

INTERNATIONAL STANDARD

Primary batteries – Part 2: Physical and electrical specifications



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2021 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC online collection - oc.iec.ch

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 18 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

Preview generated by EVS

INTERNATIONAL STANDARD

Primary batteries – Part 2: Physical and electrical specifications

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.220.10

ISBN 978-2-8322-9685-1

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	8
3 Terms, definitions, symbols and abbreviated terms.....	8
3.1 Terms and definitions.....	8
3.2 Symbols and abbreviated terms	10
4 Battery dimensions, symbols	10
5 Dimensional stability.....	11
6 Validity of testing	11
7 Constitution of the battery specification tables	11
8 Physical and electrical specifications	13
8.1 Category 1 batteries	13
8.1.1 General	13
8.1.2 Category 1 – Specifications: LR1, R1, LR8D425	14
8.1.3 Category 1 – Specifications: LR03, FR10G445, R03.....	15
8.1.4 Category 1 – Specifications: LR6, FR14505, R6P, R6S	16
8.1.5 Category 1 – Specifications: LR14, R14P, R14S.....	17
8.1.6 Category 1 – Specifications: LR20, R20P, R20S.....	18
8.2 Category 2 batteries – Specifications: CR14250, CR15H270, CR17345, CR17450, BR17335	19
8.3 Category 3 batteries – Specifications: LR9, CR11108	20
8.4 Category 4 batteries	21
8.4.1 General	21
8.4.2 Category 4 – Specifications: PR70, PR41, PR48, PR44, PR1154	21
8.4.3 Fit acceptance gauge for PR batteries	23
8.4.4 Category 4 – Specifications: LR41, LR55, LR54, LR43, LR44	24
8.4.5 Category 4 – Specifications: SR62, SR63, SR65, SR64, SR60, SR67, SR66, SR58, SR68, SR59, SR69, SR41, SR57, SR55, SR48, SR54, SR42, SR43, SR44	26
8.4.6 Category 4 – Specifications: CR1025, CR1216, CR1220, CR1225, CR1616, CR2012, CR1620, CR1632, CR2016, CR2025, CR2320, CR2032, CR2330, CR2430, CR2354, CR3032, CR2450, CR2477, BR1225, BR2016, BR2320, BR2325, BR3032.....	28
8.5 Category 5 batteries	30
8.5.1 Category 5 – Specifications: 2CR13252, 4LR44, 4SR44	30
8.5.2 Category 5 – Specification: 8LR932.....	32
8.5.3 Category 5 – Specifications: AR40, 5AR40, 6AR40, 5PR175/172, 6PR225/155.....	33
8.6 Category 6 batteries	34
8.6.1 Category 6 – Specification: 4LR61	34
8.6.2 Category 6 – Specification: CR-P2.....	35
8.6.3 Category 6 – Specification: 2CR5	36
8.6.4 Category 6 – Specifications: 3R12P, 3R12S, 3LR12	37
8.6.5 Category 6 – Specifications: AS4, AS6, AS8, AS10, AS12, PS8S, PS8P, PS10.....	38
8.6.6 Category 6 – Specification: 4R25Y	39

8.6.7	Category 6 – Specifications: 4R25X, 4LR25X	40
8.6.8	Category 6 – Specifications: 4R25-2, 4LR25-2.....	41
8.6.9	Category 6 – Specifications: 6AS4S, 6PS4S, 6PS4P	42
8.6.10	Category 6 – Specifications: 6F22, 6LR61, 6LP3146	43
8.6.11	Category 6 – Configurations: Stud for 6F22, 6LR61 6LP3146	44
8.6.12	Category 6 – Specifications: 6AS6P, 6AS6S, 6PS6P, 6PS6S.....	45
Annex A (informative)	Tabulation of batteries by application	46
Annex B (informative)	Cross-reference index	52
Annex C (informative)	Index.....	55
Annex D (informative)	Common designation.....	56
Annex E (informative)	Compliance checklist.....	57
Bibliography	58
Figure 1 – Dimensional drawing:	Category 1	13
Figure 2 – Dimensional drawing:	LR1, R1, LR8D425.....	14
Figure 3 – Dimensional drawing:	LR03, FR10G445, R03.....	15
Figure 4 – Dimensional drawing:	LR6, FR14505, R6P, R6S	16
Figure 5 – Dimensional drawing:	LR14, R14P, R14S.....	17
Figure 6 – Dimensional drawing:	LR20, R20P, R20S.....	18
Figure 7 – Dimensional drawing:	CR14250, CR15H270, CR17345, CR17450, BR17335	19
Figure 8 – Dimensional drawing:	LR9, CR11108	20
Figure 9 – Dimensional drawing:	Category 4.....	21
Figure 10 – Dimensional drawing:	PR70, PR41, PR48, PR44, PR1154	21
Figure 11 – Gauge opening for P system batteries	23
Figure 12 – Suggested gauge layout	23
Figure 13 – Air hole placement diagram for P system batteries	24
Figure 14 – Dimensional drawing:	LR41, LR55, LR54, LR43, LR44	24
Figure 15 – Dimensional drawing:	SR62, SR63, SR65, SR64, SR60, SR67, SR66, SR58, SR68, SR59, SR69, SR41, SR57, SR55, SR48, SR54, SR42, SR43, SR44	26
Figure 16 – Dimensional drawing:	CR1025, CR1216, CR1220, CR1225, CR1616, CR2012, CR1620, CR2016, CR2412, CR1632, CR2025, CR2320, CR2032, CR2330, CR2430, CR2354, CR2477, CR3032, CR2450, BR1225, BR2016, BR2320, BR2325, BR3032	28
Figure 17 – Dimensional drawing:	2CR13252, 4LR44, 4SR44	30
Figure 18 – Dimensional drawing:	8LR932	32
Figure 19 – Dimensional drawing:	AR40, 5AR40, 6AR40, 5PR175/172, 6PR225/155	33
Figure 20 – Dimensional drawing:	4LR61	34
Figure 21 – Dimensional drawing:	CR-P2.....	35
Figure 22 – Dimensional drawing:	2CR5	36
Figure 23 – Dimensional drawing:	3R12P, 3R12S, 3LR12	37
Figure 24 – Dimensional drawing:	AS4, AS6, AS8, AS10, AS12, PS8S, PS8P, PS10.....	38
Figure 25 – Dimensional drawing:	4R25Y.....	39
Figure 26 – Dimensional drawing:	4R25X, 4LR25X	40
Figure 27 – Dimensional drawing:	4R25-2, 4LR25-2	41
Figure 28 – Dimensional drawing:	6AS4S, 6PS4S, 6PS4P	42

