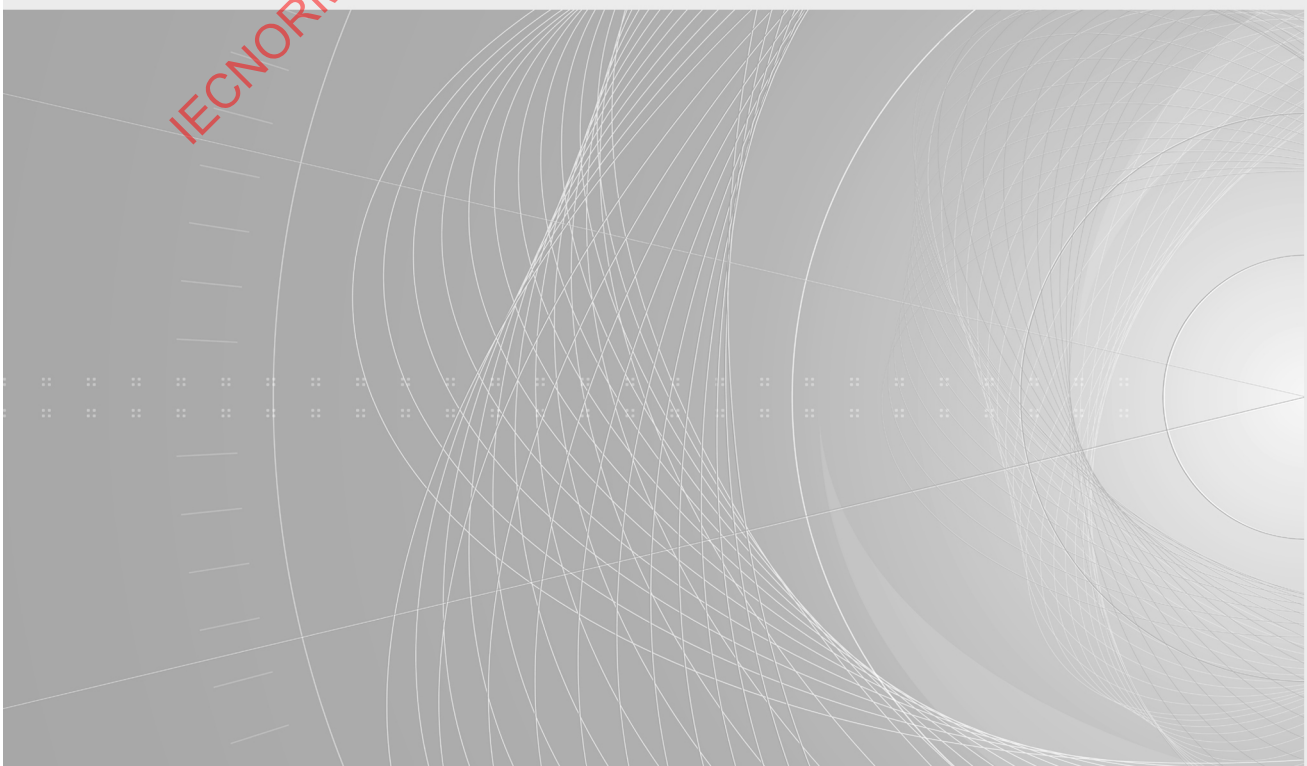
IEC 60086-2

Edition 14.0 2021-04

INTERNATIONAL STANDARD

Primary batteries –
Part 2: Physical and electrical specifications



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

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

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

g) modifications to the LR1/R1 tests;

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

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

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

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 60086 series, under the general title *Primary batteries*, can be found on the IEC website.

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

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- withdrawn,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

INTRODUCTION

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

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

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

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

PRIMARY BATTERIES –

Part 2: Physical and electrical specifications

1 Scope

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

It specifies

– the physical dimensions,

– the discharge test conditions and discharge performance requirements.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60086-1, *Primary batteries – Part 1: General*

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

3 Terms, definitions, symbols and abbreviated terms

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

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

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

3.1 Terms and definitions

3.1.1
application test
simulation of the actual use of a battery in a specific application

3.1.2
button cell or battery
small round cell or battery where the overall height is less than the diameter, containing aqueous electrolyte

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

3.1.3
closed-circuit voltage
CCV
voltage across the terminals of a battery when it is on discharge

3.1.4
coin <cell or battery>
lithium button <cell or battery>
small round cell or battery where the overall height is less than the diameter, containing non-aqueous electrolyte**.**

Note 1 to entry: The nominal voltage of lithium batteries is typically greater than 2 V.

Note 2 to entry: See button cell or battery.

3.1.5
end-point voltage
EV
specified voltage of a battery at which the battery discharge is terminated

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

3.1.6
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.

3.1.7
nominal voltage (of a primary battery)
U_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 – addition of "(of a primary battery)" and symbol U_n.]

3.1.8
open-circuit voltage
OCV
voltage across the terminals of a cell or battery when it is off discharge

3.1.9
primary (cell or battery)
cell or battery that is not designed to be electrically recharged

3.1.10
round (cell or battery)
cell or battery with circular cross section

3.1.11
service output (of a primary battery)
service life, or capacity, or energy output of a battery under specified conditions of discharge

3.1.12
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.

3.1.13
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".]

3.1.14
terminals (of a primary battery)
conductive parts of a battery that provide connection to an external circuit

3.2 Symbols and abbreviated terms

EV	end-point voltage
MAD	minimum average duration
OCV	open-circuit voltage (off-load voltage)
CCV	closed-circuit voltage (on-load voltage)
R	load resistance
U_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 d_6 and d_7 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:

$$d_6 > d$$

$$d_2 > d_7$$

$$h_3 > h_4$$

5 Dimensional stability

Refer to IEC 60086-1 for dimensional stability.

6 Validity of testing

Portable primary batteries shall be subjected to the tests, as required in the IEC 60086 series. Testing remains valid until a design change or requirement revision has been made. Retesting is required when:

a) a battery specification changes by more than 0,1 g or 20 % mass, whichever is greater, for the cathode, anode or electrolyte;

b) a battery specification changes that would lead to a failure of any of the tests;

c) there is an addition of new tests or requirements; or

d) there is a requirement change that would lead to a failure on any of the tests.

7 Constitution of the battery specification tables

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

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

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

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

– 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.

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

– 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, PR1154

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, CR1225, CR1616, CR1632, CR2012, CR1620, CR2016, CR2025, CR2320,

CR2032,CR2330, CR2412, CR2430, CR2477, CR2354, CR3032, CR2450

BR1225, BR2016, BR2320, BR2325, BR3032

e) Category 5: Other round batteries – Miscellaneous

2CR13252

4LR44

4SR44

8LR932

AR40

5AR40

6AR40

5PR175/172

6PR 225/155

f) Category 6: Non-round batteries – Miscellaneous

3R12P, 3R12S, 3LR12

4LR61

CR-P2

2CR5

AS4, AS6P, AS6S, AS8, AS10, AS12, PS8S, PS8P, PS10

4R25X, 4LR25X

4R25Y

4R25-2, 4LR25-2

6F22, 6LR61, 6LP3146

6AS4S, 6PS4S, 6PS4P

6AS6P, 6AS6S, 6PS6P, 6PS6S

– The specification drawings show the shape of the relevant batteries. Dimensions for each battery are shown in the tables of Clause 8 and in Figure 1 to Figure 31.

