

INTERNATIONAL STANDARD

IEC
60086-2

Edition 10.1

2001-10

Edition 10: 2000 consolidated with amendment 1:2001

Primary batteries –

Part 2: Physical and electrical specifications

Piles électriques –

*Partie 2:
Spécifications physiques et électriques*



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International Electrotechnical Commission 3, rue de Varembé Geneva, Switzerland
Telefax: +41 22 919 0300 e-mail: inmail@iec.ch IEC web site <http://www.iec.ch>



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CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Definitions	6
4 Symbols and abbreviations	7
5 Battery dimensions	8
6 Constitution of the battery specification tables.....	8
7 Battery specification tables and sheets.....	9
– Round batteries: Figure 1a and figure 1b.....	10
– Round batteries: CR14250, CR17345, CR17450, BR17335, BR17345	16
– Round batteries: Figure 2 and figure 3	18
– Round batteries: Figure 4	20
– Round batteries: R40, 4LR44, 2CR13252, 4SR44, 5AR40,	27
– Non-round batteries: S4, 3R12C, 3R12P, 3R12S, 3LR12, 4LR61, CR-P2, BR-P2, 2CR5, 2EP3863, 4R25X, 4LR25X, 4R25Y, 4R25-2, 4LR25-2, 6AS4, 6AS6, BR-P2, 6F22, 6LR61, 6F100,	30
Annex A (informative) Tabulation of batteries by application	43
Annex B (informative) Cross-reference index	47
Annex C (informative) Index.....	50

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRIMARY BATTERIES –

Part 2: Physical and electrical specifications

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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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- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

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

This consolidated version of IEC 60086-2 is based on the tenth edition (2000) [documents 35/1136/FDIS and 35/1147/RVD], and its amendment 1 (2001) [documents 35/1157/FDIS and 35/1163/RVD].

It bears the edition number 10.1.

A vertical line in the margin shows where the base publication has been modified by amendment 1.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

Annexes A, B and C are for information only.

IEC 60086 consists of the following parts under the general title: *Primary batteries*

- Part 1: General
- Part 2: Physical and electrical specifications
- Part 3: Watch batteries
- Part 4: Safety of lithium batteries
- Part 5: Safety of batteries with aqueous electrolyte

The committee has decided that the contents of the base publication and its amendment will remain unchanged until 2002. At this date, the publication will be

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

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

INTRODUCTION

The technical content of this part of IEC 60086 provides physical dimensions, discharge test conditions and discharge performance requirements. IEC 60086-2 complements the general information and requirements of IEC 60086-1 through provision of specification sheets for primary cells and batteries.

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 as been removed from IEC 60086-1, and is now available in IEC 60086-4 and IEC 60086-5.

PRIMARY BATTERIES –

Part 2: Physical and electrical specifications

1 Scope

This part of IEC 60086 is applicable to primary batteries based on standardized electrochemical systems.

It specifies – the physical dimensions
– the discharge test conditions and discharge performance requirements.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60086. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60086 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 600050(481):1996, *International Electrotechnical Vocabulary – Chapter 481: Primary cells and batteries*

IEC 60086-1:2000, *Primary batteries – Part 1: General*

ISO 1101:1983, *Technical drawings – Geometrical tolerancing – Tolerancing of form, orientation, location and run out – Generalities, definitions, symbols, indication on drawings*

3 Definitions

For the purpose of this International Standard, the definitions of IEC 60050(481), as well as the following definitions, apply.

3.1

application test

test which simulates the actual use of a battery in a specific application, for example, "portable lighting", "tape recorder" or "transistor radio" test

3.2

end-point voltage (EV)

specified closed circuit voltage at which a service output test is terminated

3.3

minimum average duration (MAD)

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

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

3.4**nominal voltage of a primary battery (V_n)**

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

3.5**on-load voltage****(closed-circuit voltage) (CCV)**

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

3.6**open-circuit voltage (OCV)****(off-load voltage)**

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

3.7**primary battery**

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

3.8**primary cell**

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

3.9**service output (of a primary battery)**

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

3.10**service output test**

test designed to measure the service output of a battery

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

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

3.11**storage life**

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

3.12**terminals (of a primary battery)**

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

4 Symbols and abbreviations

4.1 EV: end-point voltage

4.2 MAD: minimum average duration

4.3 OCV: open-circuit voltage (off-load voltage)

4.4 R: load resistance

4.5 V_n : nominal voltage of a battery

5 Battery dimensions

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

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

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

$$C > F$$

$$N > D$$

$$G > E$$

6 Constitution of the battery specification tables

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

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

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

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

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

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

6.7 Batteries are categorized into the following groups:

a) Category 1: Round batteries according to figures 1a and 1b

R1, R03, R6C, R6P, R6S, R14C, R14P, R14S, R20C, R20P, R20S, 2R10

LR8D425, LR1, LR03, LR6, LR14, LR20

CR 12A604

- b) Category 2: Round batteries
CR14250, CR17345, CR17450
BR17335, BR17345
- c) Category 3: Round batteries according to figure 2 and figure 3
LR9, LR53
CR 11108
- d) Category 4: Round batteries according to figure 4
PR70, PR41, PR48, PR43, PR44
LR41, LR55, LR54, LR43, LR44
SR62, SR63, SR65, SR64, SR60, SR67, SR66, SR58, SR68, SR59, SR69, SR41, SR57,
SR55, SR48, SR56, SR54, SR42, SR43, SR44
CR1025, CR1216, CR1220, CR1616, CR2012, CR1620, CR2016, CR2025, CR2320,
CR2032, CR2330, CR2430, CR2354, CR3032, CR2450
BR1225, BR2016, BR2020, BR2320, BR2325, BR3032
- e) Category 5: Other round batteries – Miscellaneous
R40
4LR44
2CR13252
4SR44
5AR40
- f) Category 6: Non-round batteries – Miscellaneous
S4
3R12C, 3R12P, 3R12S, 3LR12
4LR61
BR-P2, CR-P2
2CR5
2EP3863
4R25X, 4LR25X
4R25Y
4R25-2, 4LR25-2
6AS4
6AS6
6F22, 6LR61
6F100

