



**SLOVENSKI STANDARD**  
**SIST EN 60086-1:2007**  
**01-december-2007**

**BUXca Yý U.**  
**SIST EN 60086-1:2002**

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**Primarne baterije - 1. del: Splošno (IEC 60086-1:2006)**

Primary batteries - Part 1: General

Primärbatterien - Teil 1: Allgemeines

Piles électriques - Partie 1: Généralités

**STANDARD PREVIEW**  
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**Ta slovenski standard je istoveten z: EN 60086-1:2007**

[SIST EN 60086-1:2007](#)

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**ICS:**

29.220.10 Ú!ã æ} á|^} æ Áæ^!æ Primary cells and batteries

**SIST EN 60086-1:2007**

**en,fr,de**

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English version

**Primary batteries -  
Part 1: General  
(IEC 60086-1:2006)**

Piles électriques -  
Partie 1: Généralités  
(CEI 60086-1:2006)

Primärbatterien -  
Teil 1: Allgemeines  
(IEC 60086-1:2006)

This European Standard was approved by CENELEC on 2007-02-01. 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, 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

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

## Foreword

The text of document 35/1244/FDIS, future edition 10 of IEC 60086-1, prepared by IEC TC 35, Primary cells and batteries, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60086-1 on 2007-02-01.

This European Standard supersedes EN 60086-1:2001.

The major technical changes concern the addition of "Test condition tolerances" in 6.6 and the standardization of the "Z" electrochemical system (Nickel oxyhydroxide) included in Table 3.

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) 2007-11-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2010-02-01

Annex ZA has been added by CENELEC.

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## Endorsement notice

The text of the International Standard IEC 60086-1:2006 was approved by CENELEC as a European Standard without any modification.

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## 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 60086-2	- <sup>1)</sup>	Primary batteries – Part 2: Physical and electrical specifications	EN 60086-2	2007 <sup>2)</sup>
IEC 60086-3	- <sup>1)</sup>	Primary batteries – Part 3: Watch batteries	EN 60086-3	2005 <sup>2)</sup>
IEC 60086-4	- <sup>1)</sup>	Primary batteries – Part 4: Safety of lithium batteries	EN 60086-4	2000 <sup>2)</sup>
IEC 60086-5	- <sup>1)</sup>	Primary batteries – Part 5: Safety of batteries with aqueous electrolyte	EN 60086-5	2005 <sup>2)</sup>
IEC 60410	- <sup>1)</sup>	Sampling plans and procedures for inspection by attributes	-	-
IEC 61429	- <sup>1)</sup>	Marking of secondary cells and batteries with the international recycling symbol ISO 7000-1135	EN 61429 + corr. October + A11	1996 <sup>2)</sup> 1998 <sup>3)</sup> 1998
ISO/IEC Directives Part 1	- <sup>1)</sup>	Procedures for the technical work	-	-
ISO 3951	Series	Sampling procedures for inspection by variables	-	-

<sup>1)</sup> Undated reference.

<sup>2)</sup> Valid edition at date of issue.

<sup>3)</sup> Title changed to read "Marking of secondary cells and batteries with the international recycling symbol ISO 7000-1135 and indications regarding directives 93/86/EEC and 91/157/EEC".

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NORME  
INTERNATIONALE  
INTERNATIONAL  
STANDARD

CEI  
IEC

60086-1

Dixième édition  
Tenth edition  
2006-12

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**Piles électriques –**

**Partie 1:  
Généralités**

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**Primary batteries –**  
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**Part 1:**

**General** [SIST EN 60086-1:2007](#)

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Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

CODE PRIX  
PRICE CODE

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*Pour prix, voir catalogue en vigueur  
For price, see current catalogue*

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PRIMARY BATTERIES –****Part 1: General**

## 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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International Standard IEC 60086-1 has been prepared by IEC technical committee 35: Primary cells and batteries.

This tenth edition cancels and replaces the ninth edition (2000) and constitutes a technical revision.

The major technical changes concern the addition of "Test condition tolerances" in 6.6 and the standardization of the "Z" electrochemical system (Nickel oxyhydroxide) included in Table 3.

This bilingual version (2007-03) replaces the English version.

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

FDIS	Report on voting
35/1244/FDIS	35/1247/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.

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the 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 maintenance result 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.

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## INTRODUCTION

The technical content of this part of IEC 60086 provides fundamental requirements and information on primary cells and batteries. In this sense, IEC 60086-1 is the main component of the IEC 60086 series and forms the basis for the subsequent parts. For example, this part includes elementary information on definitions, nomenclature, dimensions and marking. While specific requirements are included, the content of this part tends to explain methodology (how) and justification (why).

