

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

**Secondary cells and batteries containing alkaline or other non-acid electrolytes –
– Secondary sealed cells and batteries for portable applications –
Part 1: Nickel-cadmium**

**Accumulateurs alcalins et autres accumulateurs à électrolyte non-acide –
Accumulateurs étanches pour applications portables –
Partie 1: Nickel-cadmium**





THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2023 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.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Secretariat
3, rue de Varembe
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 It also gives information on projects, replaced and withdrawn publications.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. 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 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC -

webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, ...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 300 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 19 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

**Secondary cells and batteries containing alkaline or other non-acid electrolytes –
Secondary sealed cells and batteries for portable applications –
Part 1: Nickel-cadmium**

**Accumulateurs alcalins et autres accumulateurs à électrolyte non-acide –
Accumulateurs étanches pour applications portables –
Partie 1: Nickel-cadmium**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.220.30

ISBN 978-2-8322-6354-9

**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.**

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SECONDARY CELLS AND BATTERIES CONTAINING
ALKALINE OR OTHER NON-ACID ELECTROLYTES –
SECONDARY SEALED CELLS AND BATTERIES
FOR PORTABLE APPLICATIONS –**

Part 1: Nickel-cadmium

AMENDMENT 1

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 document may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

Amendment 1 to IEC 61951-1:2017 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 Amendment is based on the following documents:

Draft	Report on voting
21A/821/FDIS	21A/828/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 Amendment 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/.

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,
- replaced by a revised edition, or
- amended.

2 Normative references

Add, at the end of the existing list, IEC 62902 to the list of normative references, as follows:

IEC 62902, *Secondary cells and batteries – Marking symbols for identification of their chemistry*

3 Terms and definitions

Add the following term and definition for "trickle charge":

3.11

trickle charge

method of charge applied to a battery wherein the state of charge is maintained by a continuous, long term, regulated small electric current

Note 1 to entry: The trickle charge compensates self-discharge effects and maintains the battery in an approximately fully charged state.

5.3.1 Small prismatic cells and cylindrical cells

Replace, in the sixth bullet point, "name or identification" with "name, identification or registered trademark" as follows:

- name, identification, or registered trademark of manufacturer or supplier;

5.3.2 Button cells

Replace, in the fourth bullet point, "name or identification" with "name, identification or registered trademark" as follows:

- name, identification, or registered trademark of manufacturer or supplier.

5.3.3 Batteries

Add a fifth bullet point at the end of the existing bulleted list as follows:

- marking symbols (identification of the chemistry according to IEC 62902).

Table 5 – Discharge performance at 20 °C for small prismatic cells and cylindrical cells

Replace the existing title to Table 5 with the following new title:

Table 5 – Discharge performance at 20 °C for small prismatic cells

Add, after Table 5, the following new Table 32:

Table 32 – Discharge performance at 20 °C for cylindrical cells

Discharge conditions		Minimum discharge duration h/min					
Rate of constant current A	Final voltage V	Cell designation					
		L/LT/LU/LS	M/MT/MU	J	JT	H/HT/HU	X
0,2 I_t ^a	1,0	5 h	5 h	5 h	5 h	5 h	5 h
1,0 I_t	0,9	–	42 min	48 min	43 min	48 min	54 min
5,0 I_t ^b	0,8	–	–	–	–	6 min	9 min
10,0 I_t ^b	0,7	–	–	–	–	–	4 min

^a Five cycles are permitted per cell for this test. The test shall be terminated at the end of the first cycle of each cell which meets the requirement.

^b Prior to the 5 I_t A and 10 I_t A tests, a conditioning cycle may be included if necessary. This cycle shall consist of charging at 0,1 I_t A in accordance with 7.2 and discharging at 0,2 I_t A in an ambient temperature of 20 °C ± 5 °C according to 7.3.2.

7.5.1.3 Cylindrical cells dimensionally interchangeable with primary cells

Replace the bulleted item at the end of the subclause with the following:

- 200 for KR03, KR6, KR14 and KR20 cells.

7.8 Safety device operation

Replace the existing title to 7.8 with the following:

7.8 Pressure relief feature

Replace the first paragraph after the warning statement with the following paragraph:

The following test shall be carried out in order to establish that the pressure relief feature of the cell will operate to allow the escape of gas when the internal pressure exceeds a critical value.

7.12 Internal resistance

7.12.1 General

Add, after the second paragraph, the following paragraph:

There is no requirement for internal resistance, but when the value is requested, measurement is performed according to the method described in this document.

7.12.2 Measurement of the internal AC resistance

Replace the first sentence with the following:

The alternating root mean square voltage, U_a , shall be measured when applying to the cell an alternating root mean square current, I_a , at the frequency of $1,0 \text{ kHz} \pm 0,1 \text{ kHz}$ for a period of 1 s to 5 s.

Replace the introductory sentence to the formula, the formula itself, and the list of symbols, with the following:

The internal AC resistance, R_{AC} , is given by

$$R_{AC} = \frac{U_a}{I_a}$$

where

R_{AC} is the internal AC resistance (Ω);

U_a is the alternating root mean square voltage (V);

I_a is the alternating root mean square current (A).