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

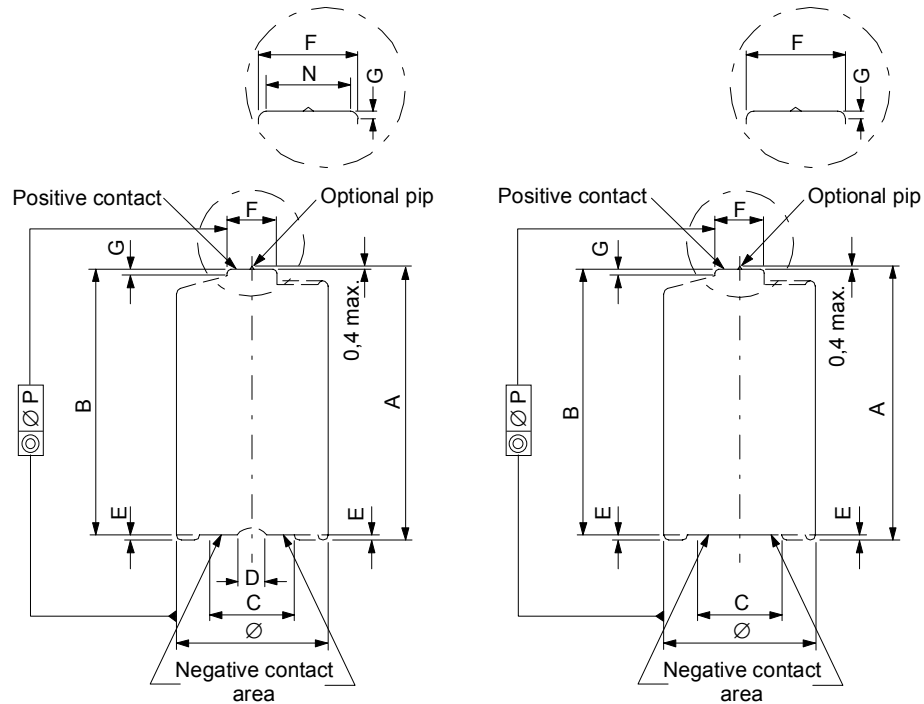
In each case the drawings show the shape of the relevant batteries. Dimensions for each battery are shown in the tables.

7 Battery specification tables and sheets

NOTE See annex C for ease of locating battery sizes.

PHYSICAL AND ELECTRICAL SPECIFICATIONS

CATEGORY 1 BATTERIES



The profile over the dotted line sections is not specified

The profile over the dotted line sections is not specified

Figure 1a

Figure 1b

IEC 2380/2000

IEC 2381/2000

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

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

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

Batteries complying with these physical and electrical specifications are:

Designation	OCV Max. V
R1, R03, R6C, R6P, R6S, R14C, R14P, R14S R20C, R20P, R20S	1,725
2R10	3,450
LR8D425, LR1, LR03, LR6, LR14, LR20	1,65
CR12A604	3,7

For the definition of the dimensions, see clause 5.

The cylindrical surface is insulated from the contacts.

Terminals: flat/cap and base.

for terminal details, see respectively 4.1.3.5 and 4.1.3.2 of IEC 60086-1.

For general information, see IEC 60086-1.

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

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

PHYSICAL AND ELECTRICAL SPECIFICATIONS												CATEGORY 1 BATTERIES				
Electro-chemical system	Designation	Vn V	Dimensions mm									Discharge conditions			MAD ^a (initial)	Applications
			A	B	C	E	F	G	∅		∅P	R Ω	Daily period	EV V		
			Max.	Min.	Min.	Max.	Max.	Min.	Max.	Min.	Max.					
(see note)	R1	1,5	30,2	29,1	5,0	0,2	4,0	0,5	12,0	10,9	0,5	300	12 h	0,9	76 h	Hearing aids
													5,1	5 min	0,9	57 min
	R03	1,5	44,5	43,3	4,3	0,5	3,8	0,8	10,5	9,5	0,4	5,1	b	0,9	45 min	Portable lighting
												10	1 h	0,9	1,4 h	Personal cassette player and tape recorder
												75	4 h	0,9	20 h	Radio
												24	15 s per min 8 h per day	1,0	4 h	Remote control
												3,6	c	0,9	120 pulses	Pulse test
	R6C (high capacity)	1,5	50,5	49,2	7,0	0,5	5,5	1,0	14,5	13,5	0,5	43	4 h	0,9	25 h	Radio
												3,9	1 h	0,8	47 min	Motor/toy
												10	1 h	0,9	3,5 h	Personal cassette player and tape recorder
												24	15 s per min 8 h per day	1,0	10,9 h	Remote control
												1,8	c	0,9	46 pulses	Pulse test
	R6P (high power)	1,5	50,5	49,2	7,0	0,5	5,5	1,0	14,5	13,5	0,5	43	4 h	0,9	27 h	Radio
												3,9	1 h	0,8	60 min	Motor/toy
												10	1 h	0,9	4,1 h	Personal cassette player and tape recorder
												24	15 s per min 8 h per day	1,0	11 h	Remote control
												1,8	c	0,9	75 pulses	Pulse test
	R6S (standard)	1,5	50,5	49,2	7,0	0,5	5,5	1,0	14,5	13,5	0,5	43	4 h	0,9	22 h	Radio

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

^a Standard conditions.
^b 4 min beginning at hourly intervals for 8 h per day.
^c 15 s on, 45 s off for 24 h per day.

