BS EN IEC 62485-5:2021
Incorporating corrigendum June 2022

BSI Standards Publication

Safety requirements for secondary batteries and battery installations

Part 5: Safe operation of stationary lithium ion batteries

Documents
Document Sharing Hub

Full document details: BS EN IEC 62485-5:2021

National foreword

This British Standard is the UK implementation of EN IEC 62485-5:2021. It is identical to IEC 62485-5:2020, incorporating corrigendum June 2022.

The start and finish of text introduced or altered by corrigendum is indicated in the text by tags. Text altered by IEC corrigendum June 2022 is indicated in the text by [AC1⟩ ⟨AC1].

The UK participation in its preparation was entrusted to Technical Committee PEL/21, Secondary cells and batteries.

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

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

This publication has been prepared under a mandate given to the European Standards Organizations by the European Commission and the European Free Trade Association. It is intended to support requirements of the EU legislation detailed in the European Foreword. A European Annex, usually Annex ZA or ZZ, describes how this publication relates to that EU legislation.

For the Great Britain market (England, Scotland and Wales), if UK Government has designated this publication for conformity with UKCA marking (or similar) legislation, it may contain an additional National Annex. Where such a National Annex exists, it shows the correlation between this publication and the relevant UK legislation. If there is no National Annex of this kind, the relevant Annex ZA or ZZ in the body of the European text will indicate the relationship to UK regulation applicable in Great Britain. References to EU legislation may need to be read in accordance with the UK designation and the applicable UK law. Further information on designated standards can be found at www.bsigroup.com/standardsandregulation.

For the Northern Ireland market, UK law will continue to implement relevant EU law subject to periodic confirmation. Therefore Annex ZA/ZZ in the European text, and references to EU legislation, are still valid for this market.

UK Government is responsible for legislation. For information on legislation and policies relating to that legislation, consult the relevant pages of www.gov.uk.

AVA Documents
Document Sharing Hub

BRITISH STANDARD

© The British Standards Institution 2022
Published by BSI Standards Limited 2022

ISBN 978 0 539 23206 6

ICS 29.220.20; 29.220.30; 29.220.99

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 January 2021.

Amendments/corrigenda issued since publication

Date	Text affected
30 September 2022	Implementation of IEC corrigendum June 2022

Documents
Document Sharing Hub

Full document details: BS EN IEC 62485-5:2021

Documents
Document Sharing Hub

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 62485-5

January 2021

ICS 29.220.20; 29.220.30

English Version

Safety requirements for secondary batteries and battery installations - Part 5: Safe operation of stationary lithium ion batteries (IEC 62485-5:2020)

Exigences de sécurité pour les batteries d'accumulateurs et les installations de batteries - Partie 5: Fonctionnement en toute sécurité des batteries ions-lithium stationnaires (IEC 62485-5:2020)

Sicherheitsanforderungen an sekundäre Batterien und Batterieanlagen - Teil 5: Sicherer Betrieb von stationären Lithium-Ionen-Batterien (IEC 62485-5:2020)

This European Standard was approved by CENELEC on 2020-12-30. 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

© 2021 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC Members.

Ref. No. EN IEC 62485-5:2021 E

AVA Documents Document Sharing Hub

Full document details: BS EN IEC 62485-5:2021

European foreword

The text of document 21/1069/FDIS, future edition 1 of IEC 62485-5, prepared by IEC/TC 21 "Secondary cells and batteries" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62485-5:2021.

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) 2021-09-30
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-12-30

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 62485-5:2020 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 60065	NOTE	Harmonized as EN 60065
IEC 60079-10-1	NOTE	Harmonized as EN 60079-10-1
IEC 60364-1	NOTE	Harmonized as HD 60364-1
IEC 60364-4-42	NOTE	Harmonized as HD 60364-4-42
IEC 60364-5-54	NOTE	Harmonized as HD 60364-5-54
IEC 60364-7-706	NOTE	Harmonized as HD 60364-7-706
IEC 60695-11-20	NOTE	Harmonized as EN 60695-11-20
IEC 60695-11-10	NOTE	Harmonized as EN 60695-11-10
IEC 60900	NOTE	Harmonized as EN IEC 60900
IEC 60950-1	NOTE	Harmonized as EN 60950-1
IEC 60990	NOTE	Harmonized as EN 60990
IEC 61000-4-2	NOTE	Harmonized as EN 61000-4-2
IEC 61000-6-5	NOTE	Harmonized as EN 61000-6-5
ISO 9773	NOTE	Harmonized as EN ISO 9773