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

8 Physical and electrical specifications

8.1 Category 1 batteries

8.1.1 General

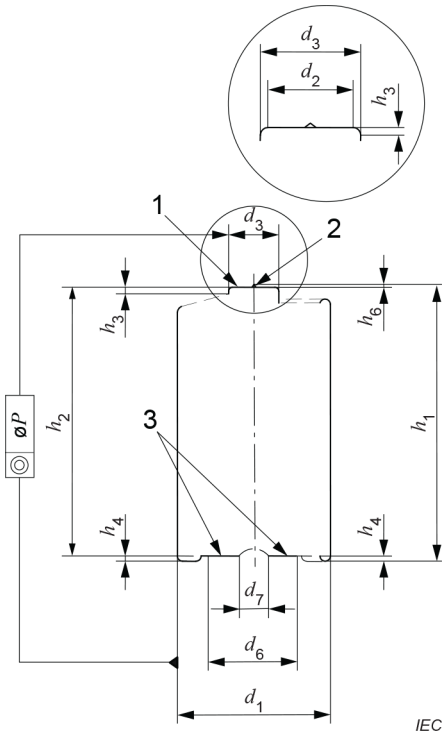


Figure 1a)

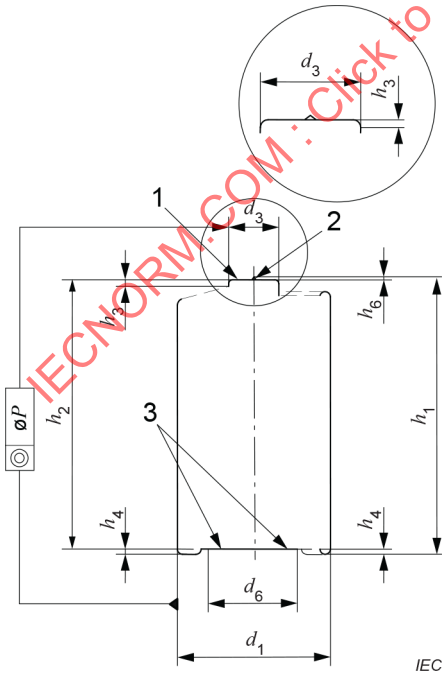


Figure 1b)

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 Figure 1a) and Figure 1b), flat negative contact is not necessarily recessed.

When the flat negative contact surface forms the lower part of the battery, dimensions "h_1" and "h_2" are both measured from the surface and dimension "h_4" 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 "h_6" for batteries having the pip is 0,4 mm max.)

3 Negative contact area

8.1.2 Category 1 – Specifications: LR1, R1, LR8D425

Dimensions in millimetres

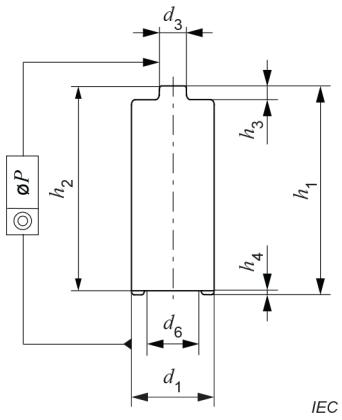


Figure 2 – Dimensional drawing: LR1, R1, LR8D425

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]
⌧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
U_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
Laser pointer	75 Ω	1 h	1,1	No test	No test	22 h
Service output test	75 Ω	1 h	0,9	38 h	18 h	27 h

[a] Standard conditions (see IEC 60086-1: 2021, Table 3, Initial discharge test)

8.1.3 Category 1 – Specifications: LR03, FR10G445, R03

Dimensions in millimetres

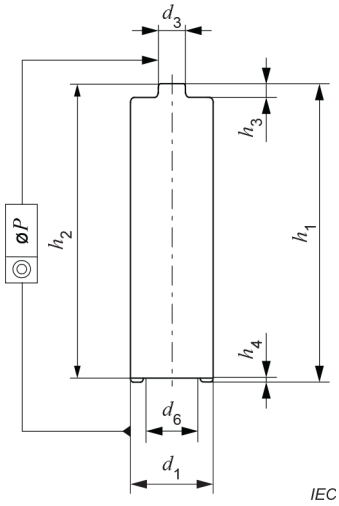


Figure 3 – Dimensional drawing: LR03, FR10G445, R03

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
⊠P	max.	0,25	0,4

Electrochemical system letter				L	F	No letter
IEC designation				LR03	FR10G445	R03
Common designation				AAA	AAA, FR03	AAA
U_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 Ttst	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 60086-1:2021, 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.

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

Dimensions in millimetres

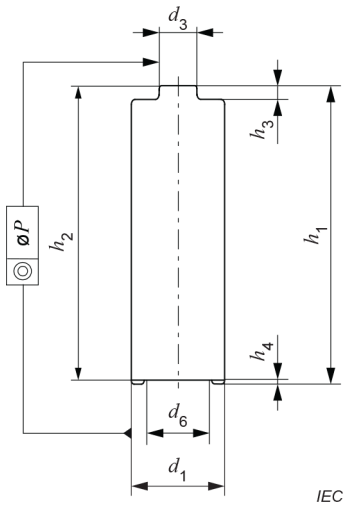


Figure 4 – Dimensional drawing: LR6, FR14505, R6P, R6S

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[a]
d_3	max.	5,5	5,5
d_6	min.	7,0	7,0
⊠P	max.	0,25	0,5

[a] R6 types without a metal jacket may have a d_1 value of 13,5.

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
U_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)**			
High drain application	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 60086-1:2021, 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.

8.1.5 Category 1 – Specifications: LR14, R14P, R14S

Dimensions in millimetres

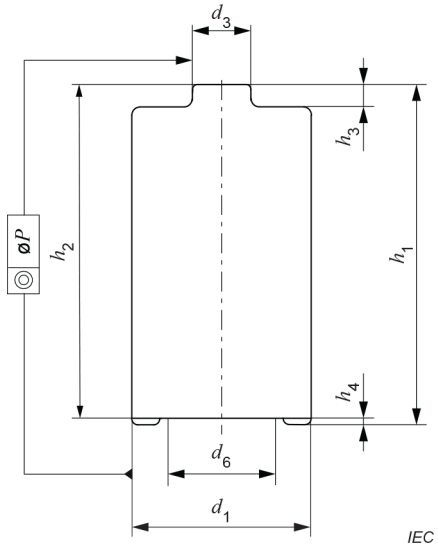


Figure 5 – Dimensional drawing: LR14, R14P, R14S

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
⌧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
U_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 60086-1:2021 , Table 3, Initial discharge test).

8.1.6 Category 1 – Specifications: LR20, R20P, R20S

Dimensions in millimetres

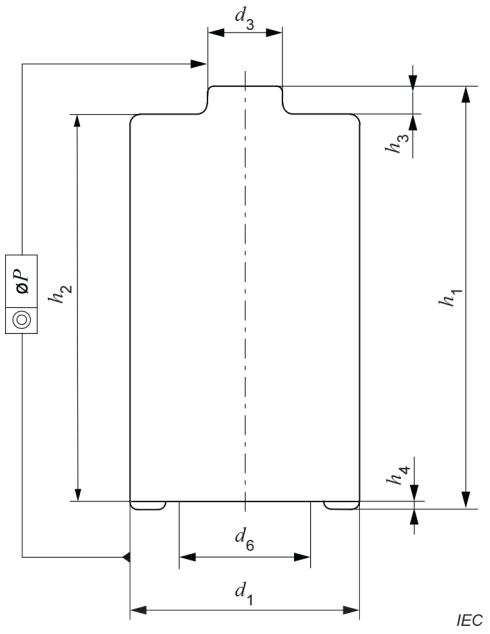


Figure 6 – Dimensional drawing: LR20, R20P, R20S

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
⊠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
U_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 60086-1:2021 , Table 3, Initial discharge test).

