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Eleventh edition
2006-12

Primary batteries –

Part 2: Physical and electrical specifications



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Part 2: Physical and electrical specifications

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International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



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CONTENTS

| | |
|---|----|
| FOREWORD..... | 4 |
| INTRODUCTION..... | 6 |
| 1 Scope..... | 7 |
| 2 Normative references | 7 |
| 3 Terms and definitions | 7 |
| 4 Symbols and abbreviations..... | 9 |
| 5 Battery dimensions, symbols | 9 |
| 6 Constitution of the battery specification tables..... | 9 |
| 7 Physical and electrical specifications..... | 12 |
| 7.1 Category 1 batteries..... | 12 |
| 7.1.1 Category 1 – Physical and electrical specifications..... | 12 |
| 7.1.2 Category 1 – Specifications: R1, R03, R6P, R6S | 13 |
| 7.1.3 Category 1 – Specifications: R14P, R14S..... | 14 |
| 7.1.4 Category 1 – Specifications: R20P, R20S, 2R10, LR8D425, LR1 | 15 |
| 7.1.5 Category 1 – Specifications: LR03, LR6, LR14, LR20 | 17 |
| 7.1.6 Category 1 – Specifications: CR12A604 | 19 |
| 7.2 Category 2 batteries..... | 20 |
| 7.2.1 Category 2 – Physical and electrical specifications..... | 20 |
| 7.2.2 Category 2 – Specifications: CR14250, CR15H270, CR17345, CR17450, BR17335..... | 21 |
| 7.3 Category 3 batteries..... | 22 |
| 7.3.1 Category 3 – Physical and electrical specifications..... | 22 |
| 7.3.2 Category 3 – Specifications: LR9, LR53, CR11108..... | 23 |
| 7.4 Category 4 batteries..... | 24 |
| 7.4.1 Category 4 – Physical and electrical specifications..... | 24 |
| 7.4.2 Category 4 – Specifications: PR70, PR41, PR48, PR44..... | 25 |
| 7.4.3 Category 4 – Specifications: LR41, LR55, LR54, LR43, LR44 | 28 |
| 7.4.4 Category 4 – Specifications: SR62, SR63, SR 65, SR64, SR60, SR67, SR66, SR58, SR68, SR59, SR69, SR41, SR57, SR55, SR48 | 29 |
| 7.4.5 Category 4 – Specifications: SR56, SR54, SR42, SR43, SR44 | 30 |
| 7.4.6 Category 4 – Specifications: CR1025, CR1216, CR1220, CR1616, CR2012, CR1620, CR2016, CR2025, CR2320, CR2032, CR2330, CR2430, CR2354, CR3032, CR2450 | 31 |
| 7.4.7 Category 4 – Specifications: BR1225, BR2016, BR2020, BR2320, BR2325, BR3032..... | 32 |
| 7.5 Category 5 batteries..... | 33 |
| 7.5.1 Category 5 – Physical and electrical specifications..... | 33 |
| 7.6 Category 6 batteries..... | 36 |
| 7.6.1 Category 6 – Physical and electrical specifications..... | 36 |
| Annex A (informative) Tabulation of batteries by application | 49 |
| Annex B (informative) Cross-reference index | 53 |
| Annex C (informative) Index..... | 56 |
| Bibliography..... | 57 |

| | |
|---|----|
| Figure 1 – Category 1 dimensional drawings..... | 12 |
| Figure 2 – Category 2 dimensional drawing | 20 |
| Figure 3 – Category 3 dimensional drawings..... | 22 |
| Figure 4 – Category 4 dimensional drawing | 24 |
| Figure 5 – Gauge for Category 4 batteries | 27 |
| Figure 6 – Dimensional drawing: R40..... | 33 |
| Figure 7 – Dimensional drawing: 4LR44, 2CR13252, 4SR44..... | 34 |
| Figure 8 – Dimensional drawing: 5AR40 | 35 |
| Figure 9 – Dimensional drawing: S4..... | 36 |
| Figure 10 – Dimensional drawing: 3R12C,3R12P, 3R12S, 3LR12 | 37 |
| Figure 11 – Dimensional drawing: 4LR61..... | 38 |
| Figure 12 – Dimensional drawing: CR-P2, BR-P2..... | 39 |
| Figure 13 – Dimensional drawing: 2CR5 | 40 |
| Figure 14 – Dimensional drawing: 2EP3863..... | 41 |
| Figure 15 – Dimensional drawing: 4R25X, 4LR25X..... | 42 |
| Figure 16 – Dimensional drawing: 4R25Y | 43 |
| Figure 17 – Dimensional drawing: 4R25-2, 4LR25-2 | 44 |
| Figure 18 – Dimensional drawing: 6AS4..... | 45 |
| Figure 19 – Dimensional drawing: 6AS6..... | 46 |
| Figure 20 – Dimensional drawing: 6F22, 6LR61 | 47 |
| Figure 21 – Dimensional drawing: 6F100 | 48 |
| | |
| Table A.1 – Road warning lamp | 49 |
| Table A.2 – Industrial equipment..... | 49 |
| Table A.3 – Electrical fence controller..... | 49 |
| Table A.4 – Radio | 50 |
| Table A.5 – Electronic equipment | 50 |
| Table A.6 – Paging test..... | 50 |
| Table A.7 – Hearing aid | 50 |
| Table A.8 – Photo | 51 |
| Table A.9 – Portable lighting..... | 51 |
| Table A.10 – Smoke detector..... | 51 |
| Table A.11 – Toy (motor) | 52 |
| Table A.12 – Accelerated application test for automatic camera..... | 52 |
| Table A.13 – Tape recorder (personal cassette player)..... | 52 |
| Table B.1 – Category 1 batteries..... | 53 |
| Table B.2 – Category 2 batteries..... | 53 |
| Table B.3 – Category 3 batteries..... | 53 |
| Table B.4 – Category 4 batteries..... | 54 |
| Table B.5 – Category 5 batteries..... | 55 |
| Table B.6 – Category 6 batteries..... | 55 |
| Table C.1 – Index | 56 |

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

This eleventh edition cancels and replaces the tenth edition (2000) and its amendments 1 (2001) and 2 (2004), and constitutes a technical revision.

The major technical changes are the addition of a "digital still camera test" for the LR6 battery, the reduction, for selected no letter batteries, from three grades (S, C and P) to two grades (S and P) with appropriate adjustments to MAD values, the deletion of the 3,6 ohm pulse test for the R03 battery, and the addition of new constant current hearing aid tests (standard and high drain) for the PR41, PR44, PR48 and PR70 batteries.

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

| FDIS | Report on voting |
|--------------|------------------|
| 35/1245/FDIS | 35/1248/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.

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.

A bilingual version of this publication may be issued at a later date.

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.

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PRIMARY BATTERIES –

Part 2: Physical and electrical specifications

1 Scope

This part of IEC 60086 is applicable to primary batteries based on standardized electro-chemical systems.

It specifies

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

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 60050-482:2004, *International Electrotechnical Vocabulary (IEV) – Part 482: Primary and secondary cells and batteries*

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 and definitions

For the purposes of this document, the definitions given in IEC 60050-482 and IEC 60086-1 (some of which are repeated below for convenience) and the following definitions apply.

3.1

application test

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

3.2

end-point voltage

EV

specified closed circuit voltage of a battery at which the battery discharge is terminated

[IEV 482-03-30:2004, modified]

3.3

minimum average duration

MAD

minimum average time on discharge which shall be met by a sample of batteries

NOTE The discharge test is carried out according to the specified methods and designed to show conformity with the standard applicable to the battery types.

3.4
nominal voltage of a primary battery

V_n
suitable approximate value of voltage used to identify the voltage of a primary battery

[IEV 482-03-31:2004, modified]

3.5
on-load voltage

closed-circuit voltage

CCV

voltage across the terminals of a battery when it is on discharge

[IEV 482-03-28:2004, modified]

3.6
open-circuit voltage

off-load voltage

OCV

voltage across the terminals of a battery when no current is flowing

[IEV 482-03-32:2004, modified]

3.7
primary battery

one or more primary cells, including case, terminals and marking

3.8
primary cell

source of electrical energy obtained by the direct conversion of chemical energy that is not designed to be charged by any other electrical source

[IEV 482-01-02:2004, modified]

3.9
service output (of a primary battery)

service life, or capacity, or energy output of a battery under specified conditions of discharge

3.10
service output test

test designed to measure the service output of a battery

NOTE A service output test may be prescribed, for example, when

- a) an application test is too complex to replicate;
- b) the duration of an application test would make it impractical for routine testing purposes .

3.11
storage life

duration under specified conditions at the end of which a battery retains its ability to perform a specified service output

[IEV 482-03-47:2004, modified]

3.12
terminals (of a primary battery)

conductive parts provided for the connection of a battery to external conductors

4 Symbols and abbreviations

| | |
|-------|---|
| EV | end-point voltage |
| MAD | minimum average duration |
| OCV | open-circuit voltage (off-load voltage) |
| R | load resistance |
| V_n | nominal voltage of a battery |

5 Battery dimensions, symbols

The symbols used to denote the various dimensions are as follows:

| | |
|---------------|--|
| A | maximum overall height of the battery; |
| B | minimum distance between the flats of the positive and negative contacts; |
| C | minimum outer diameter of the negative flat contact surface; |
| D | maximum inner diameter of the negative flat contact surface; |
| E | maximum recess of the negative flat contact surface; |
| F | maximum diameter of the positive contact within the specified projection height; |
| G | minimum projection of the flat positive contact; |
| K | minimum projection of the flat negative contact; |
| L | maximum diameter of the negative contact within the specified projection height; |
| M | minimum diameter of the flat negative contact; |
| N | minimum diameter of the flat positive contact; |
| \emptyset | maximum and minimum diameters of the battery; |
| $\emptyset P$ | concentricity of the positive contact. |

Recesses are permitted in the negative flat contact surface defined by dimensions C and D for batteries having the shape shown in Figure 1a, provided that batteries placed end to end in series make electrical contact with each other and that the contact separation is an integral multiple of the contact separation for one battery. The following conditions must be satisfied:

$$C > F$$

$$N > D$$

$$G > E$$

6 Constitution of the battery specification tables

6.1 Batteries are categorized into several groups according to their shapes.

6.2 In each category, batteries having the same shape but belonging to a different electrochemical system are grouped together and shown in succession.

6.3 Batteries are always listed in ascending order of nominal voltage and, within each nominal voltage, in ascending order of volume.

6.4 One common shape drawing of these batteries which fall in the same group is exhibited.

6.5 Designation, nominal voltage, dimensions, discharge conditions, minimum average duration and application for these batteries which fall into the same group are summarized in one table.

6.6 When a drawing represents only one type of battery, the dimensions of the relevant battery may be directly shown on the drawing.

6.7 Batteries are categorized into the following groups:

a) Category 1: Round batteries according to Figure 1

R1, R03, R6P, R6S, R14P, R14S,
R20P, R20S, 2R10, LR8D425, LR1,
LR03, LR6, LR14, LR20
CR12A604

b) Category 2: Round batteries according to Figure 2

CR14250, CR15H270, CR17345, CR17450, BR17335

c) Category 3: Round batteries according to Figure 3

LR9, LR53, CR11108

d) Category 4: Round batteries according to Figure 4

PR70, PR41, PR48, PR44
LR41, LR55, LR54, LR43, LR44
SR62, SR63, SR65, SR64, SR60, SR67, SR66, SR58, SR68, SR59, SR69, SR41, SR57,
SR55, SR48, SR56, SR54, SR42, SR43, SR44
CR1025, CR1216, CR1220, CR1616, CR2012, CR1620, CR2016, CR2025, CR2320,
CR2032, CR2330, CR2430, CR2354, CR3032, CR2450
BR1225, BR2016, BR2020, BR2320, BR2325, BR3032

e) Category 5: Other round batteries – Miscellaneous

R40
4LR44
2CR13252
4SR44
5AR40

f) Category 6: Non-round batteries – Miscellaneous

S4
3R12C, 3R12P, 3R12S, 3LR12
4LR61
BR-P2, CR-P2
2CR5
2EP3863
4R25X, 4LR25X
4R25Y
4R25-2, 4LR25-2
6AS4
6AS6
6F22, 6LR61
6F100

6.8 Drawings of round batteries which correspond to Figure 1, Figure 2, Figure 3 and Figure 4 are prepared by reduction or enlargement of the relevant original drawings. The other drawings are prepared by reduction or enlargement of conventional specification drawings.

In each case the drawings show the shape of the relevant batteries. Dimensions for each battery are shown in the tables.

NOTE See Annexes A, B and C for ease of locating battery sizes.

7 Physical and electrical specifications

7.1 Category 1 batteries

7.1.1 Category 1 – Physical and electrical specifications

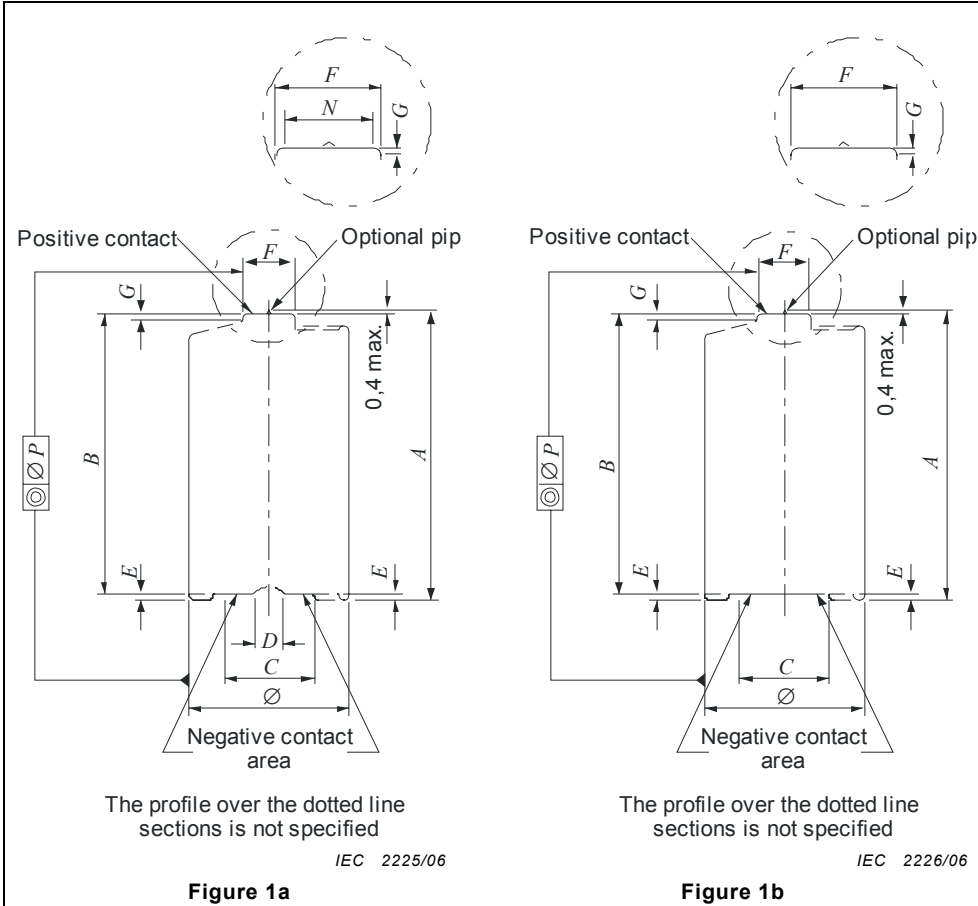


Figure 1 – Category 1 dimensional drawings

For batteries complying with Figures 1a and 1b, flat negative contact is not necessarily recessed.

