



DPC: 25 / 30507567 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

Date: 08 January 2025

Origin: International

Latest date for receipt of comments: 31 January 2025

Project No. 2022/02587

Responsible committee: PEL/21 Secondary cells and batteries

Interested committees:

Title: BS EN IEC 62620 Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for use in industrial applications

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

**WARNING: THIS IS A DRAFT AND MUST NOT BE REGARDED OR USED AS A BRITISH STANDARD.
THIS DRAFT IS NOT CURRENT BEYOND 31 January 2025**

This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

No copying is allowed, in any form, without prior written permission from BSI except as permitted under the Copyright, Designs and Patent Act 1988 or for circulation within a nominating organization for briefing purposes. Electronic circulation is limited to dissemination by e-mail within such an organization by committee members.

Further copies of this draft may be purchased from BSI Shop <http://shop.bsigroup.com> or from BSI Customer Services, Tel: +44(0) 20 8996 9001 or email cservices@bsigroup.com. British, International and foreign standards are also available from BSI Customer Services.

Information on the co-operating organizations represented on the committees referenced above may be obtained from <http://standardsdevelopment.bsigroup.com>

Responsible Committee Secretary: **Lilly Malik (BSI)**

Direct tel:

E-mail: lilly.malik@bsigroup.com

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
------------------	------------------------

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

PROJECT NUMBER:

IEC 62620 ED2

DATE OF CIRCULATION:

2025-01-03

CLOSING DATE FOR COMMENTS:

2025-02-28

SUPERSEDES DOCUMENTS:

21A/853/CD, 21A/862A/CC

IEC SC 21A : SECONDARY CELLS AND BATTERIES CONTAINING ALKALINE OR OTHER NON-ACID ELECTROLYTES

SECRETARIAT:

France

SECRETARY:

Mr Jean-Marie Bodet

OF INTEREST TO THE FOLLOWING COMMITTEES:

TC 21

HORIZONTAL FUNCTION(S):

ASPECTS CONCERNED:

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Recipients of this document are invited to submit, with their comments, notification of any local regulations or technical reasons that may exist and should be considered should this proposal proceed, recognizing that failure to address such requirements could result in the need for new or existing "In Some Countries" clauses. (SEE [AC/22/2007](#) OR [NEW GUIDANCE DOC](#)).

TITLE:

Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for use in industrial applications.

NOTE FROM TC/SC OFFICERS:

The resolved comments have been distributed under reference 21A/862A/CC on 2024-12-27. During the SC21A WG5 Spring Meeting on 2024-04 an action plan has been approved to add annexes about the definition and method of measurement of State of health (SOH) and durability. The annexes have been presented and discussed by the SC21A/WG5 on 2024-11-20. During SC21A Plenary Meeting on 2024-11-21 the decision to circulate a CD2 has been approved by the participating members (21A/912/DL - SC21A/P2024/10).

CONTENTS

1		
2	FOREWORD	4
3	1 Scope	6
4	2 Normative references	6
5	3 Terms and definitions	6
6	4 Parameters measurement tolerances	8
7	5 Marking and designation	8
8	5.1 Marking	8
9	5.2 Cell designation	10
10	5.3 Battery designation	12
11	5.3.1 General	12
12	5.3.2 Battery structure formulation	13
13	5.4 Cell or battery termination	13
14	6 Electrical tests	13
15	6.1 General	13
16	6.2 Charging procedure for test purposes	14
17	6.3 Discharge performance	14
18	6.3.1 Discharge performance at +25 °C	14
19	6.3.2 Discharge performance at low temperature	15
20	6.3.3 High rate permissible current	15
21	6.4 Charge (capacity) retention and recovery	16
22	6.4.1 General	16
23	6.4.2 Test method	16
24	6.4.3 Acceptance criterion	16
25	6.5 Cell and battery internal resistance	17
26	6.5.1 General	17
27	6.5.2 Measurement of the internal a.c. resistance	17
28	6.5.3 Measurement of the internal d.c. resistance	17
29	6.6 Endurance	18
30	6.6.1 Endurance in cycles	18
31	6.6.2 Endurance in storage at constant voltage (permanent charge life)	19
32	7 Type test conditions	20
33	7.1 General	20
34	7.2 Sample size	20
35	7.3 Conditions for type approval	22
36	7.3.1 Dimensions	22
37	7.3.2 Electrical tests	22
38	Annex A (informative) Battery structure information	23
39	A.1 Example 1	23
40	A.2 Example 2	23
41	A.3 Example 3	23
42	A.4 Example 4	23
43	A.5 Example 5	24
44	A.6 Example 6	24
45	A.7 Example 7	25
46	A.8 Example 8	25

