BS EN 60086-2:2016

BSI Standards Publication

Primary batteries

Part 2: Physical and electrical specifications
(IEC 60086-2:2015)

bsi.

National foreword

This British Standard is the UK implementation of EN 60086-2:2016. It is identical to IEC 60086-2:2015. It supersedes BS EN 60086-2:2011 which will be withdrawn on 3 December 2018.

BSI, as a member of CENELEC, is obliged to publish BS EN 60086-2 as a British Standard. However, attention is drawn to the fact that the UK committee voted against its approval as a European standard. The UK committee submitted a negative vote for the following reason:

Although it had been accepted by IEC/TC 35 that the pulse load should be applied first in all the discharge tests, this change has not been applied consistently. The circuit diagrams in 6.1.6, 6.4.2, 6.4.5, 6.5.1 and 6.6.8 still indicate that the background load is applied first. Also, in the table in 6.6.8 the background load for testing a smoke detector is listed before the pulse load.

The UK participation in its preparation was entrusted to Technical Committee CPL/35, Primary cells.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60086-2

February 2016

ICS 29.220.10

Supersedes EN 60086-2:2011

English Version

Primary batteries - Part 2: Physical and electrical specifications (IEC 60086-2:2015)

Piles électriques - Partie 2: Spécifications physiques et électriques
(IEC 60086-2:2015)

Primärbatterien - Teil 2: Physikalische und elektrische Spezifikationen
(IEC 60086-2:2015)

This European Standard was approved by CENELEC on 2015-12-03. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

The text of document 35/1350/FDIS, future edition 13 of IEC 60086-2, prepared by IEC/TC 35 "Primary cells and batteries" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60086-2:2016.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2016-09-03
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-12-03

This document supersedes EN 60086-2:2011.

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

Endorsement notice

The text of the International Standard IEC 60086-2:2015 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated :

IEC 60086-3	NOTE	Harmonized as EN 60086-3.
IEC 60086-4	NOTE	Harmonized as EN 60086-4.
IEC 60086-5	NOTE	Harmonized as EN 60086-5.
IEC 62281	NOTE	Harmonized as EN 62281.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60086-1	2015	Primary batteries - Part 1: General	EN 60086-1	2015
ISO 1101	-	Geometrical product specifications (GPS) - Geometrical tolerancing - Tolerances of form, orientation, location and run-out	EN ISO 1101	-

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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 thirteenth edition cancels and replaces the twelfth edition (2011) and constitutes a technical revision.

Significant changes from the previous edition are test changes to battery types R03, LR03, R6, LR6, PR70, PR41, PR48, 6F22, 6LR61, 6LP3146 4LR25-2, R14, LR14, R20, LR20, CR2025, and CR2032, adding the 5AR40 back into the standard, addition of common designations, addition of two new battery types FR14505 and FR10G445, deletion of battery types LR53, R40, 2EP3863, 6F100, and general editorial changes.

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

FDIS	Report on voting
35/1350/FDIS	35/1352/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 parts in the IEC 60086 series, under the general title *Primary batteries*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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

INTRODUCTION

The technical content of this part of IEC 60086 provides 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 based on standardized electro-chemical systems.

It specifies

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

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60086-1:2015, *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 abbreviations

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

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

3.1.3
end-point voltage
EV
specified voltage of a battery at which the battery discharge is terminated

[SOURCE: IEC 60050-482:2004, 482-03-30]

3.1.4
minimum average duration
MAD
minimum average time on discharge which is met by a sample of batteries

Note 1 to entry: The discharge test is carried out according to the specified methods or standards and designed to show conformity with the standard applicable to the battery types.

3.1.5
nominal voltage (of a primary battery)
V_n
suitable approximate value of the voltage used to designate or identify a cell, a battery or an electrochemical system

[SOURCE: IEC 60050-482:2004, 482-03-31, modified ("(of a primary battery)" added)]

3.1.6
open-circuit voltage
OCV
voltage across the terminals of a cell or battery when it is off discharge

3.1.7
primary (cell or battery)
cell or battery that is not designed to be electrically recharged

3.1.8
round (cell or battery)
cell or battery with circular cross section

3.1.9
service output (of a primary battery)
service life, or capacity, or energy output of a battery under specified conditions of discharge

3.1.10
service output test
test designed to measure the service output of a battery

Note 1 to entry: 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.

3.1.11
storage life
duration under specified conditions at the end of which a battery retains its ability to perform a specified service output

[SOURCE: IEC 60050-482:2004, 482-03-47, modified ("specified function" replaced by "specified service output")]

3.1.12
terminals (of a primary battery)
conductive parts of a battery that provide connection to an external circuit

3.2 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 primary battery

4 Battery dimensions, symbols

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

h_1 maximum overall height of the battery;
h_2 minimum distance between the flats of the positive and negative contacts;
h_3 minimum projection of the flat positive contact;
h_4 maximum recess of the negative flat contact surface;
h_5 minimum projection of the flat negative contact;
d_1 maximum and minimum diameters of the battery;
d_2 minimum diameter of the flat positive contact;
d_3 maximum diameter of the positive contact within the specified projection height;
d_4 minimum diameter of the flat negative contact;
d_5 maximum diameter of the negative contact within the specified projection height;
d_6 minimum outer diameter of the negative flat contact surface;
d_7 maximum inner diameter of the negative flat contact surface;
$\varnothing P$ concentricity of the positive contact.

Recesses are permitted in the negative flat contact surface defined by dimensions d6 and d7 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 shall be satisfied:

$$d_6 > d_3$$

$$d_2 > d_7$$

$$h_3 > h_4$$

5 Constitution of the battery specification tables

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

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

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

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

5.5 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.

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

5.7 Batteries are categorized into the following groups:

a) Category 1 batteries

R1, R03, R6P, R6S, R14P, R14S, R20P, R20S
LR8D425, LR1, LR03, LR6, LR14, LR20
FR10G445, FR14505

b) Category 2 batteries
CR14250, CR15H270, CR17345, CR17450, BR17335

c) Category 3 batteries
LR9, CR11108

d) Category 4 batteries
PR70, PR41, PR48, PR44
LR41, LR55, LR54, LR43, LR44
SR62, SR63, SR65, SR64, SR60, SR67, SR66, SR58, SR68, SR59, SR69, SR41, SR57, SR55, SR48, SR54, SR42, SR43, SR44
CR1025, CR1216, CR1220, CR1616, CR2012, CR1620, CR2016, CR2025, CR2320, CR2032,CR2330, CR2430, CR2354, CR3032, CR2450
BR1225, BR2016, BR2320, BR2325, BR3032

e) Category 5: Other round batteries – Miscellaneous
4LR44
2CR13252
4SR44
5AR40

f) Category 6: Non-round batteries – Miscellaneous
3R12P, 3R12S, 3LR12
4LR61
CR-P2
2CR5
4R25X, 4LR25X
4R25Y
4R25-2, 4LR25-2
6F22, 6LR61, 6LP3146
6AS4
6AS6

5.8 The specification drawings show the shape of the relevant batteries. Dimensions for each battery are shown in the tables of Clause 6.

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

6 Physical and electrical specifications

6.1 Category 1 batteries

6.1.1 General

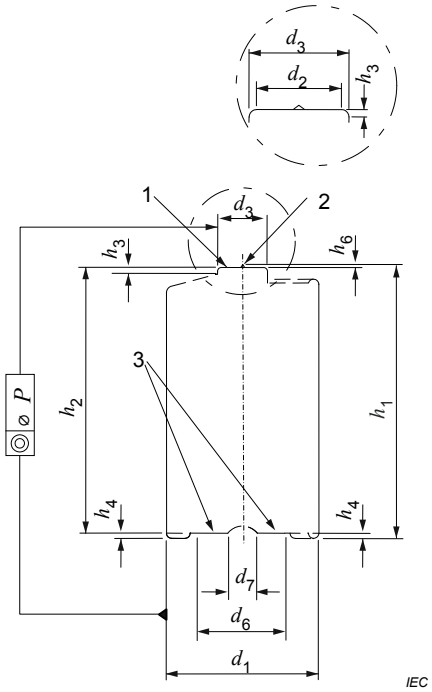


Figure 1a

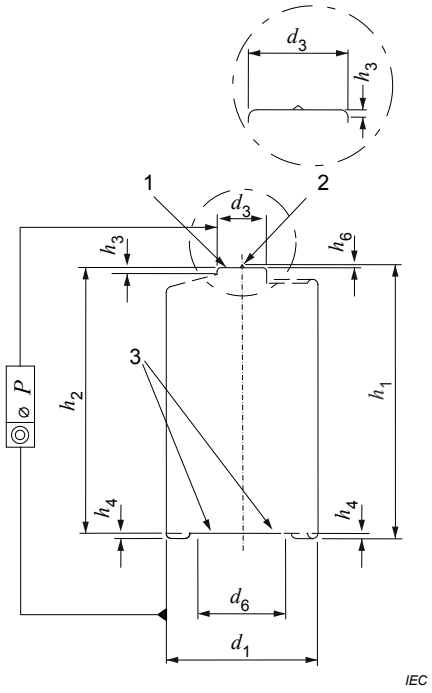


Figure 1b

Figure 1 – Dimensional drawing: Category 1

For the definition of the dimensions, see Clause 4.

The cylindrical surface is insulated from the contacts.

Terminals: flat/cap and base.

For general information, see IEC 60086-1.

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

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

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 "h1" and "h2" are both measured from the surface and dimension "h4" is zero.

Dimensions "⌀P" to be measured in accordance with ISO 1101.

The profile over the dotted lines is not specified.

1: Positive contact

2: Optional pip (Dimension "h6" for batteries having the pip is 0,4 mm max.)