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

Dimensions in millimetres

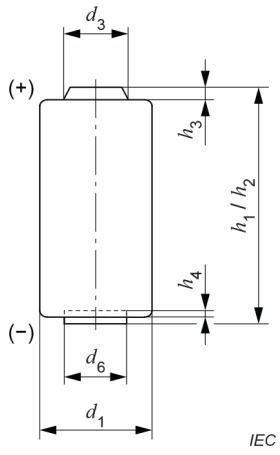


Figure 7 – Dimensional drawing: CR14250, CR15H270, CR17345, CR17450, BR17335

Dimensions		CR14250	CR15H270	CR17345	CR17450	BR17335
h_1 / h_2	max.	25,0	27,0 [a]	34,5	45,0	33,5
	min.	23,5	26,0 [a]	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
U_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[b] (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
High intensity lighting	750 mA	Repeated cycles of 4 min on, 11 min off for 1 h; then 3 h off	1,8	No test	No test	80 min	No test	No test
Service output test	0,1 kΩ	24 h	2,0	No test	22 h	40 h	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] The h_1/h_2 dimensions shall be measured on the label overlap.

[b] Standard conditions (see IEC 60086-1:2021, Table 3, Initial discharge test).

8.3 Category 3 batteries – Specifications: LR9, CR11108

Dimensions in millimetres

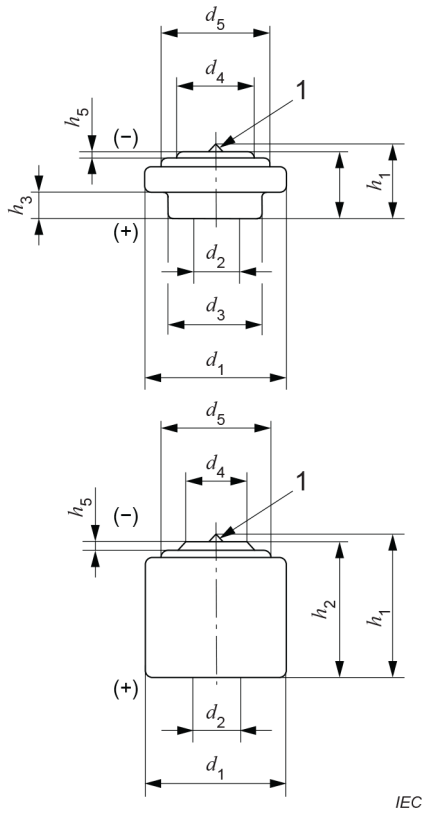


Figure 8 – Dimensional drawing: LR9, CR11108

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 60086-1:2021 is applicable.

1: Optional pip

Electrochemical system letter				L	C
IEC designation				LR9	CR11108
Common designation				-	1/3N
U_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 60086-1:2021, Table 3, Initial discharge test).

8.4 Category 4 batteries

8.4.1 General

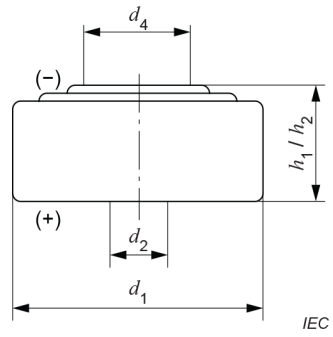


Figure 9 – Dimensional drawing: Category 4

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 60086-1:2021.

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 60086-1:2021 is applicable.

8.4.2 Category 4 – Specifications: PR70, PR41, PR48, PR44, PR1154

Dimensions in millimetres

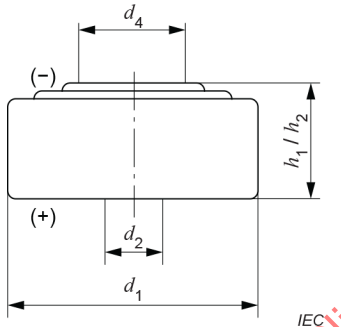


Figure 10 – Dimensional drawing: PR70, PR41, PR48, PR44, PR1154

Dimensions		PR70	PR41	PR48	PR44	PR1154
h_1 / h_2	max.	3,60	3,60	5,40	5,40	5,40
	min.	3,30	3,30	5,05	5,05	5,05
d_1	max.	5,80	7,90	7,90	11,60	11,60
	min.	5,65	7,70	7,70	11,30	11,30
d_2	min.	-	3,80	3,80	3,80	3,80
d_4	min.	-	3,00	3,00	3,80	3,80

Electrochemical system letter				P				
IEC designation				PR70[b,c]	PR41[b,c]	PR48[b,c]	PR44[b,c]	PR1154[b,c]
Common designation				10, PR536	312	13	675	675l, PR44l
U_n (V)				1,4 or 1,45	1,4 or 1,45	1,4 or 1,45	1,4 or 1,45	1,4 or 1,45
OCV max. (V)				1,59	1,59	1,59	1,59	1,59
Delayed discharge performance after 12 months (% of MAD)				95	95	95	95	95
Applications	**Load**	**Daily period**	**EV** (V)	**MAD[a]** (initial)				
Hearing aid standard	Pulse: 5 mA Background: 1,5 mA	d, e	1,1	35 h	No test	No test	No test	No test
Wireless streaming	Pulse: 3 mA (15 min) Background: 1,5 mA	d, f	1,1	28 h	No test	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	No test
Wireless streaming	Pulse: 5 mA (15 min) Background: 2 mA	d, f	1,1	No test	30 h	No test	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	No test
Wireless streaming	Pulse: 5 mA (15 min) Background: 3 mA	d, f	1,1	No test	No test	45 h	No test	No test
Hearing aid standard	Pulse: 15 mA Background: 5 mA	d, e	1,05	No test	No test	No test	70 h	No test
Hearing aid high drain	Pulse: 24 mA Background: 8 mA	d, e	1,05	No test	No test	No test	45 h	No test
Implant low drain	15 mW	24 h	1,0	No test	No test	No test	No test	25 h
Implant low drain with wireless	Pulse: 20 mW Background: 15 mW	d, f	1,05	No test	No test	No test	No test	20 h
Implant high drain	25 mW	24 h	1,0	No test	No test	No test	No test	10 h

[a] Standard conditions (see IEC 60086-1:2021, Table 3, Initial discharge test).

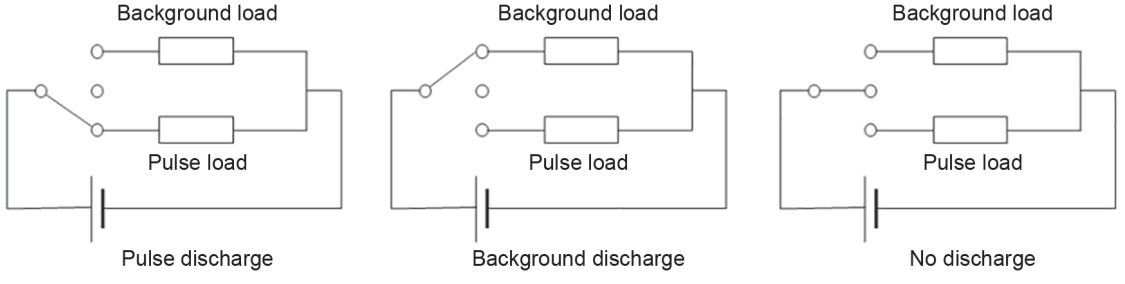
[b] A period of at least 10 min shall elapse between activation and commencement of electrical measurement.

[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.



