

Primary batteries - Part 5: Safety of batteries with aqueous electrolyte

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 60086-5:2011 sisaldab Euroopa standardi EN 60086-5:2011 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 30.04.2011 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 15.04.2011.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 60086-5:2011 consists of the English text of the European standard EN 60086-5:2011.

This standard is ratified with the order of Estonian Centre for Standardisation dated 30.04.2011 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 15.04.2011.

The standard is available from Estonian standardisation organisation.

ICS 29.220.10

batteries, electric cells, electrical engineering, electrolytes, primary batteries, safety, storage batteries

Standardite reprodutseerimis- ja levitamiseõigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:
Aru 10 Tallinn 10317 Eesti; www.evs.ee; Telefon: 605 5050; E-post: info@evs.ee

Right to reproduce and distribute belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without permission in writing from Estonian Centre for Standardisation.

If you have any questions about standards copyright, please contact Estonian Centre for Standardisation:
Aru str 10 Tallinn 10317 Estonia; www.evs.ee; Phone: 605 5050; E-mail: info@evs.ee

English version

**Primary batteries -
Part 5: Safety of batteries with aqueous electrolyte
(IEC 60086-5:2011)**

Piles électriques -
Partie 5: Sécurité des piles à électrolyte
aqueux
(CEI 60086-5:2011)

Primärbatterien -
Teil 5: Sicherheit von Batterien mit
wässrigem Elektrolyt
(IEC 60086-5:2011)

This European Standard was approved by CENELEC on 2011-04-12. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 35/1273/CDV, future edition 3 of IEC 60086-5, prepared by IEC TC 35, Primary cells and batteries, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60086-5 on 2011-04-12.

This European Standard supersedes EN 60086-5:2005.

The major technical changes with respect to EN 60086-5:2005 are the test requirements and the harmonization of the marking clause with the other standards of the EN 60086 series. Moreover, the table of safety pictograms was added as Annex C.

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

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2012-01-12
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2014-04-12

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60086-5:2011 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 60086-3	NOTE Harmonized as EN 60086-3.
IEC 60086-4	NOTE Harmonized as EN 60086-4.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-2-6	-	Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6	-
IEC 60068-2-27	-	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock	EN 60068-2-27	-
IEC 60068-2-31	-	Environmental testing - Part 2-31: Tests - Test Ec: Rough handling shocks, primarily for equipment-type specimens	EN 60068-2-31	-
IEC 60086-1	2011	Primary batteries - Part 1: General	EN 60086-1	2011
IEC 60086-2	2011	Primary batteries - Part 2: Physical and electrical specifications	EN 60086-2	2011

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	7
4 Requirements for safety	9
4.1 Design.....	9
4.1.1 General	9
4.1.2 Venting.....	9
4.1.3 Insulation resistance.....	10
4.2 Quality plan.....	10
5 Sampling.....	10
5.1 General.....	10
5.2 Sampling for type approval.....	10
6 Testing and requirements.....	11
6.1 General.....	11
6.1.1 Safety notice	12
6.1.2 Ambient temperature.....	12
6.2 Intended use	12
6.2.1 Intended use tests and requirements.....	12
6.2.2 Intended use test procedures.....	12
6.3 Reasonably foreseeable misuse	15
6.3.1 Reasonably foreseeable misuse tests and requirements.....	15
6.3.2 Reasonably foreseeable misuse test procedures	15
7 Information for safety.....	17
7.1 Safety precautions during handling of batteries.....	17
7.2 Packaging	19
7.3 Handling of battery cartons.....	19
7.4 Display and storage.....	19
7.5 Transportation.....	20
7.6 Disposal	20
8 Instructions for use	20
9 Marking	21
9.1 General.....	21
9.2 Marking of small batteries	21
Annex A (informative) Additional information to 7.4.....	22
Annex B (informative) Battery compartment design guidelines	23
Annex C (informative) Safety pictograms	34
Bibliography.....	36
Figure 1 – Sampling for type approval tests and number of batteries required.....	10
Figure 2 – Temperature cycling procedure	15
Figure 3 – Circuit diagram for incorrect installation (four batteries in series)	16
Figure 4 – Circuit diagram for external short circuit.....	16

Figure 5 – Circuit diagram for overdischarge.....	17
Figure 6 – XYZ axes for free fall	17
Figure 7 – Ingestion gauge (Inner dimensions)	19
Figure B.1 – Example of series connection with one battery reversed	23
Figure B.2 – Positive contact recessed between ribs	25
Figure B.3 – Positive contact recessed within surrounding insulation	25
Figure B.4 – Negative contact U-shaped to ensure no positive (+) battery contact	26
Figure B.5 – Design with respect to battery orientation	27
Figure B.6 – Example of the design of a positive contact of an appliance.....	28
Figure B.7 – Example of a short circuit, a switch is piercing the battery insulating jacket	29
Figure B.8 – Typical example of insulation to prevent short circuit	29
Figure B.9 – Insertion against spring (to be avoided)	29
Figure B.10 – Examples showing distorted springs	30
Figure B.11 – One example of protected insertion.....	30
Figure B.12 – Example of negative contacts	31
Figure B.13 – Example of series connection of batteries with voltage tapping	33
Table 1 – Test matrix	11
Table 2 – Intended use tests and requirements.....	12
Table 3 – Shock pulse	13
Table 4 – Test sequence.....	13
Table 5 – Test sequence.....	14
Table 6 – Reasonably foreseeable misuse tests and requirements	15
Table 7 – Marking requirements.....	21
Table B.1 – Dimensions of battery terminals and recommended dimensions of the positive contact of an appliance in Figure B.6	27
Table B.2 – Minimum wire diameters	30
Table B.3 – Dimensions of the negative battery terminal.....	31
Table C.1 – Safety pictograms	34

INTRODUCTION

The concept of safety is closely related to safeguarding the integrity of people and property. This part of IEC 60086 specifies tests and requirements for primary batteries with aqueous electrolyte and has been prepared in accordance with ISO/IEC guidelines, taking into account all relevant national and international standards which apply. Also included in this standard is guidance for appliance designers with respect to battery compartments and information regarding packaging, handling, warehousing and transportation.

Safety is a balance between freedom from risks of harm and other demands to be met by the product. There can be no absolute safety. Even at the highest level of safety, the product can only be relatively safe. In this respect, decision-making is based on risk evaluation and safety judgement.

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 standard, when followed on a judicious "use when applicable" basis, will provide reasonably consistent standards for safety.

This document is a preview generated by EVS

PRIMARY BATTERIES –

Part 5: Safety of batteries with aqueous electrolyte

1 Scope

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

2 Normative references

The following referenced documents are indispensable for the application 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 60086-1:2011, *Primary batteries – Part 1: General*

IEC 60086-2:2011, *Primary batteries – Part 2: Physical and electrical specifications*

IEC 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibrations (sinusoidal)*

IEC 60068-2-27, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-31, *Environmental testing – Part 2-31: Tests – Test Ec: Rough handling shocks, primarily for equipment-type specimens*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in IEC 60086-1 as well as the following terms and definitions apply.

3.1

battery

one or more cells electrically connected by permanent means, fitted in a case, with terminals, markings and protective devices etc, as necessary for use

[IEC 60050-482: 2004, 482-01-04, modified]

3.2

button battery

small round battery, where the overall height is less than the diameter; batteries complying with Figures 3 and 4 of IEC 60086-2

3.3

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

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