3: Negative contact area

6.1.2 Category 1 – Specifications: LR20, R20P, R20S

Dimensions in millimetres

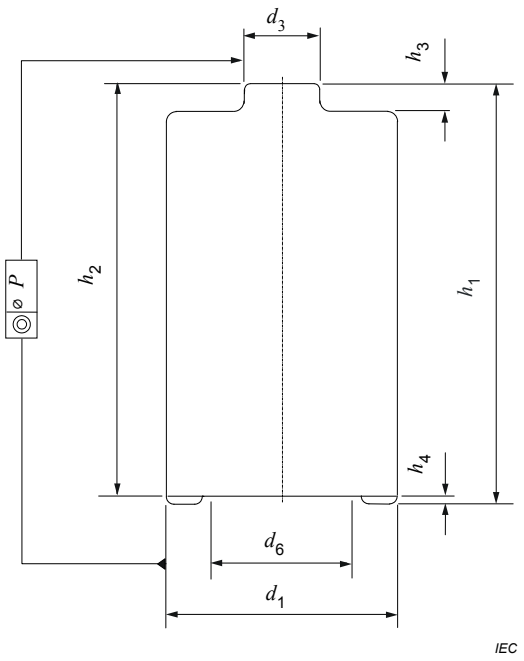


Figure 2 – Dimensional drawing: LR20, R20P, R20S

Dimensions		LR20	R20P	R20S
h_1	max.	61,5	61,5	61,5
h_2	min.	59,5	59,5	59,5
h_3	min.	1,5	1,5	1,5
h_4	max.	1,0	1,0	1,0
d_1	max.	34,2	34,2	34,2
	min.	32,3	32,3	32,3
d_3	max.	9,5	9,5	9,5
d_6	min.	18,0	18,0	18,0
$\varnothing P$	max.	1,0	1,0	1,0

Electrochemical system letter				L	No letter	No letter
IEC designation				LR20	R20P High power	R20S Standard
Common designation				D	D	D
V_n (V)				1,5	1,5	1,5
OCV max. (V)				1,68	1,73	1,73
Delayed discharge performance after 12 months (% of MAD)				90	80	80
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD**[a] (Initial)		
Portable Lighting	2,2 Ω	4 min on, 11 min off for 8 h per day	0,9	750 min	220 min	85 min
Toy	2,2 Ω	1 h	0,8	16 h	5,5 h	2 h
Radio	10 Ω	4 h	0,9	No test	33 h	18 h
Portable stereo	Current drain 600 mA	2 h	0,9	11 h	No test	No test

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

6.1.3 Category 1 – Specifications: LR14, R14P, R14S

Dimensions in millimetres

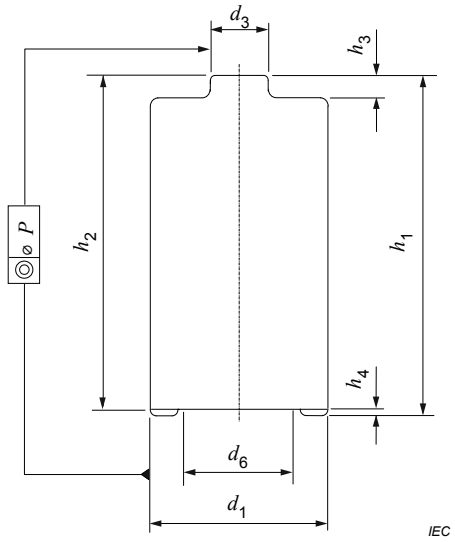


Figure 3 – Dimensional drawing: LR14, R14P, R14S

Dimensions		LR14	R14P	R14S
h_1	max.	50,0	50,0	50,0
h_2	min.	48,6	48,6	48,6
h_3	min.	1,5	1,5	1,5
h_4	max.	0,9	0,9	0,9
d_1	max.	26,2	26,2	26,2
	min.	24,9	24,9	24,9
d_3	max.	7,5	7,5	7,5
d_6	min.	13,0	13,0	13,0
$\varnothing P$	max.	1,0	1,0	1,0

Electrochemical system letter				L	No letter	No letter
IEC designation				LR14	R14P High power	R14S Standard
Common designation				C	C	C
V_n (V)				1,5	1,5	1,5
OCV max. (V)				1,68	1,73	1,73
Delayed discharge performance after 12 months (% of MAD)				90	80	80
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD[a] (Initial)**		
Toy	3,9 Ω	1 h	0,8	14 h	4 h	1,5 h
Portable Lighting	3,9 Ω	4 min on, 11 min off for 8 h per day	0,9	790 min	200 min	90 min
Portable stereo	Current drain 400 mA	2 h	0,9	8 h	No Test	No Test

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

6.1.4 Category 1 – Specifications: LR6, FR14505, R6P, R6S

Dimensions in millimetres

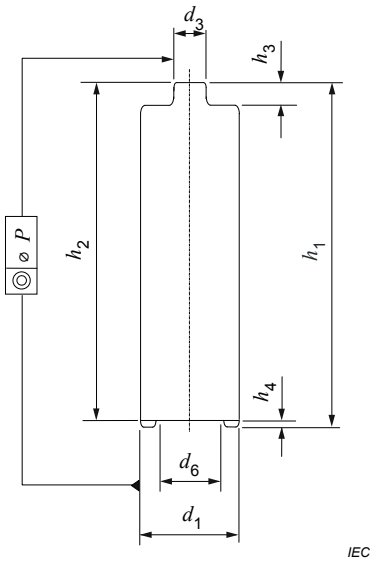


Figure 4 – Dimensional drawing: LR6, FR14505, R6P, R6S

Dimensions		LR6, FR14505	R6P, R6S
h_1	max.	50,5	50,5
h_2	min.	49,5	49,5
h_3	min.	1,0	1,0
h_4	max.	0,5	0,5
d_1	max.	14,5	14,5
	min.	13,7	13,7
d_3	max.	5,5	5,5
d_6	min.	7,0	7,0
$\varnothing P$	max.	0,25	0,5

Electrochemical system letter				L	F	No letter	No letter
IEC designation				LR6	FR14505	R6P High power	R6S Standard
Common designation				AA	AA, FR6	AA	AA
V_n (V)				1,5	1,5	1,5	1,5
OCV max. (V)				1,68	1,83	1,73	1,73
Delayed discharge performance after 12 months (% of MAD)				90	95	80	80
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD**[a] **(Initial)**			
Digital still camera	1 500 mW 650 mW	[b]	1,05	40 pulses	370 pulses	No Test	No Test
Portable lighting (LED)	3,9 Ω	4 min on, 56 min off for 8h per day	0,9	230 min	No Test	60 min	No Test
Motor/toy	3,9 Ω	1 h	0,8	5 h	No Test	65 min	45 min
Toy, non-motorized	250 mA	1 h	0.9	5 h	No Test	No Test	No Test
CD, digital audio, wireless gaming and accessories	100 mA	1 h	0,9	15 h	No Test	4.5 h	No Test
Radio/Clock	43 Ω	4 h	0,9	No Test	No Test	No Test	22 h
Radio / Clock / Remote Control	50 mA	1 h on, 7 h off for 24 h per day	1,0	30 h	No Test	10 h	No Test
High intensity lighting	1000 mW	4 min on, 11 min off for 8 h per day	1,0	No Test	120 min	No Test	No Test

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

[b] Repeat 10 times per hour: 1 500 mW for 2 s, then 650 mW for 28 s, then 0 mW for 55 min.

6.1.5 Category 1 – Specifications: LR03, FR10G445, R03

Dimensions in millimetres

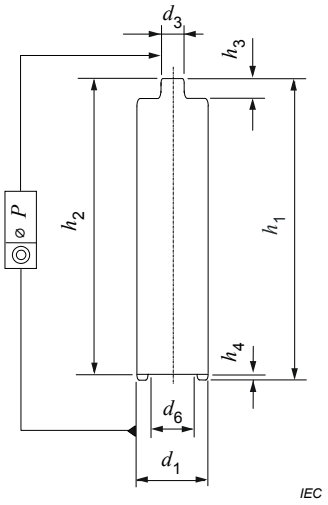


Figure 5 – Dimensional drawing: LR03, FR10G445, R03

Dimensions		LR03, FR10G445	R03
h_1	max.	44,5	44,5
h_2	min.	43,5	43,5
h_3	min.	0,8	0,8
h_4	max.	0,5	0,5
d_1	max.	10,5	10,5
	min.	9,8	9,8
d_3	max.	3,8	3,8
d_6	min.	4,3	4,3
$\varnothing P$	max.	0,25	0,4

Electrochemical system letter				L	F	No letter
IEC designation				LR03	FR10G445	R03
Common designation				AAA	AAA, FR03	AAA
V_n (V)				1,5	1,5	1,5
OCV max. (V)				1,68	1,83	1,73
Delayed discharge performance after 12 months (% of MAD)				90	95	80
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD**[a] (Initial)		
Digital still camera	1 200 mW 650 mW	[b]	1,05	No Test	100 pulses	No Test
Portable lighting	5,1 Ω	4 min on, 56 min off for 8 h per day	0,9	130 min	No Test	50 min
Toy	5,1 Ω	1 h	0,8	120 min	No Test	30 min
Digital audio	50 mA	1 h on, 11 hr off for 24 h	0,9	12 h	16 h	3 h
Remote control	24 Ω	15 s per min 8 h per day	1,0	14,5 h	No Test	4 h
Radio	75 Ω	4 h	0,9	No Test	No Test	20 h
High intensity lighting	400 mW	4 min on, 11 min off for 8 h per day	1,0	No Test	140 min	No Test

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

[b] Repeat 10 times per hour: 1 200 mW for 2 s, then 650 mW for 28 s, then 0 mW for 55 min.

6.1.6 Category 1 – Specifications: LR1, R1, LR8D425

Dimensions in millimetres

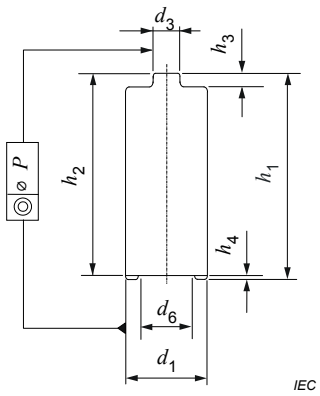


Figure 6 – Dimensional drawing: LR1, R1, LR8D425

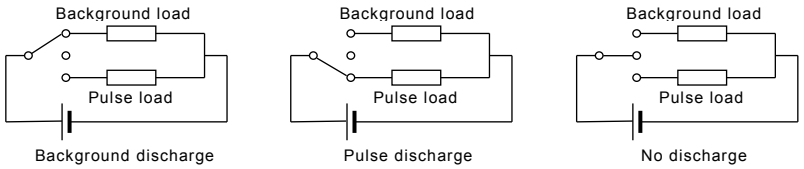
Dimensions		LR1	R1	LR8D425
h_1	max.	30,2	30,2	42,5
h_2	min.	29,1	29,1	41,5
h_3	min.	0,5	0,5	0,7
h_4	max.	0,2	0,2	0,1
d_1	max.	12,0	12,0	8,3
	min.	10,9	10,9	7,7
d_3	max.	4,0	4,0	3,8
d_6	min.	5,0	5,0	2,3[a]
$\varnothing P$	max.	0,5	0,5	0,1

[a] This battery does not fulfill the requirement $d_6 > d_3$ due to constructional constraints.