47	A.9 Example 9.....	26
48	Bibliography.....	27
49		
50	Figure 1 – Test sequence	21
51	Figure A.1 – Structure 3S	23
52	Figure A.2 – Structure 2P	23
53	Figure A.3 – Structure 3S2P	23
54	Figure A.4 – Structure 2P4S	24
55	Figure A.5 – Structure 2P4S3P	24
56	Figure A.6 – Structure (2P4S)3P.....	25
57	Figure A.7 – Structure (3S2P)3P.....	25
58	Figure A.8 – Structure (5S)4S.....	26
59	Figure A.9 – Structure ((3S2P)3P)2S	26
60		
61	Table 1 – Marking	10
62	Table 2 – Discharge performance at +25 °C ± 5 °C	14
63	Table 3 – Discharge performance at low temperature	15
64	Table 4 – Discharge current values for high rate permissible test.....	16
65	Table 5 – Constant discharge current used for measurement of the internal d.c.	
66	resistance	18
67	Table 6 – Type test.....	20
68	Table 7 – Severe conditions.....	22
69		
70		

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SECONDARY CELLS AND BATTERIES CONTAINING
ALKALINE OR OTHER NON-ACID ELECTROLYTES –
SECONDARY LITHIUM CELLS AND BATTERIES
FOR USE IN INDUSTRIAL APPLICATIONS**

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 62620 has been prepared by subcommittee 21A: Secondary cells and batteries containing alkaline or other non-acid electrolytes, of IEC technical committee 21: Secondary cells and batteries.

The text of this standard is based on the following documents:

FDIS	Report on voting
21A/561/FDIS	21A/572/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

119 The committee has decided that the contents of this publication will remain unchanged until the
120 stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to
121 the specific publication. At this date, the publication will be

- 122 • reconfirmed,
- 123 • withdrawn,
- 124 • replaced by a revised edition, or
- 125 • amended.

126

127

128

**SECONDARY CELLS AND BATTERIES CONTAINING
ALKALINE OR OTHER NON-ACID ELECTROLYTES –
SECONDARY LITHIUM CELLS AND BATTERIES
FOR USE IN INDUSTRIAL APPLICATIONS**

1. Scope

This International Standard specifies marking, tests and requirements for lithium secondary cells and batteries used in industrial applications including stationary applications.

When there exists an IEC standard specifying test conditions and requirements for cells used in special applications and which is in conflict with this standard, the former takes precedence. (e.g. IEC 62660 series on road vehicles).

The following are some examples of applications that utilize the cells and batteries under the scope of this standard.

- Stationary applications: telecom, uninterruptible power supplies (UPS), electrical energy storage system (EESS), utility switching, emergency power and similar applications.
- Motive applications: fork-lift truck, golf cart, automated guide vehicle (AGV), railway, and marine, excluding road vehicles.

Applications excluded from the portable use specified in the scope of IEC61960-3.

NOTE 1 EESS and UPS, which use batteries with electrical energy equal or lower than 500 Wh are excluded.

Since this standard covers batteries for various industrial applications, it includes those requirements, which are common and minimum to the various applications.

This document addresses first life cells and batteries. Reuse, repurpose, second life use or similar are not taken into consideration by this document.

2. Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-482:2004, *International Electrotechnical Vocabulary (IEV) – Part 482: Primary and secondary cells and batteries*

ISO/IEC Guide 51, *Safety aspects – Guidelines for their inclusion in standards*

3. Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-482 and ISO/IEC Guide 51 as well as the following apply.

3.1. charge recovery**capacity recovery**

capacity that a cell or battery can deliver after the charge following the charge retention test

Note 1 to entry: Charge retention is defined in 3.2.