When the flat negative contact surface forms the lower part of the battery, dimensions "A" and "B" are both measured from the surface and dimension "E" is zero.

Dimension "P" to be measured in accordance with ISO 1101.

Batteries complying with these physical and electrical specifications are as follows:

| Designation | OCV max. |
|--|----------|
| | V |
| R1, R03, R6P, R6S, R14P, R14S R20P, R20S | 1,725 |
| 2R10 | 3,450 |
| LR8D425, LR1, LR03, LR6, LR14, LR20 | 1,65 |
| CR12A604 | 3,7 |

For the definition of the dimensions, see Clause 5.

The cylindrical surface is insulated from the contacts.

Terminals: flat/cap and base.

For general information, see IEC 60086-1.

Figure 1a: negative contact C may not be flat over the whole area.

Figure 1b: negative contact shall be essentially flat over the whole surface area.

7.1.2 Category 1 – Specifications: R1, R03, R6P, R6S

| Electro-chemical system letter | Designation | V_n V | Dimensions mm | | | | | | | | | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|---------------------|------------|------------------|----------|----------|----------|----------|----------|---------------|------|-----------------|----------------------|--------------------------------|---------|-------------------------------|--|
| | | | <i>A</i> | <i>B</i> | <i>C</i> | <i>E</i> | <i>F</i> | <i>G</i> | \varnothing | | $\varnothing P$ | <i>R</i> Ω | Daily period | EV V | | |
| | | | Max. | Min. | Min. | Max. | Max. | Min. | Max. | Min. | Max. | | | | | |
| No letter (see note) | R1 | 1,5 | 30,2 | 29,1 | 5,0 | 0,2 | 4,0 | 0,5 | 12,0 | 10,9 | 0,5 | 300 | 12 h | 0,9 | 76 h | Hearing aid |
| | | | | | | | | | | | | 5,1 | 5 min | 0,9 | 30 min | Portable lighting |
| | R03 | 1,5 | 44,5 | 43,3 | 4,3 | 0,5 | 3,8 | 0,8 | 10,5 | 9,5 | 0,4 | 5,1 | b | 0,9 | 45 min | Portable lighting |
| | | | | | | | | | | | | 10 | 1 h | 0,9 | 1,5 h | Personal cassette player and tape recorder |
| | | | | | | | | | | | | 75 | 4 h | 0,9 | 20 h | Radio |
| | | | | | | | | | | | | 24 | 15 s per minute 8 h per day | 1,0 | 4 h | Remote control |
| | | | | | | | | | | | | 43 | 4 h | 0,9 | 27 h | Radio |
| | R6P (high power) | 1,5 | 50,5 | 49,2 | 7,0 | 0,5 | 5,5 | 1,0 | 14,5 | 13,5 | 0,5 | 3,9 | 1 h | 0,8 | 60 min | Motor/toy |
| | | | | | | | | | | | | 10 | 1 h | 0,9 | 4,0 h | Personal cassette player and tape recorder |
| | | | | | | | | | | | | 24 | 15 s per min 8 h per day | 1,0 | 11 h | Remote control |
| | | | | | | | | | | | | 1,8 | c | 0,9 | 60 pulses | Pulse test |
| | R6S (standard) | 1,5 | 50,5 | 49,2 | 7,0 | 0,5 | 5,5 | 1,0 | 14,5 | 13,5 | 0,5 | 43 | 4 h | 0,9 | 22 h | Radio |

NOTE Delayed discharge performance after 12 months is 80 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

^b 4 min beginning at hourly intervals for 8 h per day.

^c 15 s on, 45 s off for 24 h per day.

7.1.3 Category 1 – Specifications: R14P, R14S

| Electro-chemical system letter | Designation | V_n V | Dimensions mm | | | | | | | | | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|----------------------|------------|------------------|----------|----------|----------|----------|----------|---------------|------|-----------------|----------------------|--------------|---------|-------------------------------|-------------------|
| | | | <i>A</i> | <i>B</i> | <i>C</i> | <i>E</i> | <i>F</i> | <i>G</i> | \varnothing | | $\varnothing P$ | <i>R</i> Ω | Daily period | EV V | | |
| | | | Max. | Min. | Min. | Max. | Max. | Min. | Max. | Min. | Max. | | | | | |
| No letter (see note) | R14P (high power) | 1,5 | 50,0 | 48,6 | 13,0 | 0,9 | 7,5 | 1,5 | 26,2 | 24,9 | 1,0 | 3,9 | b | 0,9 | 270 min | Portable lighting |
| | | | | | | | | | | | | 6,8 | 1 h | 0,9 | 9 h | Tape recorder |
| | | | | | | | | | | | | 20 | 4 h | 0,9 | 27 h | Radio |
| | | | | | | | | | | | | 3,9 | 1 h | 0,8 | 3 h | Toy |
| | R14S (standard) | 1,5 | 50,0 | 48,6 | 13,0 | 0,9 | 7,5 | 1,5 | 26,2 | 24,9 | 1,0 | 3,9 | b | 0,9 | 120 min | Portable lighting |
| | | | | | | | | | | | | 6,8 | 1 h | 0,9 | 3 h | Tape recorder |
| | | | | | | | | | | | | 20 | 4 h | 0,9 | 15 h | Radio |
| | | | | | | | | | | | | 3,9 | 1 h | 0,8 | 1,5 h | Toy |

NOTE Delayed discharge performance after 12 months is 80 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).
^b 4 min beginning at hourly intervals for 8 h per day.

7.1.4 Category 1 – Specifications: R20P, R20S, 2R10, LR8D425, LR1

| Electro-chemical system letter | Designation | V_n V | Dimensions mm | | | | | | | | | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|----------------------|------------|------------------|----------|------------------|----------|----------|----------|---------------|------|-----------------|--|------------------------------------|---------|-------------------------------|-----------------------|
| | | | <i>A</i> | <i>B</i> | <i>C</i> | <i>E</i> | <i>F</i> | <i>G</i> | \varnothing | | $\varnothing P$ | <i>R</i> Ω | Daily period | EV V | | |
| | | | Max. | Min. | Min. | Max. | Max. | Min. | Max. | Min. | Max. | | | | | |
| No letter (see note 1) | R20P (high power) | 1,5 | 61,5 | 59,5 | 18,0 | 1,0 | 9,5 | 1,5 | 34,2 | 32,3 | 1,0 | 2,2 | b | 0,9 | 320 min | Portable lighting (1) |
| | | | | | | | | | | | | 3,9 | 1 h | 0,9 | 11 h | Tape recorder |
| | | | | | | | | | | | | 10 | 4 h | 0,9 | 32 h | Radio |
| | | | | | | | | | | | | 2,2 | 1 h | 0,8 | 5 h | Toy |
| | | | | | | | | | | | | 1,5 | 4 min per 15 min 8 h per day | 0,9 | 135 min | Portable lighting (2) |
| | R20S (standard) | 1,5 | 61,5 | 59,5 | 18,0 | 1,0 | 9,5 | 1,5 | 34,2 | 32,3 | 1,0 | 2,2 | b | 0,9 | 100 min | Portable lighting (1) |
| | | | | | | | | | | | | 3,9 | 1 h | 0,9 | 4 h | Tape recorder |
| | | | | | | | | | | | | 10 | 4 h | 0,9 | 18 h | Radio |
| | | | | | | | | | | | | 2,2 | 1 h | 0,8 | 2 h | Toy |
| | | | | | | | | | | | | 1,5 | 4 min per 15 min 8 h per day | 0,9 | 32 min | Portable lighting (2) |
| 2R10 | 3,0 | 74,6 | 71,5 | 9,0 | 0,8 | 6,8 | 1,0 | 21,8 | 20,0 | | 6,8 | 5 min | 1,8 | 85 min | Portable lighting | |
| L (see note 2) | LR8D425 | 1,5 | 42,5 | 41,5 | 2,3 ^C | 0,1 | 3,8 | 0,7 | 8,3 | 7,7 | 0,1 | 5,1 | 5 min | 0,9 | 90 min | Lighting |
| | | | | | | | | | | | | 75 | 1 h | 1,1 | 22 h | Laser pointer |
| | | | | | | | | | | | | 75 | 1 h | 0,9 | 27 h | Service output test |
| | LR1 | 1,5 | 30,2 | 29,1 | 5,0 | 0,2 | 4,0 | 0,5 | 12,0 | 10,9 | 0,5 | 300 | 12 h | 0,9 | 130 h | Hearing aid |
| | | | | | | | | | | | | 5,1 | 5 min | 0,9 | 94 min | Portable lighting |
| | | | | | | | | | | | | Background: 3 000 ^d Pulse: 10 | 24 h 5 s per h | 0,9 | 888 h | Paging test |

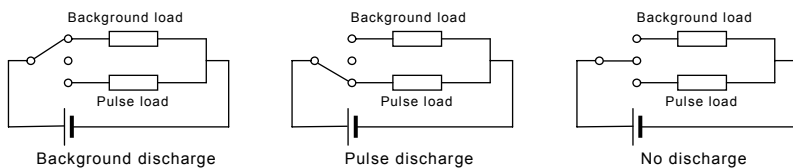
NOTE 1 Delayed discharge performance after 12 months is 80 % of MAD.

NOTE 2 Delayed discharge performance after 12 months is 90 % of MAD.

7.1.4 (continued)

- a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).
- b 4 min beginning at hourly intervals for 8 h per day.
- c This battery does not fulfill the requirement $C > F$ due to constructional constraints.
- d The pulse load of 10Ω alone shall be applied across the battery. It is not added in series or parallel to the $3\,000 \Omega$ background load. See Example.

EXAMPLE



7.1.5 Category 1 – Specifications: LR03, LR6, LR14, LR20

| Electro-chemical system letter | Designation | V_n V | Dimensions mm | | | | | | | | | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|------------|------------------|----------|----------|----------|----------|----------|---------------|------|-----------------|--|----------------------------------|---------|-------------------------------|--|
| | | | <i>A</i> | <i>B</i> | <i>C</i> | <i>E</i> | <i>F</i> | <i>G</i> | \varnothing | | $\varnothing P$ | <i>R</i> | Daily period | EV V | | |
| | | | Max. | Min. | Min. | Max. | Max. | Min. | Max. | Min. | Max. | Ω | | | | |
| L (see note) | LR03 | 1,5 | 44,5 | 43,3 | 4,3 | 0,5 | 3,8 | 0,8 | 10,5 | 9,5 | 0,4 | 5,1 | b | 0,9 | 130 min | Portable lighting |
| | | | | | | | | | | | | 24 | 15 s per minute 8 h per day | 1,0 | 14,5 h | Remote control |
| | | | | | | | | | | | | 10 | 1 h | 0,9 | 5 h | Personal cassette player and tape recorder |
| | | | | | | | | | | | | 75 | 4 h | 0,9 | 44 h | Radio |
| | | | | | | | | | | | | Current drain 600 mA | c | 0,9 | 140 pulses | Photo flash |
| | LR6 | 1,5 | 50,5 | 49,2 | 7,0 | 0,5 | 5,5 | 1,0 | 14,5 | 13,5 | 0,5 | 43 | 4 h | 0,9 | 60 h | Radio |
| | | | | | | | | | | | | 3,9 | 1 h | 0,8 | 4 h | Motor/toy |
| | | | | | | | | | | | | 10 | 1 h | 0,9 | 11,5 h | Personal cassette player and tape recorder |
| | | | | | | | | | | | | Current drain 250 mA | 1 h | 0,9 | 4,5 h | CD/MD/ Electronic game |
| | | | | | | | | | | | | Current drain 1 000 mA | c | 0,9 | 200 pulses | Photo flash |
| | | | | | | | | | | | | Power drains 1 500 mW 650 mW 0 mW | 5 min ^d 55 min | 1,05 | 40 pulses | Digital still camera |
| | | | | | | | | | | | | 24 | 15 s per minute 8 h per day | 1,0 | 31 h | Remote control |
| | LR14 | 1,5 | 50,0 | 48,6 | 13,0 | 0,9 | 7,5 | 1,5 | 26,2 | 24,9 | 1,0 | 3,9 | b | 0,9 | 770 min | Portable lighting |
| | | | | | | | | | | | | Current drain 400 mA | 2 h | 0,9 | 8 h | Portable stereo |
| | | | | | | | | | | | | 20 | 4 h | 0,9 | 77 h | Radio |
| | | | | | | | | | | | | 3,9 | 1 h | 0,8 | 12 h | Toy |

7.1.5 (continued)

| Electro-chemical system letter | Designation | V_n V | Dimensions mm | | | | | | | | | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|------------|------------------|----------|----------|----------|----------|----------|---------------|------|-----------------|-------------------------|---------------------------------|---------|-------------------------------|-----------------------|
| | | | <i>A</i> | <i>B</i> | <i>C</i> | <i>E</i> | <i>F</i> | <i>G</i> | \varnothing | | $\varnothing P$ | <i>R</i> | Daily period | EV V | | |
| | | | Max. | Min. | Min. | Max. | Max. | Min. | Max. | Min. | Max. | Ω | | | | |
| L (see note) | LR20 | 1,5 | 61,5 | 59,5 | 18,0 | 1,0 | 9,5 | 1,5 | 34,2 | 32,3 | 1,0 | 2,2 | b | 0,9 | 810 min | Portable lighting (1) |
| | | | | | | | | | | | | Current drain 600 mA | 2 h | 0,9 | 11 h | Portable stereo |
| | | | | | | | | | | | | 10 | 4 h | 0,9 | 81 h | Radio |
| | | | | | | | | | | | | 2,2 | 1 h | 0,8 | 15 h | Toy |
| | | | | | | | | | | | | 1,5 | 4 min per 15 min 8 h per day | 0,9 | 450 min | Portable lighting (2) |

NOTE Delayed discharge performance after 12 months is 90 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).
^b 4 min beginning at hourly intervals for 8 h per day.
^c 10 s on, 50 s off for 1 h per day.
^d Repeat 10 times 1 500 mW for 2 s and 650 mW for 28 s followed by 0 mW for 55 min. Repeat to 1,05 V.