Documents
Document Sharing Hub

Full document details: BS EN IEC 62485-5:2021

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 60050-482	-	International Electrotechnical Vocabulary - Part 482: Primary and secondary cells and batteries	-	-
IEC 60364-4-41 (mod)	2005	Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock	HD 60364-4-41	2017
+A1	2017		+ A11	2017
-	-		+ A12	2019
IEC 60364-4-43	-	IEC 60364-4-43 Ed. 4: Low-voltage electrical installations - Part 4-43: Protection for safety - Protection against overcurrent	-	-
IEC 60364-5-53	-	Low-voltage electrical installations - Part 5-53: Selection and erection of electrical equipment - Protection, isolation, switching, control and monitoring	-	-
IEC 60364-5-54	-	Low-voltage electrical installations - Part 5-54: Selection and erection of electrical equipment - Earthing arrangements and protective conductors	HD 60364-5-54	-
IEC 60417	-	Graphical symbols for use on equipment. Index, survey and compilation of the single sheets.	-	-
IEC 60529	-	Degrees of protection provided by enclosures (IP Code)	-	-
IEC 60664-1	2020	Insulation coordination for equipment within low-voltage supply systems - Part 1: Principles, requirements and tests	EN IEC 60664-1	2020
IEC 60755	-	General safety requirements for residual current operated protective devices	-	-

Documents
Document Sharing Hub
Full document details: BS EN IEC 62485-5:2021

Publication	Year	Title	EN/HD	Year
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 61000-6-1	-	Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity standard for residential, commercial and light-industrial environments	EN IEC 61000-6-1	-
IEC 61000-6-2	-	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments	EN IEC 61000-6-2	-
IEC 61000-6-3	-	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for equipment in residential environments	EN IEC 61000-6-3[1]	-
IEC 61000-6-4	-	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments	EN IEC 61000-6-4	-
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 61140	-	Protection against electric shock - Common aspects for installation and equipment	EN 61140	-
IEC/TR 61340-1	-	Electrostatics - Part 1: Electrostatic phenomena - Principles and measurements	-	-
IEC 61340-5-1	-	Electrostatics - Part 5-1: Protection of electronic devices from electrostatic phenomena - General requirements	EN 61340-5-1	-
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 62133-2	-	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary lithium cells, and for batteries made from them, for use in portable applications - Part 2: Lithium systems	EN 62133-2	-

[1] To be published. Stage at the time of publication: prEN IEC 61000-6-3:2019.

Documents
Document Sharing Hub

Full document details: BS EN IEC 62485-5:2021

Publication	Year	Title	EN/HD	Year
IEC 62485-1	-	Safety requirements for secondary batteries and battery installations - Part 1: General safety information	EN IEC 62485-1	-
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
IEC 62620	2014	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for use in industrial applications	EN 62620	2015
ISO/IEC Guide 51	-	Safety aspects - Guidelines for their inclusion in standards	-	-
ISO 3864	series	Graphical symbols - Safety colours and safety signs	-	-
ISO 7010	-	Graphical symbols - Safety colours and safety signs - Registered safety signs	-	-

Documents
Document Sharing Hub
Full document details: BS EN IEC 62485-5:2021

IEC 62485-5

Edition 1.0 2020-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Safety requirements for secondary batteries and battery installations – Part 5: Safe operation of stationary lithium ion batteries

Exigences de sécurité pour les batteries d'accumulateurs et les installations de batteries – Partie 5: Fonctionnement en toute sécurité des batteries ions-lithium stationnaires

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 29.220.20; 29.220.30

ISBN 978-2-8322-9091-0

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.

AVA Documents
Document Sharing Hub

® Registered trademark of the International Electrotechnical Commission
Marque déposée de la Commission Electrotechnique Internationale