8.4.3 Fit acceptance gauge for PR batteries

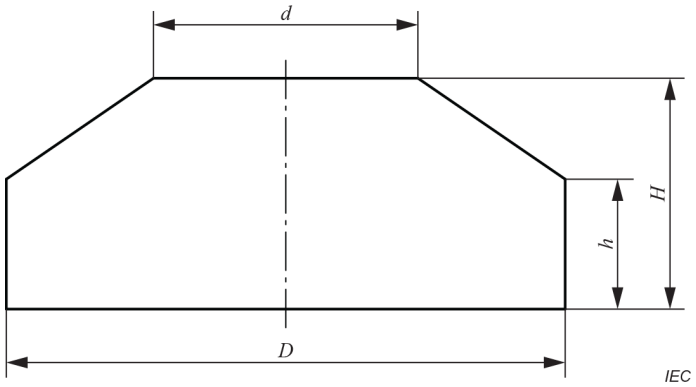
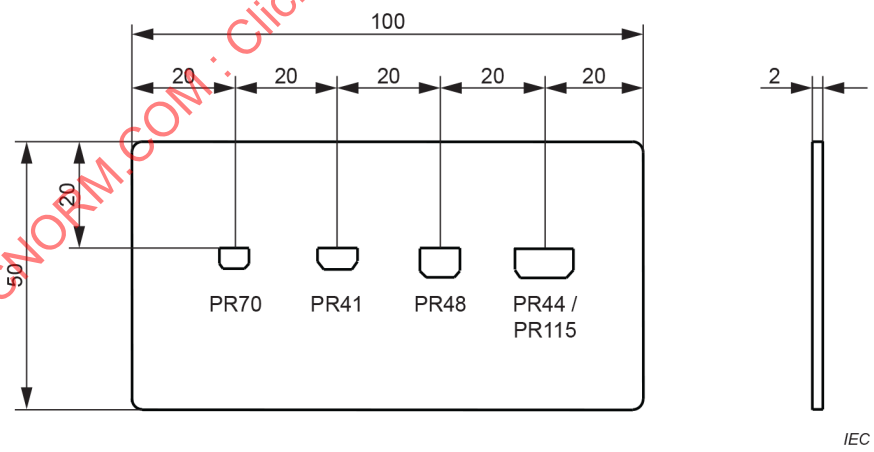


Figure 11 – Gauge opening for P system batteries

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
	PR1154	11,610	±0,005	9,010	±0,005	5,410	±0,005	4,110	±0,005

Dimensions in millimetres



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

Figure 12 – Suggested gauge layout

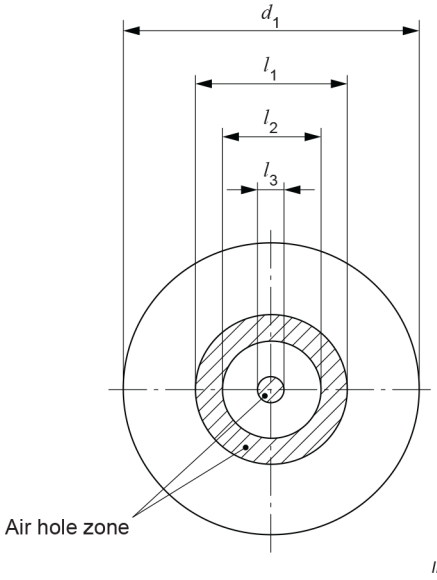


Figure 13 – Air hole placement diagram for P system batteries

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
	PR1154	11,60	11,30	5,80	3,80	1,00

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

Dimensions in millimetres

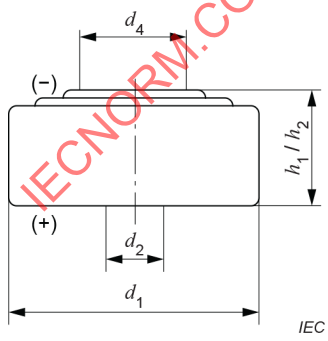


Figure 14 – Dimensional drawing: LR41, LR55, LR54, LR43, LR44

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
U_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	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 60086-1:2021 , Table 3, Initial discharge test).								

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

Dimensions in millimetres

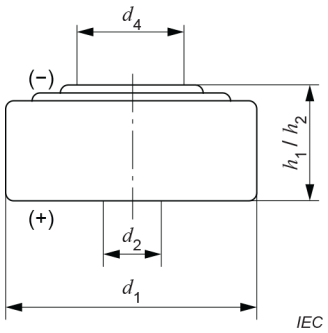


Figure 15 – Dimensional drawing: SR62, SR63, SR65, SR64, SR60, SR67, SR66, SR58, SR68, SR59, SR69, SR41, SR57, SR55, SR48, SR54, SR42, SR43, SR44

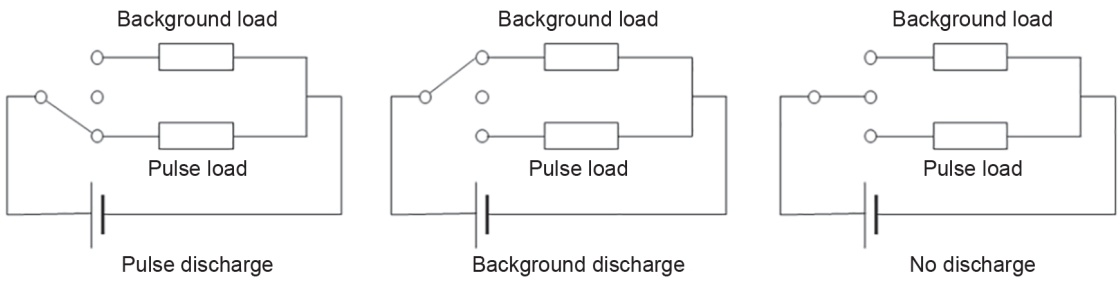
Designation	h_1/h_2		d_1		d_2	d_4
	max.	min.	max.	min.	min.	min.
SR62	1,65	1,45	5,8	5,55	3,8	2,5
SR63	2,15	1,9	5,8	5,55	3,8	2,5
SR65	1,65	1,45	6,8	6,6	–	3,0
SR64	2,7	2,4	5,8	5,55	3,8	2,5
SR60	2,15	1,9	6,8	6,5	3,8	3,0
SR67	1,65	1,45	7,9	7,65	–	3,0
SR66	2,6	2,4	6,8	6,6	–	3,0
SR58	2,1	1,85	7,9	7,55	3,8	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
U_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	Service output test	15 kΩ	24 h	1,2	580 h
	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	Service output test	6,8 kΩ	24 h	1,2	620 h
	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 60086-1:2021 , 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.