7.1.6 Category 1 – Specifications: CR12A604

| Electro-chemical system letter | Designation | V_n V | Dimensions mm | | | | | | | | | Discharge conditions | | | MAD ^a (initial) | Applications |
|--|-----------------------|------------|------------------|----------|----------|----------|----------|----------|---------------|------|-----------------|----------------------|--------------|---------|-------------------------------|---------------------|
| | | | <i>A</i> | <i>B</i> | <i>C</i> | <i>E</i> | <i>F</i> | <i>G</i> | \varnothing | | $\varnothing P$ | <i>R</i> | Daily period | EV V | | |
| | | | Max. | Min. | Min. | Max. | Max. | Min. | Max. | Min. | Max. | Ω | | | | |
| C (see note) | CR12A604 ^b | 3,0 | 60,4 | 58,0 | 4,8 | – | 4,5 | 0,3 | 12,0 | 10,7 | – | 2 000 | 24 h | 2,0 | 840 h | Service output test |
| NOTE Delayed discharge performance after 12 months is 98 % of MAD. | | | | | | | | | | | | | | | | |
| ^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test). | | | | | | | | | | | | | | | | |
| ^b Marking: 4.1.6.2 of IEC 60086-1 is applicable. | | | | | | | | | | | | | | | | |

7.2 Category 2 batteries

7.2.1 Category 2 – Physical and electrical specifications

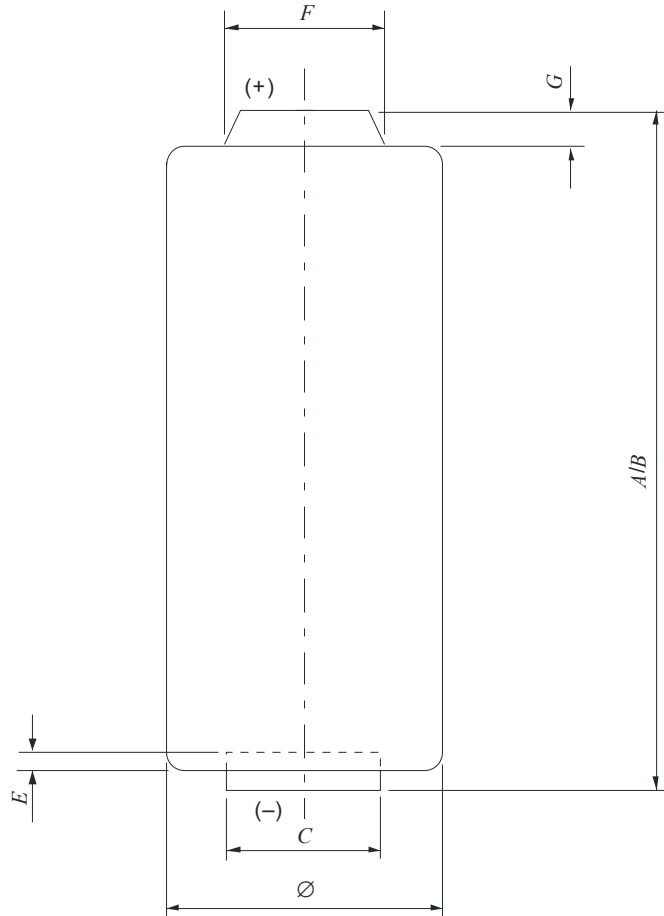


Figure 2 – Category 2 dimensional drawing

IEC 2227/06

Batteries complying with these physical and electrical specifications are as follows:

| Designation | OCV max. V |
|---|---------------|
| CR14250, CR15H270, CR17345, CR17450, BR17335 | 3,7 3,7 |

For the definition of the dimensions, see Clause 5.
 The cylindrical surface is insulated from the contacts.
 Terminals: flat/cap and base.
 For general information, see IEC 60086-1.

7.2.2 Category 2 – Specifications: CR14250, CR15H270, CR17345, CR17450, BR17335

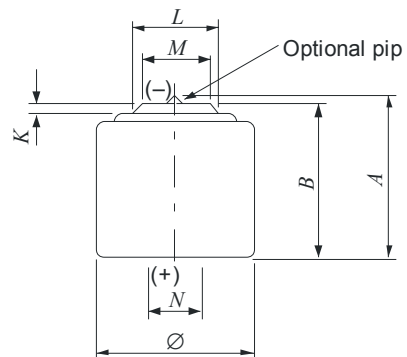
| Electro-chemical system letter | Designation | V_n V | Dimensions mm | | | | | | | | Discharge conditions | | | MAD ^a (initial) | Applications | |
|--------------------------------|-------------|------------|-------------------|-------------------|----------|----------|------|----------|----------|-------------|----------------------|-------------------------|------------------------------|-------------------------------|---------------------|---------------------|
| | | | <i>A</i> | <i>B</i> | <i>C</i> | <i>E</i> | | <i>F</i> | <i>G</i> | \emptyset | | <i>R</i> k Ω | Daily period | | | E V V |
| | | | Max. | Min. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | | | | | |
| C (see note) | CR14250 | 3,0 | 25,0 | 23,5 | 5,0 | – | – | 8,0 | 0,4 | 14,5 | 13,5 | 3 | 24 h | 2,0 | 750 h | Service output test |
| | CR15H270 | 3,0 | 27,0 ^b | 26,0 ^b | 8,5 | 0,4 | 0,05 | 7,0 | 0,6 | 15,6 | 15,0 | 0,2 | 24 h | 2,0 | 48 h | Service output test |
| | | | | | | | | | | | | Current drain 900 mA | 3 s on 27 s off 24 h/d | 1,55 | 840 pulses | Photo |
| | CR17345 | 3,0 | 34,5 | 33,5 | 11,0 | 0,9 | 0,5 | 9,6 | 1,0 | 17,0 | 16,0 | 0,1 | 24 h | 2,0 | 40 h | Service output test |
| | | | | | | | | | | | | Current drain 900 mA | 3 s on 27 s off 24 h/d | 1,55 | 1 400 pulses | Photo |
| CR17450 | 3,0 | 45,0 | 43,5 | 5,0 | – | – | 8,0 | 0,4 | 17,0 | 16,0 | 1 | 24 h | 2,0 | 710 h | Service output test | |
| B (see note) | BR17335 | 3,0 | 33,5 | 32,0 | 5,0 | – | – | 8,0 | 0,1 | 17,0 | 16,0 | – | – | – | – | – |

NOTE Delayed discharge performance after 12 months is 98 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).
^b The *A* dimensions shall be measured on the label overlap.

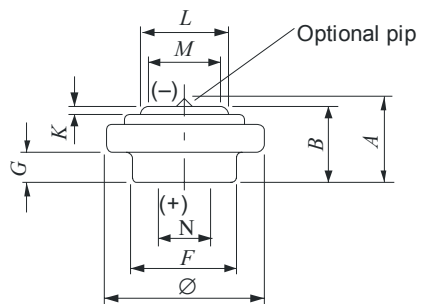
7.3 Category 3 batteries

7.3.1 Category 3 – Physical and electrical specifications



IEC 2228/06

Figure 3a



IEC 2229/06

Figure 3b

Figure 3 – Category 3 dimensional drawings

No part of the battery shall project beyond the positive contact area.

Marking: 4.1.6.2 of IEC 60086-1 is applicable.

Batteries complying with these physical and electrical specifications are as follows:

| Designation | OCV max. V |
|-------------|---------------|
| LR9, LR53 | 1,65 |
| CR11108 | 3,7 |

For the definition of the dimensions, see Clause 5.

The cylindrical surface is connected to the positive terminal.

Terminals: flat/cap and case.

For general information, see IEC 60086-1.

7.3.2 Category 3 – Specifications: LR9, LR53, CR11108

| Electro-chemical system letter | Designation | V_n V | Dimensions mm | | | | | | | | | | Discharge conditions | | | MAD ^a (initial) | Applications |
|--|-------------|------------|------------------|----------|----------|----------|----------|----------|----------|----------|-------------|------|----------------------|--------------|---------|-------------------------------|---------------------|
| | | | <i>A</i> | <i>B</i> | <i>F</i> | <i>G</i> | <i>K</i> | <i>L</i> | <i>M</i> | <i>N</i> | \emptyset | | <i>R</i> | Daily period | EV V | | |
| | | | Max. | Min. | Max. | Min. | Min. | Max. | Min. | Min. | Max. | Min. | Ω | | | | |
| L (see note 1) | LR9 | 1,5 | 6,2 | 5,6 | 13,5 | 2,0 | 0,2 | 12,5 | 10,0 | 10,0 | 16,0 | 15,2 | 390 | 24 h | 0,9 | 48 h | Service output test |
| | LR53 | 1,5 | 6,1 | 5,4 | 20,9 | 2,1 | 0,2 | 21,0 | 15,3 | 18,7 | 23,2 | 22,6 | 470 | 24 h | 0,9 | 50 h | Service output test |
| C (see note 2) | CR11108 | 3,0 | 10,8 | 10,4 | – | – | 0,2 | 9,0 | 3,0 | 9,0 | 11,6 | 11,4 | 15 000 | 24 h | 2,0 | 620 h | Service output test |
| NOTE 1 Delayed discharge performance after 12 months is 90 % of MAD. | | | | | | | | | | | | | | | | | |
| NOTE 2 Delayed discharge performance after 12 months is 98 % of MAD. | | | | | | | | | | | | | | | | | |
| ^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test). | | | | | | | | | | | | | | | | | |

7.4 Category 4 batteries

7.4.1 Category 4 – Physical and electrical specifications

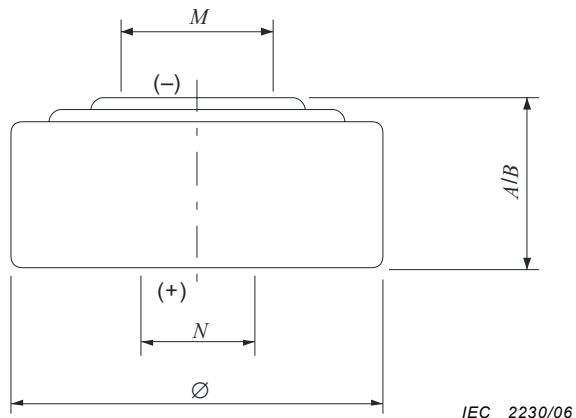


Figure 4 – Category 4 dimensional drawing

Any difference between the height of the battery and the distance between the contacts shall not exceed 0,1 mm.

No part of the battery shall project beyond the positive contact.

Marking: 4.1.6.2 of IEC 60086-1 is applicable.

Batteries complying with these physical and electrical specifications are as follows:

| Designation | OCV max. V |
|--|---------------|
| PR70, PR41, PR48, PR44 | 1,68 |
| LR41, LR55, LR54, LR43, LR44 | 1,65 |
| SR62, SR63, SR65, SR64, SR60, SR67, SR66, SR58, SR68, SR59, SR69, SR41, SR57, SR55, SR48, SR56, SR54, SR42, SR43, SR44 | 1,63 |
| CR1025, CR1216, CR1220, CR1616, CR2012, CR1620, CR2016, CR2025, CR2320, CR2032, CR2330, CR2430, CR2354, CR3032, CR2450 | 3,7 |
| BR1225, BR2016, BR2020, BR2320, BR2325, BR3032 | 3,7 |

For the definition of the dimensions, see Clause 5.

The cylindrical surface is connected to the positive terminal. Positive contact should be made to the side of the battery but may be made to the base.

Terminals: flat/cap and case.

The flat negative contact shall project.

Contact pressure resistance, see 4.1.3.1 of IEC 60086-1.

For general information see IEC 60086-1.

7.4.2 Category 4 – Specifications: PR70, PR41, PR48, PR44

| Electro-chemical system letter | Designation | V_n V | Dimensions mm | | | | | | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|----------------------|------------|------------------|------|------|------|------|------|---|--|------|-------------------------------|--------------------------------|
| | | | A/B | | M | N | Ø | | R | Daily period | EV | | |
| | | | Max. | Min. | Min. | Min. | Max. | Min. | kΩ | | V | | |
| P (see note) | PR70 ^{b, c} | 1,4 | 3,6 | 3,3 | – | – | 5,8 | 5,55 | 3 | 12 h | 0,9 | 90 h | Hearing aid |
| | | | | | | | | | Background: 3 Pulse: 0,510 | 12 h 1 s on/3 s off for 12 h ^d | 1,0 | 45 h | High power service output test |
| | | | | | | | | | Current drain Background: 0,7 mA Pulse: 3 mA | e | 1,05 | 85 h | Hearing aid standard |
| | | | | | | | | | Current drain Background: 1 mA Pulse: 5 mA | e | 1,05 | 50 h | Hearing aid high drain |
| | PR41 ^{b, c} | 1,4 | 3,6 | 3,3 | 3,0 | 3,8 | 7,9 | 7,55 | 1,5 | 12 h | 0,9 | 100 h | Hearing aid |
| | | | | | | | | | Background: 1,5 Pulse: 0,160 | 12 h 1 s on/3 s off for 12 h ^d | 1,0 | 25 h | High power service output test |
| | | | | | | | | | Current drain Background: 1,2 mA Pulse : 5 mA | e | 1,05 | 95 h | Hearing aid standard |
| | | | | | | | | | Current drain Background : 2 mA Pulse : 10 mA | e | 1,05 | 55 h | Hearing aid high drain |
| | PR48 ^{b, c} | 1,4 | 5,4 | 5,0 | 3,0 | 3,8 | 7,9 | 7,55 | 1,5 | 12 h | 0,9 | 195 h | Hearing aid |
| | | | | | | | | | Background: 1,5 Pulse: 0,110 | 12 h 1 s on/3 s off for 12 h ^d | 1,0 | 30 h | High power service output test |
| | | | | | | | | | Current drain Background : 2 mA Pulse : 6mA | e | 1,05 | 82 h | Hearing aid standard |
| | | | | | | | | | Current drain Background: 3 mA Pulse: 12 mA | e | 1,05 | 55 h | Hearing aid high drain |

7.4.2 (continued)

| Electro-chemical system letter | Designation | V_n V | Dimensions mm | | | | | | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|----------------------|------------|------------------|------|------|------|------|-------|--|--|------|-------------------------------|--------------------------------|
| | | | A/B | | M | N | Ø | | R | Daily period | EV | | |
| | | | Max. | Min. | Min. | Min. | Max. | Min. | kΩ | | V | | |
| P (see note) | PR44 ^{b, c} | 1,4 | 5,4 | 5,0 | 3,8 | 3,8 | 11,6 | 11,25 | 0,620 | 12 h | 0,9 | 195 h | Hearing aid |
| | | | | | | | | | Background: 0,620 Pulse: 0,043 | 12 h 1 s on/3 s off for 12 h ^d | 1,0 | 38 h | High power service output test |
| | | | | | | | | | Current drain Background : 5 mA Pulse: 15 mA | e | 1,05 | 69 h | Hearing aid standard |
| | | | | | | | | | Current drain Background: 8 mA Pulse: 24 mA | e | 1,05 | 45 h | Hearing aid high drain |

NOTE Delayed discharge performance after 12 months is 95 % of MAD.

