

INTERNATIONAL STANDARD

COMMENTED VERSION

**Secondary cells and batteries containing alkaline or other non-acid electrolytes -
Safety requirements for portable sealed secondary cells, and for batteries made
from them, for use in portable applications -
Part 1: Nickel systems**

CONTENTS

FOREWORD	3
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Parameter measurement tolerances	7
5 General safety considerations	8
5.1 General.....	8
5.2 Insulation and wiring	8
5.3 Venting	8
5.4 Temperature, voltage and current management	8
5.5 Terminal contacts	9
5.6 Assembly of cells into batteries	9
5.7 Quality plan	9
6 Type test and sample size	9
7 Specific requirements and tests	10
7.1 Charging procedure for test purposes	10
7.2 Intended use	10
7.2.1 Continuous low-rate charging (cells).....	10
7.2.2 Vibration	10
7.2.3 Case stress at high ambient temperature (batteries).....	11
7.2.4 Temperature cycling	11
7.3 Reasonably foreseeable misuse.....	12
7.3.1 Incorrect installation (cells).....	12
7.3.2 External short circuit.....	12
7.3.3 Free fall	13
7.3.4 Mechanical shock (crash hazard).....	13
7.3.5 Thermal abuse (cells)	13
7.3.6 Crushing of Crush (cells)	13
7.3.7 Low pressure (cells)	14
7.3.8 Overcharge.....	14
7.3.9 Forced discharge (cells)	14
8 Information for safety.....	14
8.1 General.....	14
8.2 Small cell and battery safety information	15
9 Marking	15
9.1 Cell marking.....	15
9.2 Battery marking	16
9.3 Caution for ingestion of small cells and batteries	16
9.4 Other information	16
10 Packaging	16
Annex A (informative) Recommendations to equipment manufacturers and battery assemblers	17
Annex B (informative) Recommendations to the end-users	18
Annex C (informative) Packaging	19
Bibliography.....	20

List of comments.....	21
Figure 1 – Temperature profile for 7.2.4 – Temperature cycling test.....	12
Figure 2 – Ingestion gauge	15
Table 1 – Sample size for type tests	10
Table 2 – Conditions for vibration test.....	11

INTERNATIONAL ELECTROTECHNICAL COMMISSION

Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications - Part 1: Nickel systems

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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC [had/had not] received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

This commented version (CMV) of the official standard IEC 62133-1:2026 edition 2.0 allows the user to identify the changes made to the previous IEC 62133-1:2017 edition 1.0. Furthermore, comments from IEC SC 21A experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

IEC 62133-1 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. It is an International Standard.

This second edition cancels and replaces the first edition of IEC 62133-1 published in 2017. It constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 62133-1:2017:

- a) removal of the definition "secondary battery";
- b) removal of the definition "portable battery";
- c) "removal of the definition "portable cell";
- d) replacement of the single term "room temperature" with $20\text{ °C} \pm 5\text{ °C}$ in 7.2.3;
- e) modification of Figure 1.

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

Draft	Report on voting
21A/946/FDIS	21A/969/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts of the IEC 62133 series, published under the general title *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable 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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

1 Scope

This part of IEC 62133 specifies requirements and tests for the safe operation of portable sealed secondary nickel cells and batteries containing alkaline electrolyte, under intended use and reasonably foreseeable misuse.

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

IEC 61951-1, *Secondary cells and batteries containing alkaline or other non-acid electrolytes - ~~Portable sealed rechargeable single cells~~ Secondary sealed cells and batteries for portable applications* 1 - Part 1: Nickel-Cadmium

IEC 61951-2, *Secondary cells and batteries containing alkaline or other non-acid electrolytes - ~~Portable sealed rechargeable single cells~~ Secondary sealed cells and batteries for portable applications* 1 - Part 2: Nickel-metal hydride

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

Bibliography

IEC 60051 (all parts), *Direct acting indicating analogue electrical measuring instruments and their accessories*

IEC 60664 (all parts), *Insulation coordination for equipment within low-voltage systems*

IEC 61434, *Secondary cells and batteries containing alkaline or other non-acid electrolytes - Guide to designation of current in alkaline secondary cell and battery standards*

IEC TR 61438, *Possible safety and health hazards in the use of alkaline secondary cells and batteries - Guide to equipment manufacturers and users*

IEC TR 62188, *Secondary cells and batteries containing alkaline or other non-acid electrolytes - Design and manufacturing recommendations for portable batteries made from sealed secondary cells*

ISO 8124-1, *Safety of toys - Part 1: Safety aspects related to mechanical and physical properties*

List of comments

- 1 These changes are made to be consistent with the terms used for rechargeable cells and batteries.
 - 2 This term does not occur in the standard and hence the definition is removed.
 - 3 More details are added as simple venting is not a major hazard.
 - 4 An example is provided on what features can provide additional safety.
 - 5 Clarity is added with this phrase.
 - 6 Editorial change is made to be consistent with the correct use of the word.
 - 7 Experience has indicated that the age of the cells needs to be considered when making batteries, and cells of different ages should not be mixed due to differences in electrochemical and component aging factors. Manufacturer's recommendations should be taken into account.
 - 8 Details are provided on the hazards of exposing batteries to water, especially salt water, in order to prevent shorting, and to indicate that condensation can also result in the collection of water.
 - 9 Clarity is added that disposal of the cells and batteries should be performed in a responsible manner by understanding the disposal methods for the relevant battery chemistry and carrying them out responsibly.
-