Figure 29 – Dimensional drawing: 6F22, 6LR61, 6LP3146	43
Figure 30 – Dimensional drawing: Stud	44
Figure 31 – Dimensional drawing: 6AS6P, 6AS6S, 6PS6P, 6PS6S	45
Table 1 – Gauge opening dimension (mm)	23
Table A.1 – Automatic camera	46
Table A.2 – CD, digital audio, wireless gaming and accessories	46
Table A.3 – Digital audio	46
Table A.4 – Digital still camera	46
Table A.5 – Electric equipment	46
Table A.6 – Electrical fence equipment, parking meters, light houses, beacons, railway signaling and road signaling	47
Table A.7 – Electronic key	47
Table A.8 – Hearing aid	47
Table A.9 – Hearing aid standard	48
Table A.10 – High intensity lighting	48
Table A.11 – Implant high drain	48
Table A.12 – Implant low drain	48
Table A.13 – Implant low drain with wireless	48
Table A.14 – Photo	48
Table A.15 – Portable lighting (LED)	49
Table A.16 – Portable stereo	49
Table A.17 – Radio	49
Table A.18 – Radio / Clock	50
Table A.19 – Radio/clock/remote control	50
Table A.20 – Remote control	50
Table A.21 – Road warning lamp	50
Table A.22 – Smoke detector	50
Table A.23 – Toy (motor)	51
Table A.24 – Toy (non-motorized)	51
Table A.25 – Wireless streaming	51
Table B.1 – Category 1 batteries	52
Table B.2 – Category 2 batteries	52
Table B.3 – Category 3 batteries	52
Table B.4 – Category 4 batteries	53
Table B.5 – Category 5 batteries	54
Table B.6 – Category 6 batteries	54
Table C.1 – Index	55
Table D.1 – Index	56
Table E.1 – Summary of specified items	57

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRIMARY BATTERIES –**Part 2: Physical and electrical specifications****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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 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) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60086-2 has been prepared by IEC technical committee 35: Primary cells and batteries.

This fourteenth edition cancels and replaces the thirteenth edition published in 2015. This edition constitutes a technical revision.

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

- a) clarification and distinct separation of the terms used for coin (lithium button) and button cells and batteries;
- b) importation of the dimensional stability from 60086-1;
- c) reordering category 1, 5 and 6 batteries by volume;
- d) addition of cochlear implant tests and a new zinc air hearing aid battery type;
- e) modification of PR70 hearing aid tests;
- f) addition of a compliance checklist annex (Annex E);

- g) modifications to the LR1/R1 tests;
- h) addition of new specifications for 8LR932, CR1632, CR1225, CR2477, 6AS6P, 6AS6S, 6PS6P, 6PS6S, 6PS4P, 6PS4S, 5PR175/172, 6PR225/155, AS4, AS6, AS8, AS10, AS12, PS121/195S, PS121/195P, AS149/195, 6AS4S, AR40, 5AR40, 6AR40.

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

FDIS	Report on voting
35/1466/FDIS	35/1468/RVD

Full information on the voting for the approval of this International Standard 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/standardsdev/publications.

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 "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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

INTRODUCTION

The technical content of this part of IEC 60086 provides physical dimensions, discharge test conditions and discharge performance requirements. IEC 60086-2 complements the general information and requirements of IEC 60086-1.

This part was prepared to benefit primary battery users, device designers and battery manufacturers by furnishing the specifics of form, fit and function for individual standardized primary cells and batteries. Over the years, this part has been changed to improve its contents and may again be revised in due course in the light of comments made by national committees and experts on the basis of practical experience and changing technology.

This current revision is the result of a reformatting initiative, as well as some content changes, aimed at making this part more user-friendly, less ambiguous, and, from a cross reference basis, fully harmonized with other parts of IEC 60086.

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

PRIMARY BATTERIES –

Part 2: Physical and electrical specifications

1 Scope

This part of IEC 60086 is applicable to primary batteries which are based on standardised electrochemical systems.

It specifies

- the physical dimensions,
- the discharge test conditions and discharge performance requirements.

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, *Primary batteries – Part 1: General*

ISO 1101, *Geometrical product specifications (GPS) – Geometrical tolerancing – Tolerances of form, orientation, location and run-out*

3 Terms, definitions, symbols and abbreviated terms

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 Terms and definitions

3.1.1

application test

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

3.1.2

button cell or battery

small round cell or battery where the overall height is less than the diameter, containing aqueous electrolyte

Note 1 to entry: See coin (cell or battery), lithium button (cell or battery).