

Primary batteries - Part 4: Safety of lithium batteries

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 60086-4:2019 sisaldab Euroopa standardi EN IEC 60086-4:2019 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 60086-4:2019 consists of the English text of the European standard EN IEC 60086-4:2019.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 12.07.2019.	Date of Availability of the European standard is 12.07.2019.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

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English Version

**Primary batteries - Part 4: Safety of lithium batteries  
(IEC 60086-4:2019)**

Piles électriques - Partie 4: Sécurité des piles au lithium  
(IEC 60086-4:2019)

Primärbatterien - Teil 4: Sicherheit von Lithium-Batterien  
(IEC 60086-4:2019)

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## European foreword

The text of document 35/1420/FDIS, future edition 5 of IEC 60086-4, prepared by IEC/TC 35 "Primary cells and batteries" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60086-4:2019.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2020-02-28
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-05-30

This document supersedes EN 60086-4:2015 and all of its amendments and corrigenda (if any).

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## Endorsement notice

The text of the International Standard IEC 60086-4:2019 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60068-2-6:1995	NOTE	Harmonized as EN 60068-2-6:1995 (not modified)
IEC 60068-2-27:1987	NOTE	Harmonized as EN 60068-2-27:1987 (not modified)
IEC 60068-2-31:2008	NOTE	Harmonized as EN 60068-2-31:2008 (not modified)
IEC 60086-5:2016	NOTE	Harmonized as EN 60086-5:2016 (not modified)
IEC 62133-2	NOTE	Harmonized as EN 62133-2
IEC 60617 (series)	NOTE	Harmonized as EN 60617 (series)
IEC 61960	NOTE	Harmonized as EN 61960
IEC 62281	NOTE	Harmonized as EN IEC 62281
ISO 7010	NOTE	Harmonized as EN ISO 7010

## Annex ZA

(normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cenelec.eu](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60086-1	-	Primary batteries - Part 1: General	EN 60086-1	-
IEC 60086-2	-	Primary batteries - Part 2: Physical and electrical specifications	EN 60086-2	-

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PRIMARY BATTERIES –****Part 4: Safety of lithium batteries****FOREWORD**

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International Standard IEC 60086-4 has been prepared by technical committee 35: Primary cells and batteries.

This fifth edition cancels and replaces the fourth edition published in 2014. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) Revised criteria for an explosion;
- b) Addition of test parameters for the overdischarge test of battery types FR14505 and FR10G445;
- c) Addition of a new subclause 5.1 Validity of Testing;
- d) revised pictogram E in Table D.1;
- e) Addition of Annex E with requirements for child resistant packaging of coin cells;

- f) Addition of Annex F with recommendations on the use of the KEEP OUT OF REACH OF CHILDREN safety sign.

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

FDIS	Report on voting
35/1420/FDIS	35/1423/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.

NOTE The following print types are used:

- instructions/warnings for consumers: *in italic type*.

A list of all parts in the IEC 60086 series, under the general title *Primary batteries*, can be found on the IEC website.

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

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

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## INTRODUCTION

The concept of safety is closely related to safeguarding the integrity of people and property. This document specifies tests and requirements for lithium batteries and has been prepared in accordance with ISO/IEC guidelines, taking into account all relevant national and international standards which apply.

Lithium batteries are different from conventional primary batteries using aqueous electrolyte in that they contain flammable materials.

Consequently, it is important to carefully consider safety during design, production, distribution, use, and disposal of lithium batteries. Based on such special characteristics, lithium batteries for consumer applications were initially small in size and had low power output. There were also lithium batteries with high power output which were used for special industrial and military applications and were characterized as being “technician replaceable”. The first edition of this document was drafted to accommodate this situation.

However, from around the end of the 1980s, lithium batteries with high power output started to be widely used in the consumer replacement market, mainly as a power source in camera applications. Since the demand for such lithium batteries with high power output significantly increased, various manufacturers started to produce these types of lithium batteries. As a consequence of this situation, the safety aspects for lithium batteries with high power output were included in the second edition of this document.

Primary lithium batteries both for consumer and industrial applications are well-established safe and reliable products in the market, which is at least partly due to the existence of safety standards such as this document and, for transport, IEC 62281. The fourth edition of this document therefore reflects only minor changes which became necessary in order to keep it harmonized with IEC 62281 and to continuously improve the user information about safety related matters.

Guidelines addressing safety issues during the design of lithium batteries are provided in Annex A. Annex B provides guidelines addressing safety issues during the design of equipment where lithium batteries are installed. Both Annex A and B reflect experience with lithium batteries used in camera applications and are based on [23]<sup>1</sup>.

Safety is freedom from unacceptable risk. There can be no absolute safety: some risk will remain. Therefore a product, process or service can only be relatively safe. Safety is achieved by reducing risk to a tolerable level determined by the search for an optimal balance between the ideal of absolute safety and the demands to be met by a product, process or service, and factors such as benefit to the user, suitability for purpose, cost effectiveness, and conventions of the society concerned.

As safety will pose different problems, it is impossible to provide a set of precise provisions and recommendations that will apply in every case. However, this document, when followed on a judicious “use when applicable” basis, will provide reasonably consistent standards for safety.

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<sup>1</sup> Numbers in square brackets refer to the bibliography.