PHYSICAL AND ELECTRICAL SPECIFICATIONS											CATEGORY 1 BATTERIES					
Electro-chemical system	Designation	Vn V	Dimensions mm									Discharge conditions			MAD ^a (initial)	Applications
			A	B	C	E	F	G	∅		∅P	R Ω	Daily period	EV V		
			Max.	Min.	Min.	Max.	Max.	Min.	Max.	Min.	Max.					
(see note)	R14C (high capacity)	1,5	50,0	48,6	13,0	0,9	7,5	1,5	26,2	24,9	1,0	3,9	b	0,9	250 min	Portable lighting
												6,8	1 h	0,9	7 h	Tape recorders
												20	4 h	0,9	25 h	Radio
												3,9	1 h	0,8	2,5 h	Toy
	R14P (high power)	1,5	50,0	48,6	13,0	0,9	7,5	1,5	26,2	24,9	1,0	3,9	b	0,9	300 min	Portable lighting
												6,8	1 h	0,9	9 h	Tape recorders
												20	4 h	0,9	30 h	Radio
												3,9	1 h	0,8	4,8 h	Toy
	R14S (standard)	1,5	50,0	48,6	13,0	0,9	7,5	1,5	26,2	24,9	1,0	3,9	b	0,9	120 min	Portable lighting
												6,8	1 h	0,9	3,0 h	Tape recorders
												20	4 h	0,9	15 h	Radio
												3,9	1 h	0,8	1,5 h	Toy
	R20C (high capacity)	1,5	61,5	59,5	18,0	1,0	9,5	1,5	34,2	32,3	1,0	2,2	b	0,9	300 min	Portable lighting (1)
												3,9	1 h	0,9	9 h	Tape recorders
												10	4 h	0,9	30 h	Radio
												2,2	1 h	0,8	4 h	Toy
												1,5	4 min per 15 min 8 h per day	0,9	130 min	Portable lighting (2)

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

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

PHYSICAL AND ELECTRICAL SPECIFICATIONS											CATEGORY 1 BATTERIES					
Electro-chemical system	Designation	Vn V	Dimensions mm									Discharge conditions			MAD ^a (initial)	Applications
			A	B	C	E	F	G	∅		∅P	R	Daily period	EV		
			Max.	Min.	Min.	Max.	Max.	Min.	Max.	Min.	Max.	Ω		V		
(see note 1)	R20P (high power)	1,5	61,5	59,5	18,0	1,0	9,5	1,5	34,2	32,3	1,0	2,2	^b	0,9	320 min	Portable lighting
												3,9	1 h	0,9	13 h	Tape recorders
												10	4 h	0,9	35 h	Radio
												2,2	1 h	0,8	6 h	Toy
												1,5	4 min per 15 min 8 h per day	0,9	137 min	Portable lighting (2)
	R20S (standard)	1,5	61,5	59,5	18,0	1,0	9,5	1,5	34,2	32,3	1,0	2,2	^b	0,9	100 min	Portable lighting
												3,9	1 h	0,9	4 h	Tape recorders
												10	4 h	0,9	18 h	Radio
												2,2	1 h	0,8	2 h	Toy
												1,5	4 min per 15 min 8 h per day	0,9	32 min	Portable lighting (2)
2R10	3,0	74,6	71,5	9,0	0,8	6,8	1,0	21,8	20,0		6,8	5 min	1,8	85 min	Portable lighting	
NOTE 1 Delayed discharge performance after 12 months is 80 % of MAD.																
(see note 2)	LR8D425	1,5	42,5	41,5	2,3 ^c	0,1	3,8	0,7	8,3	7,7	0,1	5,1	5 min	0,9	90 min	Lighting
												75	1 h	1,1	22 h	Laser pointer
												75	1 h	0,9	27 h	Service output test
	LR1	1,5	30,2	29,1	5,0	0,2	4,0	0,5	12,0	10,9	0,5	300	12 h	0,9	130 h	Hearing aids
												5,1	5 min	0,9	94 min	Portable lighting
												3 000	^d	0,9	888 h	Paging test
NOTE 2 Delayed discharge performance after 12 months is 90 % of MAD.																
^a Standard conditions.																
^b 4 min beginning at hourly intervals for 8 h per day.																
^c This battery does not fulfil the requirement C > F due to constructional constraints.																
^d 24 h per day, plus 10 Ω for 5 s at hourly intervals for 24 h per day.																

PHYSICAL AND ELECTRICAL SPECIFICATIONS											CATEGORY 1 BATTERIES					
Electro-chemical system	Designation	Vn V	Dimensions mm									Discharge conditions			MAD ^a (initial)	Applications
			A	B	C	E	F	G	Ø		ØP	R Ω	Daily period	EV V		
			Max.	Min.	Min.	Max.	Max.	Min.	Max.	Min.	Max.					
L (see note)	LR03	1,5	44,5	43,3	4,3	0,5	3,8	0,8	10,5	9,5	0,4	5,1	b	0,9	130 min	Portable lighting
												24	15 s per min 8 h per day	1,0	14,5 h	Remote control
												10	1 h	0,9	5 h	Personal cassette player and tape recorder
												75	4 h	0,9	44 h	Radio
												(current drain) 600 mA	c	0,9	140 pulses	Photo flash
	LR6	1,5	50,5	49,2	7,0	0,5	5,5	1,0	14,5	13,5	0,5	43	4 h	0,9	60 h	Radio
												3,9	1 h	0,8	4 h	Motor/toy
												10	1 h	0,9	11,5 h	Personal cassette player and tape recorder
												(current drain) 1 000 mA	c	0,9	200 pulses	Photo flash
												24	15 s per min 8 h per day	1,0	31 h	Remote control
	LR14	1,5	50,0	48,6	13,0	0,9	7,5	1,5	26,2	24,9	1,0	3,9	b	0,9	770 min	Portable lighting
												6,8	1 h	0,9	23 h	Tape recorders
												20	4 h	0,9	77 h	Radio
												3,9	1 h	0,8	12 h	Toy
	LR20	1,5	61,5	59,5	18,0	1,0	9,5	1,5	34,2	32,3	1,0	2,2	b	0,9	810 min	Portable lighting (1)
												3,9	1 h	0,9	25 h	Tape recorders
10												4 h	0,9	81 h	Radio	
2,2												1 h	0,8	15 h	Toy	
1,5												4 min per 15 min 8 h per day	0,9	450 min	Portable lighting (2)	

