IEC 62133-1

Edition 2.0 2026-03

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

ICS 29.220.30

ISBN 978-2-8327-1136-1

THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2026 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.

IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
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 corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
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 It also gives information on projects, replaced and withdrawn publications.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 once a month by email.

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: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

Warning! Make sure that you obtained this publication from an authorized distributor.

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 °C ± 5 °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*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

– IEC Electropedia: available at https://www.electropedia.org/

– ISO Online browsing platform: available at https://www.iso.org/obp

3.1
safety
freedom from unacceptable risk

3.2
risk
combination of the probability of occurrence of harm and the severity of that harm

3.3
harm
physical injury or damage to the health of people or damage to property or to the environment

3.4
hazard
potential source of harm

3.5
intended use
use of a product, process or service in accordance with specifications, instructions and information provided by the supplier

3.6
reasonably foreseeable misuse
use of a product, process or service in a way which is not intended by the supplier, but which may result from readily predictable human behaviour

3.7
secondary cell
basic manufactured unit providing a source of electrical energy by direct conversion of chemical energy, that consists of electrodes, separators, electrolyte, container and terminals, and that is designed to be charged electrically

~~**3.8**~~
~~**secondary battery**~~ **2**
~~assembly of secondary cell(s) ready for use as a source of electrical energy characterized by its voltage, size, terminal arrangement, capacity and rate capability~~

~~Note 1 to entry: Includes single cell batteries.~~

3.8
leakage
unplanned, visible escape of liquid electrolyte

3.9
venting
release of excessive internal pressure from a cell or battery in a manner intended by design to preclude rupture or explosion

3.10
rupture
mechanical failure of a cell container or battery case induced by an internal or external cause, resulting in exposure or spillage but not ejection of materials

3.11
explosion
failure that occurs when a cell container or battery case opens violently and major components are forcibly expelled

3.12
fire
emission of flames from a cell or battery

~~**3.14**~~
~~**portable battery**~~ **2**
~~battery for use in a device or appliance which is conveniently hand-carried~~

~~**3.15**~~
~~**portable cell**~~ **2**
~~cell intended for assembly in a portable battery~~

3.13
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_5 Ah (ampere-hours) declared by the manufacturer which a single cell can deliver when discharged at the reference test current of 0,2 I_t A to a specified final voltage, after charging, storing and discharging under specified conditions.

[SOURCE: IEC 60050-482:2004, 482-03-15, modified – In the definition, "battery" replaced with "cell or battery", Note 1 to entry added]

3.14
reference test current
I_t
charge or discharge current, expressed as a multiple of I_t A, where I_t A = C_5 Ah/1 h, as defined in IEC 61434, and based on the rated capacity (C_5 Ah) of the cell or battery

3.15
button cell
coin cell
cell with a cylindrical shape in which the overall height is less than the diameter, e.g. in the shape of a button or a coin

Note 1 to entry: In practice, the term coin is used exclusively for non-aqueous lithium cells.

[SOURCE: IEC 60050-482:2004, 482-02-40]

3.16
cylindrical cell
cell with a cylindrical shape in which the overall height is equal to or greater than the diameter

[SOURCE: IEC 60050-482:2004, 482-02-39]

3.17
prismatic cell
cell having the shape of a parallelepiped whose faces are rectangular

[SOURCE: IEC 60050-482:2004, 482-02-38, modified – Source term is "prismatic" (adj.). In the definition, "qualifies a cell or a battery" replaced with "cell"]

4 Parameter measurement tolerances

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

a) ± 1 % for voltage;

b) ± 1 % for current;

c) ± 2 °C for temperature;

d) ± 0,1 % for time;

e) ± 1 % for dimension;

f) ± 1 % for capacity.

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.