^a Standard conditions (see IEC 690086-1, Table 4, Initial discharge test).

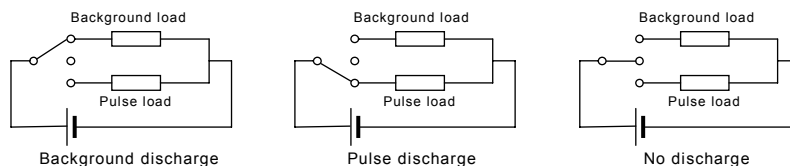
^b A period of at least 10 min shall elapse between activation and commencement of electrical measurement.

^c Equipment designers' attention is drawn to the importance of making positive electrical contact on the side of the battery so that air access is not impeded for "P" system batteries.

^d The pulse load alone shall be applied across the battery. It is the effective load. It is not added in series or parallel to the background load. See Example.

^e 12 h per day repeated cycle of the heavier load for 100 ms, plus the lighter load for 119 min, 59 s, 900 ms.

EXAMPLE



7.4.2 (continued)

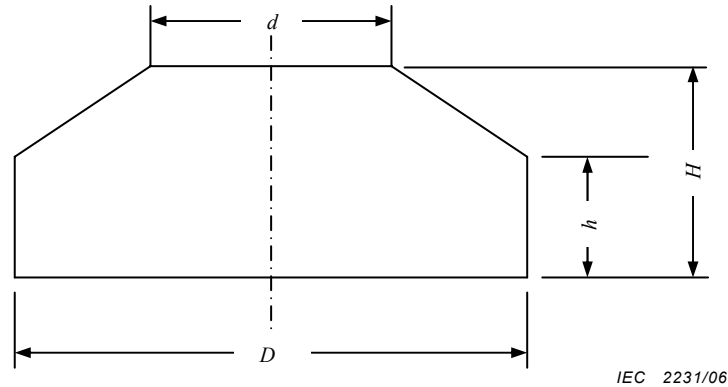


Figure 5 – Gauge for Category 4 batteries

The batteries specified on this sheet shall pass freely through a gauge having the form given above and the dimensions shown below.

| Electro-chemical system letter | Designation | V_n V | Gauge dimensions | | | | | | | |
|--------------------------------|-------------|------------|------------------|--------|-------|-------|-------|-------|-------|-------|
| | | | mm | | | | | | | |
| | | | D | | d | | H | | h | |
| | | | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| P | PR70 | 1,4 | 5,814 | 5,805 | 4,652 | 4,643 | 3,612 | 3,604 | 3,031 | 3,023 |
| | PR41 | 1,4 | 7,914 | 7,905 | 6,314 | 6,305 | 3,612 | 3,604 | 2,808 | 2,802 |
| | PR48 | 1,4 | 7,914 | 7,905 | 6,314 | 6,305 | 5,412 | 5,404 | 4,612 | 4,604 |
| | PR44 | 1,4 | 11,617 | 11,606 | 9,614 | 9,605 | 5,412 | 5,404 | 4,412 | 4,404 |

7.4.3 Category 4 – Specifications: LR41, LR55, LR54, LR43, LR44

| Electro-chemical system letter | Designation | V_n V | Dimensions mm | | | | | | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|------------|------------------|------|----------|----------|-------------|-------|----------------------|--------------|---------|-------------------------------|---------------------|
| | | | <i>A/B</i> | | <i>M</i> | <i>N</i> | \emptyset | | <i>R</i> | Daily period | EV V | | |
| | | | Max. | Min. | Min. | Min. | Max. | Min. | k Ω | | | | |
| L (see note) | LR41 | 1,5 | 3,6 | 3,3 | 3,0 | 3,8 | 7,9 | 7,55 | 22 | 24 h | 1,2 | 300 h | Service output test |
| | LR55 | 1,5 | 2,1 | 1,85 | 3,8 | 3,8 | 11,6 | 11,25 | 22 | 24 h | 1,2 | 275 h | Service output test |
| | LR54 | 1,5 | 3,05 | 2,75 | 3,8 | 3,8 | 11,6 | 11,25 | 15 | 24 h | 1,2 | 350 h | Service output test |
| | LR43 | 1,5 | 4,2 | 3,8 | 3,8 | 3,8 | 11,6 | 11,25 | 10 | 24 h | 1,2 | 359 h | Service output test |
| | LR44 | 1,5 | 5,4 | 5,0 | 3,8 | 3,8 | 11,6 | 11,25 | 6,8 | 24 h | 1,2 | 340 h | Service output test |

NOTE Delayed discharge performance after 12 months is 90 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

7.4.4 Category 4 – Specifications: SR62, SR63, SR 65, SR64, SR60, SR67, SR66, SR58, SR68, SR59, SR69, SR41, SR57, SR55, SR48

| Electro-chemical system letter | Designation | V_n V | Dimensions mm | | | | | | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|------------|------------------|------|------|------|------|-------|----------------------|--------------|-------|-------------------------------|---------------------|
| | | | A/B | | M | N | Ø | | R | Daily period | EV | | |
| | | | Max. | Min. | Min. | Min. | Max. | Min. | kΩ | | V | | |
| S (see note) | SR62 | 1,55 | 1,65 | 1,45 | 2,5 | 3,8 | 5,8 | 5,55 | 82 | 24 h | 1,2 | 390 h | Service output test |
| | SR63 | 1,55 | 2,15 | 1,9 | 2,5 | 3,8 | 5,8 | 5,55 | 68 | 24 h | 1,2 | 560 h | Service output test |
| | SR65 | 1,55 | 1,65 | 1,45 | 3,0 | – | 6,8 | 6,6 | 100 | 24 h | 1,2 | 810 h | Service output test |
| | SR64 | 1,55 | 2,7 | 2,4 | 2,5 | 3,8 | 5,8 | 5,55 | 56 | 24 h | 1,2 | – | Service output test |
| | SR60 | 1,55 | 2,15 | 1,9 | 3,0 | 3,8 | 6,8 | 6,5 | 68 | 24 h | 1,2 | 685 h | Service output test |
| | SR67 | 1,55 | 1,65 | 1,45 | 3,0 | – | 7,9 | 7,65 | 68 | 24 h | 1,2 | 820 h | Service output test |
| | SR66 | 1,55 | 2,6 | 2,4 | 3,0 | – | 6,8 | 6,6 | 47 | 24 h | 1,2 | 680 h | Service output test |
| | SR58 | 1,55 | 2,1 | 1,85 | 3,0 | 3,8 | 7,9 | 7,55 | 47 | 24 h | 1,2 | 518 h | Service output test |
| | SR68 | 1,55 | 1,65 | 1,45 | 3,8 | – | 9,5 | 9,25 | 47 | 24 h | 1,2 | 680 h | Service output test |
| | SR59 | 1,55 | 2,6 | 2,3 | 3,0 | 3,8 | 7,9 | 7,55 | 33 | 24 h | 1,2 | 530 h | Service output test |
| | SR69 | 1,55 | 2,1 | 1,85 | 3,8 | – | 9,5 | 9,25 | 33 | 24 h | 1,2 | 663 h | Service output test |
| | SR41 | 1,55 | 3,6 | 3,3 | 3,0 | 3,8 | 7,9 | 7,55 | 22 | 24 h | 1,2 | 450 h | Service output test |
| | SR57 | 1,55 | 2,7 | 2,4 | 3,8 | 3,8 | 9,5 | 9,15 | 22 | 24 h | 1,2 | 500 h | Service output test |
| | SR55 | 1,55 | 2,1 | 1,85 | 3,8 | 3,8 | 11,6 | 11,25 | 22 | 24 h | 1,2 | 450 h | Service output test |
| SR48 | 1,55 | 5,4 | 5,0 | 3,0 | 3,8 | 7,9 | 7,55 | 1,5 | 12 h | 0,9 | 40 h | Hearing aid | |
| | | | | | | | | 15 | 24 h | 1,2 | 580 h | Service output test | |

NOTE Delayed discharge performance after 12 months is 90 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

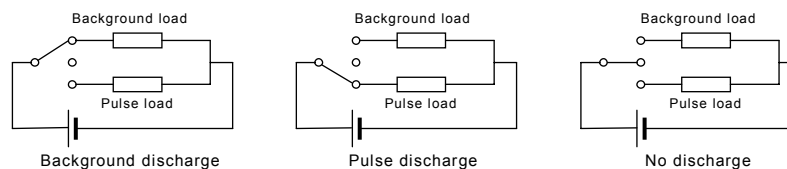
7.4.5 Category 4 – Specifications: SR56, SR54, SR42, SR43, SR44

| Electro-chemical system letter | Designation | V_n V | Dimensions mm | | | | | | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|------------|------------------|------|------|------|------|-------|---|--------------|---------|-------------------------------|---------------------|
| | | | A/B | | M | N | Ø | | R kΩ | Daily period | EV V | | |
| | | | Max. | Min. | Min. | Min. | Max. | Min. | | | | | |
| S (see note) | SR56 | 1,55 | 2,6 | 2,3 | 3,8 | 3,8 | 11,6 | 11,25 | 15 | 24 h | 1,2 | 490 h | Service output test |
| | SR54 | 1,55 | 3,05 | 2,75 | 3,8 | 3,8 | 11,6 | 11,25 | 15 | 24 h | 1,2 | 580 h | Service output test |
| | SR42 | 1,55 | 3,6 | 3,3 | 3,8 | 3,8 | 11,6 | 11,25 | 15 | 24 h | 1,2 | 670 h | Service output test |
| | SR43 | 1,55 | 4,2 | 3,8 | 3,8 | 3,8 | 11,6 | 11,25 | 10 | 24 h | 1,2 | 620 h | Service output test |
| | SR44 | 1,55 | 5,4 | 5,0 | 3,8 | 3,8 | 11,6 | 11,25 | 6,8 | 24 h | 1,2 | 620 h | Service output test |
| | | | | | | | | | Background ^d : 5,6 Pulse: 0,039 | b | 0,9 | 450 h | c |

NOTE Delayed discharge performance after 12 months is 90 % of MAD.

- ^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).
- ^b 24 h per day, plus 39 Ω for 1 s every 6 s, for 5 min per day.
- ^c Accelerated application test for automatic cameras.
- ^d The pulse load alone shall be applied across the battery. It is the effective load. It is not added in series or parallel to the background load. See Example.

EXAMPLE



7.4.6 Category 4 – Specifications: CR1025, CR1216, CR1220, CR1616, CR2012, CR1620, CR2016, CR2025, CR2320, CR2032, CR2330, CR2430, CR2354, CR3032, CR2450

| Electro-chemical system letter | Designation | V_n V | Dimensions mm | | | | | | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|------------|------------------|------|------|------|------|------|----------------------|--------------|---------|-------------------------------|---------------------|
| | | | A/B | | M | N | ∅ | | R | Daily period | EV | | |
| | | | Max. | Min. | Min. | Min. | Max. | Min. | kΩ | | V | | |
| C (see note) | CR1025 | 3,0 | 2,5 | 2,2 | 3,0 | – | 10,0 | 9,7 | 68 | 24 h | 2,0 | 630 h | Service output test |
| | CR1216 | 3,0 | 1,6 | 1,4 | 4,0 | – | 12,5 | 12,2 | 62 | 24 h | 2,0 | 480 h | Service output test |
| | CR1220 | 3,0 | 2,0 | 1,8 | 4,0 | – | 12,5 | 12,2 | 62 | 24 h | 2,0 | 700 h | Service output test |
| | CR1616 | 3,0 | 1,6 | 1,4 | 5,0 | – | 16,0 | 15,7 | 30 | 24 h | 2,0 | 480 h | Service output test |
| | CR2012 | 3,0 | 1,2 | 1,0 | 8,0 | – | 20,0 | 19,7 | 30 | 24 h | 2,0 | 530 h | Service output test |
| | CR1620 | 3,0 | 2,0 | 1,8 | 5,0 | – | 16,0 | 15,7 | 47 | 24 h | 2,0 | 900 h | Service output test |
| | CR2016 | 3,0 | 1,6 | 1,4 | 8,0 | – | 20,0 | 19,7 | 30 | 24 h | 2,0 | 675 h | Service output test |
| | CR2025 | 3,0 | 2,5 | 2,2 | 8,0 | – | 20,0 | 19,7 | 15 | 24 h | 2,0 | 540 h | Service output test |
| | CR2320 | 3,0 | 2,0 | 1,8 | 8,0 | – | 23,0 | 22,6 | 15 | 24 h | 2,0 | 590 h | Service output test |
| | CR2032 | 3,0 | 3,2 | 2,9 | 8,0 | – | 20,0 | 19,7 | 15 | 24 h | 2,0 | 920 h | Service output test |
| | CR2330 | 3,0 | 3,0 | 2,7 | 8,0 | – | 23,0 | 22,6 | 15 | 24 h | 2,0 | 1 320 h | Service output test |
| | CR2430 | 3,0 | 3,0 | 2,7 | 8,0 | – | 24,5 | 24,2 | 15 | 24 h | 2,0 | 1 300 h | Service output test |
| | CR2354 | 3,0 | 5,4 | 5,1 | 8,0 | – | 23,0 | 22,6 | 7,5 | 24h | 2,0 | 1 260 h | Service output test |
| | CR3032 | 3,0 | 3,2 | 2,9 | 8,0 | – | 30,0 | 29,6 | 7,5 | 24 h | 2,0 | 1 250 h | Service output test |
| CR2450 | 3,0 | 5,0 | 4,6 | 8,0 | – | 24,5 | 24,2 | 7,5 | 24 h | 2,0 | 1 200 h | Service output test | |