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

^a Standard conditions.

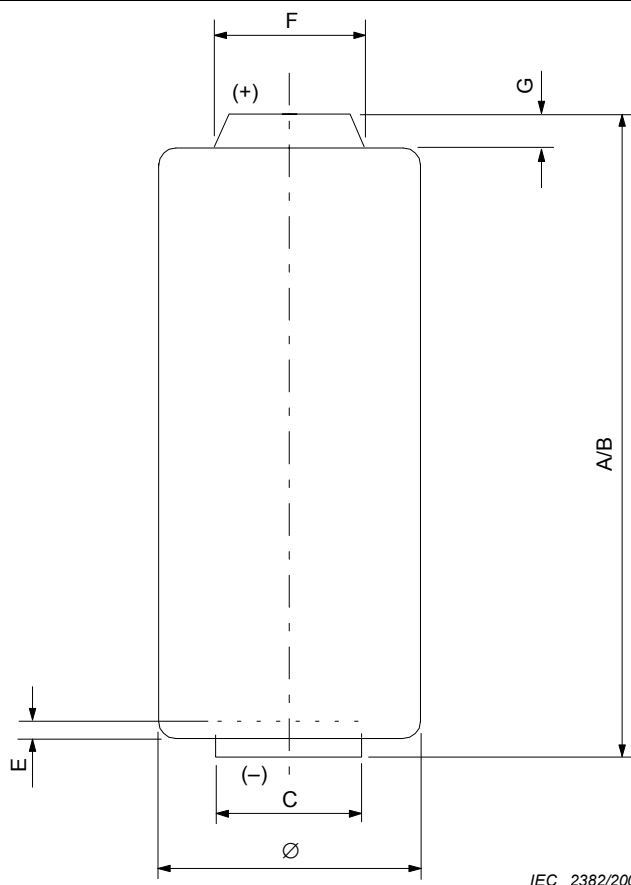
^b 4 min beginning at hourly intervals for 8 h per day.

^c 10 s on, 50 s off for 1 h per day.

PHYSICAL AND ELECTRICAL SPECIFICATIONS											CATEGORY 1 BATTERIES					
Electro-chemical system	Designation	Vn V	Dimensions mm								Discharge conditions			MAD ^a (initial)	Applications	
			A	B	C	E	F	G	∅		R Ω	Daily period	EV V			
			Max.	Min.	Min.	Max.	Max.	Min.	Max.	Min.						Max.
C (see note)	CR12A604 ^b	3	60,4	58,0	4,8	–	4,5	0,3	12,0	10,7		2 000	24 h	2,0	840 h	Service output test
NOTE Delayed discharge performance after 12 months is 98 % of MAD.																
^a Standard conditions																
^b Marking: subclause 4.1.6.2 of IEC 60086-1 is applicable.																

PHYSICAL AND ELECTRICAL SPECIFICATIONS

CATEGORY 2 BATTERIES



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

Designation	OCV Max. V
CR14250, CR17345, CR17450	3,7
BR17335, BR17345	3,7

For the definition of the dimensions, see clause 5.

The cylindrical surface is insulated from the contacts.

Terminals: flat/cap and base.

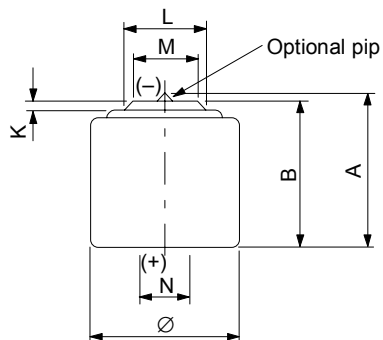
for terminal details, see respectively 4.1.3.5 and 4.1.3.2 of IEC 60086-1.

For general information, see IEC 60086-1.

PHYSICAL AND ELECTRICAL SPECIFICATIONS												CATEGORY 2 BATTERIES				
Electro-chemical system	Designation	Vn V	Dimensions mm									Discharge conditions			MAD ^a (initial)	Applications
			A/B		C	E		F	G	Ø		R	Daily period	EV		
			Max.	Min.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	kΩ	V	V		
C (see note1)	CR14250	3	25,0	23,5	5,0			8,0	0,4	14,5	13,5	3	24 h	2,0	750 h	Service output test
	CR17345	3	34,5	33,5	11,0	0,9	0,5	9,6	1,0	17,0	16,0	0,1	24 h	2,0	40 h	Service output test
												(Current drain) 900 mA	3 s on 27 s off 24h/d	1,55	1 400 pulses	Photo
	CR17450	3	45,0	43,5	5,0			8,0	0,4	17,0	16,0	1	24 h	2,0	710 h	Service output test
NOTE 1 Delayed discharge performance after 12 months is 98 % of MAD.																
B (see note 2)	BR17335	3	33,5	32,0	5,0			8,0	0,1	17,0	16,0					
	BR17345	3	34,5	33,5	11,0	0,9	0,5	9,6	1,0	17,0	16,0	0,1	24 h	2,0	40 h	Service output test
												(Current drain) 900 mA	3 s on 27 s off 24h/d	1,55	1 200 pulses	Photo
NOTE 2 Delayed discharge performance after 12 months is 98 % of MAD.																
^a Standard conditions.																