8.4.6 Category 4 – Specifications: CR1025, CR1216, CR1220, CR1225, CR1616, CR2012, CR1620, CR1632, CR2016, CR2025, CR2320, CR2032, CR2330, CR2430, CR2354, CR3032, CR2450, CR2477, BR1225, BR2016, BR2320, BR2325, BR3032

Dimensions in millimetres

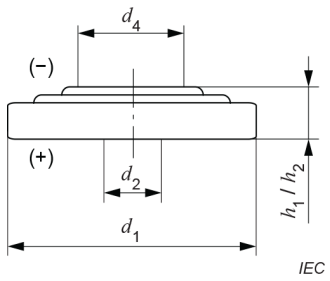


Figure 16 – Dimensional drawing: CR1025, CR1216, CR1220, CR1225, CR1616, CR2012, CR1620, CR2016, CR2412, CR1632, CR2025, CR2320, CR2032, CR2330, CR2430, CR2354, CR2477, CR3032, CR2450, BR1225, BR2016, BR2320, BR2325, BR3032

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
CR1225	2,5	2,2	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
CR2412	1,25	1,1	24,5	24,25	-	8,0
CR1632	3,2	2,9	16,0	15,7	-	5,0
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
CR2354	5,4	5,1	23,0	22,6	-	8,0
CR2430	3,0	2,7	24,5	24,2	-	8,0
CR2450	5,0	4,6	24,5	24,2	-	8,0
CR2477	7,7	7,3	24,5	24,2	-	8,0
CR3032	3,2	2,9	30,0	29,6	-	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
U_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	600 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
CR1225	Service output test	30 kΩ	24 h	2,0	395 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	30 kΩ	24 h	2,0	540 h	No test
CR2016	Service output test	30 kΩ	24 h	2,0	675 h	No test
CR2412	Service output test	15 kΩ	24 h	2,0	420 h	No test
CR1632	Service output test	15 kΩ	24 h	2,0	540 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
CR2477	Service output test	5,1 kΩ	24 h	2,0	1 250 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 60086-1:2021 , Table 3, Initial discharge test).

8.5 Category 5 batteries

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

Dimensions in millimetres

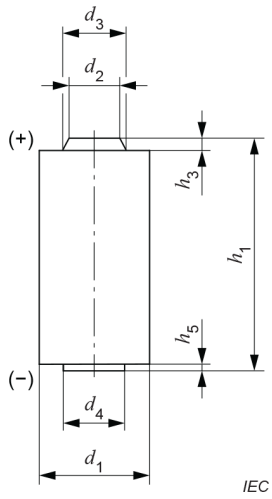


Figure 17 – Dimensional drawing: 2CR13252, 4LR44, 4SR44

Dimensions		2CR13252	4LR44	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.

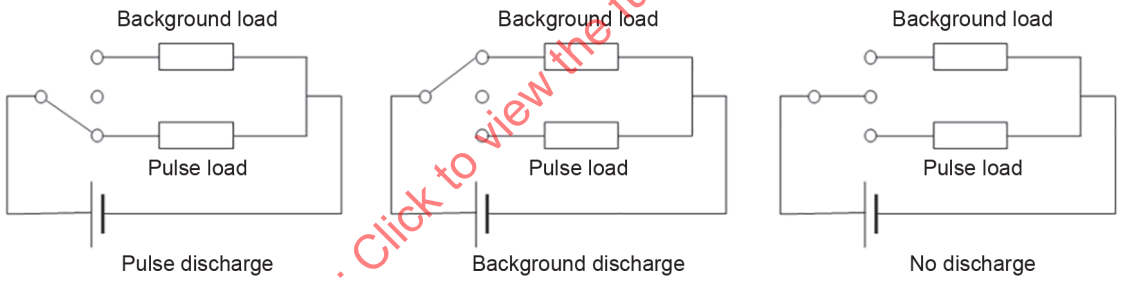
For general information see IEC 60086-1.

Electrochemical system letter				C	L	S
IEC designation				2CR13252	4LR44	4SR44
Common designation				2CR-1/3N, 28L	-	-
U_n (V)				6,0	6,0	6,2
OCV max. (V)				7,4	6,72	6,52
Delayed discharge performance after 12 months (% of MAD)				98	90	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	No test	310 h	570 h
Service output test	27 kΩ	24 h	3,6	No test	420 h	620 h
Pulse test	0,1 kΩ	2 s on, 1 s off for 24 h per day	3,6	No test	950 pulses	1 000 pulses
Service output test	30 kΩ	24 h	4,0	620 h	No test	No test

[a] Standard conditions (see IEC 60086-1:2021 , 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.



8.5.2 Category 5 – Specification: 8LR932

Dimensions in millimetres

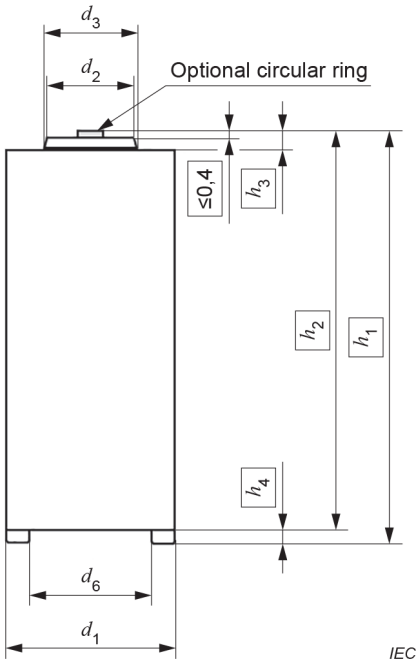


Figure 18 – Dimensional drawing: 8LR932

Dimensions		8LR932
h_1	max.	28,5
h_2	min.	27,5
h_3	min.	0,5
h_4	max.	0,4
d_1	max.	10,3
	min.	9,7
d_2	min.	3,5
d_3	max.	6,0
d_6	min.	4,7

The cylindrical surface is insulated from the contacts.

Terminals: Optional circular ring

For general information see IEC 60086-1.

NOTE When the negative electrode terminal protrudes from the case, h_2 and h_1 are the same dimension.

Electrochemical system letter				L
IEC designation				8LR932
Common designation				23A
U_n (V)				12,0
OCV max. (V)				13,45
Delayed discharge performance after 12 months (% of MAD)				90
Applications	**Load**	**Daily period**	**EV (V)**	**MAD[a] (initial)**
Service output test	20 kΩ	24 h	6,0	85 h
[a] Standard conditions (see IEC 60086-1:2021 , Table 3, Initial discharge test).				

8.5.3 Category 5 – Specifications: AR40, 5AR40, 6AR40, 5PR175/172, 6PR225/155

Dimensions in millimetres

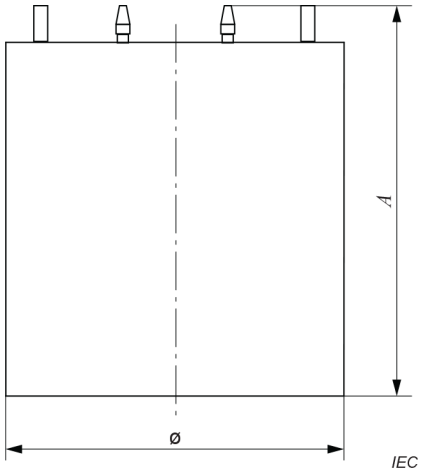


Figure 19 – Dimensional drawing: AR40, 5AR40, 6AR40, 5PR175/172, 6PR225/155

Dimensions		AR40	5AR40	6AR40	5PR175/172	6PR225/155
A	max.	163^{+3}	179	179	179	179
A	min	160^{-3}	178	178	178	178
Ø	max.	64^{+3}	175^{+5}	225	175^{+5}	225
Ø	Min	64^{-3}	174^{-3}	224	174^{-3}	224

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	A	A	P	P
IEC designation				AR40	5AR40[a]	6AR40	5PR175/172	6PR225/155
Common designation				--	--	--	--	--
U_n (V)				1,4	7,0	8,4	7,5	9,0
OCV max. (V)				1,416	7,75	8,47	7,5	9,0
Delayed discharge performance after 12 months (% of MAD)				80	80	80	80	80
Applications	**Load**	**Daily period**	**EV** (V)	**MAD[b]** (initial)				
Electrical fence equipment, parking meters, light houses, beacons, railway signaling and road signaling	51 Ω	24 h	0,8	1 920 h	No test	No test	No test	No test
	200 Ω	24 h	4,5	No test	No test	No test	1 920 h	2 700 h
	240 Ω	24 h	4,5	No test	3 100 h	No test	No test	No test
	240 Ω	24 h	5,6	No test	No test	3 200 h	No test	No test
	320 Ω	24 h	4,5	No test	No test	No test	3 300 h	4 300 h

[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 60086-1:2021, Table 3, Initial discharge test).