Electrochemical system letter				L	No letter	L
IEC designation				LR1	R1	LR8D425
Common designation				N	N	AAAA
V_n (V)				1,5	1,5	1,5
OCV max. (V)				1,68	1,73	1,68
Delayed discharge performance after 12 months (% of MAD)				90	80	90
Applications	**Load**	**Daily Period**	**EV (V)**	**MAD[a] (Initial)**		
Portable lighting	5,1 Ω	5 min	0,9	94 min	30 min	90 min
Pager	Pulse: 10 Ω Background: 3 000 Ω	5 s on, 59 min 55 s off for 24 h per day[b]	0,9	888 h	No Test	No Test
Laser pointer	75 Ω	1 h	1,1	No Test	No Test	22 h
Service output test	75 Ω	1 h	0,9	No Test	No Test	27 h
Hearing aid	300 Ω	12 h	0,9	130 h	76 h	No Test

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

[b] 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 diagram below.



6.2 Category 2 batteries – Specifications: CR14250, CR15H270, CR17345, CR17450, BR17335

Dimensions in millimetres

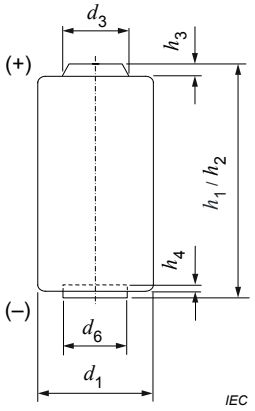


Figure 7 – Dimensional drawing: CR14250, CR15H270, CR17345, CR17450, BR17335

Dimensions		CR14250	CR15H270	CR17345	CR17450	BR17335
h_1 / h_2	max.	25,0	27,0 [b]	34,5	45,0	33,5
	min.	23,5	26,0 [b]	33,5	43,5	32,0
h_3	min.	0,4	0,6	1,0	0,4	0,1
h_4	max.	-	0,4	0,9	-	-
	min.	-	0,05	0,5	-	-
d_1	max.	14,5	15,6	17,0	17,0	17,0
	min.	13,5	15,0	16,0	16,0	16,0
d_3	max.	8,0	7,0	9,6	8,0	8,0
d_6	min.	5,0	8,5	11,0	5,0	5,0

For the definition of the dimensions, see Clause 4.

The cylindrical surface is insulated from the contacts.

Terminals: flat/cap and base.

For general information, see IEC 60086-1.

Electrochemical system letter				C				B
IEC designation				CR14250	CR15H270	CR17345	CR17450	BR17335
Common designation				CR-1/2AA	CR2	123, CR123A	CR-A	BR-2/3A
V_n (V)				3,0	3,0	3,0	3,0	3,0
OCV max. (V)				3,7	3,7	3,7	3,7	3,7
Delayed discharge performance after 12 months (% of MAD)				98	98	98	98	98
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD[a] (Initial)**				
Photo	Current drain 900 mA	3 s on, 27 s off for 24 h per day	1,55	No Test	840 pulses	1 400 pulses	No Test	No Test
Service output test	0,1 kΩ	24 h	2,0	No Test	No Test	40 h	No Test	No Test
Service output test	0,2 kΩ	24 h	2,0	No Test	48 h	No Test	No Test	No Test
Service output test	1 kΩ	24 h	1,8	No Test	No Test	No Test	No Test	380 h
Service output test	1 kΩ	24 h	2,0	No Test	No Test	No Test	710 h	No Test
Service output test	3 kΩ	24 h	2,0	750 h	No Test	No Test	No Test	No Test

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

[b] The h_1/h_2 dimensions shall be measured on the label overlap.

6.3 Category 3 batteries – Specifications: LR9, CR11108

Dimensions in millimetres

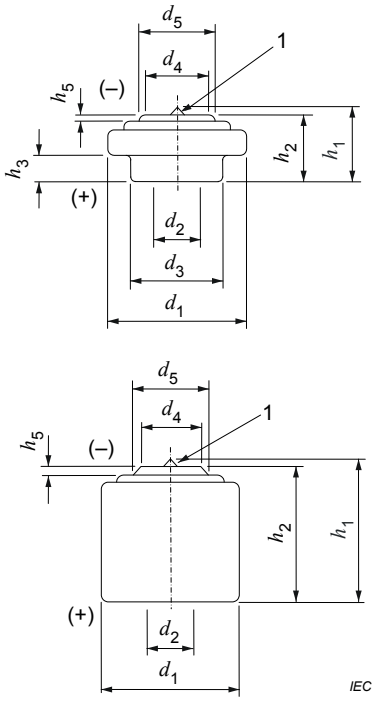


Figure 8 – Dimensional drawing: LR9, CR11108

Dimensions		LR9	CR11108
h_1	max.	6,2	10,8
h_2	min.	5,6	10,4
h_3	min.	2,0	-
h_5	min.	0,2	0,2
d_1	max.	16,0	11,6
	min.	15,2	11,4
d_2	min.	10,0	9,0
d_3	max.	13,5	-
d_4	min.	10,0	3,0
d_5	max.	12,5	9,0

For the definition of the dimensions, see Clause 4.

The cylindrical surface is connected to the positive terminal.

Terminals: flat/cap and case.

For general information, see IEC 60086-1.

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

Marking: 4.1.6.2 of IEC 60086-1:2015 is applicable.

1: Optional pip

Electrochemical system letter				L	C
IEC designation				LR9	CR11108
Common designation				-	1/3N
V_n (V)				1,5	3,0
OCV max. (V)				1,68	3,7
Delayed discharge performance after 12 months (% of MAD)				90	98
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD[a] (Initial)**	
Service output test	0,39 kΩ	24 h	0,9	48 h	No test
Service output test	15 kΩ	24 h	2,0	No test	620 h

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

6.4 Category 4 batteries

6.4.1 General

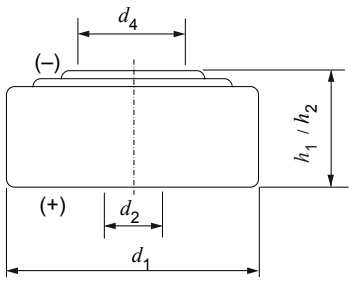


Figure 9 – Dimensional drawing: Category 4

For the definition of the dimensions, see Clause 4.

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 4.1.3.2 of IEC 60086-1:2015.

For general information see IEC 60086-1.

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 60086-1:2015 is applicable.

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

Dimensions in millimetres

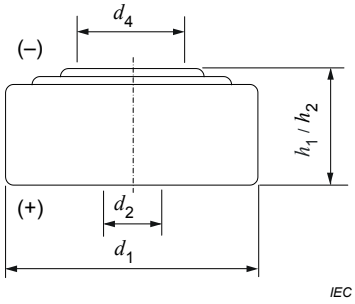


Figure 10 – Dimensional drawing: PR70, PR41, PR48, PR44

Dimensions		PR70	PR41	PR48	PR44
h_1 / h_2	max.	3,60	3,60	5,40	5,40
	min.	3,30	3,30	5,05	5,05
d_1	max.	5,80	7,90	7,90	11,60
	min.	5,65	7,70	7,70	11,30
d_2	min.	-	3,80	3,80	3,80
d_4	min.	-	3,00	3,00	3,80

Electrochemical system letter				P			
IEC designation				PR70[b,c]	PR41[b,c]	PR48[b,c]	PR44[b,c]
Common designation				10, PR536	312	13	675
V_n (V)				1,4	1,4	1,4	1,4
OCV max. (V)				1,59	1,59	1,59	1,59
Delayed discharge performance after 12 months (% of MAD)				95	95	95	95
Applications	**Current Drain**	**Daily Period**	**EV** (V)	**MAD**[a] (Initial)			
Hearing aid standard	Pulse: 5 mA Background: 1 mA	[d, e]	1,05	50 h	No test	No test	No test
Hearing aid high drain	Pulse: 5 mA Background: 1,5 mA	[d, e]	1,1	35 h	No test	No test	No test
Hearing aid standard	Pulse:10 mA Background: 2 mA	[d, e]	1,05	No test	55 h	No test	No test
Wireless streaming	Pulse: 5 mA (15 min) Background: 2 mA	[d, f]	1,1	No test	30 h	No test	No test
Hearing aid standard	Pulse: 12 mA Background: 3 mA	[d, e]	1,05	No test	No test	55 h	No test
Wireless streaming	Pulse: 5 mA (15 min) Background: 3 mA	[d, f]	1,1	No test	No test	45 h	No test
Hearing aid standard	Pulse: 15 mA Background: 5 mA	[d, e]	1,05	No test	No test	No test	70 h
Hearing aid high drain	Pulse: 24 mA Background: 8 mA	[d, e]	1,05	No test	No test	No test	45 h

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

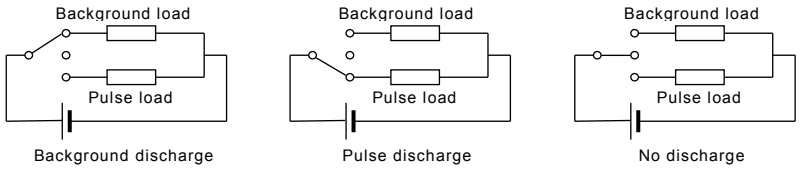
[b] A period of at least 10 min shall elapse between activation and commencement of electrical measurement.

[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 diagram in footnote f.

[e] Six repeated cycles of the pulse load for 100 ms, followed by the background load for 119 min, 59 s, 900 ms, then off for 12 h.

[f] Twelve repeated cycles of the pulse load for 15 min, followed by the background load for 45 min, then off for 12 h.