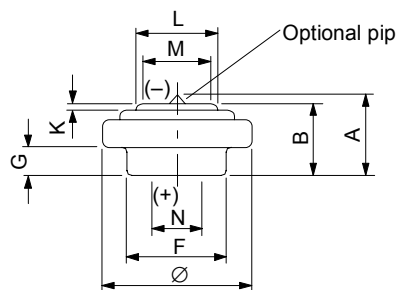
PHYSICAL AND ELECTRICAL SPECIFICATIONS

CATEGORY 3 BATTERIES



IEC 2383/2000

Figure 2



IEC 2384/2000

Figure 3

No part of the battery shall project beyond the positive contact area.
 Marking: 4.1.6.2 of IEC 60086-1 is applicable.

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

Designation	OCV Max. V
LR9, LR53	1,65
CR11108	3,7

For the definition of the dimensions, see clause 5.

The cylindrical surface is connected to the positive terminal.

Terminals: flat/cap and case.

for terminal details, see respectively 4.1.3.5 and 4.1.3.3 of IEC 60086-1.

For general information, see IEC 60086-1.

PHYSICAL AND ELECTRICAL SPECIFICATIONS												CATEGORY 3 BATTERIES					
Electro-chemical system	Designation	Vn V	Dimensions mm										Discharge conditions			MAD ^a (initial)	Applications
			A	B	F	G	K	L	M	N	∅		R Ω	Daily period	EV V		
			Max.	Min.	Max.	Min.	Min.	Max.	Min.	Min.	Max.	Min.					
L (see note 1)	LR9	1,5	6,2	5,6	13,5	2,0	0,2	12,5	10,0	10,0	16,0	15,2	390	24 h	0,9	48 h	Service output test
	LR53	1,5	6,1	5,4	20,9	2,1	0,2	21,0	15,3	18,7	23,2	22,6	470	24 h	0,9	50 h	Service output test
NOTE 1 Delayed discharge performance after 12 months is 90 % of MAD.																	
C (see note 2)	CR11108	3	10,8	10,4	–	–	0,2	9,0	3,0	9,0	11,6	11,4	15000	24 h	2,0	620 h	Service output test
NOTE 2 Delayed discharge performance after 12 months is 98 % of MAD.																	
^a Standard conditions.																	

PHYSICAL AND ELECTRICAL SPECIFICATIONS

CATEGORY 4 BATTERIES

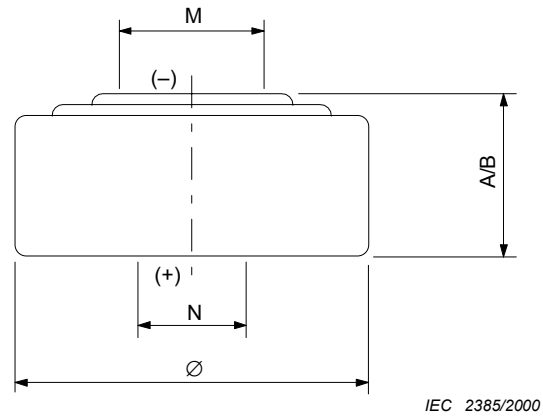


Figure 4

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

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

Marking: 4.1.6.2 of IEC 60086-1 is applicable.

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

Designation	OCV Max. V
PR70, PR41, PR48, PR43, PR44	1,68
LR41, LR55, LR54, LR43, LR44	1,65
SR62, SR63, SR65, SR64, SR60, SR67, SR66, SR58, SR68, SR59, SR69, SR41, SR57, SR55, SR48, SR56, SR54, SR42, SR43, SR44	1,63
CR1025, CR1216, CR1220, CR1616, CR2012, CR1620, CR2016, CR2025, CR2320, CR2032, CR2330, CR2430, CR2354, CR3032, CR2450	3,7
BR1225, BR2016, BR2020, BR2320, BR2325, BR3032	3,7

For the definition of the dimensions, see clause 5.

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

Terminals: flat/cap and case.

for terminal details, see respectively 4.1.3.5 and 4.1.3.3 of IEC 60086-1.

The flat negative contact shall project.

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

For general information see IEC 60086-1.

PHYSICAL AND ELECTRICAL SPECIFICATIONS									CATEGORY 4 BATTERIES				
Electro-chemical system	Designation	Vn V	Dimensions mm						Discharge conditions			MAD ^a (initial)	Applications
			A/B		M	N	∅		R	Daily period	EV		
			Max.	Min.	Min.	Min.	Max.	Min.	kΩ		V		
P (see note)	PR70 ^b _c	1,4	3,6	3,3	–	–	5,8	5,55	3	12 h	0,9	90 h	Hearing aids
									3	^d	1,0	45 h	High power service output test
	PR41 ^b _c	1,4	3,6	3,3	3	3,8	7,9	7,55	1,5	12 h	0,9		Hearing aids
									1,5	^e	1,0	25 h	High power service output test
	PR48 ^b _c	1,4	5,4	5,0	3	3,8	7,9	7,55	1,5	12 h	0,9	195 h	Hearing aids
									1,5	^f	1,0	30 h	High power service output test
	PR43 ^b _c	1,4	4,2	3,8	3,8	3,8	11,6	11,25	1	12 h	0,9		Service output test
	PR44 ^b _c	1,4	5,4	5,0	3,8	3,8	11,6	11,25	0,620	12 h	0,9	195 h	Hearing aids
									0,620	^g	1,0	38 h	High power service output test

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

^a Standard conditions.
^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 24 h per day, plus 510 Ω for 1 s on/3 s off for 12 h per day.
^e 24 h per day, plus 160 Ω for 1 s on/3 s off for 12 h per day.
^f 24 h per day, plus 110 Ω for 1 s on/3 s off for 12 h per day.
^g 24 h per day, plus 43 Ω for 1 s on/3 s off for 12 h per day.

