SLOVENSKI STANDARD
SIST EN IEC 60086-4:2025

01-maj-2025

Primarne baterije - 4. del: Varnostni standard za litijeve baterije (IEC 60086-4:2025)

Primary batteries - Part 4: Safety of lithium batteries (IEC 60086-4:2025)

Primärbatterien - Teil 4: Sicherheit von Lithium-Batterien (IEC 60086-4:2025)

Piles électriques - Partie 4: Sécurité des piles au lithium (IEC 60086-4:2025)

Ta slovenski standard je istoveten z: **EN IEC 60086-4:2025**

ICS:

29.220.10 Primarni členi in baterije Primary cells and batteries

SIST EN IEC 60086-4:2025 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60086-4

March 2025

ICS 29.220.10

Supersedes EN IEC 60086-4:2019; EN IEC 60086-4:2019/AC:2019-11; EN IEC 60086-4:2019/AC:2020-05

English Version

Primary batteries - Part 4: Safety of lithium batteries (IEC 60086-4:2025)

Piles électriques - Partie 4: Sécurité des piles au lithium (IEC 60086-4:2025)

Primärbatterien - Teil 4: Sicherheit von Lithium-Batterien (IEC 60086-4:2025)

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN IEC 60086-4:2025 E

European foreword

The text of document 35/1571/FDIS, future edition 6 of IEC 60086-4, prepared by TC 35 "Primary cells and batteries" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60086-4:2025.

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) 2026-03-31
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2028-03-31

This document supersedes EN IEC 60086-4:2019 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 60086-4:2025 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 standard indicated:

IEC 60068-2-31:2008	NOTE	Approved as EN 60068-2-31:2008 (not modified)
IEC 60086-5:2021	NOTE	Approved as EN IEC 60086-5:2021 (not modified)
IEC 62133-2	NOTE	Approved as EN 62133-2
IEC 61960 (series)	NOTE	Approved as EN IEC 61960 (series)
ISO 7010	NOTE	Approved 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.cencenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60086-1	2021	Primary batteries - Part 1: General	EN IEC 60086-1	2021
IEC 60086-2	-	Primary batteries - Part 2: Physical and electrical specifications	EN IEC 60086-2	-
IEC 62281	-	Safety of primary and secondary lithium cells and batteries during transport	EN IEC 62281	-

IEC 60086-4

Edition 6.0 2025-01

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Primary batteries –
Part 4: Safety of lithium batteries

Piles électriques –
Partie 4: Sécurité des piles au lithium

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

This sixth edition cancels and replaces the fifth edition published in 2019. This edition constitutes a technical revision.

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

a) Added definitions for leakage and venting, in addition to the test criteria;
b) Revised overdischarge test;
c) Revised marking requirements;
d) Revised criteria for the child resistant packaging test;
e) Changed the purpose of Annex F from "informative" to "normative";

f) Added a new Annex G with additional measures against misuse of batteries not intended for consumer replacement;

g) Integrated the contents of Interpretation Sheet 1 (IEC 60086-4:2019/ISH1:2020);

h) In Clause 3, terms were reordered according their functions: basic terms, electrochemical systems, battery shapes, battery sizes, electrical characteristics, specifications, safety aspects, failure modes;

i) In 6.4.4, the exemption for the shock acceleration for lithium primary batteries was reduced from 12 kg to 4,482 kg in order to reflect the fact that this is the threshold in IEC 62281, Test T-4, where the peak acceleration decreases below 150 g_n.

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

Draft	Report on voting
35/1571/FDIS	35/1579/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.

NOTE 1 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 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.

NOTE 2 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC document in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests. It is the recommendation of the committee that the content of this document be adopted for implementation nationally not earlier than 2 years from the date of publication. The transitional period applies specifically to changes in Table 10. In the meantime, the previous edition can still be ordered by contacting your local IEC member National Committee or the IEC Secretariat.

IMPORTANT – The "colour inside" logo on the cover page of this document 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 reflected 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 Annex B reflect experience with lithium batteries used in camera applications and are based on [22][1].

The ingestion hazard of coin cell batteries has become an issue and was addressed in the fifth and sixth editions of this document by several independent measures such as the development of a new safety sign "KEEP OUT OF REACH OF CHILDREN" as well as the introduction of child resistant packaging.

A new Annex G addresses measures against misuse of cells and batteries not intended for consumer replacement.

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.

[1] Numbers in square brackets refer to the Bibliography.

PRIMARY BATTERIES –

Part 4: Safety of lithium batteries

1 Scope

This part of IEC 60086 specifies tests and requirements for primary lithium batteries to ensure their safe operation under intended use and reasonably foreseeable misuse.

NOTE Primary lithium batteries that are standardized in IEC 60086-2 are expected to meet all applicable requirements herein. It is understood that consideration of this part of IEC 60086 might also be given to measuring and/or ensuring the safety of non-standardized primary lithium batteries. In either case, no claim or warranty is made that compliance or non-compliance with this part of IEC 60086 will fulfil or not fulfil any of the user's particular purposes or needs.

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 60086-1:2021, *Primary batteries – Part 1: General*

IEC 60086-2, *Primary batteries – Part 2: Physical and electrical specifications*

IEC 62281, *Safety of primary and secondary lithium cells and batteries during transport*

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

NOTE Certain definitions taken from IEC 60050-482, IEC 60086-1, and ISO/IEC Guide 51 are repeated below for convenience.

3.1
cell
basic functional unit, consisting of an assembly of electrodes, electrolyte, container, terminals and usually separators, that is a source of electric energy obtained by direct conversion of chemical energy

[SOURCE: IEC 60050-482:2004, 482-01-01]