NOTE Delayed discharge performance after 12 months is 98 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

7.4.7 Category 4 – Specifications: BR1225, BR2016, BR2020, BR2320, BR2325, BR3032

| Electro-chemical system letter | Designation | V_n V | Dimensions mm | | | | | | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|------------|------------------|------|------|------|------|------|----------------------|--------------|---------|-------------------------------|---------------------|
| | | | A/B | | M | N | Ø | | R kΩ | Daily period | EV V | | |
| | | | Max. | Min. | Min. | Min. | Max. | Min. | | | | | |
| B (see note) | BR1225 | 3,0 | 2,5 | 2,2 | 4,0 | – | 12,5 | 12,2 | 30 | 24 h | 2,0 | 395 h | Service output test |
| | BR2016 | 3,0 | 1,6 | 1,4 | 8,0 | – | 20,0 | 19,7 | 30 | 24 h | 2,0 | 636 h | Service output test |
| | BR2020 | 3,0 | 2,0 | 1,8 | 8,0 | – | 20,0 | 19,7 | 15 | 24 h | 2,0 | 490 h | Service output test |
| | BR2320 | 3,0 | 2,0 | 1,8 | 8,0 | – | 23,0 | 22,6 | 15 | 24 h | 2,0 | 468 h | Service output test |
| | BR2325 | 3,0 | 2,5 | 2,2 | 8,0 | – | 23,0 | 22,6 | 15 | 24 h | 2,0 | 696 h | Service output test |
| | BR3032 | 3,0 | 3,2 | 2,9 | 8,0 | – | 30,0 | 29,6 | 7,5 | 24 h | 2,0 | 1 310 h | Service output test |

NOTE Delayed discharge performance after 12 months is 98 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

7.5 Category 5 batteries

7.5.1 Category 5 – Physical and electrical specifications

7.5.1.1 Category 5 – Specifications: R40

| Designation | OCV max. |
|-------------|----------|
| | V |
| R40 | 1,725 |

Dimensions in millimetres.
Terminals: screw terminals.
For general information see IEC 60086-1.

IEC 2386/2000

Figure 6 – Dimensional drawing: R40

| Electro-chemical system letter | Designation | V_n V | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|------------|----------------------|--------------|---------|-------------------------------|---------------------------|
| | | | R Ω | Daily period | EV V | | |
| No letter (see note) | R40 | 1,5 | 6,8 | b | 0,93 | 200 days | Industrial equipment (1) |
| | | | 2,7 | c | 0,85 | 60 h | Industrial equipment (2) |
| | | | 10 | 24 h | 0,85 | 280 h | Industrial equipment (3) |
| | | | 51 | 24 h | 0,9 | 80 days | Electric fence controller |

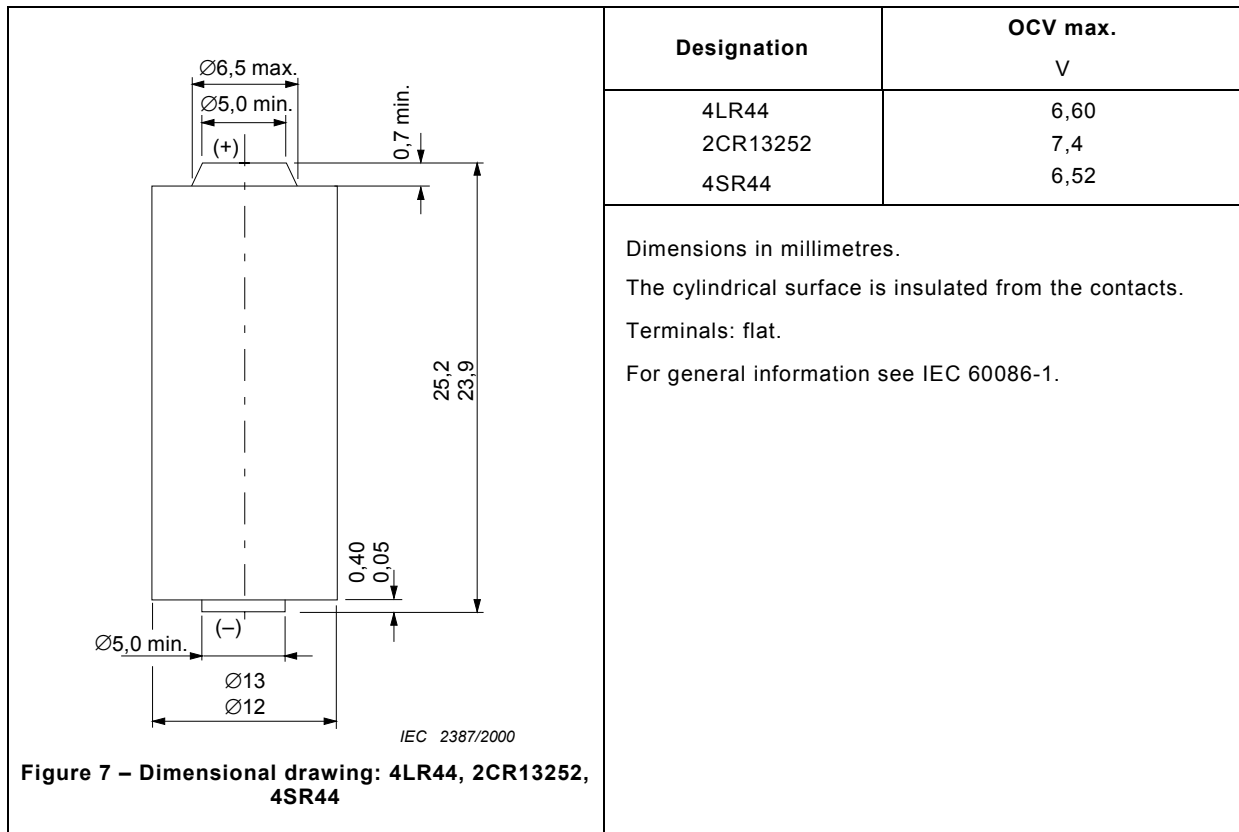
NOTE Delayed discharge performance after 12 months is 80 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

^b Ten periods of 4 min each beginning at hourly intervals during six days per week.
On the seventh day, five periods beginning at 2 h intervals.

^c 1 h on, 6 h off, 1 h on, 16 h off.

7.5.1.2 Category 5 - Specifications: 4LR44, 2CR13252, 4SR44



| Electro-chemical system letter | Designation | V_n V | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|------------|--|--------------|---------|-------------------------------|---------------------|
| | | | R kΩ | Daily period | EV V | | |
| L (see note 1) | 4LR44 | 6,0 | 27 | b | 3,6 | 310 h | c |
| | | | 27 | 24 h | 3,6 | 420 h | Service output test |
| | | | 0,1 | d | 3,6 | 950 pulses | Pulse test |
| C (see note 2) | 2CR13252 | 6,0 | 30 | 24 h | 4,0 | 620 h | Service output test |
| S (see note 1) | 4SR44 | 6,2 | Background ^e : 27 Pulse: 0,160 | b | 3,6 | 570 h | c |
| | | | 27 | 24 h | 3,6 | 620 h | Service output test |
| | | | 0,1 | d | 3,6 | 1 000 pulses | Pulse test |

NOTE 1 Delayed discharge performance after 12 months is 90 % of MAD.

NOTE 2 Delayed discharge performance after 12 months is 98 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

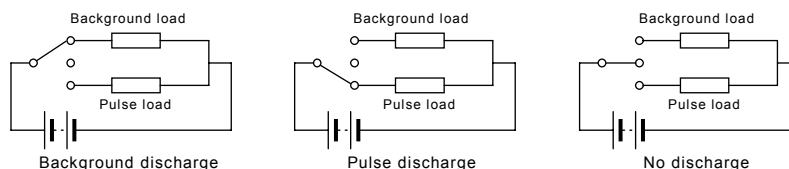
^b 24 h per day, plus 160 Ω for 1 s every 6 s for 5 min per day.

^c Accelerated application test for automatic cameras.

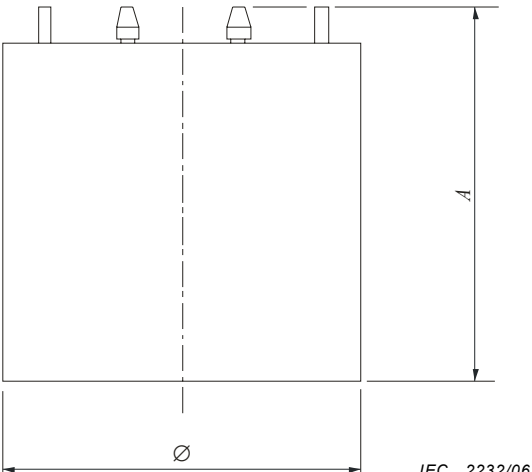
^d 24 h per day, 2 s on, 1 s off.

^e The pulse load alone shall be applied across the battery. It is the effective load. It is not added in series or parallel to the background load. See Example.

EXAMPLE



7.5.1.3 Category 5 – Specifications: 5AR40

| | | |
|--|---|----------------------|
|  <p style="text-align: center;">IEC 2232/06</p> <p style="text-align: center;">Figure 8 – Dimensional drawing: 5AR40</p> | Designation | OCV max. V |
| | 5AR40 | 7,75 |
| | <p>Dimensions in millimetres.</p> <p>Terminals: screw terminals.</p> <p>Terminals located on top surface.</p> <p>Maximum terminal stud diameter: 4,2 mm.</p> <p>For general information, see IEC 60086-1.</p> | |

| Dimension | Max. |
|-----------|-------|
| <i>A</i> | 190,0 |
| Ø | 184,0 |

| Electro-chemical system letter | Designation | V_n V | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|--------------------|------------|----------------------|--------------|---------|-------------------------------|---------------------------|
| | | | R Ω | Daily period | EV V | | |
| A (see note) | 5AR40 ^b | 7,0 | 240 | 24 h | 4,5 | 120 days | Electric fence controller |

NOTE Delayed discharge performance after 12 months is 80 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

^b Equipment designers' attention is drawn to the importance of ensuring that air access is not impeded for "A" system batteries.

7.6 Category 6 batteries

7.6.1 Category 6 – Physical and electrical specifications

7.6.1.1 Category 6 – Specifications: S4

| | | Designation | | OCV max. | | | |
|--|-------------|---|----------------------|--------------|---------|-------------------------------|----------------------|
| | | S4 | | V | | | |
| | | | | 1,725 | | | |
| <p>Figure 9 – Dimensional drawing: S4</p> | | <p>Dimensions in millimetres.</p> <p>Terminals:</p> <ul style="list-style-type: none"> –negative: wire, approximate free length 90 mm. –positive: screw terminal (metal nut). –For general information, see IEC 60086-1. | | | | | |
| Electro-chemical system letter | Designation | V_n V | Discharge conditions | | | MAD ^a (initial) | Applications |
| | | | R Ω | Daily period | EV V | | |
| No letter (see note) | S4 | 1,5 | 20 | 24 h | 0,85 | 500 h | Industrial equipment |
| NOTE Delayed discharge performance after 12 months is 80 % of MAD. | | | | | | | |
| ^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test). | | | | | | | |

7.6.1.2 Category 6 – Specifications: 3R12C, 3R12P, 3R12S, 3LR12

| Designation | OCV max. |
|-------------|----------|
| | V |
| 3R12C | 5,175 |
| 3R12P | 5,175 |
| 3R12S | 5,175 |
| 3LR12 | 4,95 |

Dimensions in millimetres.
 Terminals: spring clips.
 For general information, see IEC 60086-1.

Figure 10 – Dimensional drawing: 3R12C, 3R12P, 3R12S, 3LR12

| Electro-chemical system letter | Designation | V_n V | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|--------------------------|------------|----------------------|--------------|---------|-------------------------------|-------------------|
| | | | R Ω | Daily period | EV V | | |
| No letter (see note 1) | 3R12C (high capacity) | 4,5 | 20 | 1 h | 2,7 | 4,5 h | Portable lighting |
| | | | 220 | 4 h | 2,7 | 96 h | Radio |
| | 3R12P (high power) | 4,5 | 20 | 1 h | 2,7 | 5,5 h | Portable lighting |
| | | | 220 | 4 h | 2,7 | 96 h | Radio |
| 3R12S (standard) | 4,5 | 20 | 1 h | 2,7 | 3,5 h | Portable lighting | |
| | | 220 | 4 h | 2,7 | 96 h | Radio | |
| L (see note 2) | 3LR12 | 4,5 | 20 | 1 h | 2,7 | 12 h | Portable lighting |
| | | | 220 | 4 h | 2,7 | 300 h | Radio |

NOTE 1 Delayed discharge performance after 12 months is 80 % of MAD.