PHYSICAL AND ELECTRICAL SPECIFICATIONS

CATEGORY 4 BATTERIES

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

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

^a Standard conditions.

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

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

^a Standard conditions.

PHYSICAL AND ELECTRICAL SPECIFICATIONS									CATEGORY 4 BATTERIES				
Electro-chemical system	Designation	Vn V	Dimensions mm						Discharge conditions			MAD ^a (initial)	Applications
			A/B		M	N	∅		R kΩ	Daily period	EV V		
			Max.	Min.	Min.	Min.	Max.	Min.					
S (see note)	SR56	1,55	2,6	2,3	3,8	3,8	11,6	11,25	15	24 h	1,2	490 h	Service output test
	SR54	1,55	3,05	2,75	3,8	3,8	11,6	11,25	15	24 h	1,2	580 h	Service output test
	SR42	1,55	3,6	3,3	3,8	3,8	11,6	11,25	15	24 h	1,2	670 h	Service output test
	SR43	1,55	4,2	3,8	3,8	3,8	11,6	11,25	10	24 h	1,2	620 h	Service output test
	SR44	1,55	5,4	5,0	3,8	3,8	11,6	11,25	6,8	24 h	1,2	620 h	Service output test
									5,6	^b	0,9	450 h	^c

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

^a Standard conditions.
^b 24 h per day, plus 39 Ω for 1 s every 6 s, for 5 min per day.
^c Accelerated application test for automatic cameras.

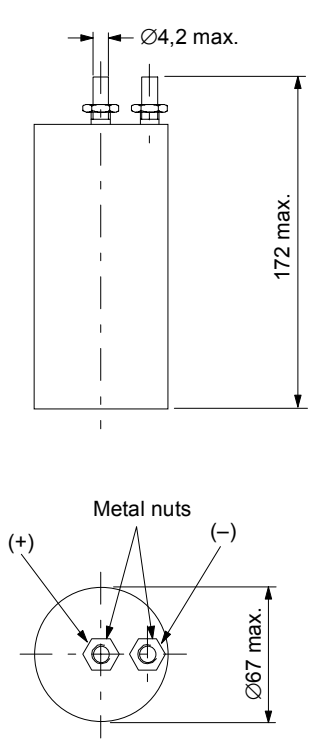
PHYSICAL AND ELECTRICAL SPECIFICATIONS									CATEGORY 4 BATTERIES				
Electro-chemical system	Designation	Vn V	Dimensions mm						Discharge conditions			MAD ^a (initial)	Applications
			A/B		M	N	∅		R kΩ	Daily period	EV V		
			Max.	Min.	Min.	Min.	Max.	Min.					
C (see note)	CR1025	3	2,5	2,2	3,0	–	10,0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

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

^a Standard conditions.

PHYSICAL AND ELECTRICAL SPECIFICATIONS									CATEGORY 4 BATTERIES				
Electro-chemical system	Designation	Vn V	Dimensions mm						Discharge conditions			MAD ^a (initial)	Applications
			A/B		M	N	∅		R kΩ	Daily period	EV V		
			Max.	Min.	Min.	Min.	Max.	Min.					
B (see note)	BR1225	3	2,5	2,2	4,0	–	12,5	12,2	30	24 h	2,0	395 h	Service output test
	BR2016	3	1,6	1,4	8,0	–	20,0	19,7	30	24 h	2,0	636 h	Service output test
	BR2020	3	2,0	1,8	8,0	–	20,0	19,7	15	24 h	2,0	490 h	Service output test
	BR2320	3	2,0	1,8	8,0	–	23,0	22,6	15	24 h	2,0	468 h	Service output test
	BR2325	3	2,5	2,2	8,0	–	23,0	22,6	15	24 h	2,0	696 h	Service output test
	BR3032	3	3,2	2,9	8,0	–	30,0	29,6	7,5	24 h	2,0	1 310 h	Service output test
NOTE Delayed discharge performance after 12 months is 98 % of MAD.													
^a Standard conditions.													

PHYSICAL AND ELECTRICAL SPECIFICATIONS	CATEGORY 5 BATTERIES
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 <p style="text-align: center;"><i>IEC 2386/2000</i></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Designation</td> <td style="text-align: center;">OCV Max.</td> </tr> <tr> <td style="text-align: center;">R40</td> <td style="text-align: center;">V</td> </tr> <tr> <td></td> <td style="text-align: center;">1,725</td> </tr> </table> <p>Terminals: Screw terminals which comply with 4.1.3.4 of IEC 60086-1.</p> <p>For general information see IEC 60086-1.</p> <p>Dimensions in millimetres.</p>	Designation	OCV Max.	R40	V		1,725
Designation	OCV Max.						
R40	V						
	1,725						

Electro-chemical system	Designation	Vn V	Discharge conditions			MAD ^a (initial)	Applications
			R Ω	Daily period	EV V		
See note	R40	1,5	6,8	^b	0,93	200 days	Industrial equipment ^c
			2,7	^d	0,85	60 h	Industrial equipment ^c
			10	24 h	0,85	280 h	Industrial equipment
			51	24 h	0,9	80 days	Electric fence controllers