Full document details: BS EN IEC 62485-5:2021

CONTENTS

FOREWORD 5
INTRODUCTION 7
1 Scope 8
2 Normative references 8
3 Terms and definitions and abbreviated terms 10
3.1 Terms and definitions 10
3.2 Abbreviated terms 14
4 Protection against electric shock 14
4.1 General 14
4.2 Basic protection 14
4.3 Fault protection 15
4.3.1 General 15
4.3.2 Protection by automatic disconnection of supply 16
4.3.3 Protection by use of class II equipment or by equivalent insulation 20
4.3.4 Protection by electrical separation 20
4.4 Protective measure: extra-low voltage provided by SELV, PELV and FELV 20
4.4.1 General 20
4.4.2 Protection by SELV or by PELV 20
4.4.3 Protection by functional extra-low voltage (FELV) without protective separation 20
5 Disconnection and separation 21
6 Prevention of short-circuits and protection from other effects of electric current 21
6.1 General 21
6.2 Short-circuits 22
6.3 Maintenance instructions 22
6.3.1 General 22
6.3.2 Protective measures during maintenance 22
6.4 Leakage currents 23
7 Provision against hazards 23
7.1 General 23
7.2 Charging modes 23
7.3 Overcharging or overdischarging under fault conditions 24
7.4 Prevention of electrostatic discharges when working with batteries 24
8 Provision against hazards posed by chemical substances 24
8.1 General 24
8.2 Initial actions in case of hazardous chemical release 24
8.2.1 General 24
8.2.2 Eye or skin contact 25
8.2.3 Swallowing 25
8.2.4 Respiratory tract 25
8.2.5 Burns 25
8.3 Battery accessories and maintenance tools 25
9 Accommodation, housing 25
9.1 General 25
9.2 Specific requirements for separate battery rooms 25

AVA Documents
Document Sharing Hub

Full document details: BS EN IEC 62485-5:2021

9.3 Specific requirements for the specially separated areas in rooms accommodating electrical equipment ... 26
9.4 Battery enclosures ... 26
9.5 Working on or near batteries ... 26
9.5.1 Working distances within battery rooms ... 26
9.5.2 Remarks on special work in battery rooms ... 27
9.6 Accommodation of lithium ion batteries in combination with batteries containing aqueous electrolyte (e.g. lead-acid and NiCd batteries) in the same room ... 27
10 Charge current requirements ... 27
10.1 General ... 27
10.2 Superimposed ripple current ... 27
10.3 Maximum ripple current ... 27
11 Identification labels, warning notices and instructions for use, installation and maintenance ... 28
11.1 Warning labels and notices in rooms ... 28
11.2 Identification labels or marking on cell, module, battery pack or battery system ... 28
11.3 Instructions for use, installation and maintenance ... 28
12 Transportation, storage and environmental aspects ... 28
13 Inspection and monitoring ... 29
14 EMC for stationary application ... 29
Annex A (informative) Charging methods and modes of operation ... 31
A.1 Parallel operation mode ... 31
A.1.1 General ... 31
A.1.2 Battery "stand-by" operation mode ... 31
A.1.3 Battery "buffer" operation mode ... 31
A.1.4 Shallow cycling operation mode ... 32
A.2 Response mode operation ... 32
A.3 Charging methods ... 32
A.3.1 General ... 32
A.3.2 Temperature compensation of the charge voltage and limiting of charge currents ... 33
A.4 Discharge ... 33
Annex B (normative) Electromagnetic compatibility (EMC) ... 34
B.1 Case 1 – EMC requirements for battery systems depending on each end-device application ... 34
B.2 Case 2 – EMC requirements for testing battery system as an end-device ... 34
Annex C (informative) Cell behaviour inside and outside of operating region ... 35
Bibliography ... 36

Figure 1 – TN system with separate protective conductor (PE) in the entire system (TN-S network) ... 16
Figure 2 – TN system with functional earthing and protective earthing (FPE, PEN) combined with an external line conductor (TN-C system) ... 17
Figure 3 – TT system ... 18
Figure 4 – IT system ... 19
Figure 5 – Converters with intermediate DC circuit (IT system) (example) ... 19
Figure A.1 – Parallel operation mode circuit ... 31

AVA Documents
Document Sharing Hub
Full document details: BS EN IEC 62485-5:2021

Figure A.2 – Example of battery charge current interlaced with frequent temporary discharge events due to a load current exceeding the current supply capability 32
Figure A.3 – Response mode operation circuit 32
Figure A.4 – Constant current/constant voltage charge 33
Figure C.1 – An example for operating region of lithium ion cell 35

Documents
Document Sharing Hub
Full document details: BS EN IEC 62485-5:2021

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SAFETY REQUIREMENTS FOR SECONDARY BATTERIES AND BATTERY INSTALLATIONS –

Part 5: Safe operation of stationary lithium ion batteries

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 62485-5 has been prepared by IEC technical committee 21: Secondary cells and batteries.

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

FDIS	Report on voting
21/1069/FDIS	21/1076/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.

Documents
Document Sharing Hub

Full document details: BS EN IEC 62485-5:2021

A list of all parts in the IEC 62485 series, published under the general title *Safety requirements for secondary batteries and battery installations*, 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.

Documents
Document Sharing Hub

Full document details: BS EN IEC 62485-5:2021