7.12.3 Measurement of the internal DC resistance

Replace the introductory sentence to the formula, the formula itself, and the list of symbols, with the following:

The internal DC resistance, R_{DC} , of the cell shall be calculated using the following formula:

<https://standards.iteh.ai/catalog/standards/sist/29b55841-90da-4394-83fc-cd12dea2de26/iec-61951-1-2017-amd1-2023>

$$R_{DC} = \frac{U_1 - U_2}{I_2 - I_1}$$

where

R_{DC} is the internal DC resistance (Ω);

U_1, U_2 are the appropriate voltages measured during discharge (V);

I_1, I_2 are the constant discharge currents (A).

Table 31 – Recommended test sequence for batch acceptance

Replace the existing Table 31 with the following new Table 31 (footnote "a" added in order to add detail):

Table 31 – Recommended test sequence for batch acceptance

Group	Clause or subclause	Inspection/tests	Recommendation	
			Inspection level	AQL %
A		Visual inspection		
		– absence of mechanical damage	II	4
		– absence of corrosion on case and terminals	II	4
		– number, position and secure fittings of connection tabs ^a	S3	1
		– absence of liquid electrolyte on case and terminals	II	0,65
B	Clause 6 5.3	Physical inspection		
		– dimensions	S3	1
		– weight ^a	S3	1
		– marking	S3	1
C	7.3.2 7.3.2	Electrical inspection		
		– open-circuit voltage and polarity ^a	II	0,65
		– discharge at 20 °C at 0,2 I _t A	S3	1
		– discharge at 20 °C at 1,0 I _t A	S3	1
<p>NOTE Two or more failures on a single cell are not cumulative. Only the failure corresponding to the lowest AQL is taken into consideration.</p> <p>^a According to agreement between supplier and purchaser.</p>				

[IEC 61951-1:2017/AMD1:2023](https://standards.iteh.ai/catalog/standards/sist/29b55841-90da-4394-83fc-cd12dea2de26/iec-61951-1-2017-amd1-2023)

<https://standards.iteh.ai/catalog/standards/sist/29b55841-90da-4394-83fc-cd12dea2de26/iec-61951-1-2017-amd1-2023>

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

**ACCUMULATEURS ALCALINS ET AUTRES ACCUMULATEURS
À ÉLECTROLYTE NON-ACIDE – ACCUMULATEURS ÉTANCHES
POUR APPLICATIONS PORTABLES –****Partie 1: Nickel-cadmium****AMENDEMENT 1****AVANT-PROPOS**

- 1) La Commission Electrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. A cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
- 2) Les décisions ou accords officiels de l'IEC concernant les questions techniques représentent, dans la mesure du possible, un accord international sur les sujets étudiés, étant donné que les Comités nationaux de l'IEC intéressés sont représentés dans chaque comité d'études.
- 3) Les Publications de l'IEC se présentent sous la forme de recommandations internationales et sont agréées comme telles par les Comités nationaux de l'IEC. Tous les efforts raisonnables sont entrepris afin que l'IEC s'assure de l'exactitude du contenu technique de ses publications; l'IEC ne peut pas être tenue responsable de l'éventuelle mauvaise utilisation ou interprétation qui en est faite par un quelconque utilisateur final.
- 4) Dans le but d'encourager l'uniformité internationale, les Comités nationaux de l'IEC s'engagent, dans toute la mesure possible, à appliquer de façon transparente les Publications de l'IEC dans leurs publications nationales et régionales. Toutes divergences entre toutes Publications de l'IEC et toutes publications nationales ou régionales correspondantes doivent être indiquées en termes clairs dans ces dernières.
- 5) L'IEC elle-même ne fournit aucune attestation de conformité. Des organismes de certification indépendants fournissent des services d'évaluation de conformité et, dans certains secteurs, accèdent aux marques de conformité de l'IEC. L'IEC n'est responsable d'aucun des services effectués par les organismes de certification indépendants.
- 6) Tous les utilisateurs doivent s'assurer qu'ils sont en possession de la dernière édition de cette publication.
- 7) Aucune responsabilité ne doit être imputée à l'IEC, à ses administrateurs, employés, auxiliaires ou mandataires, y compris ses experts particuliers et les membres de ses comités d'études et des Comités nationaux de l'IEC, pour tout préjudice causé en cas de dommages corporels et matériels, ou de tout autre dommage de quelque nature que ce soit, directe ou indirecte, ou pour supporter les coûts (y compris les frais de justice) et les dépenses découlant de la publication ou de l'utilisation de cette Publication de l'IEC ou de toute autre Publication de l'IEC, ou au crédit qui lui est accordé.
- 8) L'attention est attirée sur les références normatives citées dans cette publication. L'utilisation de publications référencées est obligatoire pour une application correcte de la présente publication.
- 9) L'attention est attirée sur le fait que certains des éléments du présent document de l'IEC peuvent faire l'objet de droits de brevet. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets.

L'amendement 1 de l'IEC 61951-1:2017 a été établi par le sous-comité 21A: Accumulateurs alcalins et autres accumulateurs à électrolyte non acide, du comité d'études 21 de l'IEC: Accumulateurs.