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

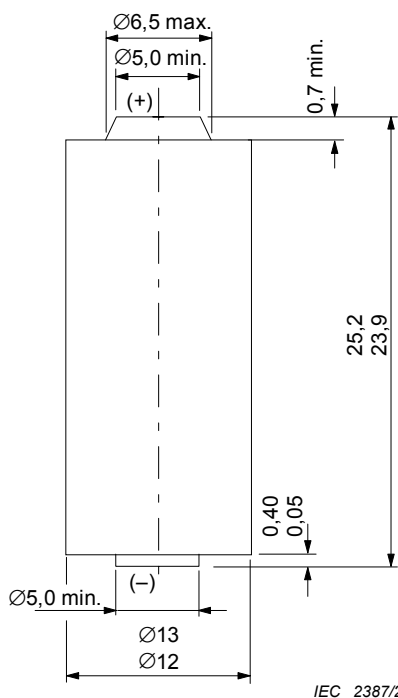
^a Standard conditions.

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

^c The battery must comply with both tests.

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

PHYSICAL AND ELECTRICAL SPECIFICATIONS **CATEGORY 5 BATTERIES**

	Designation	OCV Max.	
			V
	4LR44 2CR13252 4SR44	6,60 7,4 6,52	

Dimensions in millimetres.
The cylindrical surface is insulated from the contacts.
Terminals: flat.
for terminal details, see 4.1.3.5 of IEC 60086-1.
For general information see IEC 60086-1.

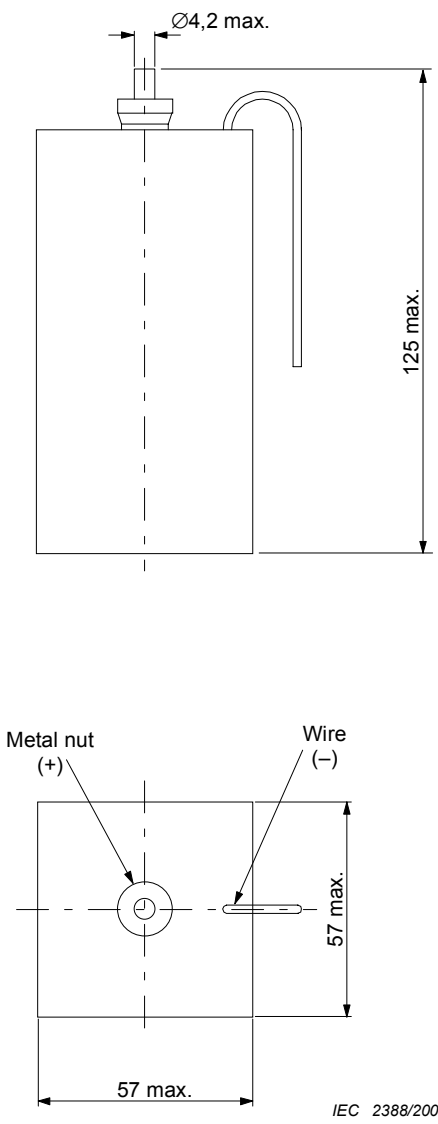
Electro-chemical system	Designation	Vn V	Discharge conditions			MAD ^a (initial)	Applications
			R kΩ	Daily period	EV V		
L (see note 1)	4LR44	6,0	27	^b	3,6	310 h	^c
			27	24 h	3,6	420 h	Service output test
			0,1	^d	3,6	950 pulses	Pulse test
C (see note 2)	2CR13252	6	30	24 h	4,0	620 h	Service output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

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

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

^a Standard conditions.
^b 24 h per day, plus 160 Ω for 1 s every 6 s for 5 min per day.
^c Accelerated application test for automatic cameras.
^d 24 h per day, 2 s on, 1 s off.

PHYSICAL AND ELECTRICAL SPECIFICATIONS			CATEGORY 5 BATTERIES				
			Designation		OCV Max.		
					V		
			5AR40		7,75		
			<p>Dimensions in millimetres.</p> <p>Terminals: Screw terminals.</p> <p style="padding-left: 40px;">for terminal details, see 4.1.3.4 of IEC 60086-1.</p> <p>Terminals located on top surface.</p> <p>Maximum terminal stud diameter: 4,2 mm.</p> <p>For general information, see IEC 60086-1.</p>				
Dimension	Max.						
Overall height	190,0						
Diameter	184,0						
Electro-chemical system	Designation	Vn V	Discharge conditions			MAD ^a (initial)	Applications
			R Ω	Daily period	EV V		
A (see note)	5AR40 ^b	7,0	240	24 h	4,5	120 days	Electric fence controllers
NOTE Delayed discharge performance after 12 months is 80 % of MAD.							
^a Standard conditions.							
^b Equipment designers' attention is drawn to the importance of ensuring that air access is not impeded for "A" system batteries.							

