IEC 60086-1

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Primary batteries –
Part 1: General

Piles électriques –
Partie 1: Généralités

IEC 60086-1:2011

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRIMARY BATTERIES –

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

This eleventh edition cancels and replaces the tenth edition (2006) and constitutes a technical revision.

The major technical changes with respect to the previous edition are:

– the clarification of the humidity controls for testing various battery types;
– the modification of the standardization guidelines to allow for standardization of electrochemical systems;
– the standardization of the lithium sulfuryl chloride ($LiSO_2Cl_2$) and lithium sulphur dioxide ($LiSO_2$) electrochemical systems.

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

CDV	Report on voting
35/1270/CDV	35/1274/RVC

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.

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.

INTRODUCTION

The technical content of this part of IEC 60086 provides fundamental requirements and information on primary cells and batteries. All batteries within the IEC 60086 series are considered dry cell 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.

PRIMARY BATTERIES –

Part 1: General

1 Scope

This part of IEC 60086 is intended to standardize primary batteries with respect to dimensions, nomenclature, terminal configurations, markings, test methods, typical performance, safety and environmental aspects.

As a primary battery classification tool, electrochemical systems are also standardized with respect to system letter, electrodes, electrolyte, nominal and maximum open circuit voltage.

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

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

IEC 60086-3:2011, *Primary batteries – Part 3: Watch batteries*

IEC 60086-4:2007, *Primary batteries – Part 4: Safety of lithium batteries*

IEC 60086-5:2011, *Primary batteries – Part 5: Safety of batteries with aqueous electrolyte*

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

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

ISO 3951(all parts, as applicable), *Sampling procedures*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
application test
simulation of the actual use of a battery in a specific application

3.2
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]

3.3
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

3.4
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]

3.5
closed-circuit voltage
CCV (abbreviation)
voltage across the terminals of a battery when it is on discharge

[IEC 60050-482:2004, 482-03-28, modified]

3.6
cylindrical (cell or battery)
cell or battery with a cylindrical shape in which the overall height is equal to or greater than the diameter

[IEC 60050-482: 2004, 482-02-39, modified]

3.7
discharge (of a primary battery)
operation during which a battery delivers current to an external circuit

[IEC 60050-482:2004, 482-03-23, modified]

3.8
dry (primary) **battery**
primary battery in which the liquid electrolyte is essentially immobilized

[IEC 60050-482:2004, 482-04-14, modified]

3.9
effective internal resistance – DC method
The internal d.c. resistance of any electrochemical cell is defined by the following relation:

$$R_{\mathrm{i}}\,(\Omega) = \frac{\Delta U\,(\mathrm{V})}{\Delta i\,(\mathrm{A})}$$

3.10
end-point voltage
EV (abbreviation)
specified voltage of a battery at which the battery discharge is terminated