IEC

6.4.3 Fit acceptance gauge for PR batteries

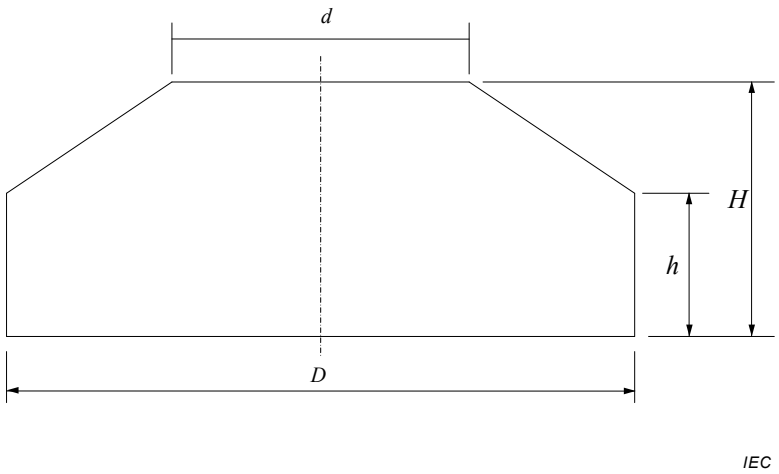
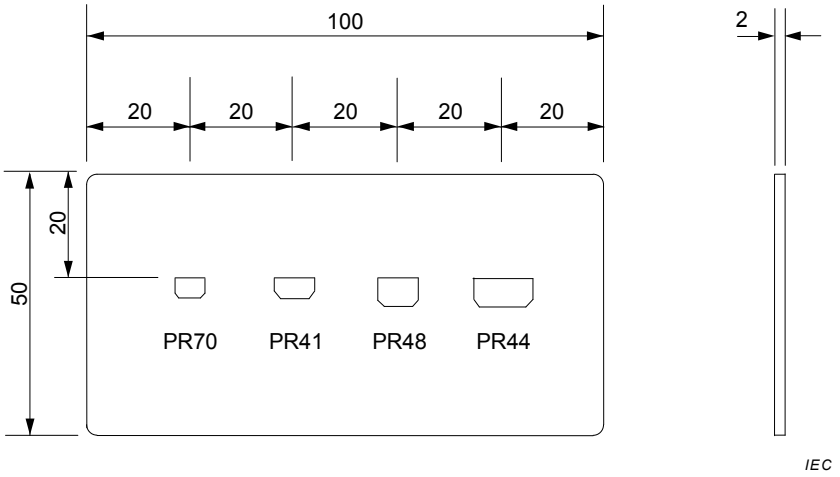


Figure 11 – Gauge opening for P system batteries

Table 1 – Gauge opening dimension (mm)

Electro-chemical system letter	Designa-tion	*D*		*d*		*H*		*h*	
		Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
P	PR70	5,810	±0,005	4,210	±0,005	3,610	±0,005	2,810	±0,005
	PR41	7,910	±0,005	5,510	±0,005	3,610	±0,005	2,410	±0,005
	PR48	7,910	±0,005	5,510	±0,005	5,410	±0,005	4,210	±0,005
	PR44	11,610	±0,005	9,010	±0,005	5,410	±0,005	4,110	±0,005



Gauge should maintain physical integrity for form, fit and function.

(All dimensions in mm)

Figure 12 – Suggested gauge layout

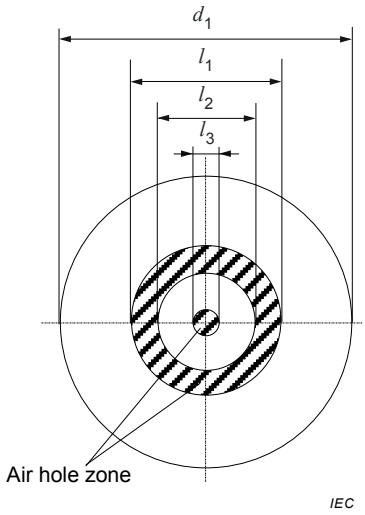


Figure 13 – Air hole placement diagram for P system batteries

Electro-chemical system letter	Designation	d_1		l_1 (max.)	l_2 (min.)	l_3 (max.)
		max.	min.			
P	PR70	5,80	5,65	-	-	2,00
	PR41	7,90	7,70	3,70	2,30	1,00
	PR48	7,90	7,70	3,70	2,30	1,00
	PR44	11,60	11,30	5,80	3,80	1,00

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

Dimensions in millimetres

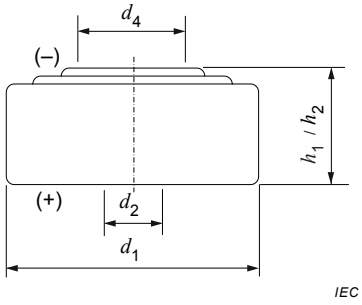


Figure 14 – Dimensional drawing: LR41, LR55, LR54, LR43, LR44

Dimensions		LR41	LR55	LR54	LR43	LR44
h_1 / h_2	max.	3,6	2,1	3,05	4,2	5,4
	min.	3,3	1,85	2,75	3,8	5,0
d_1	max.	7,9	11,6	11,6	11,6	11,6
	min.	7,55	11,25	11,25	11,25	11,25
d_2	min.	3,8	3,8	3,8	3,8	3,8
d_4	min.	3,0	3,8	3,8	3,8	3,8

Electrochemical system letter				L				
IEC designation				LR41	LR55	LR54	LR43	LR44
Common designation				192	191	189, LR1130	186	A76
V_n (V)				1,5	1,5	1,5	1,5	1,5
OCV max. (V)				1,68	1,68	1,68	1,68	1,68
Delayed discharge performance after 12 months (% of MAD)				90	90	90	90	90
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD**[a] **(Initial)**				
Service output test	22 kΩ	24 h	1,2	300 h	No Test	No Test	No Test	No Test
Service output test	22 kΩ	24 h	1,2	No Test	275 h	No Test	No Test	No Test
Service output test	15 kΩ	24 h	1,2	No Test	No Test	350 h	No Test	No Test
Service output test	10 kΩ	24 h	1,2	No Test	No Test	No Test	359 h	No Test
Service output test	6,8 kΩ	24 h	1,2	No Test	No Test	No Test	No Test	340 h

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

6.4.5 Category 4 – Specifications: SR62, SR63, SR65, SR64, SR60, SR67, SR66, SR58, SR68, SR59, SR69, SR41, SR57, SR55, SR48, SR54, SR42, SR43, SR44

Dimensions in millimetres

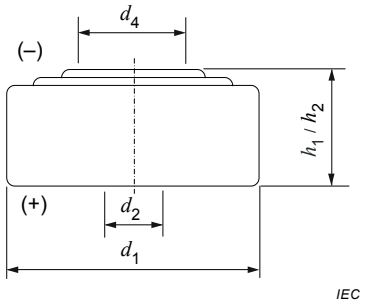


Figure 15 – Dimensional drawing: SR62, SR63, SR65, SR64, SR60, SR67, SR66, SR58, SR68, SR59, SR69, SR41, SR57, SR55, SR48, SR54, SR42, SR43, SR44

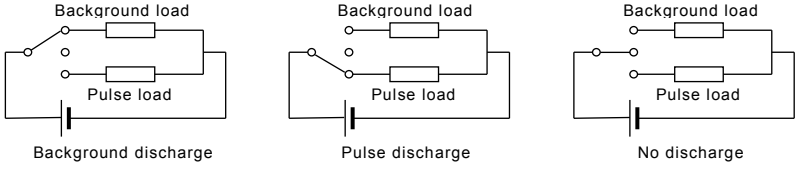
Designation	h_1/h_2		d_1		d_2	d_4
	max.	min.	max.	min.	min.	min.
SR62	1,65	1,45	5,8	5,55	3,8	2,5
SR63	2,15	1,9	5,8	5,55	3,8	2,5
SR65	1,65	1,45	6,8	6,6	–	3,0
SR64	2,7	2,4	5,8	5,55	3,8	2,5
SR60	2,15	1,9	6,8	6,5	3,8	3,0
SR67	1,65	1,45	7,9	7,65	–	3,0
SR66	2,6	2,4	6,8	6,6	–	3,0
SR58	2,1	1,85	7,9	7,55	3,8	3,0
SR68	1,65	1,45	9,5	9,25	–	3,8
SR59	2,6	2,3	7,9	7,55	3,8	3,0
SR69	2,1	1,85	9,5	9,25	–	3,8
SR41	3,6	3,3	7,9	7,55	3,8	3,0
SR57	2,7	2,4	9,5	9,15	3,8	3,8
SR55	2,1	1,85	11,6	11,25	3,8	3,8
SR48	5,4	5,0	7,9	7,55	3,8	3,0
SR54	3,05	2,75	11,6	11,25	3,8	3,8
SR42	3,6	3,3	11,6	11,25	3,8	3,8
SR43	4,2	3,8	11,6	11,25	3,8	3,8
SR44	5,4	5,0	11,6	11,25	3,8	3,8

Electrochemical system letter						S
V_n (V)						1,55
OCV max. (V)						1,63
Delayed discharge performance after 12 months (% of MAD)						90
IEC designation	**Common designation**	**Test**	**Load**	**Daily Period**	**EV** (V)	**MAD**[a] (Initial)
SR62	SR516	Service output test	82 kΩ	24 h	1,2	390 h
SR63	379, SR521	Service output test	68 kΩ	24 h	1,2	560 h
SR65	SR616	Service output test	100 kΩ	24 h	1,2	810 h
SR64	SR527	Service output test	56 kΩ	24 h	1,2	540 h
SR60	363, 364, SR621	Service output test	68 kΩ	24 h	1,2	685 h
SR67	SR716	Service output test	68 kΩ	24 h	1,2	820 h
SR66	376, 377, SR626	Service output test	47 kΩ	24 h	1,2	680 h
SR58	361, 362, SR721	Service output test	47 kΩ	24 h	1,2	518 h
SR68	373, SR916	Service output test	47 kΩ	24 h	1,2	680 h
SR59	396, 397, SR726	Service output test	33 kΩ	24 h	1,2	530 h
SR69	370, 371, SR921	Service output test	33 kΩ	24 h	1,2	663 h
SR41	384, 392	Service output test	22 kΩ	24 h	1,2	450 h
SR57	395, 399, SR927	Service output test	22 kΩ	24 h	1,2	500 h
SR55	381, 391	Service output test	22 kΩ	24 h	1,2	450 h
SR48	309, 393	Hearing aid	1,5 kΩ	12 h	0,9	40 h
		Service output test	15 kΩ	24 h	1,2	580 h
SR54	389, 390, SR1130	Service output test	15 kΩ	24 h	1,2	580 h
SR42	344, 350, 387	Service output test	15 kΩ	24 h	1,2	670 h
SR43	301, 386	Service output test	10 kΩ	24 h	1,2	620 h
SR44	303, 357	Service output test	6,8 kΩ	24 h	1,2	620 h
		Accelerated application test for automatic camera	Pulse: 39 Ω Background: 5,6 kΩ	b,c	0,9	450 h

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

[b] Pulse load for 1 s every 6 s for 5 min per day. Background load alternately and continuously for 24 h per day

[c] 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 diagram below.