8.6 Category 6 batteries

8.6.1 Category 6 – Specification: 4LR61

Dimensions in millimetres

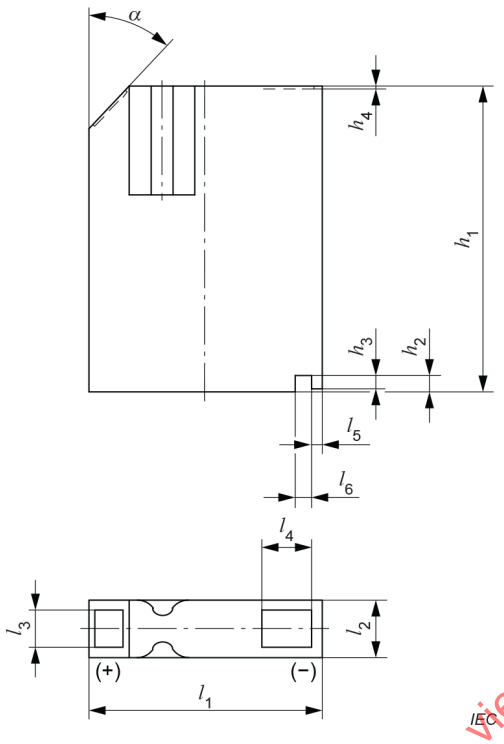


Figure 20 – Dimensional drawing: 4LR61

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
U_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 60086-1:2021, Table 3, Initial discharge test).

8.6.2 Category 6 – Specification: CR-P2

Dimensions in millimetres

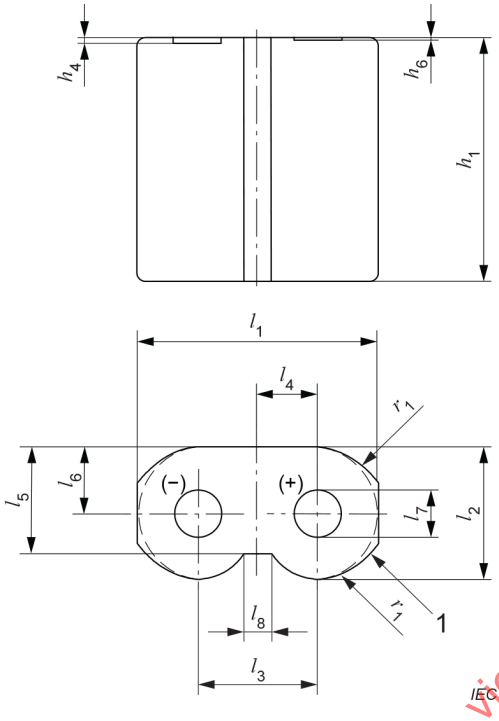


Figure 21 – Dimensional drawing: CR-P2

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
U_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 60086-1:2021, Table 3, Initial discharge test).

8.6.3 Category 6 – Specification: 2CR5

Dimensions in millimetres

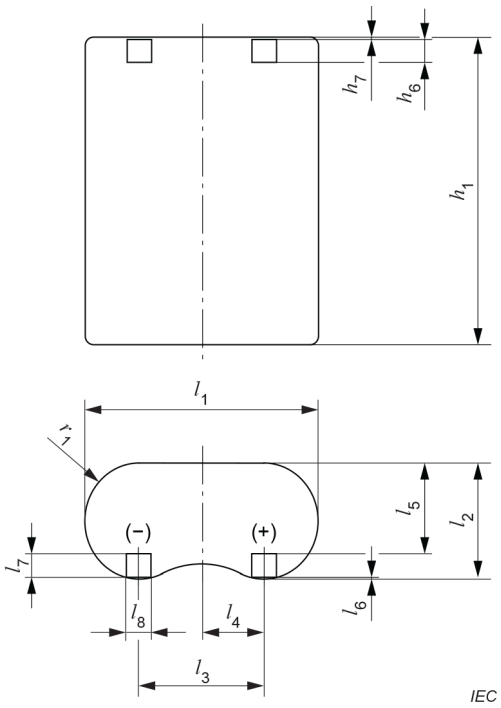


Figure 22 – Dimensional drawing: 2CR5

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
U_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 60086-1:2021, Table 3, Initial discharge test).				

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

Dimensions in millimetres

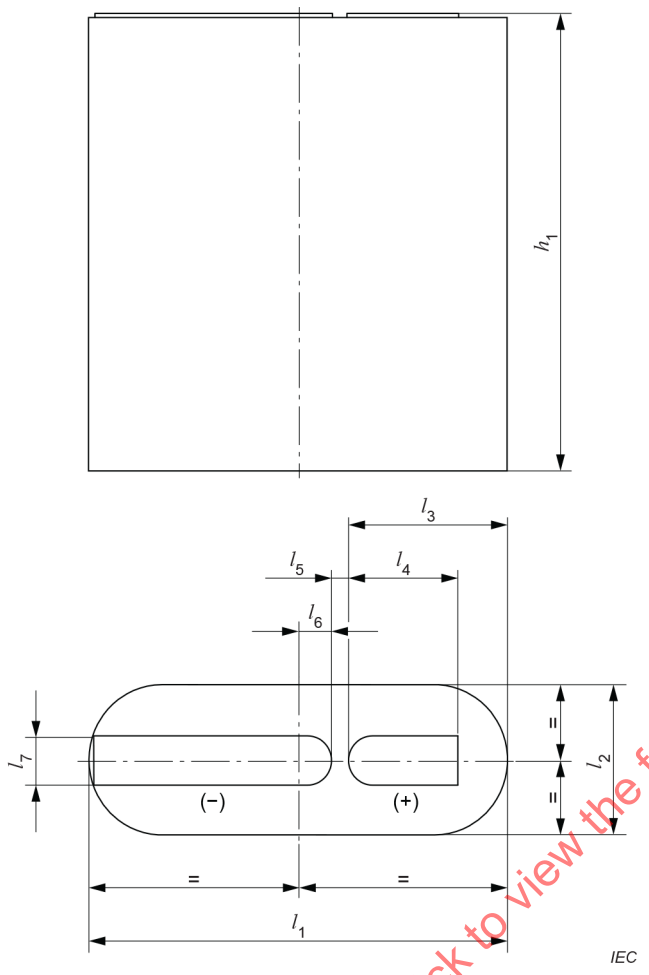


Figure 23 – Dimensional drawing: 3R12P, 3R12S, 3LR12

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				-	-	-
U_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 60086-1:2021, Table 3, Initial discharge test).

