrated EES systems – Electrochemical-based systems

FOREWORD

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International Standard IEC 62933-5-2 has been prepared by IEC technical committee 120: Electrical Energy Storage (EES) Systems.

This International Standard is to be used in conjunction with IEC TS 62933-5-1:2017.

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

FDIS	Report on voting
120/173/FDIS	120/182/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.

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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.

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INTRODUCTION

All the electrical energy storage systems (EESS) follow the general safety requirements as described in IEC TS 62933-5-1, which is based on a systems approach. IEC 62933-5-2 follows the same structure as IEC TS 62933-5-1 and provides additional requirements for battery energy storage systems (BESS). The additional requirements are provided for the following reasons:

- a) BESS can be integrated into a significant range of electrical grids.
- b) The level of safety requirements awareness can vary between utilities, system integrators, operators and end-users.
- c) Although the safety of individual subsystems is generally covered by international standards at ISO and IEC levels, the safety matters that arise due to the combination of electrochemical accumulation subsystems and any electrical subsystems are not always considered. BESS are complex at the systems level due to the variety of potential battery options and configurations, including the combination of subsystems (e.g. control systems for electrochemical accumulation subsystems, electrochemical accumulation subsystems, power conversion subsystems and auxiliary subsystems). Compliance with standards and related material produced specifically for the safety of subsystems cannot be sufficient to reach an acceptable level of safety for the overall system.
- d) BESS can have additional safety hazards, due, for example, to the presence of chemicals, the emission of toxic gases, chemicals spilt around the electrochemical accumulation subsystems and to events critical for safety from electrochemical accumulation subsystems that cause safety issues for the entire BESS. They can cause loss of power at any part of the systems and buildings that can result in additional threats to safety. From a systems perspective, these individual hazards can have a system wide impact.

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ELECTRICAL ENERGY STORAGE (EES) SYSTEMS –

Part 5-2: Safety requirements for grid-integrated EES systems – Electrochemical-based systems

1 Scope

This part of IEC 62933 primarily describes safety aspects for people and, where appropriate, safety matters related to the surroundings and living beings for grid-connected energy storage systems where an electrochemical storage subsystem is used.

This safety standard is applicable to the entire life cycle of BESS (from design to end of service life management).

This document provides further safety provisions that arise due to the use of an electrochemical storage subsystem (e.g. battery system) in energy storage systems that are beyond the general safety considerations described in IEC TS 62933-5-1.

This document specifies the safety requirements of an “electrochemical” energy storage system as a “system” to reduce the risk of harm or damage caused by the hazards of an electrochemical energy storage system due to interactions between the subsystems as presently understood.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitute 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 60068-2-52, *Environmental testing – Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)*

IEC 60079-7:2015, *Explosive atmospheres – Part 7: Equipment protection by increased safety “e”*
IEC 60079-7:2015/AMD1:2017

IEC 60079-13, *Explosive atmospheres – Part 13: Equipment protection by pressurized room “p” and artificially ventilated room “v”*

IEC 60079-29 (all parts), *Explosive atmospheres – Gas detectors*

IEC 60364 (all parts), *Low-voltage electrical installations*

IEC 60364-4-44, *Low-voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*

IEC 60364-6:2016, *Low voltage electrical installations – Part 6: Verification*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60664-1:2007, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*