NOTE 2 Delayed discharge performance after 12 months is 90 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

7.6.1.3 Category 6 – Specifications: 4LR61

| | Designation | OCV max. V |
|---|-------------|---------------|
| | 4LR61 | 6,60 |
| <p>Dimensions in millimetres. Terminals: flat contacts. For general information, see IEC 60086-1.</p> | | |

IEC 2233/06

Figure 11 – Dimensional drawing: 4LR61

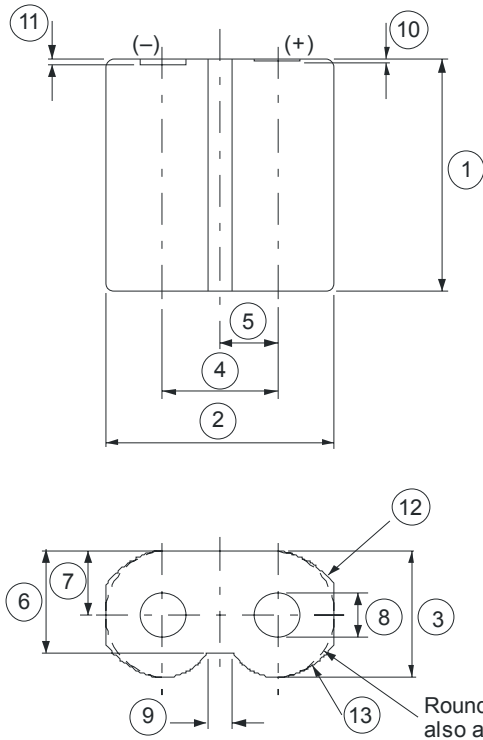
| Electro-chemical system letter | Designation | V_n V | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|------------|----------------------|--------------|---------|-------------------------------|----------------------|
| | | | R kΩ | Daily period | EV V | | |
| L (see note) | 4LR61 | 6,0 | 0,33 | 24 h | 3,6 | 24 h | Electronic equipment |
| | | | 6,8 | 24 h | 3,6 | 700 h | Service output test |

NOTE Delayed discharge performance after 12 months is 90 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

7.6.1.4 Category 6 – Specifications: CR-P2, BR-P2

| Designation | OCV max. V |
|-------------|---------------|
| CR-P2 | 7,4 |
| BR-P2 | 7,4 |



IEC 2234/06

Figure 12 – Dimensional drawing: CR-P2, BR-P2

Dimensions in millimetres

| Dimension | Max. | Min. |
|-----------|------|------|
| ① | 36,0 | 34,5 |
| ② | 35,0 | 32,5 |
| ③ | 19,5 | 18,5 |
| ④ | 16,8 | |
| ⑤ | 8,4 | |
| ⑥ | 16,2 | 15,3 |
| ⑦ | 9,8 | 9,2 |
| ⑧ | 8,7 | 7,5 |
| ⑨ | - | 1,3 |
| ⑩ | 1,0 | 0,1 |
| ⑪ | 1,5 | 0,7 |
| ⑫ | 10,0 | 7,4 |
| ⑬ | 10,0 | 7,4 |

Terminals: flat contacts.

contacts are recessed.

For general information, see IEC 60086-1.

| Electro-chemical system letter | Designation | V _n V | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|---------------------|---------------------------|----------------------------------|---------|-------------------------------|---------------------|
| | | | R Ω | Daily period | EV V | | |
| C (see note) | CR-P2 | 6,0 | 200 | 24 h | 4,0 | 40 h | Service output test |
| | | | (Current drain) 900 mA | 3 s on, 27 s off continuously | 3,1 | 1 400 pulses | Photo test |
| B (see note) | BR-P2 | 6,0 | 200 | 24 h | 4,0 | 40 h | Service output test |
| | | | (Current drain) 900 mA | 3 s on, 27 s off continuously | 3,1 | 1 000 pulses | Photo test |

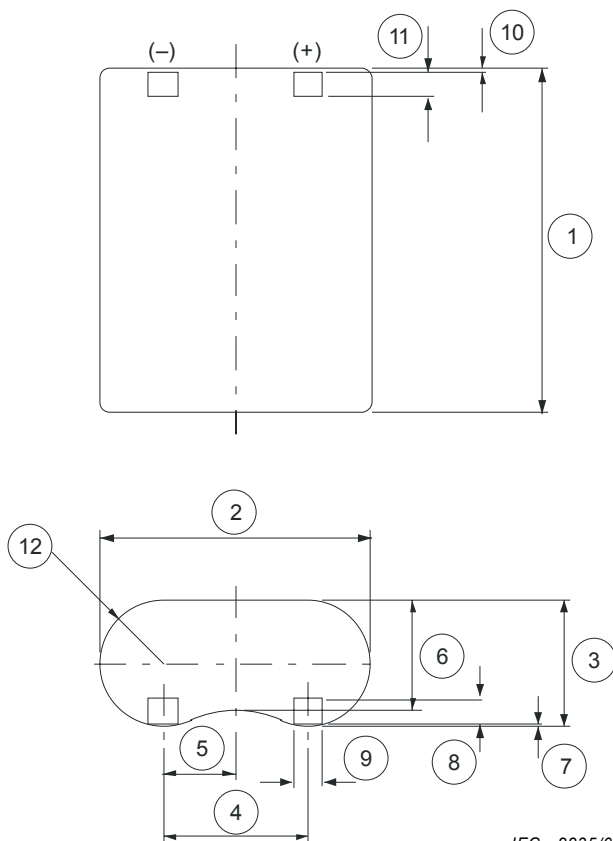
NOTE Delayed discharge performance after 12 months is 98 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

7.6.1.5 Category 6 – Specifications: 2CR5

| Designation | OCV max. V |
|-------------|---------------|
| 2CR5 | 7,4 |

Dimensions in millimetres



| Dimension | Max. | Min. |
|-----------|------|------|
| ① | 45,0 | 43,0 |
| ② | 34,0 | 32,5 |
| ③ | 17,0 | 16,0 |
| ④ | 16,0 | |
| ⑤ | 8,0 | |
| ⑥ | 15,5 | - |
| ⑦ | 1,0 | 0,2 |
| ⑧ | 4,5 | 3,5 |
| ⑨ | 4,6 | 3,5 |
| ⑩ | 0,9 | 0,1 |
| ⑪ | 4,5 | 3,5 |
| ⑫ | 9,0 | 8,0 |

Figure 13 – Dimensional drawing: 2CR5

Terminals: flat contacts.

For general information, see IEC 60086-1.

| Electro-chemical system letter | Designation | V_n V | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|------------|---------------------------|------------------------------------|---------|-------------------------------|---------------------|
| | | | R Ω | Daily period | EV V | | |
| C (see note) | 2CR5 | 6,0 | 200 | 24 h | 4,0 | 40 h | Service output test |
| | | | (Current drain) 900 mA | 3 s on 27 s off continuously | 3,1 | 1 400 pulses | Photo test |

NOTE Delayed discharge performance after 12 months is 98 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

7.6.1.6 Category 6 – Specifications: 2EP3863

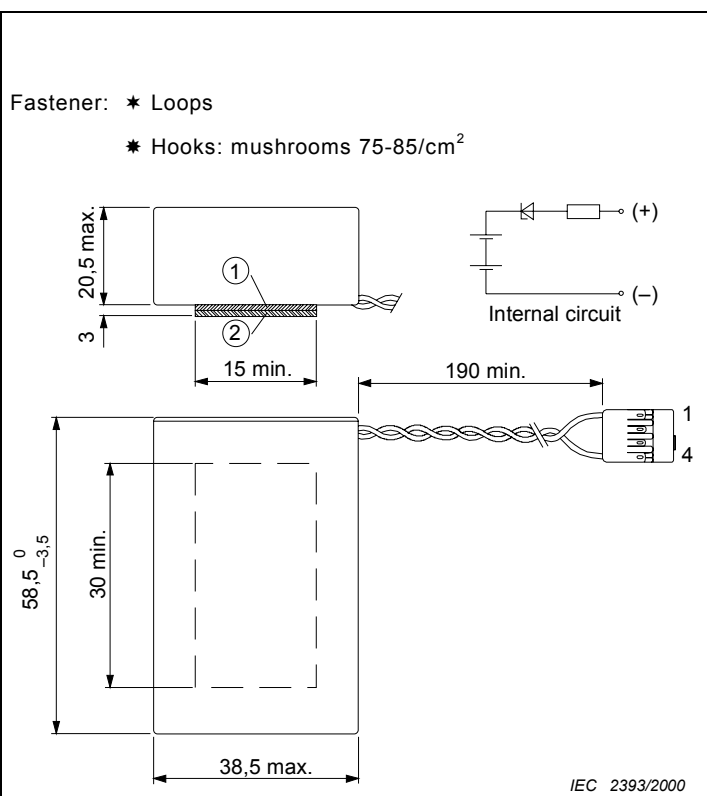


Figure 14 – Dimensional drawing: 2EP3863

Connector with four receptacles:

- 1 negative terminal
- 2 blank
- 3 polarizing key
- 4 positive terminal

Features: dual-metal contact.

Gold plating over nickel.

Mating data:

- 2,54 mm distance.
- 0,64 mm square or round pins.
- 5,84 mm nominal pin length.

| Designation | OCV max. V |
|-------------|---------------|
| 2EP3863 | 7,8 |

Dimensions in millimetres.

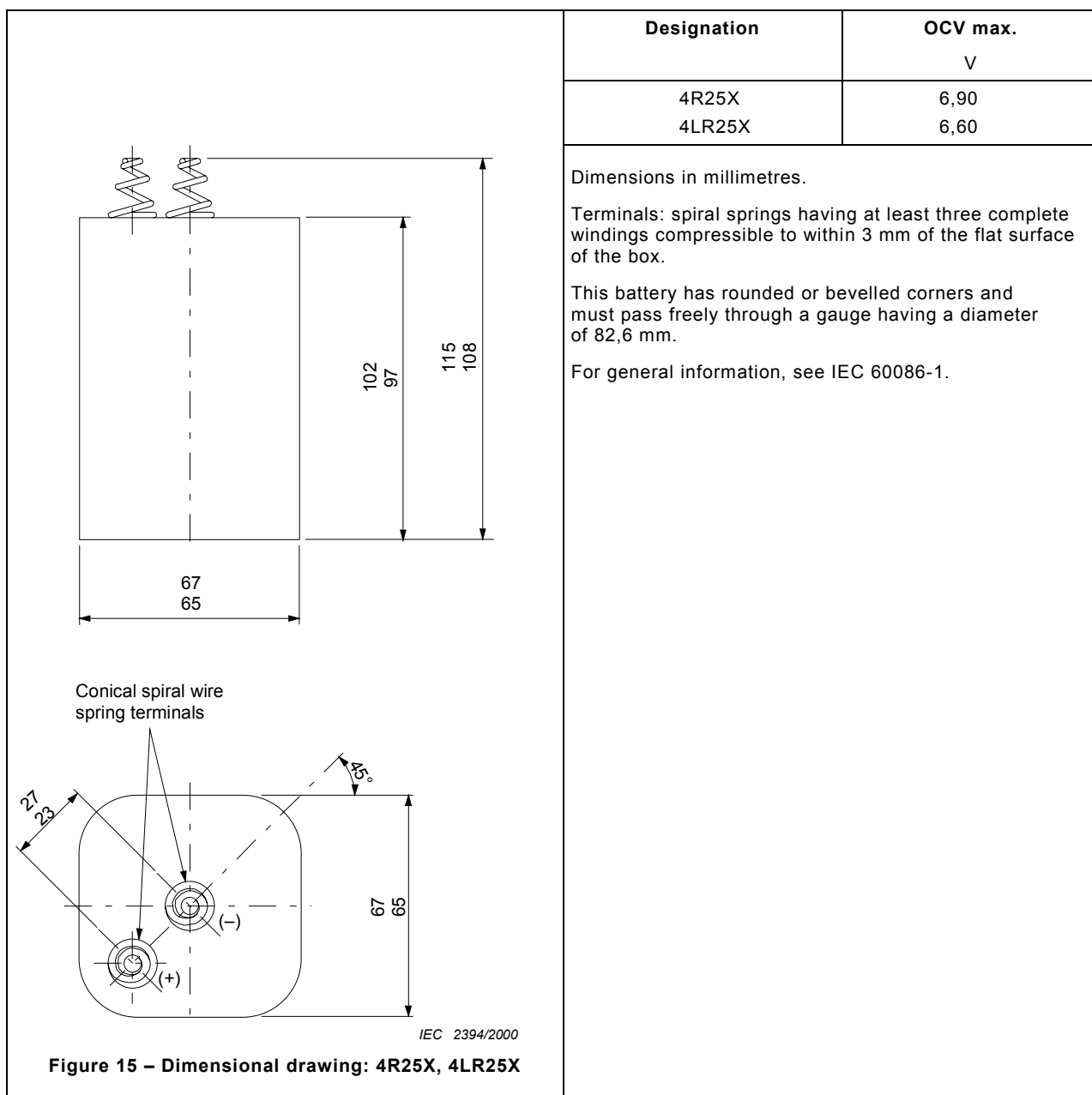
Terminals: Two flexible wires with connector.
Positive terminal: red.
Negative terminal: black.

For general information, see IEC 60086-1.

| Electro-chemical system letter | Designation | V _n V | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|---------------------|----------------------|--------------|---------|-------------------------------|---------------------|
| | | | R kΩ | Daily period | EV V | | |
| E | 2EP3863 | 6,0 | 3,3 | 24 h | 3,0 | 650 h | Service output test |

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

7.6.1.7 Category 6 – Specifications: 4R25X, 4LR25X



| Designation | OCV max. V |
|-------------|---------------|
| 4R25X | 6,90 |
| 4LR25X | 6,60 |

Dimensions in millimetres.

Terminals: spiral springs having at least three complete windings compressible to within 3 mm of the flat surface of the box.

This battery has rounded or bevelled corners and must pass freely through a gauge having a diameter of 82,6 mm.

For general information, see IEC 60086-1.

| Electro-chemical system letter | Designation | V_n V | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|------------|----------------------|--------------|---------|-------------------------------|---------------------|
| | | | R Ω | Daily period | EV V | | |
| No letter (see note 1) | 4R25X | 6,0 | 8,2 | 30 min | 3,6 | 350 min | Portable lighting 1 |
| | | | 9,1 | b | 3,6 | 270 min | Portable lighting 2 |
| | | | 110 | 12 h | 3,6 | 155 h | Road warning lamp |
| L (see note 2) | 4LR25X | 6,0 | 8,2 | 30 min | 3,6 | 900 min | Portable lighting 1 |
| | | | 9,1 | b | 3,6 | 1 020 min | Portable lighting 2 |
| | | | 110 | 12 h | 3,6 | 310 h | Road warning lamp |

NOTE 1 Delayed discharge performance after 12 months is 80 % of MAD.

NOTE 2 Delayed discharge performance after 12 months is 90 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

^b 30 min beginning at hourly intervals for 8 h per day.

7.6.1.8 Category 6 – Specifications: 4R25Y

| | Designation | OCV max. V |
|--|-------------|---------------|
| | | 4R25Y |

Figure 16 – Dimensional drawing: 4R25Y

Dimensions in millimetres.

Terminals: screw terminals (insulated or metallic nuts).

The maximum terminal stud diameter is 3,5.

This battery has bevelled or rounded corners and must pass freely through a gauge having a diameter of 82,6 mm.

For general information, see IEC 60086-1.