IEC

6.4.6 Category 4 – Specifications: CR1025, CR1216, CR1220, CR1616, CR2012, CR1620, CR2016, CR2025, CR2320, CR2032, CR2330, CR2430, CR2354, CR3032, CR2450, BR1225, BR2016, BR2320, BR2325, BR3032

Dimensions in millimetres

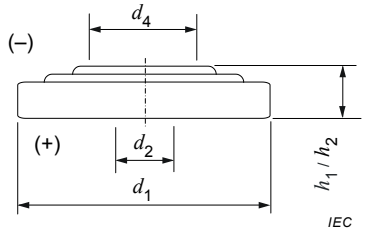


Figure 16 – Dimensional drawing: CR1025, CR1216, CR1220, CR1616, CR2012, CR1620, CR2016, CR2025, CR2320, CR2032, CR2330, CR2430, CR2354, CR3032, CR2450, BR1225, BR2016, BR2320, BR2325, BR3032

Designation	h_1/h_2		d_1		d_2	d_4
	max.	min.	max.	min.	min.	min.
CR1025	2,5	2,2	10,0	9,7	-	3,0
CR1216	1,6	1,4	12,5	12,2	-	4,0
CR1220	2,0	1,8	12,5	12,2	-	4,0
CR1616	1,6	1,4	16,0	15,7	-	5,0
CR2012	1,2	1,0	20,0	19,7	-	8,0
CR1620	2,0	1,8	16,0	15,7	-	5,0
CR2016	1,6	1,4	20,0	19,7	-	8,0
CR2025	2,5	2,2	20,0	19,7	-	8,0
CR2320	2,0	1,8	23,0	22,6	-	8,0
CR2032	3,2	2,9	20,0	19,7	-	8,0
CR2330	3,0	2,7	23,0	22,6	-	8,0
CR2430	3,0	2,7	24,5	24,2	-	8,0
CR2354	5,4	5,1	23,0	22,6	-	8,0
CR3032	3,2	2,9	30,0	29,6	-	8,0
CR2450	5,0	4,6	24,5	24,2	-	8,0
BR1225	2,5	2,2	12,5	12,2	-	4,0
BR2016	1,6	1,4	20,0	19,7	-	8,0
BR2320	2,0	1,8	23,0	22,6	-	8,0
BR2325	2,5	2,2	23,0	22,6	-	8,0
BR3032	3,2	2,9	30,0	29,6	-	8,0

Electrochemical system letter					C	B
V_n (V)					3,0	3,0
OCV max. (V)					3,7	3,7
Delayed discharge performance after 12 months (% of MAD)					98	98
Designation	**Test**	**Load**	**Daily Period**	**EV** (V)	**MAD**[a] (Initial)	
CR1025	Service output test	68 kΩ	24 h	2,0	630 h	No test
CR1216	Service output test	62 kΩ	24 h	2,0	480 h	No test
CR1220	Service output test	62 kΩ	24 h	2,0	700 h	No test
CR1616	Service output test	30 kΩ	24 h	2,0	480 h	No test
CR2012	Service output test	30 kΩ	24 h	2,0	530 h	No test
CR1620	Service output test	47 kΩ	24 h	2,0	900 h	No test
CR2016	Service output test	30 kΩ	24 h	2,0	675 h	No test
CR2025	Service output test	15 kΩ	24 h	2,0	540 h	No test
	Electronic key test	10 mA	5 s on, 55 s off 24 h per day	1.8	8.5 h	No test
CR2320	Service output test	15 kΩ	24 h	2,0	590 h	No test
CR2032	Service output test	15 kΩ	24 h	2,0	920 h	No test
	Electronic key test	10 mA	5 s on, 55 s off 24 h per day	1.8	12.5 h	No test
CR2330	Service output test	15 kΩ	24 h	2,0	1 320 h	No test
CR2430	Service output test	15 kΩ	24 h	2,0	1 300 h	No test
CR2354	Service output test	7,5 kΩ	24 h	2,0	1 260 h	No test
CR3032	Service output test	7,5 kΩ	24 h	2,0	1 250 h	No test
CR2450	Service output test	7,5 kΩ	24 h	2,0	1 200 h	No test
BR1225	Service output test	30 kΩ	24 h	2,0	No test	395 h
BR2016	Service output test	30 kΩ	24 h	2,0	No test	636 h
BR2320	Service output test	15 kΩ	24 h	2,0	No test	468 h
BR2325	Service output test	15 kΩ	24 h	2,0	No test	696 h
BR3032	Service output test	7,5 kΩ	24 h	2,0	No test	1 310 h

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

6.5 Category 5 batteries

6.5.1 Category 5 – Specifications: 4LR44, 2CR13252, 4SR44

Dimensions in millimetres

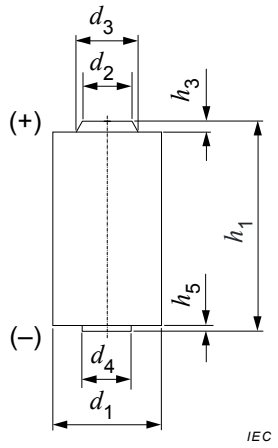


Figure 17 – Dimensional drawing: 4LR44, 2CR13252, 4SR44

Dimensions		4LR44	2CR13252	4SR44
h_1	max.	25,2	25,2	25,2
	min.	23,9	23,9	23,9
h_3	min.	0,7	0,7	0,7
h_5	max.	0,4	0,4	0,4
	min.	0,05	0,05	0,05
d_1	max.	13	13	13
	min.	12	12	12
d_2	min.	5,0	5,0	5,0
d_3	max.	6,5	6,5	6,5
d_4	min.	5,0	5,0	5,0

The cylindrical surface is insulated from the contacts.

Terminals: flat.

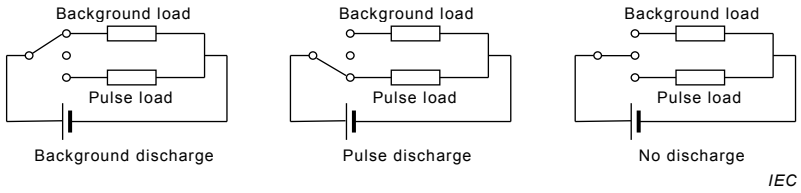
For general information see IEC 60086-1.

Electrochemical system letter				L	C	S
IEC designation				4LR44	2CR13252	4SR44
Common designation				-	2CR-1/3N, 28L	-
V_n (V)				6,0	6,0	6,2
OCV max. (V)				6,72	7,4	6,52
Delayed discharge performance after 12 months (% of MAD)				90	98	90
Applications	**Load**	**Daily Period**	**EV (V)**	**MAD[a] (Initial)**		
Accelerated application test for automatic camera	Pulse: 0,160 kΩ Background: 27 kΩ	b,c	3,6	310 h	No test	570 h
Service output test	27 kΩ	24 h	3,6	420 h	No test	620 h
Pulse test	0,1 kΩ	2 s on, 1 s off for 24 h per day	3,6	950 pulses	No test	1 000 pulses
Service output test	30 kΩ	24 h	4,0	No test	620 h	No test

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

[b] Pulse load for 1 s every 6 s for 5 min per day. Background load alternately and continuously for 24 h per day

[c] 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 diagram below.



6.5.2 Category 5 – Specifications: 5AR40

Dimensions in millimeters

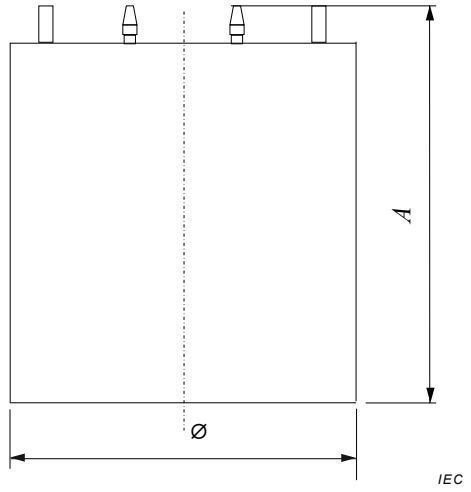


Figure 18 – Dimensional drawing: 5AR40

Dimensions		5AR40
A	max.	190,0
Ø	*max.*	184,0

Terminals: Screw terminals.

Terminals located on top surface.

Maximum terminal stud diameter: 4,2 mm.

For general information, see IEC 60086-1.

Electrochemical system letter				A
IEC designation				5AR40[a]
Common designation				--
V_n (V)				7,0
OCV max. (V)				7,75
Delayed discharge performance after 12 months (% of MAD)				80
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD**[b] (initial)
Electric fence controller	240 Ω	24 h	4,5	120 days

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

[b] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

6.6 Category 6 batteries

6.6.1 Category 6 – Specifications: 3R12P, 3R12S, 3LR12

Dimensions in millimetres

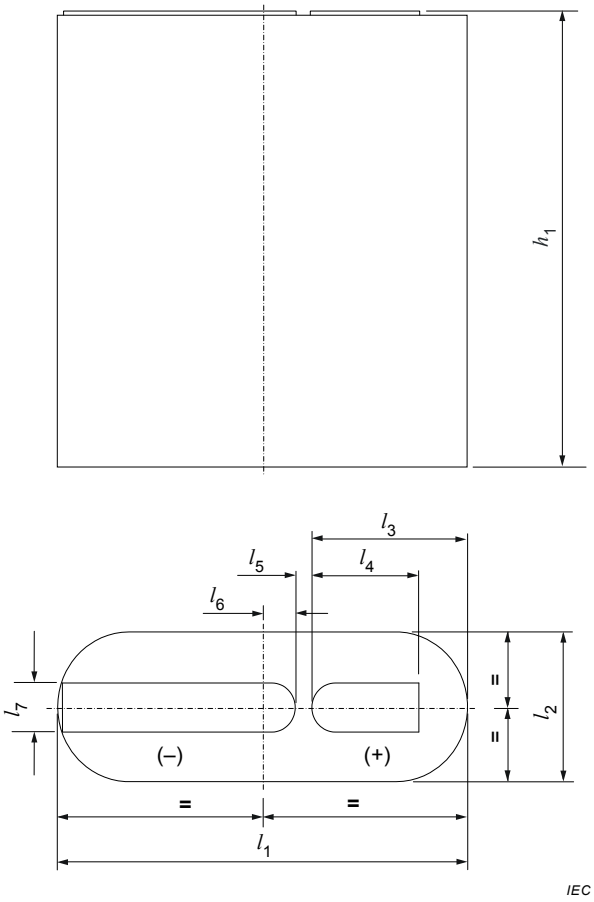


Figure 19 – Dimensional drawing: 3R12P, 3R12S, 3LR12

Dimensions		3R12P	3R12S	3LR12
h_1	max.	67,0	67,0	67,0
	min.	63,0	63,0	63,0
l_1	max.	62,0	62,0	62,0
	min.	60,0	60,0	60,0
l_2	max.	22,0	22,0	22,0
	min.	20,0	20,0	20,0
l_3	max.	-	-	-
	min.	23,0	23,0	23,0
l_4	max.	-	-	-
	min.	16,0	16,0	16,0
l_5	max.	-	-	-
	min.	1,0	1,0	1,0
l_6	max.	-	-	-
	min.	3,0	3,0	3,0
l_7	max.	7,0	7,0	7,0
	min.	6,0	6,0	6,0

Terminals: spring clips.