8.6.5 Category 6 – Specifications: AS4, AS6, AS8, AS10, AS12, PS8S, PS8P, PS10

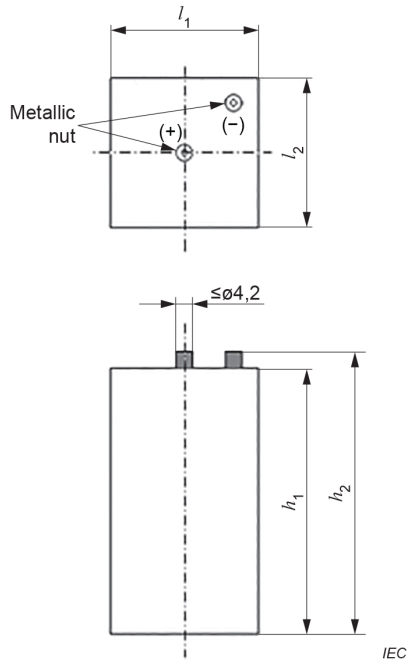


Figure 24 – Dimensional drawing: AS4, AS6, AS8, AS10, AS12, PS8S, PS8P, PS10

Dimensions		AS4	AS6P/S	AS8	AS10	AS12	PS8P/S	PS10
l_1	max.	55	65	86	106	170	86	106
	min.	54	64	85	105	169	85	105
l_2	max.	55	65	86	106	170	86	106
	min.	54	64	85	105	169	85	105
h_1	max.	112	160	180	185	205	180	185
	min.	111	159	179	184	204	179	184
h_2	max.	121	171	195	195	215	195	195
	min.	120	170	194	194	214	194	194

The terminals shall align with the connections in the battery compartment.

Diameter of nut (4,2 ± 0,02) mm

Electrochemical system letter				A						P		
IEC designation				AS4	AS6S	AS6P	AS8	AS10	AS12	PS8S	PS8P	PS10
Common designation				-		-	-	-	-	-	-	-
U_n (V)				1,4	1,4	1,4	1,4	1,4	1,4	1,5	1,5	1,5
OCV max. (V)				1,43	1,42	1,42	1,42	1,42	1,42	1,5	1,5	1,5
Nominal capacity				55 Ah	90 Ah	100 Ah	150 Ah	270 Ah	900 Ah	350 Ah	700 Ah	300 Ah
Applications	Load	Daily period	EV (V)	MAD[a] (initial)								
Railway signalling, road signalling, light houses, beacons.	40 Ω	24 h	0,85	1 900h	No test	No test	No test	No test	No test	No test	No test	No test
		14 h	1,80	No test	No test	No test	No test	No test	No test	No test	No test	No test
	24 Ω	14 h	0,9	No test	No test	No test	No test	No test	No test	No test	No test	5 400h
	20 Ω	24 h	1,85	No test	No test	No test	No test	No test	No test	No test	No test	No test
		14 h	0,9	No test	No test	No test	No test	No test	No test	5 700h	No test	No test
	15 Ω	24 h	0,85	No test	1 200h	1 500h	No test	No test	No test	No test	No test	No test
	12 Ω	24 h	0,9	No test	No test	No test	No test	No test	No test	No test	No test	2 800h
	10 Ω	24 h	0,85	No test	No test	No test	1 400h	No test	No test	2 600h	No test	No test
		14 h	0,9	No test	No test	No test	No test	No test	No test	No test	5 500h	No test
	5 Ω	24 h	0,85	No test	No test	No test	No test	1 300h	No test	No test	2 600h	No test
	2 Ω	24 h	0,85	No test	No test	No test	No test	No test	1 700h	No test	No test	No test

[a] Standard conditions (see IEC 60086-1:2021,Table 3,Initial discharge test).

8.6.6 Category 6 – Specification: 4R25Y

Dimensions in millimetres

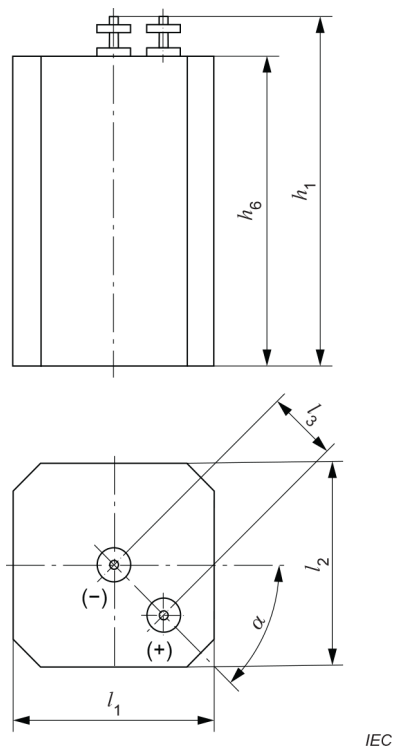


Figure 25 – Dimensional drawing: 4R25Y

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
U_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 60086-1:2021, Table 3, Initial discharge test).

8.6.7 Category 6 – Specifications: 4R25X, 4LR25X

Dimensions in millimetres

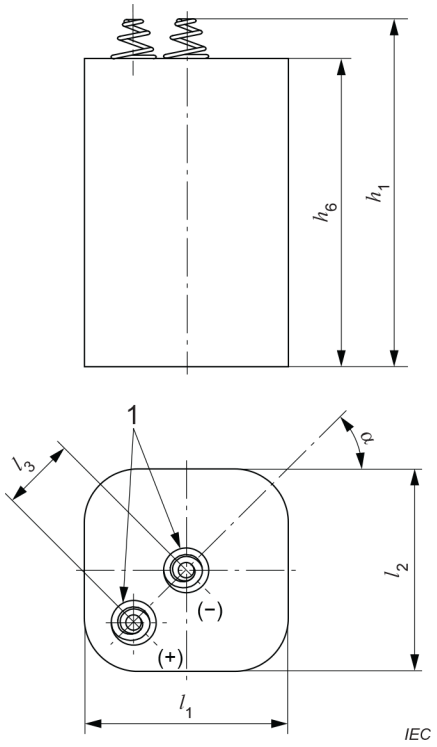


Figure 26 – Dimensional drawing: 4R25X, 4LR25X

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
U_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 60086-1:2021, Table 3, Initial discharge test).

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

Dimensions in millimetres

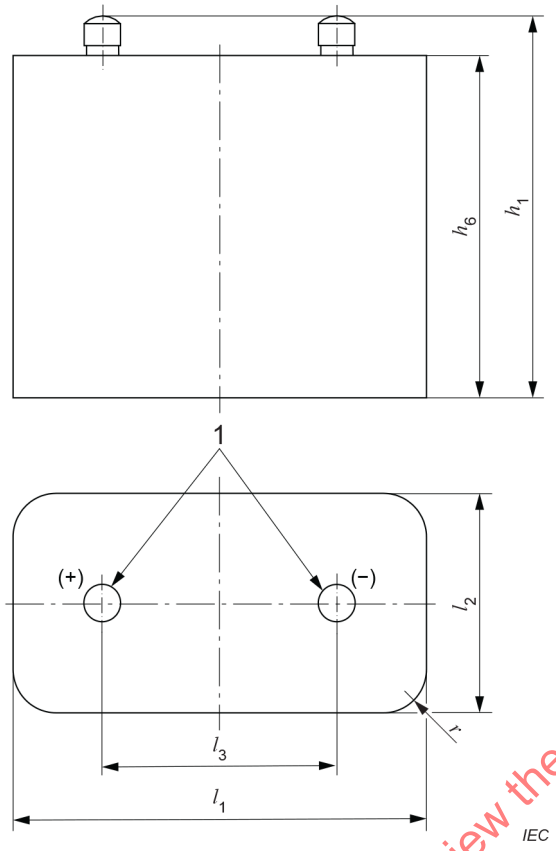


Figure 27 – Dimensional drawing: 4R25-2, 4LR25-2

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
U_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 60086-1:2021, Table 3, Initial discharge test).