Over the years, this part has been changed to improve its content and remains under continual scrutiny to ensure that the publication is kept up to date with the advances in both battery and battery-powered device technologies.

NOTE Safety information is available in IEC 60086-4, IEC 60086-5 and IEC 62281.

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# PRIMARY BATTERIES –

## Part 1: General

### 1 Scope

The purpose of this part of IEC 60086 is to standardize primary batteries with respect to their electrochemical system, dimensions, nomenclature, terminal configurations, markings, test methods, typical performance, safety and environmental aspects.

NOTE The requirements justifying the inclusion or the ongoing retention of batteries in the IEC 60086 series are given in Annex A.

The objective of IEC 60086-1 is to benefit primary battery users, device designers and battery manufacturers by ensuring that batteries from different manufacturers are interchangeable according to standard form, fit and function. Furthermore, to ensure compliance with the above, this part specifies standard test methods for testing primary cells and batteries.

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

IEC 60086-3, *Primary batteries – Part 3: Watch batteries*

IEC 60086-4, *Primary batteries – Part 4: Safety of lithium batteries*

IEC 60086-5, *Primary batteries – Part 5: Safety of batteries with aqueous electrolyte*

IEC 60410, *Sampling plans and procedures for inspection by attributes*

IEC 61429, *Marking of secondary cells and batteries with the international recycling symbol*  
ISO 7000-1135

ISO/IEC Directives, Part 1: *Procedures for the technical work*

ISO 3951 (all parts as applicable), *Sampling procedures for inspection by variables*

### 3 Terms and definitions

For the purposes of this document, the definitions given in IEC 60050-482 (some of which are repeated below for convenience), as well as the following definitions, apply.

**3.1****application test**

simulation of the actual use of a battery in a specific application

**3.2****discharge (of a primary battery)**

operation during which a battery delivers current to an external circuit

[IEV 482-03-23:2004, modified]

**3.3****dry (primary) battery**

primary battery in which the liquid electrolyte is immobilized

[IEV 482-04-14:2004, modified]

**3.4****effective internal resistance – DC method**

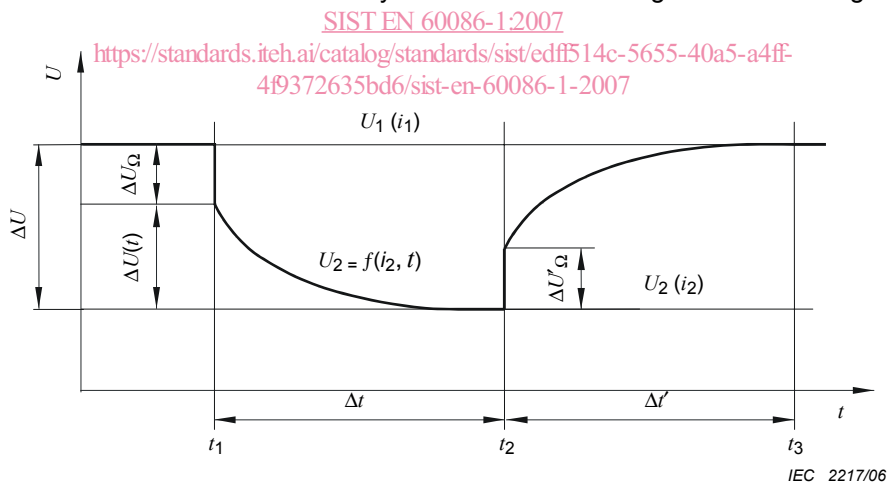
resistance of any electrical component determined by calculating the ratio between the voltage drop  $\Delta U$  across this component and the range of current  $\Delta i$  passing through this component and causing the voltage drop  $R = \Delta U / \Delta i$

NOTE As an analogy, the internal d.c. resistance of any electrochemical cell is defined by the following relation:

$$R_i (\Omega) = \frac{\Delta U (V)}{\Delta i (A)} \quad (1)$$

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The internal d.c. resistance is illustrated by the schematic voltage transient as given below:



**Figure 1 – Schematic voltage transient**

As can be seen from this diagram, the voltage drop  $\Delta U$  of the two components differs in nature, as shown in the following relation:

$$\Delta U = \Delta U_{\Omega} + \Delta U(t) \quad (2)$$

The first component  $\Delta U_{\Omega}$  for  $(t = t_1)$  is independent of time, and results from the increase in current  $\Delta i$  according to the relation:

$$\Delta U_{\Omega} = \Delta i \times R_{\Omega} \quad (3)$$