For general information, see IEC 60086-1.

Electrochemical system letter				No letter	No letter	L
IEC designation				3R12P High power	3R12S Standard	3LR12
Common designation				-	-	-
V_n (V)				4,5	4,5	4,5
OCV max. (V)				5,19	5,19	5,04
Delayed discharge performance after 12 months (% of MAD)				80	80	90
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD**[a] **(Initial)**		
Portable lighting	20 Ω	1 h	2,7	5,5 h	3,5 h	12 h
Radio	220 Ω	4 h	2,7	96 h	96 h	300 h

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

6.6.2 Category 6 – Specifications: 4LR61

Dimensions in millimetres

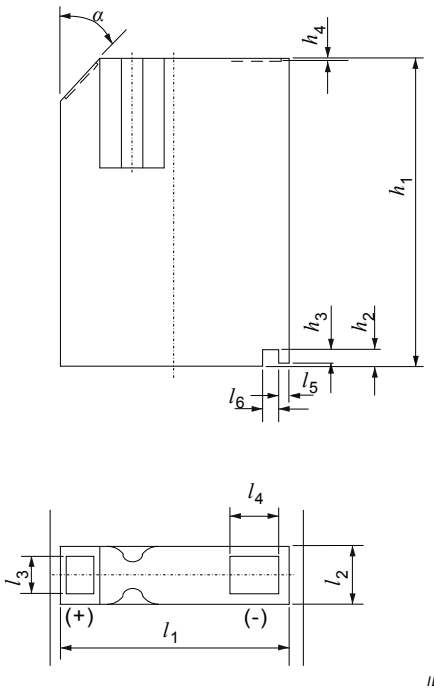


Figure 20 – Dimensional drawing: 4LR61

Dimensions		4LR61
h_1	max.	48,5
	min.	47,0
h_2	max.	2,7
	min.	2,2
h_3	max.	2,3
	min.	1,8
h_4	max.	0,8
	min.	0,3
l_1	max.	35,6
	min.	35,0
l_2	max.	9,2
	min.	8,7
l_3	max.	6,5
	min.	6,0
l_4	max.	8,0
	min.	6,5
l_5	max.	1,5
	min.	1,0
l_6	max.	2,5
	min.	2,0
α		45°

Terminals: flat contacts.

For general information, see IEC 60086-1.

Electrochemical system letter				L
IEC designation				4LR61
Common designation				J
V_n (V)				6,0
OCV max. (V)				6,72
Delayed discharge performance after 12 months (% of MAD)				90
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD[a] (Initial)**
Electric equipment	0,33 kΩ	24 h	3,6	24 h
Service output test	6,8 kΩ	24 h	3,6	700 h

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

6.6.3 Category 6 – Specifications: CR-P2

Dimensions in millimetres

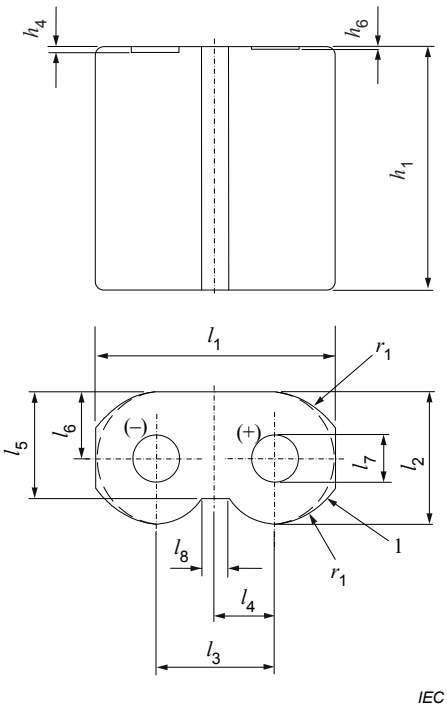


Figure 21 – Dimensional drawing: CR-P2

Dimensions		CR-P2
h_1	max.	36,0
	min.	34,5
h_4	max.	1,5
	min.	0,7
h_6	max.	1,0
	min.	0,1
l_1	max.	35,0
	min.	32,5
l_2	max.	19,5
	min.	18,5
l_3	-	16,8
l_4	-	8,4
l_5	max.	16,2
	min.	15,3
l_6	max.	9,8
	min.	9,2
l_7	max.	8,7
	min.	7,5
l_8	max.	-
	min.	1,3
r_1	max.	10,0
	min.	7,4

Terminals: flat contacts.

contacts are recessed.

For general information, see IEC 60086-1.

1: Round sides are also acceptable.

Electrochemical system letter				C
IEC designation				CR-P2
Common designation				223
V_n (V)				6,0
OCV max. (V)				7,4
Delayed discharge performance after 12 months (% of MAD)				98
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD**[a] (Initial)
Photo test	Current drain 900 mA	3 s on, 27 s off for 24 h per day.	3,1	1 400 pulses
Service output test	200 Ω	24 h	4,0	40 h

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

6.6.4 Category 6 – Specifications: 2CR5

Dimensions in millimetres

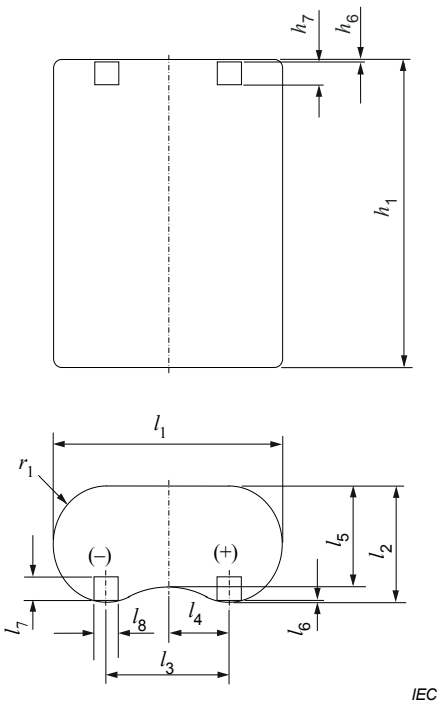


Figure 22 – Dimensional drawing: 2CR5

Dimensions		2CR5
h_1	max.	45,0
	min.	43,0
h_6	max.	0,9
	min.	0,1
h_7	max.	4,5
	min.	3,5
l_1	max.	34,0
	min.	32,5
l_2	max.	17,0
	min.	16,0
l_3	-	16,0
l_4	-	8,0
l_5	max.	15,5
	min.	-
l_6	max.	1,0
	min.	0,2
l_7	max.	4,5
	min.	3,5
l_8	max.	4,6
	min.	3,5
r_1	max.	9,0
	min.	8,0
Terminals: flat contacts.		
For general information, see IEC 60086-1.		

Electrochemical system letter				C
IEC designation				2CR5
Common designation				245
V_n (V)				6,0
OCV max. (V)				7,4
Delayed discharge performance after 12 months (% of MAD)				98
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD**[a] (Initial)
Photo test	Current drain 900 mA	3 s on, 27 s off for 24 h per day.	3,1	1 400 pulses
Service output test	200 Ω	24 h	4,0	40 h
a Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).				

6.6.5 Category 6 – Specifications: 4R25X, 4LR25X

Dimensions in millimetres

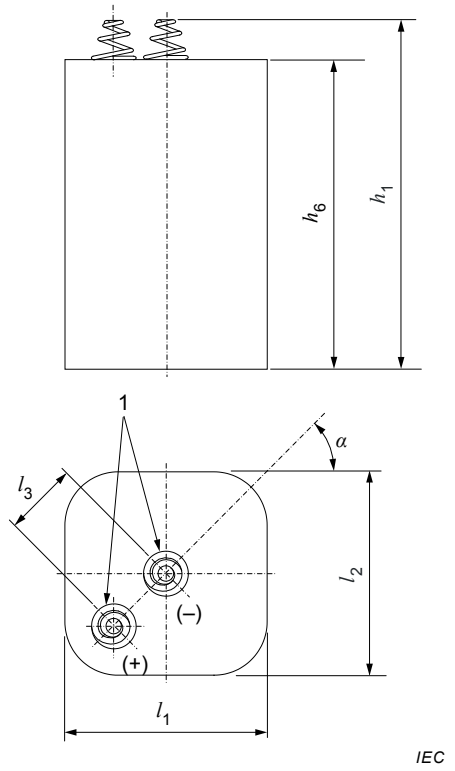


Figure 23 – Dimensional drawing: 4R25X, 4LR25X

Dimensions		4R25X	4LR25X
h_1	max.	115	115
	min.	108	108
h_6	max.	102	102
	min.	97	97
l_1	max.	67	67
	min.	65	65
l_2	max.	67	67
	min.	65	65
l_3	max.	27	27
	min.	23	23
α	-	45°	45°

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 shall pass freely through a gauge having a diameter of 82,6 mm.

For general information, see IEC 60086-1.

1: Conical spiral wire spring terminals

Electrochemical system letter				No letter	L
IEC designation				4R25X	4LR25X
V_n (V)				6,0	6,0
OCV max. (V)				6,92	6,72
Delayed discharge performance after 12 months (% of MAD)				80	90
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD**[a] (Initial)	
Portable Lighting 1	8,2 Ω	30 min	3,6	350 min	900 min
Portable Lighting 2	9,1 Ω	30 min on, 30 min off for 8 h per day	3,6	270 min	1 020 min
Road warning lamp	110 Ω	12 h	3,6	155 h	310 h

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

6.6.6 Category 6 – Specifications: 4R25Y

Dimensions in millimetres

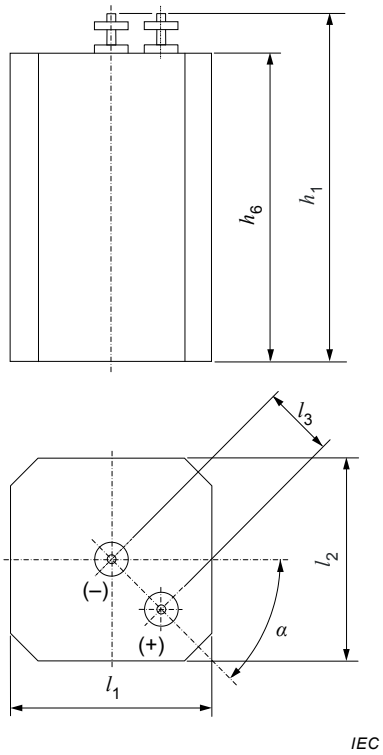


Figure 24 – Dimensional drawing: 4R25Y

Dimensions		4R25Y
h_1	max.	114
	min.	106
h_6	max.	102
	min.	97
l_1	max.	67
	min.	65
l_2	max.	67
	min.	65
l_3	max.	25
	min.	22
α	-	45°

Terminals: screw terminals (insulated or metallic nuts).