8.6.9 Category 6 – Specifications: 6AS4S, 6PS4S, 6PS4P

Dimensions in millimetres

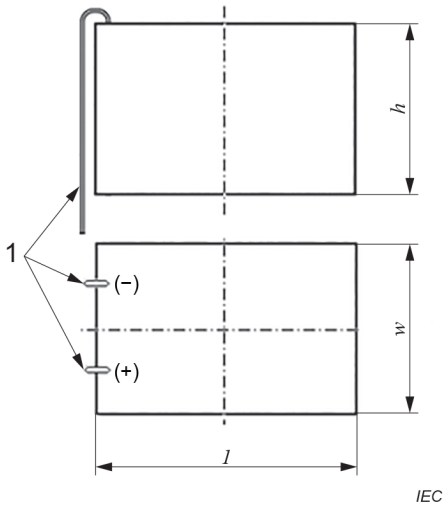


Figure 28 – Dimensional drawing: 6AS4S, 6PS4S, 6PS4P

Dimensions		6AS4S	6PS4S	6PS4P
Height	max	115	115	115
	min	112	112	112
Width	max	114	114	114
	min	111	111	111
Length	max	169	169	169
	min	165	165	165

Cable of connection, free length (200 ± 5) mm

Electrochemical system letter				A	P	
IEC designation				6AS4S	6PS4S	6PS4P
Common designation				-	-	-
U_n (V)				8,4	9	9
OCV max. (V)				8,51	9	9
Delayed discharge performance after 12 months (% of MAD)				80	80	80
Applications	**Load**	**Daily period**	**EV (V)**	**MAD[a]** (initial)		
Electrical fence equipment , parking meters, pight houses, peacons, railway signalling and road signalling	240 Ω	24h	5,4	1 570 h	3 700 h	5 000 h
	400 Ω	24 h	5,4	2 600 h	5 800 h	7 500 h

[a] Standard conditions (see IEC 60086-1:2021,Table 3, Initial discharge test).

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

Dimensions in millimetres

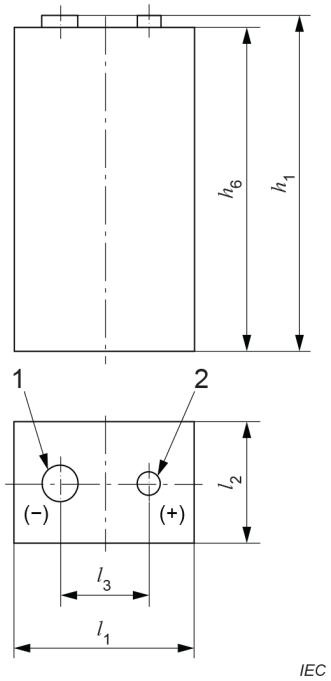


Figure 29 – Dimensional drawing: 6F22, 6LR61, 6LP3146

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

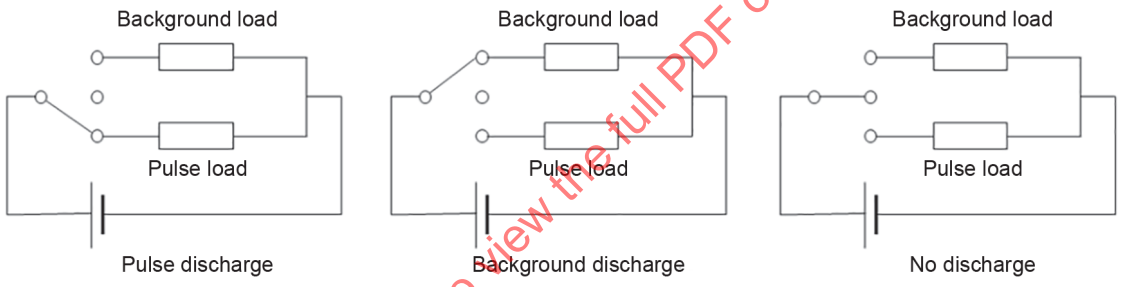
2: Stud

Electrochemical system letter				No letter	L	L
IEC designation				6F22	6LR61	6LP3146
Common designation				9V	9V	9V, 6LF22
U_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 60086-1:2021, 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.



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

Dimensions in millimetres

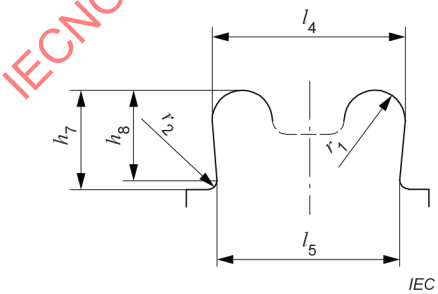


Figure 30 – Dimensional drawing: Stud

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)

8.6.12 Category 6 – Specifications: 6AS6P, 6AS6S, 6PS6P, 6PS6S

Dimensions in millimetres

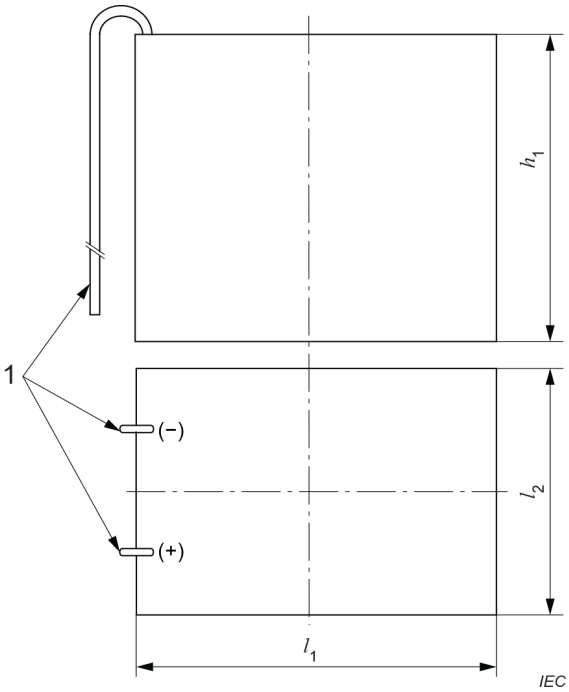


Figure 31 – Dimensional drawing: 6AS6P, 6AS6S, 6PS6P, 6PS6S

Dimensions		6AS6P/S	6PS6P/S
h_1	max.	162	162
l_1	max.	192	192
l_2	max.	128	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		P	
IEC designation				6AS6S (standard)	6AS6P[b] (high power)	6PS6S (standard)	6PS6P (high power)
U_n (V)				8,4	8,4	9,0	9,0
OCV max. (V)				8,52	8,52	9,30	9,30
Delayed discharge performance after 12 months (% of MAD)				80	80	80	80
Applications	**Load**	**Daily period**	**EV (V)**	**MAD[a] (initial)**			
Electric fence equipment, parking meters, light houses, beacons, railway and road signalling	240 Ω	24 h	5,4	2 500 h	3 700 h	3 700 h	5 000 h
	400 Ω	24 h		4 200 h	6 100 h	5 800 h	7 700 h

[a] Standard conditions (see IEC 60086-1:2021, 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 Table A.1 to Table 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 – Electrical fence equipment, parking meters, light houses, beacons, railway signaling and road signaling

Designation	Nominal voltage V
AR40	1,4
AS4	1,4
AS6	1,4
AS8	1,4
AS10	1,4
AS12	1,4
PS8S	1,5
PS8P	1,5
PS10	1,5
5AR40	7,0
5PR175/172	7,5
6AR40	8,4
6AS4	8,4
6AS4S	8,4
6AS6P	8,4
6AS6S	8,4
6PR225/155	9,0
6PS4S	9,0
6PS4P	9,0
6PS6S	9,0
6PS6P	9,0

Table A.7 – Electronic key

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

Table A.8 – Hearing aid

Designation	Nominal voltage V
SR48	1,55