3.2. charge retention**capacity retention**

capacity that a cell or battery can deliver after storage, at a specific temperature, for a specific time without subsequent recharge as a percentage of the rated capacity

3.3. final voltage**end-of-discharge voltage**

specified closed circuit voltage at which the discharge of a cell or battery is terminated

3.4. nominal voltage

suitable approximate value of the voltage used to designate or identify a cell or a battery

Note 1 to entry: The cell or battery manufacturer may provide the nominal voltage.

Note 2 to entry: The nominal voltage of a battery of n series connected cells is equal to n times the nominal voltage of a single cell.

[SOURCE: IEC 60050-482:2004, 482-03-31, modified – Addition of Notes 1 and 2 to entry.]

3.5.**rated capacity**

capacity value of a cell or battery determined under specified conditions and declared by the manufacturer

Note 1 to entry: The rated capacity is the quantity of electricity C_n Ah (ampere-hours) declared by the manufacturer which a single cell or battery can deliver during a n h period when charging, storing and discharging under the conditions specified in 6.3.1. n is 5 for an E, M and H discharge rate type cell or battery. n is 8, 10, 20 or 240 for an S discharge rate type battery.

[SOURCE: IEC 60050-482:2004, 482-03-15, modified – Addition of Note 1 to entry.]

3.6. cell**secondary lithium cell**

secondary cell where electrical energy is derived from the insertion and extraction reactions of lithium ions or oxidation and reduction reaction of lithium between the negative electrode and the positive electrode

Note 1 to entry: A secondary cell is a manufactured unit providing a source of electrical energy by direct conversion of chemical energy. The cell consists of electrodes, electrolyte, container, terminals and, if any, separators. The electrode can be monopolar or bipolar; the current collector of the former has active material of single polarity and latter has positive and negative electrode active materials. The electrolyte includes an ionic conductive liquid or solid, or mixture of them. The cell is designed to be charged electrically.

3.7. cell block

group of cells connected together in parallel configuration with or without protective devices (e.g. fuse or positive temperature coefficient device (PTC)) and monitoring circuitry

Note 1 to entry: The cell block is not ready for use in an application because it is not yet fitted with its final housing, terminal arrangement and electronic control device.

3.8. module

group of cells connected together either in a series and/or parallel configuration with or without protective devices (e.g. fuse or PTC) and monitoring circuitry

3.9. battery pack

energy storage device, which comprises one or more cells or modules electrically connected and has monitoring circuitry which provides information (e.g. cell voltage) to a battery system to influence the battery 's safety, performance and/or service life

Note 1 to entry: The battery pack may incorporate a protective housing and be provided with terminals or other interconnection arrangements.

**3.10. battery system
battery**

system which comprises one or more cells, modules or battery packs and has a battery management system capable of controlling current in case of overcharge, overcurrent, overdischarge, and overheating Note 1 to entry: Overdischarge cut-off is not mandatory if there is an agreement between the cell manufacturer and the customer.

Note 2 to entry: The battery system may have cooling or heating units. More than one battery system may constitute a larger battery system. The battery system is sometimes also referred to as a battery.

**3.11. battery management system
BMS**

electronic system associated with a battery which has functions to control current in case of overcharge, overcurrent, overdischarge, and overheating and which monitors and/or manages the battery's state, calculates secondary data, reports that data and/or controls its environment to influence the battery 's safety, performance and/or service life

Note 1 to entry: Overdischarge cut-off is not mandatory if there is an agreement between the cell manufacturer and the customer.

Note 2 to entry: The function of the BMS can be assigned to the battery pack or to equipment that uses the battery. (See Figure 6.)

Note 3 to entry: The BMS can be divided and it can be found partially in the battery pack and partially on the equipment that uses the battery. (See Figure 6.)

Note 4 to entry: The BMS is sometimes also referred to as a BMU (battery management unit).

4. Parameters measurement tolerances

The overall accuracy of controlled or measured values, relative to the specified or actual values, shall be within the following tolerances:

- a) $\pm 0,5$ % for voltage;
- b) ± 1 % for current;
- c) ± 2 °C for temperature;
- d) $\pm 0,1$ % for time;
- e) ± 1 % for dimensions.