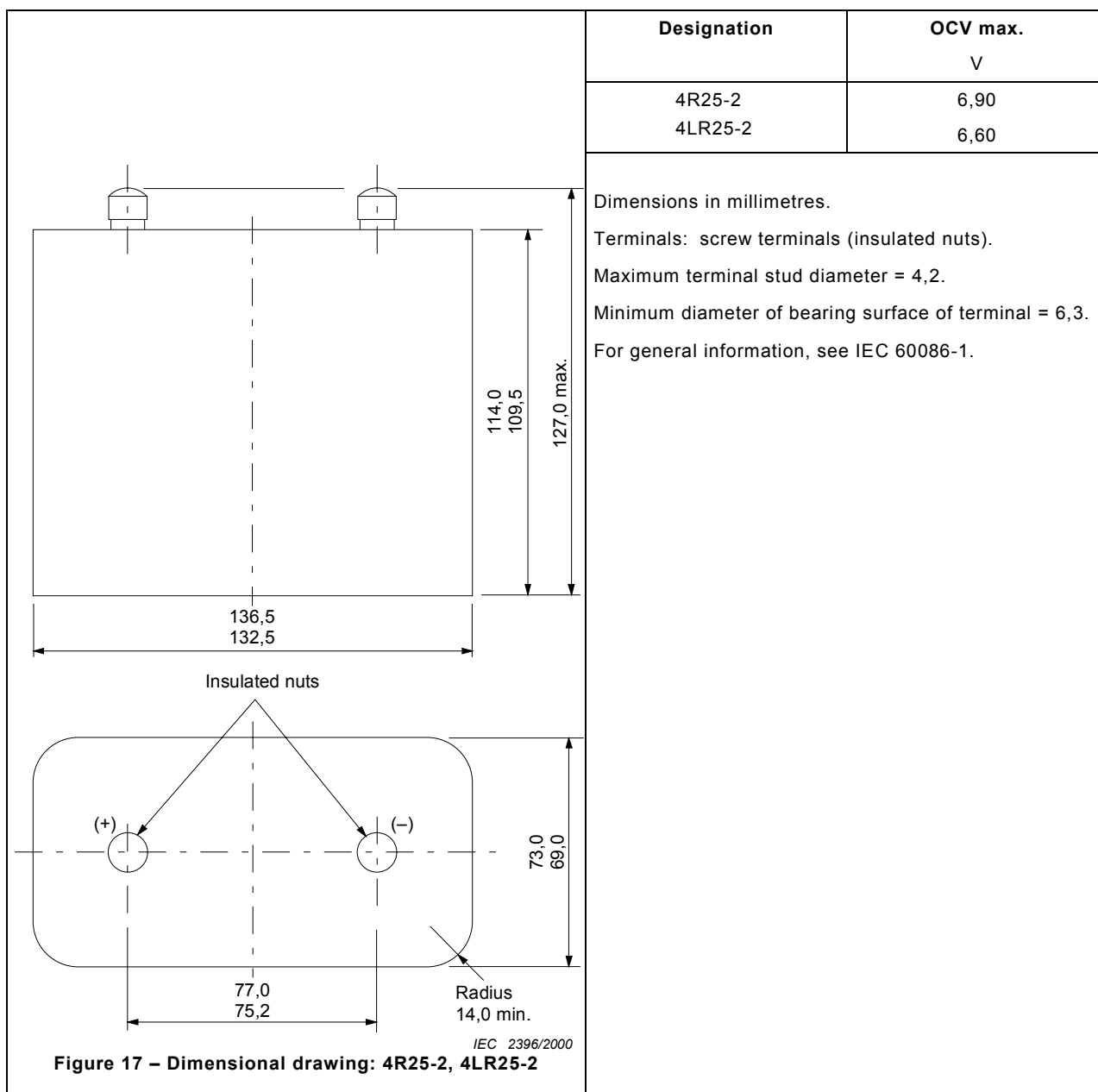
| Electro-chemical system letter | Designation | V_n V | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|------------|----------------------|--------------|---------|-------------------------------|---------------------|
| | | | R Ω | Daily period | EV V | | |
| No letter (see note) | 4R25Y | 6,0 | 8,2 | 30 min | 3,6 | 350 min | Portable lighting 1 |
| | | | 9,1 | b | 3,6 | 270 min | Portable lighting 2 |
| | | | 110 | 12 h | 3,6 | 155 h | Road warning lamp |

NOTE Delayed discharge performance after 12 months is 80 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

^b 30 min beginning at hourly intervals for 8 h per day.

7.6.1.9 Category 6 – Specifications: 4R25-2, 4LR25-2



| Designation | OCV max. V |
|-------------|---------------|
| 4R25-2 | 6,90 |
| 4LR25-2 | 6,60 |

Dimensions in millimetres.
 Terminals: screw terminals (insulated nuts).
 Maximum terminal stud diameter = 4,2.
 Minimum diameter of bearing surface of terminal = 6,3.
 For general information, see IEC 60086-1.

| Electro-chemical system letter | Designation | V_n V | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|------------|----------------------|--------------|---------|-------------------------------|---------------------|
| | | | R Ω | Daily period | EV V | | |
| No letter (see note 1) | 4R25-2 | 6,0 | 8,2 | 30 min | 3,6 | 900 min | Portable lighting 1 |
| | | | 9,1 | b | 3,6 | 696 min | Portable lighting 2 |
| | | | 110 | 12 h | 3,6 | 200 h | Road warning lamp |
| L (see note 2) | 4LR25-2 | 6,0 | 8,2 | 30 min | 3,6 | 1 800 min | Portable lighting 1 |
| | | | 9,1 | b | 3,6 | 2 040 min | Portable lighting 2 |
| | | | 110 | 12 h | 3,6 | 620 h | Road warning lamp |

NOTE 1 Delayed discharge performance after 12 months is 80 % of MAD.

NOTE 2 Delayed discharge performance after 12 months is 90 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

^b 30 min beginning at hourly intervals for 8 h per day.

7.6.1.10 Category 6 – Specifications: 6AS4

| Designation | OCV max. V |
|-------------|---------------|
| | |

Figure 18 – Dimensional drawing: 6AS4

Dimensions in millimetres.
 Terminals: wire.
 Minimum free length of connecting wires = 200 mm.
 For general information, see IEC 60086-1.

| Electro-chemical system letter | Designation | V_n V | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------------|------------|----------------------|--------------|---------|-------------------------------|---------------------------|
| | | | R Ω | Daily period | EV V | | |
| A (see note) | 6AS4 ^b | 8,4 | 300 | 24 h | 5,4 | 80 days | Electric fence controller |

NOTE Delayed discharge performance after 12 months is 80 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

^b Equipment designers' attention is drawn to the importance of ensuring that air access is not impeded for "A" system batteries.

7.6.1.11 Category 6 – Specifications: 6AS6

| Designation | OCV max. V |
|-------------|---------------|
| | |

Dimensions in millimetres.
 Terminals: wire.
 Minimum free length of connecting wires = 200 mm.
 The wire ends may be fitted with special terminals.
 For general information, see IEC 60086-1.

Figure 19 – Dimensional drawing: 6AS6

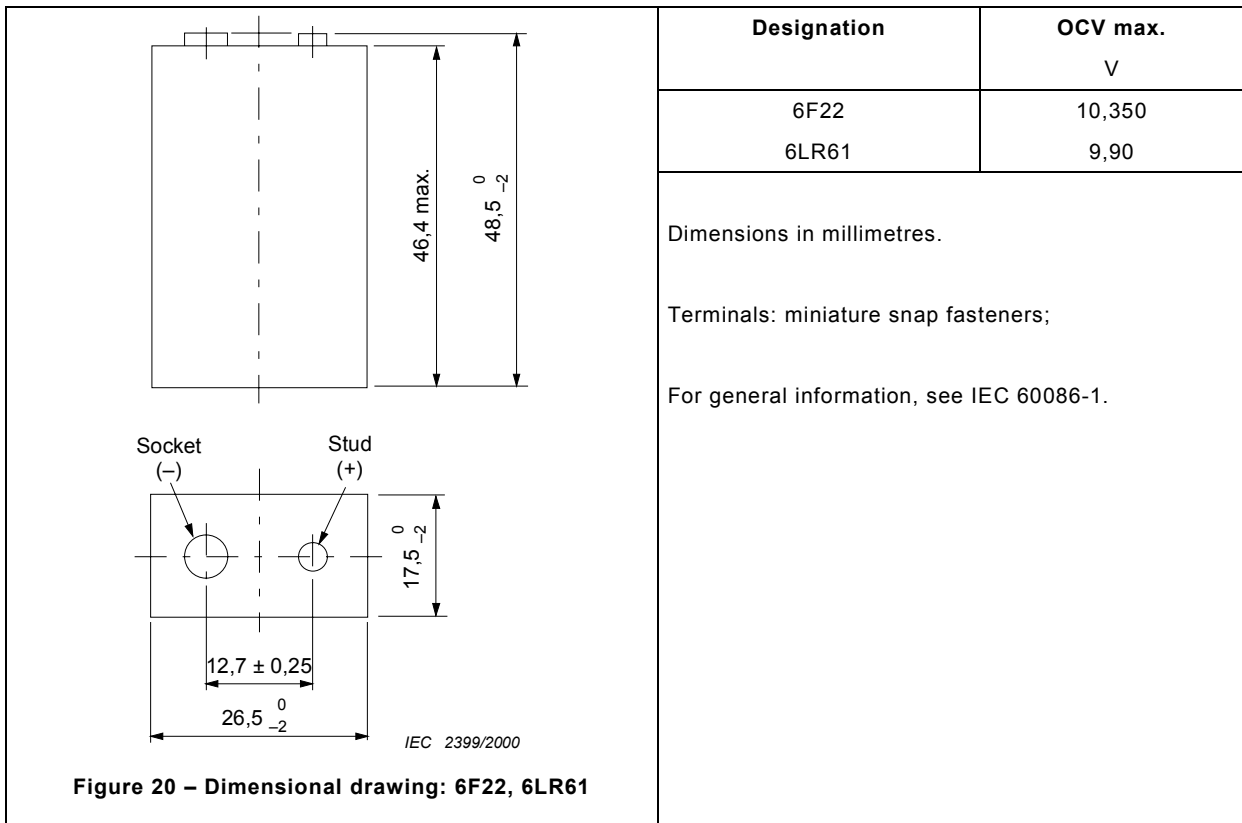
| Electro-chemical system letter | Designation | V_n V | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------------|------------|----------------------|--------------|---------|-------------------------------|---------------------------|
| | | | R Ω | Daily period | EV V | | |
| A (see note) | 6AS6 ^b | 8,4 | 300 | 24 h | 5,4 | 120 days | Electric fence controller |

NOTE Delayed discharge performance after 12 months is 80 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

^b Equipment designers' attention is drawn to the importance of ensuring that air access is not impeded for "A" system batteries.

7.6.1.12 Category 6 – Specifications: 6F22, 6LR61



| Electro-chemical system letter | Designation | V_n V | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|------------|--|-------------------|---------|-------------------------------|-----------------------------|
| | | | R Ω | Daily period | EV V | | |
| No letter (see note 1) | 6F22 | 9,0 | 620 | 2 h | 5,4 | 24 h | Radio |
| | | | Background: 10 000 ^b Pulse: 620 | 24 h 1 s per h | 7,5 | 8 days | Smoke detector ^c |
| | | | 270 | 1 h | 5,4 | 7 h | Toy |
| L (see note 2) | 6LR61 | 9,0 | 620 | 2 h | 5,4 | 33 h | Radio |
| | | | Background: 10 000 ^b Pulse: 620 | 24 h 1 s per h | 7,5 | 16 days | Smoke detector ^c |
| | | | 270 | 1 h | 5,4 | 12 h | Toy |

NOTE 1 Delayed discharge performance after 12 months is 80 % of MAD.

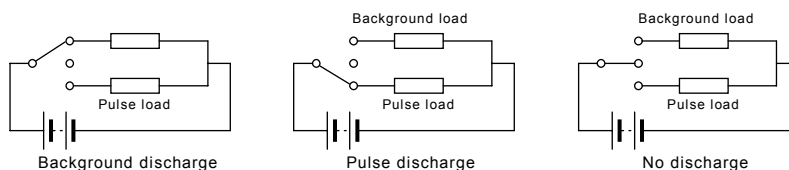
NOTE 2 Delayed discharge performance after 12 months is 90 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

^b Smoke detector test. See Example below.

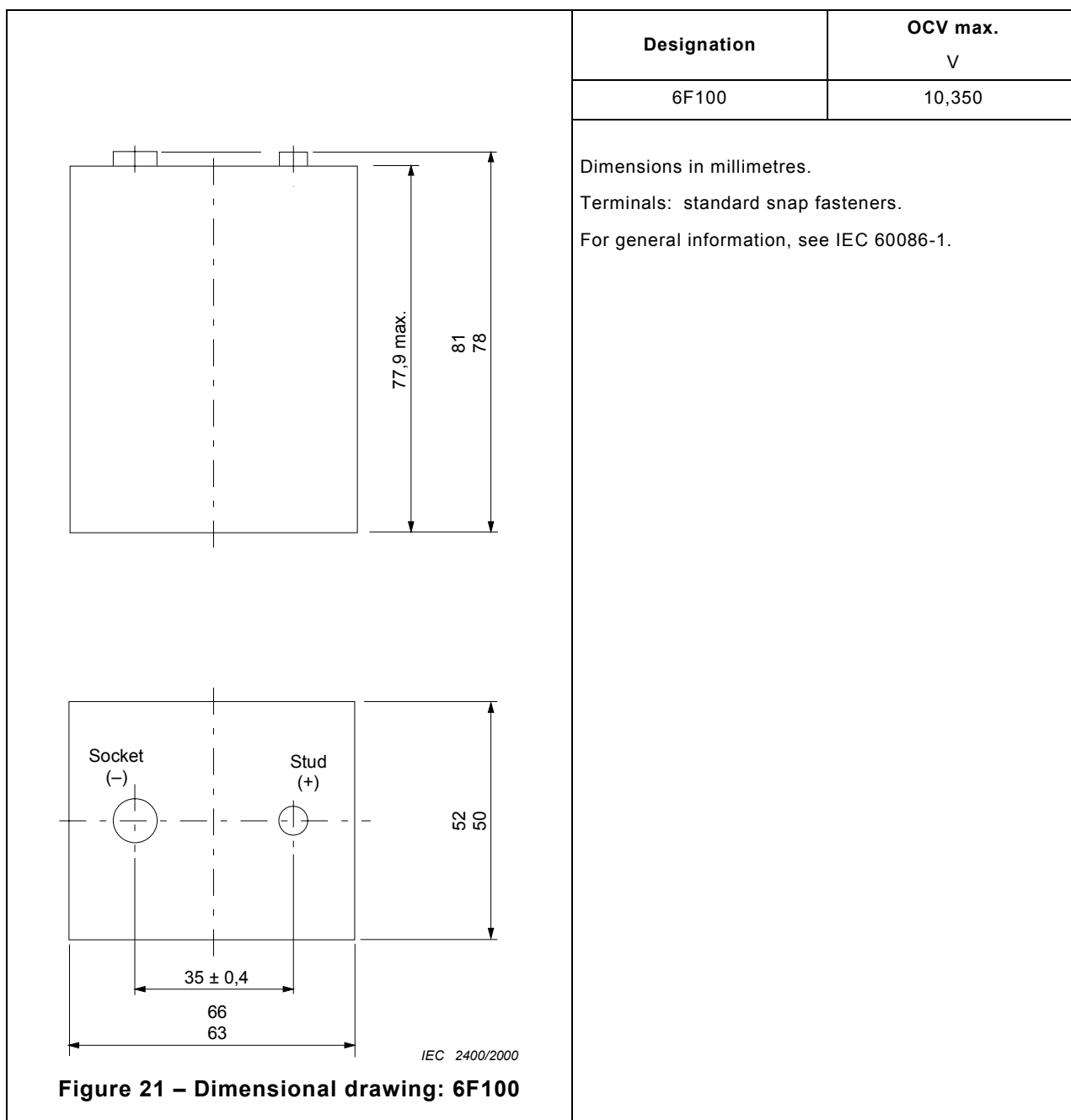
^c This is an accelerated test.

EXAMPLE



NOTE The pulse load of 620 Ω alone should be applied across the battery. It is the effective load. It is not added in series or parallel to the 10 000 Ω background load.

7.6.1.13 Category 6 – Specifications: 6F100



Dimensions in millimetres.
 Terminals: standard snap fasteners.
 For general information, see IEC 60086-1.

| Electro-chemical system letter | Designation | V_n V | Discharge conditions | | | MAD ^a (initial) | Applications |
|--------------------------------|-------------|------------|----------------------|--------------|---------|-------------------------------|--------------|
| | | | R Ω | Daily period | EV V | | |
| No letter (see note) | 6F100 | 9,0 | 240 | 4 h | 5,4 | 126 h | Radio |

NOTE Delayed discharge performance after 12 months is 80 % of MAD.

^a Standard conditions (see IEC 60086-1, Table 4, Initial discharge test).

Annex A (informative)

Tabulation of batteries by application

Each of the following tables lists all the batteries for which there is a discharge test given in this specification for that application.

Within each table the batteries are listed in ascending order of nominal voltage and, within each nominal voltage, in ascending order of volume.

Table A.1 – Road warning lamp

| Designation | Nominal voltage V |
|-------------|----------------------|
| 4R25X | 6,0 |
| 4LR25X | 6,0 |
| 4R25Y | 6,0 |
| 4R25-2 | 6,0 |
| 4LR25-2 | 6,0 |

Table A.2 – Industrial equipment

| Designation | Nominal voltage V |
|-------------|----------------------|
| S4 | 1,5 |
| R40 | 1,5 |

Table A.3 – Electrical fence controller

| Designation | Nominal voltage V |
|-------------|----------------------|
| R40 | 1,5 |
| 5AR40 | 7,0 |
| 6AS4 | 8,4 |
| 6AS6 | 8,4 |

Table A.4 – Radio

| Designation | Nominal voltage |
|-------------|-----------------|
| | V |
| R03 | 1,5 |
| LR03 | 1,5 |
| R6P | 1,5 |
| R6S | 1,5 |
| LR6 | 1,5 |
| R14P | 1,5 |
| R14S | 1,5 |
| LR14 | 1,5 |
| R20P | 1,5 |
| R20S | 1,5 |
| LR20 | 1,5 |
| 3R12C | 4,5 |
| 3R12P | 4,5 |
| 3R12S | 4,5 |
| 3LR12 | 4,5 |
| 6F22 | 9,0 |
| 6LR61 | 9,0 |
| 6F100 | 9,0 |

Table A.5 – Electronic equipment

| Designation | Nominal voltage |
|-------------|-----------------|
| | V |
| CR15H270 | 3,0 |
| 4LR61 | 6,0 |

Table A.6 – Paging equipment

| Designation | Nominal voltage |
|-------------|-----------------|
| | V |
| LR1 | 1,5 |

Table A.7 – Hearing aid

| Designation | Nominal voltage |
|-------------|-----------------|
| | V |
| R1 | 1,5 |
| LR1 | 1,5 |
| PR41 | 1,4 |
| PR44 | 1,4 |
| PR48 | 1,4 |
| PR70 | 1,4 |
| SR48 | 1,55 |

Table A.8 – Photo

| Designation | Nominal voltage V |
|--------------------|------------------------------|
| CR15H270 | 3,0 |
| CR17345 | 3,0 |
| BR-P2 | 6,0 |
| CR-P2 | 6,0 |
| 2CR5 | 6,0 |

Table A.9 – Portable lighting

| Designation | Nominal voltage V |
|--------------------|------------------------------|
| LR8D425 | 1,5 |
| R1 | 1,5 |
| LR1 | 1,5 |
| R03 | 1,5 |
| LR03 | 1,5 |
| R14P | 1,5 |
| R14S | 1,5 |
| LR14 | 1,5 |
| R20P | 1,5 |
| R20S | 1,5 |
| LR20 | 1,5 |
| 2R10 | 3,0 |
| 3R12C | 4,5 |
| 3R12P | 4,5 |
| 3R12S | 4,5 |
| 3LR12 | 4,5 |
| 4R25X | 6,0 |
| 4LR25X | 6,0 |
| 4R25Y | 6,0 |
| 4R25-2 | 6,0 |
| 4LR25-2 | 6,0 |

Table A.10 – Smoke detector

| Designation | Nominal voltage V |
|--------------------|------------------------------|
| 6F22 | 9,0 |
| 6LR61 | 9,0 |

Table A.11 – Toy (motor)

| Designation | Nominal voltage V |
|--------------------|-----------------------------|
| R6P | 1,5 |
| LR6 | 1,5 |
| R14P | 1,5 |
| R14S | 1,5 |
| LR14 | 1,5 |
| R20P | 1,5 |
| R20S | 1,5 |
| LR20 | 1,5 |
| 6F22 | 9,0 |
| 6LR61 | 9,0 |

Table A.12 –Automatic camera

| Designation | Nominal voltage V |
|--------------------|-----------------------------|
| SR44 | 1,55 |
| 4LR44 | 6,0 |
| 4SR44 | 6,2 |

Table A.13 – Tape recorder (personal cassette player)

| Designation | Nominal voltage V |
|--------------------|-----------------------------|
| R03 | 1,5 |
| LR03 | 1,5 |
| R6P | 1,5 |
| LR6 | 1,5 |
| R14P | 1,5 |
| R14S | 1,5 |
| LR14 | 1,5 |
| R20P | 1,5 |
| R20S | 1,5 |
| LR20 | 1,5 |

Annex B (informative)

Cross-reference index

Batteries having the same physical dimensions may belong to a different electrochemical system.

In order to allow physically interchangeable batteries from different electrochemical systems to be compared in terms of electrical performance, a cross-reference is given below.

Batteries are ranked per category and in each category by chemistry and by shape/size.

Batteries are always ranked by voltage and in each voltage by volume.

Table B.1 – Category 1 batteries

| Round batteries according to Figures 1a and 1b | |
|--|--|
| Ranking by electrochemical system | Ranking by shape/volume |
| R1,R03,R6P,R6S, R14P,R14S, R20P, R20S, 2R10 LR8D425, LR1, LR03, LR6, LR14, LR20 CR12A604 | LR8D425 R1, LR1 R03, LR03 R6P, R6S, LR6 R14P, R14S, LR14 R20P, R20S, LR20 CR12A604 2R10 |

Table B.2 – Category 2 batteries

| Round batteries according to Figure 2 | |
|--|--|
| Ranking by electrochemical system | Ranking by shape/volume |
| CR14250, CR15H270, CR17345, CR17450 BR17335 | CR14250 CR15H270 BR17335 CR17345 CR17450 |

Table B.3 – Category 3 batteries

| Round batteries according to Figure 3 | | |
|---------------------------------------|-------------------------|---|
| Ranking by electrochemical system | Ranking by shape/volume | |
| LR9, LR53 CR11108 | CR11108 LR9 LR53 | (Figure 3a) (Figure 3a) (Figure 3b) |

Table B.4 – Category 4 batteries

| Round batteries according to Figure 4 | |
|--|-------------------------|
| Ranking by electrochemical system | Ranking by shape/volume |
| PR70, PR41, PR48, PR44 | SR62 |
| | SR63 |
| LR41, LR55, LR54, LR43, LR44 | SR65 |
| | SR64 |
| SR62, SR63, SR65, SR64, SR60, SR67, SR66, SR58, SR68, SR59, SR69, SR41, SR57, SR55, SR48, SR56, SR54, SR42, SR43, SR44 | SR60 |
| | SR67 |
| | SR66 |
| | PR70 |
| CR1025, CR1216, CR1220, CR1616, CR2012, CR1620, CR2016, CR2025, CR2320, CR2032, CR2330, CR2430, CR2354, CR3032, CR2450 | SR58 |
| | SR68 |
| | SR59 |
| | SR69 |
| BR1225, BR2016, BR2020, BR2320, BR2325, BR3032 | PR41, LR41, SR41 |
| | SR57 |
| | CR1025 |
| | CR1216 |
| | LR55, SR55 |
| | CR1220 |
| | PR48, SR48 |
| | SR56 |
| | BR1225 |
| | CR1616 |
| | LR54, SR54 |
| | CR2012 |
| | SR42 |
| | CR1620 |
| | LR43, SR43 |
| | CR2016, BR2016 |
| | PR44, LR44, SR44 |
| | BR2020 |
| | CR2025 |
| | CR2320, BR2320 |
| | CR2032 |
| | BR2325 |
| | CR2330 |
| | CR2430 |
| | CR2354 |
| | CR3032, BR3032 |
| | CR2450 |

Table B.5 – Category 5 batteries

| Other round batteries – Miscellaneous | |
|--|-------------------------|
| Ranking by electrochemical system | Ranking by shape/volume |
| R40 | 4LR44, 2CR13252, 4SR44 |
| 4LR44 | R40 |
| 2CR13252 | 5AR40 |
| 4SR44 | |
| 5AR40 | |

Table B.6 – Category 6 batteries

| Non-round batteries – Miscellaneous | |
|---|----------------------------|
| Ranking by electrochemical system | Ranking by shape/volume |
| S4, 3R12C, 3R12P, 3R12S, 4R25X, 4R25Y, 4R25-2, 6F22 | 4LR61 |
| 6F100 | 6F22, 6LR61 |
| | CR-P2, BR-P2 |
| 3LR12, 4LR61, 4LR25X, 4LR25-2, 6LR61 | 2CR5 |
| | 2EP3863 |
| 6AS4, 6AS6 | 3R12C, 3R12P, 3R12S, 3LR12 |
| | 6F100 |
| CR-P2, 2CR5 | S4 |
| | 4R25X, 4LR25X |
| BR-P2 | 4R25Y |
| | 4R25-2, 4LR25-2 |
| 2EP3863 | 6AS4 |
| | 6AS6 |

Annex C (informative)

Index

This index provides for the relation between a particular battery and its physical dimensions and application/service output test requirements.

In this index the batteries are ranked by increasing number of the numerical part after the alphabetical part of the designation. In the case where two batteries have the same numerical part, they are ranked alphabetically according to the alphabetical part of the designation. In the case where two batteries having these two rules still do not allow a clear ranking, further distinction is made by the increasing numerical part before the alphabetical part of the designation.

Table C.1 – Index

| Battery | Page | Battery | Page | Battery | Page |
|---------|------|---------|------|----------|------|
| LR1 | 15 | LR41 | 28 | 6F100 | 48 |
| R1 | 13 | PR41 | 25 | CR15H270 | 21 |
| BR-P2 | 39 | SR41 | 29 | LR8D425 | 15 |
| CR-P2 | 39 | SR42 | 30 | CR12A604 | 19 |
| LR03 | 17 | LR43 | 28 | CR1025 | 31 |
| R03 | 13 | SR43 | 30 | CR1216 | 31 |
| 6AS4 | 45 | LR44 | 28 | CR1220 | 31 |
| S4 | 36 | 4LR44 | 34 | BR1225 | 32 |
| 2CR5 | 40 | PR44 | 25 | CR1616 | 31 |
| 6AS6 | 46 | SR44 | 30 | CR1620 | 31 |
| LR6 | 17 | 4SR44 | 34 | CR2012 | 31 |
| R6P | 13 | PR48 | 25 | BR2016 | 32 |
| R6S | 13 | SR48 | 29 | CR2016 | 31 |
| LR9 | 23 | LR53 | 23 | BR2020 | 32 |
| 2R10 | 15 | LR54 | 28 | CR2025 | 31 |
| 3LR12 | 37 | SR54 | 30 | CR2032 | 31 |
| 3R12C | 37 | LR55 | 28 | BR2320 | 32 |
| 3R12P | 37 | SR55 | 29 | CR2320 | 31 |
| 3R12S | 37 | SR56 | 30 | BR2325 | 32 |
| LR14 | 17 | SR57 | 29 | CR2330 | 31 |
| R14P | 14 | SR58 | 29 | CR2354 | 31 |
| R14S | 14 | SR59 | 29 | CR2430 | 31 |
| LR20 | 17 | SR60 | 29 | CR2450 | 31 |
| R20P | 15 | 4LR61 | 38 | BR3032 | 32 |
| R20S | 15 | 6LR61 | 47 | CR3032 | 31 |
| 6F22 | 47 | SR62 | 29 | 2EP3863 | 41 |
| 4LR25X | 42 | SR63 | 29 | CR11108 | 23 |
| 4LR25-2 | 44 | SR64 | 29 | 2CR13252 | 34 |
| 4R25X | 42 | SR65 | 29 | CR14250 | 21 |
| 4R25Y | 43 | SR66 | 29 | BR17335 | 21 |
| 4R25-2 | 44 | SR67 | 29 | CR17345 | 21 |
| 5AR40 | 35 | SR68 | 29 | CR17450 | 21 |
| R40 | 33 | SR69 | 29 | | |
| | | PR70 | 25 | | |

Bibliography

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





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