The maximum terminal stud diameter is 3,5 mm.

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

For general information, see IEC 60086-1.

Electrochemical system letter				No letter
IEC designation				4R25Y
V_n (V)				6,0
OCV max. (V)				6,92
Delayed discharge performance after 12 months (% of MAD)				80
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD**[a] (Initial)
Portable Lighting 1	8,2 Ω	30 min	3,6	350 min
Portable Lighting 2	9,1 Ω	30 min on, 30 min off for 8 h per day	3,6	270 min
Road warning lamp	110 Ω	12 h	3,6	155 h

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

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

Dimensions in millimetres

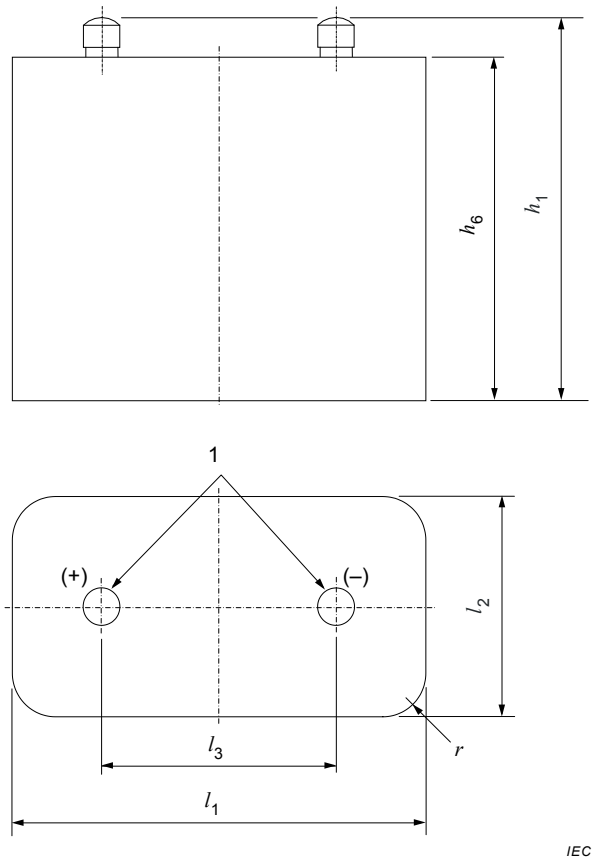


Figure 25 – Dimensional drawing: 4R25-2, 4LR25-2

Dimensions		4R25-2	4LR25-2
h_1	max.	127,0	127,0
	min.	-	-
h_6	max.	114,0	114,0
	min.	109,5	109,5
l_1	max.	136,5	136,5
	min.	132,5	132,5
l_2	max.	73,0	73,0
	min.	69,0	69,0
l_3	max.	77,0	77,0
	min.	75,2	75,4
r	min.	14,0	14,0

Terminals: screw terminals (insulated nuts).

Maximum terminal stud diameter = 4,2 mm.

Minimum diameter of bearing surface of terminal = 6,3 mm.

For general information, see IEC 60086-1.

1: Insulated nuts

Electrochemical system letter				No letter	L
IEC designation				4R25-2	4LR25-2
V_n (V)				6,0	6,0
OCV max. (V)				6,92	6,72
Delayed discharge performance after 12 months (% of MAD)				80	90
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD**[a] (Initial)	
Portable Lighting 1	8,2 Ω	30 min	3,6	900 min	1 800 min
Portable Lighting 2	9,1 Ω	30 min on, 30 min off for 8 h per day	3,6	696 min	2 040 min
Road warning lamp	110 Ω	12 h	3,6	200 h	620 h

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

6.6.8 Category 6 – Specifications: 6F22, 6LR61, 6LP3146

Dimensions in millimetres

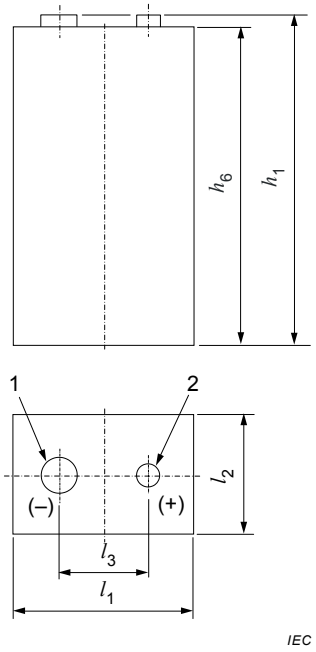


Figure 26 – Dimensional drawing: 6F22, 6LR61, 6LP3146

Dimensions		6F22	6LR61	6LP3146
h_1	max.	48,5	48,5	48,5
	min.	46,5	46,5	46,5
h_6	max.	46,4	46,4	46,4
	min.	-	-	-
l_1	max.	26,5	26,5	26,5
	min.	24,5	24,5	24,5
l_2	max.	17,5	17,5	17,5
	min.	15,5	15,5	15,5
l_3	max.	12,95	12,95	12,95
	min.	12,45	12,45	12,45

Terminals: miniature snap fasteners.

For general information, see IEC 60086-1.

1: Socket

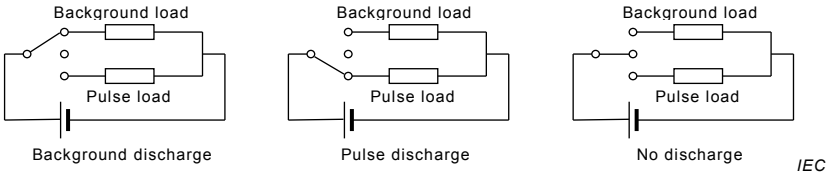
2: Stud

Electrochemical system letter				No letter	L	L
IEC designation				6F22	6LR61	6LP3146
Common designation				9V	9V	9V, 6LF22
V_n (V)				9,0	9,0	9,0
OCV max. (V)				10,4	10,1	10,1
Delayed discharge performance after 12 months (% of MAD)				80	90	90
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD**[a] (Initial)		
Toy	270 Ω	1 h	5,4	7 h	12 h	12 h
Clock radio	620 Ω	2 h	5,4	24 h	33 h	33 h
Smoke detector[b]	Background: 10 kΩ Pulse: 0,62 kΩ	1 s on, 3 599 s off for 24 h per day[c]	7,5	8 days	16 days	16 days

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test)

[b] This is an accelerated test

[c] 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 diagram below.



6.6.9 Category 6 – Configurations: Stud for 6F22, 6LR61 6LP3146

Dimensions in millimetres

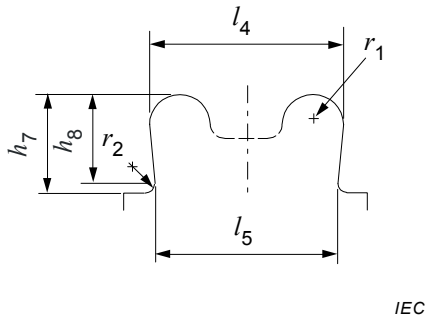


Figure 27 – Dimensional drawing: Stud

Dimensions		6F22 6LR61 6LP3146
h_7	max.	3,10
	min.	2,90
h_8	max.	(2,55)
	min.	
l_4	max.	5,77
	min.	5,67
l_5	max.	(5,38)
	min.	
r_1	max.	(0,8)
	min.	
r_2	max.	(0,4)
	min.	

6.6.10 Category 6 – Specifications: 6AS4

Dimensions in millimetres

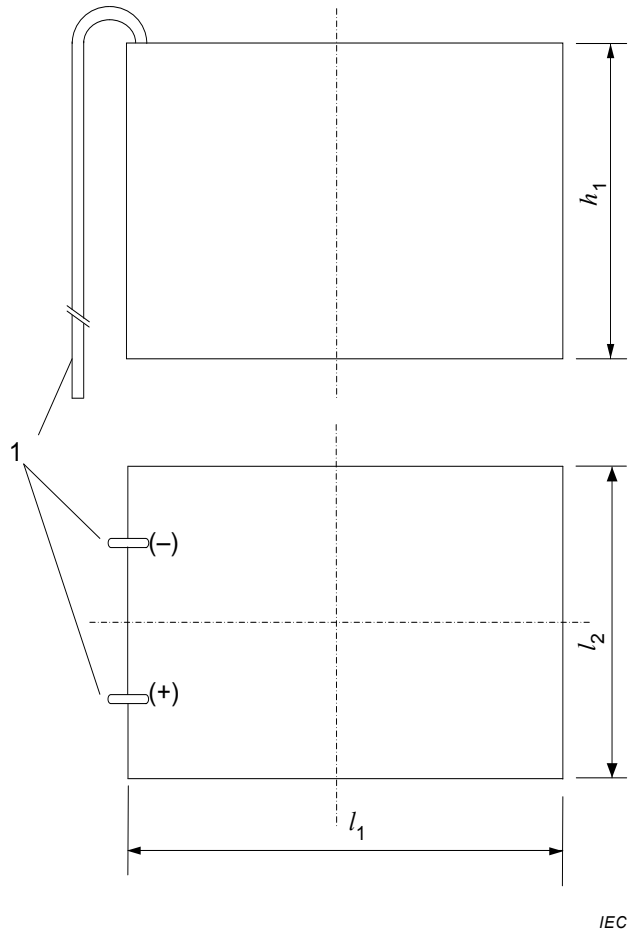


Figure 28 – Dimensional drawing: 6AS4

Dimensions		6AS4
h_1	max.	114
l_1	max.	168
l_2	max.	113

Terminals: wire.

Minimum free length of connecting wires = 200 mm.

For general information, see IEC 60086-1.

1: Wire

Electrochemical system letter				A
IEC designation				6AS4[b]
V_n (V)				8,4
OCV max. (V)				9,30
Delayed discharge performance after 12 months (% of MAD)				80
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD**[a] (Initial)
Electric fence controller	300 Ω	24 h	5,4	80 days

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

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

6.6.11 Category 6 – Specifications: 6AS6

Dimensions in millimetres

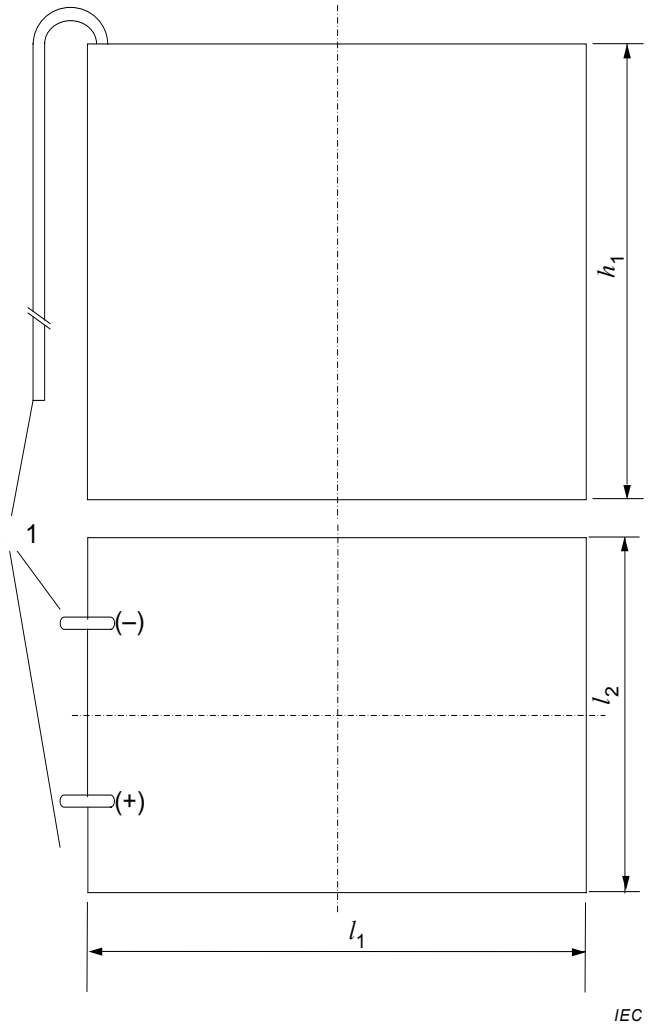


Figure 29 – Dimensional drawing: 6AS6

Dimensions		6AS6
h_1	max.	162
l_1	max.	192
l_2	max.	128

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.

1: Wire

Electrochemical system letter				A
IEC designation				6AS6[b]
V_n (V)				8,4
OCV max. (V)				9,30
Delayed discharge performance after 12 months (% of MAD)				80
Applications	**Load**	**Daily Period**	**EV** (V)	**MAD**[a] (Initial)
Electric fence controller	300 Ω	24 h	5,4	120 days

[a] Standard conditions (see IEC 60086-1:2015, Table 3, Initial discharge test).

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

Annex A
(informative)

Tabulation of batteries by application

Each of the Tables A.1 to A.25 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 – Automatic camera

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

Table A.2 – CD, digital audio, wireless gaming and accessories

Designation	Nominal voltage V
R6P	1,5
LR6	1,5

Table A.3 – Digital audio

Designation	Nominal voltage V
R03	1,5
LR03	1,5
FR10G445	1,5

Table A.4 – Digital still camera

Designation	Nominal voltage V
LR6	1,5
FR14505	1,5
FR10G445	1,5

Table A.5 – Electric equipment

Designation	Nominal voltage V
4LR61	6,0

Table A.6 – Electric fence controller

Designation	Nominal voltage V
5AR40	7,0
6AS4	8,4
6AS6	8,4

Table A.7 – Electronic key

Designation	Nominal voltage V
CR2025	3,0
CR2032	3,0

Table A.8 – Hearing aid

Designation	Nominal voltage V
R1	1,5
LR1	1,5
SR48	1,55

Table A.9 – Hearing aid high drain

Designation	Nominal voltage V
PR70	1,4
PR44	1,4

Table A.10 – Hearing aid standard

Designation	Nominal voltage V
PR70	1,4
PR41	1,4
PR48	1,4
PR44	1,4

Table A.11 – High intensity lighting

Designation	Nominal voltage V
FR10G445	1,5
FR14505	1,5

Table A.12 – Laser pointer

Designation	Nominal voltage V
LR8D425	1,5

Table A.13 – Pager

Designation	Nominal voltage V
LR1	1,5

Table A.14 – Photo

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

Table A.15 – Portable lighting (LED)

Designation	Nominal voltage V
LR8D425	1,5
R1	1,5
LR1	1,5
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
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.16 – Portable stereo

Designation	Nominal voltage V
LR14	1,5
LR20	1,5

Table A.17 – Radio

Designation	Nominal voltage V
R03	1,5
R20P	1,5
R20S	1,5
3R12P	4,5
3R12S	4,5
3LR12	4,5

Table A.18 – Radio / Clock

Designation	Nominal voltage V
R6S	1,5
6F22	9,0
6LR61	9,0
6LP3146	9,0
NOTE The application for the 6F22, 6LR61 and 6LP3146 is Clock radio	

Table A.19 – Radio / Clock / Remote control

Designation	Nominal voltage V
R6P	1,5
LR6	1,5

Table A.20 – Remote control

Designation	Nominal voltage V
R03	1,5
LR03	1,5

Table A.21 – 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.22 – Smoke detector

Designation	Nominal voltage V
6F22	9,0
6LR61	9,0
6LP3146	9,0

Table A.23 – Toy (motor)

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
6F22	9,0
6LR61	9,0
6LP3146	9,0

Table A.24 – Toy (non-motorized)

Designation	Nominal voltage V
LR6	1,5

Table A.25 – Wireless streaming

Designation	Nominal voltage V
PR41	1,4
PR48	1,4

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 in Tables B.1 to B.6.

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 LR8D425, LR1, LR03, LR6, LR14, LR20 FR10G445, FR14505	LR8D425 R1, LR1 FR10G445, R03, LR03 FR14505, R6P, R6S, LR6 R14P, R14S, LR14 R20P, R20S, LR20

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 CR11108	CR11108 LR9	(Figure 8) (Figure 8)

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,	SR60
SR68, SR59, SR69, SR41, SR57, SR55, SR48,	SR67
SR54, SR42, SR43, SR44	SR66
	PR70
CR1025, CR1216, CR1220, CR1616, CR2012,	SR58
CR1620, CR2016, CR2025, CR2320, CR2032,	SR68
CR2330, CR2430, CR2354, CR3032, CR2450	SR59
	SR69
BR1225, BR2016, BR2320, BR2325, BR3032	PR41, LR41, SR41
	SR57
	CR1025
	CR1216
	LR55, SR55
	CR1220
	PR48, SR48
	BR1225
	CR1616
	LR54, SR54
	CR2012
	SR42
	CR1620
	LR43, SR43
	CR2016, BR2016
	PR44, LR44, SR44
	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
4LR44 2CR13252 4SR44 5AR40	4LR44, 2CR13252, 4SR44 5AR40

Table B.6 – Category 6 batteries

Non-round batteries – Miscellaneous	
Ranking by electrochemical system	Ranking by shape/volume
3R12P, 3R12S, 4R25X, 4R25Y, 4R25-2, 6F22 3LR12, 4LR61, 4LR25X, 4LR25-2, 6LR61, 6LP3146 CR-P2, 2CR5 6AS4, 6AS6	4LR61 6F22, 6LR61, 6LP3146 CR-P2, 2CR5 3R12P, 3R12S, 3LR12 4R25X, 4LR25X 4R25Y 4R25-2, 4LR25-2 6AS4 6AS6

Annex C
(informative)

Index

The index in Table C.1 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 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

Annex D
(informative)

Common designation

The index in Table D.1 provides a cross-reference for IEC and common designations of batteries for marking purposes.

Table D.1 – Index

IEC Designation	Common Designation	IEC Designation	Common Designation	IEC Designation	Common Designation
LR1	N	LR41	192	CR15H270	CR2
R1	N	PR41	312	LR8D425	AAAA
CR-P2	223	SR41	384, 392	CR1025	1025
LR03	AAA	SR42	344, 350, 387	CR1216	1216
R03	AAA	LR43	186	CR1220	1220
FR10G445	AAA, FR03	SR43	301, 386	BR1225	--
2CR5	245	LR44	A76	CR1616	1616
LR6	AA	4LR44	--	CR1620	1620
R6P	AA	PR44	675	CR2012	2012
R6S	AA	SR44	303, 357	BR2016	--
FR14505	AA, FR6	4SR44	--	CR2016	2016
LR9	--	PR48	13	CR2025	2025
3LR12	--	SR48	309, 393	CR2032	2032
3R12P	--	LR54	191, LR1130	BR2320	--
3R12S	--	SR54	389, 390, SR1130	CR2320	2320
LR14	C	LR55	191	BR2325	--
R14P	C	SR55	381, 391	CR2330	2330
R14S	C	SR57	395, 399, SR927	CR2354	2354
LR20	D	SR58	361, 362, SR721	CR2430	2430
R20P	D	SR59	396, 397, SR726	CR2450	2450
R20S	D	SR60	363, 364, SR621	BR3032	--
6F22	9V	4LR61	J	CR3032	3032
6LR61	9V	SR62	SR516	CR11108	1/3N
6LP3146	9V, 6LF22	SR63	379, SR521	2CR13252	2CR-1/3N, 28L
4LR25X	--	SR64	SR527	CR14250	CR-1/2AA
4LR25-2	--	SR65	SR616	BR17335	BR-2/3A
4R25X	--	SR66	376, 377, SR626	CR17345	123, CR123A
4R25Y	--	SR67	SR716	CR17450	CR-A
4R25-2	--	SR68	373, SR916	5AR40	--
		SR69	370, 371, SR921	6AS4	--
		PR70	10, PR536	6AS6	--

Batteries having a letter ‘W’ at the end of the common designation should comply with IEC 60086-3, where more detailed dimensions and test conditions are specified.

EXAMPLE SR626W, SR626SW.

Bibliography

IEC 60050-482, *International Electrotechnical Vocabulary – Part 482: Primary and secondary cells and batteries*

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

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

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

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

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