These tolerances comprise the combined accuracy of the measuring instruments, the measurement techniques used, and all other sources of error in the test procedure.

The details of the instrumentation used shall be provided in any report of results.

5. Marking and designation**5.1 Marking**

The marking items shown in Table 1 are indicated on the cell, battery system or instruction manual. When marked on the cell or battery system, each cell or battery system that is installed or maintained shall carry clear and durable markings giving the information.

The following options are allowed:

- 255 • if there are designations on a battery system, designations are not necessary on the battery
256 pack, module or cell;
- 257 • if there are designations on a battery pack, designations are not necessary on the module
258 and cell;
- 259 • if there are designations on a module, designations are not necessary on the cell.

260 However, for a transportable unit (i.e. a unit that is being shipped), it is necessary to provide
261 the marking information on the main transportable unit or in its instruction manual. Furthermore,
262 if there is a marking matter of arrangement between the purchaser and the manufacturer, it
263 shall comply with the agreement.

264 See Table 1.

265 Each cell or battery that is installed or maintained shall carry clear and durable markings giving
266 the following information:

- 267 • secondary (rechargeable) Li or Li-ion;
- 268 • polarity (can be deleted if there is an agreement between cell and pack manufacturer);
- 269 • Year and either day with month, week or month of manufacture (which may be in code);
- 270 • name or identification of manufacturer or supplier;
- 271 • rated capacity;
- 272 • nominal voltage;
- 273 • appropriate caution statement.

274 The model name and manufacturing traceability shall be marked on the cell and battery surface.
275 The other items listed above can be marked on the smallest package or supplied with the cell
276 or the battery.

277 The following information shall be marked on or supplied with the cell or the battery:

- 278 • disposal instructions;
- 279 • recommended charge instructions.

280 The following information shall be marked on the cell or when there is no marking place on the
281 cell, it shall be marked in the manual.

- 282 • cell designation as specified in 5.2.

283

Table 1 – Marking

Marking information	Cell	Cell block, Module or Battery pack	Battery system
Secondary (rechargeable) Li or Li-ion	R	R	R
Polarity (see NOTE 1)	R	R	R
Year and either day with month, week or month of manufacture (which may be in code)	R	R	R
Name or identification of manufacturer or supplier	R	R	R ^a
Rated capacity	R	R	R ^b
Calculated rated capacity ^c	--	--	R
Method for calculating rated capacity ^c	--	--	R
Nominal voltage	R	R	R
Watt-hour* (see NOTE 2)	V	V	V
Appropriate caution statement (Including disposal instructions)	R	R	R
Cell designation as specified in 5.2	R	--	--
Battery designation as specified in 5.3	--	R	R
Recommended charge instructions	R	R	R
"R" = required; "V" = voluntary, "--" = unnecessary or not applicable			
a It is necessary to mark designations on the main battery system. b Tested by main battery system; shall be indicated on the main battery system. c If evaluated by testing the split unit of a battery system; it shall be indicated as the rated capacity and shall be the amount calculated by a reasonable method. For example: Measured rated capacity of module: 10 Ah Number of modules connected in parallel: 5 Calculated rated capacity (Ah) = 10 Ah × 5 = 50 Ah NOTE 1 There is an exception, see 5.1. NOTE 2 Watt-hour (Wh) designation on cell, module, battery pack or battery system is the rated capacity (Ah) or calculated rated capacity (Ah) as defined in table footnote^c multiplied by the nominal voltage of the cell, module, battery pack or battery system according to the following formula: Watt-hour (Wh) = Rated capacity (Ah) or Calculated rated capacity (Ah) × Nominal voltage (V)			

284

285 **5.2. Cell designation**

286 Cells shall be designated with following form:

287
$$A_1 A_2 A_3 N_2 / N_3 / N_4 / A_4 / T_L T_H / N_C$$

288 where

289 **A₁** designates the negative electrode basis in which:

290 I is carbon;

291 T is titanium;

292 X is other material.

293 **A₂** designates the positive electrode basis in which: