

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**General guidance on reuse and repurposing of secondary cells and batteries**

**Recommandations générales relatives à la réutilisation et à la réaffectation des accumulateurs et des batteries d'accumulateurs**



**THIS PUBLICATION IS COPYRIGHT PROTECTED**  
**Copyright © 2024 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](mailto:info@iec.ch)  
[www.iec.ch](http://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](http://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 It also gives information on projects, replaced and withdrawn publications.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](http://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](http://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](mailto:sales@iec.ch).

#### IEC Products & Services Portal - [products.iec.ch](http://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](http://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.

---

#### 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](http://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](http://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](http://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](mailto:sales@iec.ch).

#### IEC Products & Services Portal - [products.iec.ch](http://products.iec.ch)

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

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 500 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 25 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

**General guidance on reuse and repurposing of secondary cells and batteries**

**Recommandations générales relatives à la réutilisation et à la réaffectation des accumulateurs et des batteries d'accumulateurs**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 29.220.20, 29.220.30, 29.220.99

ISBN 978-2-8322-9417-8

**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.**

## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	9
2 Normative references .....	9
3 Terms and definitions .....	9
4 General considerations.....	15
5 Consideration of safety risks associated with reuse and repurposing .....	16
5.1 General.....	16
5.2 Lithium ion systems .....	17
5.2.1 Lithium ion cells.....	17
5.2.2 Lithium ion battery systems .....	17
5.3 Nickel systems.....	18
5.3.1 Nickel-metal hydride cells .....	18
5.3.2 Nickel-metal hydride cells and battery systems .....	19
6 Considerations for reused or repurposed battery systems.....	19
6.1 General.....	19
6.2 Determining suitability for reuse or repurposing (based on battery lifetime traceability data) .....	20
6.2.1 General .....	20
6.2.2 Battery lifetime traceability data .....	21
6.3 Safety evaluation of reused or repurposed batteries .....	21
6.4 Reused or repurposed cell and battery operating region .....	21
7 Coordination of reuse or repurposing with the original manufacturer.....	22
7.1 General.....	22
7.2 Warning notice on reuse or repurposing applicability.....	22
7.2.1 General .....	22
7.2.2 Originally intended reuse or repurposing (according to the original manufacturer) .....	22
7.2.3 Warning notice requesting the original manufacturer's approval for reuse or repurposing .....	22
7.2.4 Absence of warning notice.....	22
8 Recommendations for reuse or repurposed application manufacturers.....	23
8.1 Removal of original cell or battery label and markings.....	23
8.2 Affixation of label or marking specifying reuse or repurposing .....	23
8.3 Prerequisites for reuse or repurposed application manufacturers .....	23
9 Environmental options if reuse or repurposing is not possible.....	23
Annex A (informative) Guidance checklist.....	24
Annex B (informative) Reuse and repurposing: relevant reference information .....	25
B.1 General.....	25
B.2 IEC 63330-1 .....	25
B.3 IEC 62933-4-4 .....	25
B.4 IEC 62933-5-3 .....	26
B.5 UL 1974 .....	26
B.6 SAE J2997 (Under development) .....	26
B.7 EN 45554.....	26

B.8 National Renewable Energy Laboratory (of the U.S. Department of Energy Office of Energy Efficiency & Renewable Energy) TP-5400-63332 ..... 26

B.9 European Commission JRC Technical Report 2018-08-28 ..... 27

B.10 Ecodesign preparatory Study for Batteries 2020-03-10 ..... 27

Annex C (informative) Examples of common terms for reuse and repurposing ..... 28

Bibliography..... 29

Figure 1 – Scope of this document..... 9

Figure 2 – Battery system configuration example ..... 18

Figure 3 – Example of protection device installation..... 19

Table 1 – Standards on reuse and repurposing of batteries and battery energy storage systems (BESS)..... 7

Table A.1 – Checklist of recommendations before reuse or repurposing of relevant secondary cells and batteries..... 24

Table B.1 – Reuse and repurposing: relevant reference information..... 25

Table C.1 – Examples of common terms for reuse and repurposing ..... 28

This document is a preview generated by EVS

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## GENERAL GUIDANCE ON REUSE AND REPURPOSING OF SECONDARY CELLS AND 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) 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 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.

IEC 63338 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.

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

Draft	Report on voting
21A/885/FDIS	21A/899/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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://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](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

This document is a preview generated by EVS

## INTRODUCTION

Based on the principles of life cycle thinking (LCT) and environmentally conscious design (ECD), secondary battery reuse and repurposing are a means to reduce raw material consumption. However, there are potential safety risks to consider before reusing or repurposing a battery. These should be thoroughly addressed before considering any kind of reuse or repurposing operations. Further, it is essential that all reused or repurposed batteries or sub-units of batteries comply with all safety, transport and product testing at the same level as new battery products (except tests requiring destructive sampling).

The primary purpose of this document is to provide basic guidance on the environmental aspects of reuse and repurposing of relevant cells and batteries; basic guidance on safety risks for the reuse and repurposing of relevant cells and batteries; basic guidance on original manufacturer warning notice on the applicability of a product for reuse or repurposing; and useful information regarding reuse and repurposing and relevant cell and battery regulations and standards to interested parties.

Additionally, various regions and countries are currently developing requirements and regulations for the reuse and repurposing of secondary cells and batteries, especially those used for the propulsion of electric road vehicles, after being extracted at their end of life. These differing requirements and regulations could lead to technical or safety issues in the use of these batteries. Thus, this document can assist nations and regions in setting up secondary battery reuse and repurposing regulations.

The expected users of this document are the following: original manufacturers (including cell and battery or application), qualified reuse and repurposed application manufacturers (e.g. with approval in writing from the original manufacturer to reuse or repurpose); national, regional, and local authorities that establish secondary battery reuse and repurposing regulations; and national, regional, and local authorities that revise secondary battery reuse and repurposing regulations.

However, other stakeholders are not precluded from using this document.

National and regional standards and voluntary stewardship programs are given priority over the matters covered in this document.

Table 1 contains an overview of different standards on reuse and repurposing of batteries and Battery Energy Storage Systems (BESS) developed by IEC/TC 21 Secondary cells and batteries and IEC/TC 120 Electrical Energy Storage (EES) systems. The purpose of Table 1 is to inform users of these standards about the existence of the other standards listed in the table and give a concise overview of the outline of those standards. It also identifies areas of possible overlap and informs users in these cases which of the standards takes precedence.

**Table 1 – Standards on reuse and repurposing of batteries and battery energy storage systems (BESS)**

		IEC 63338		IEC 63330-1		IEC 62933-4-4		IEC 62933-5-3	
<b>Title</b>		General guidance on reuse and repurposing of secondary cells and batteries		Repurposing of secondary batteries – Part 1: General requirements		Electrical energy storage (EES) systems – Part 4-4: Environmental requirements for battery-based energy storage systems (BESS) with reused batteries		Electrical energy storage (EES) systems – Part 5-3: Safety requirements for grid-integrated EES systems – Performing unplanned modification of electrochemical based system	
<b>Scope</b>		Secondary lithium ion and Ni-MH		Repurposing of secondary batteries and systems (excluding redox flow/Ni-MH/Pb batteries)		BESS using reused batteries		Energy storage systems	
		Battery	System	Battery	System	Battery	System	Battery	System
<b>Requirements</b>	<b>General</b>			No overlap: Clause 4 Clause 5 Clause 6					
	<b>Environment</b>					Support: Annex A (info)	No overlap: Clause 4 Clause 5 Clause 6 Clause 7 Annex B (info)		
	<b>Safety</b>			Priority: Clause 4 Clause 5 Clause 6	Support: Clause 6 (ESS)  No overlap: Clause 6 (other)			Support: Annex A (Info)	No overlap: Clause 5 Clause 6 Clause 7 Clause 8  Priority: Clause 9
	<b>Assessment</b>			Priority: Clause 5	Support: Clause 6 (ESS)  No overlap: Clause 6 (other)				

		IEC 63338		IEC 63330-1		IEC 62933-4-4		IEC 62933-5-3	
<b>Guidance</b>	<b>General</b>	No overlap: Clause 4							
	<b>Environment</b>	No overlap: Clause 9							
	<b>Safety</b>	Priority: Clause 5 Clause 6  No overlap: Clause 7 Clause 8							

This document is a preview generated by EVS

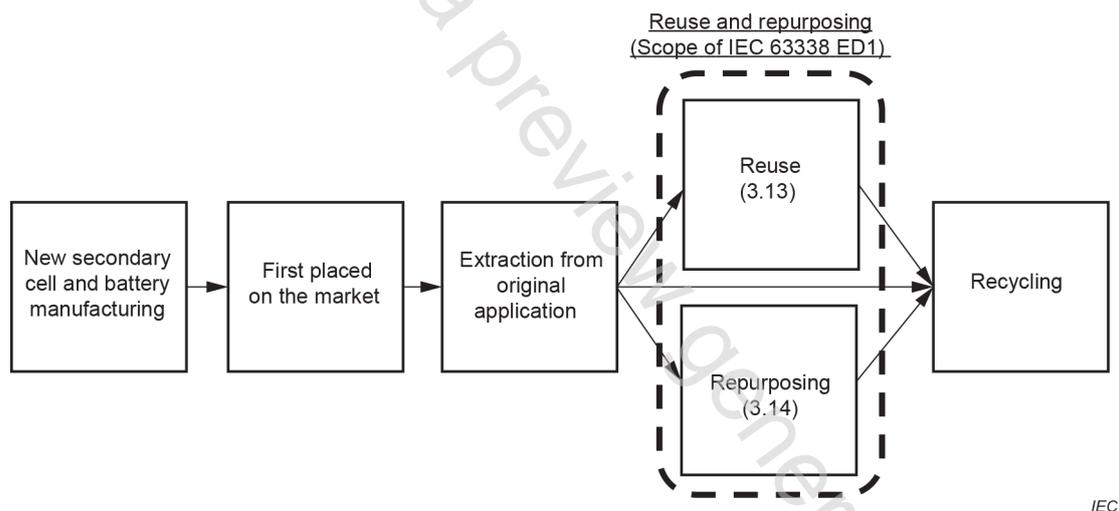
# GENERAL GUIDANCE ON REUSE AND REPURPOSING OF SECONDARY CELLS AND BATTERIES

## 1 Scope

This document applies to the reuse and repurposing of secondary lithium ion and nickel-metal hydride cells and batteries after extraction from the application for which they were first placed on the market (hereafter "relevant cells and batteries").

This document does not permit reuse or repurposing of single cells or cell assemblies if battery lifetime traceability data are not recorded. See Clause 4. Swappable batteries such as those used in e-scooters are removed and installed by the user (such as for charging) without conducting a safety assessment (such as battery lifetime traceability data assessment) as part of intended use, which is not considered reuse or repurposing. This document does not cover system component reuse and repurposing. The original manufacturer can be contacted to confirm suitability of components for reuse and repurposing.

Figure 1 illustrates the scope of this document in the product life stage.



IEC

Figure 1 – Scope of this document

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions 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>