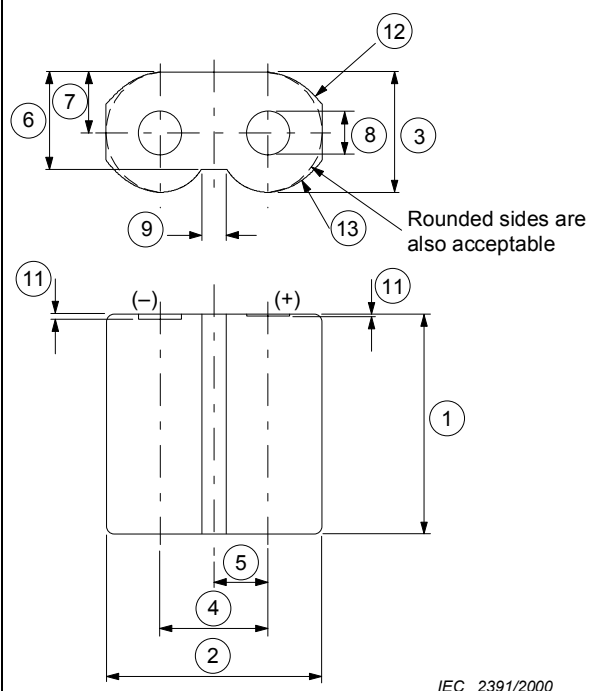
PHYSICAL AND ELECTRICAL SPECIFICATIONS			CATEGORY 6 BATTERIES				
 <p style="text-align: right;">IEC 2388/2000</p>			Designation	OCV Max.			
			S4	V			
			1,725				
			<p>Dimensions in millimetres.</p> <p>Terminals:</p> <ul style="list-style-type: none"> - negative: wire, approximate free length 90 mm. - positive: screw terminal (metal nut). - for terminal details, see respectively 4.1.3.9 and 4.1.3.4 of IEC 60086-1. <p>For general information, see IEC 60086-1.</p>				
Electro-chemical system	Designation	Vn V	Discharge conditions			MAD^a (initial)	Applications
			R Ω	Daily period	EV V		
See note	S4	1,5	20	24 h	0,85	500 h	Industrial equipment
NOTE Delayed discharge performance after 12 months is 80 % of MAD							
^a Standard conditions.							

PHYSICAL AND ELECTRICAL SPECIFICATIONS			CATEGORY 6 BATTERIES				
			Designation	OCV Max.			
				V			
			3R12C	5,175			
			3R12P	5,175			
			3R12S	5,175			
			3LR12	4,95			
			Dimensions in millimetres. Terminals: spring clips. for terminal details, see 4.1.3.10 of IEC 60086-1. For general information, see IEC 60086-1.				
			IEC 2389/2000				
Electro-chemical system	Designation	Vn V	Discharge conditions			MAD ^a (initial)	Applications
			R Ω	Daily period	EV V		
See note 1	3R12C (high capacity)	4,5	20	1 h	2,7	4,5 h	Portable lighting
			220	4 h	2,7	96 h	Transistor radios
	3R12P (high power)	4,5	20	1 h	2,7	5,5 h	Portable lighting
			220	4 h	2,7	96 h	Transistor radios
	3R12S (standard)	4,5	20	1 h	2,7	3,5 h	Portable lighting
			220	4 h	2,7	96 h	Transistor radios
L (see note 2)	3LR12	4,5	20	1 h	2,7	12 h	Portable lighting
			220	4 h	2,7	300 h	Transistor radios
NOTE 1 Delayed discharge performance after 12 months is 80 % of MAD.							
NOTE 2 Delayed discharge performance after 12 months is 90 % of MAD.							
^a Standard conditions.							

PHYSICAL AND ELECTRICAL SPECIFICATIONS

CATEGORY 6 BATTERIES

Designation	OCV Max. V
CR-P2	7,4
BR-P2	7,4



Dimensions in millimetres

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

Terminals: flat contacts.

for terminal details, see 4.1.3.5
of IEC 60086-1.

contacts are recessed.

For general information, see IEC 60086-1.

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

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

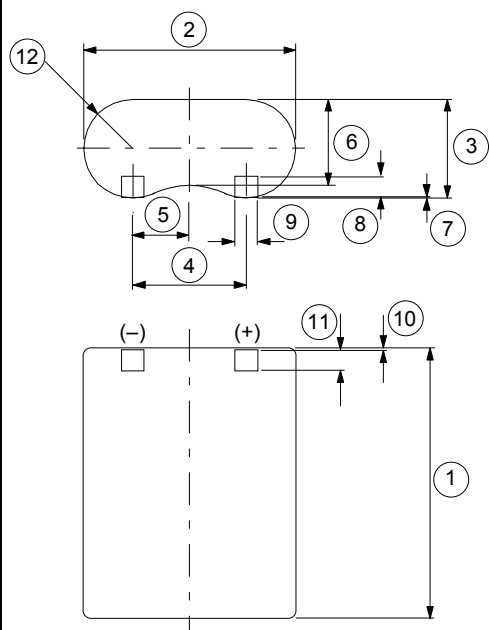
^a Standard conditions.

PHYSICAL AND ELECTRICAL SPECIFICATIONS

CATEGORY 6 BATTERIES

Designation	OCV Max. V
2CR5	7,4

Dimensions in millimetres



IEC 2392/2000

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

Terminals: flat contacts.

for terminal details, see 4.1.3.5 of IEC 60086-1.

For general information, see IEC 60086-1.

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

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

^a Standard conditions.

PHYSICAL AND ELECTRICAL SPECIFICATIONS **CATEGORY 6 BATTERIES**

Fastener: ① Loops
 ② Hooks: mushrooms 75-85/cm²

IEC 2393/2000

Connector with four receptacles:
 1 negative terminal
 2 blank
 3 polarizing key
 4 positive terminal

Features: dual-metal contact.
 Gold plating over nickel.
 Mating data:
 - 2,54 mm distance.
 - 0,64 mm square or round pins.
 - 5,84 mm nominal pin length.

Designation	OCV Max. V
2EP3863	7,8

Dimensions in millimetres.
 Terminals: Two flexible wires with connector.
 Positive terminal: red.
 Negative terminal: black.
 For general information, see IEC 60086-1.

Electro-chemical system	Designation	Vn V	Discharge conditions			MAD ^a	Applications
			R kΩ	Daily period	EV V		
E	2EP3863	6	3,3	24 h	3	650 h	Service output test

^a Standard conditions.

PHYSICAL AND ELECTRICAL SPECIFICATIONS **CATEGORY 6 BATTERIES**

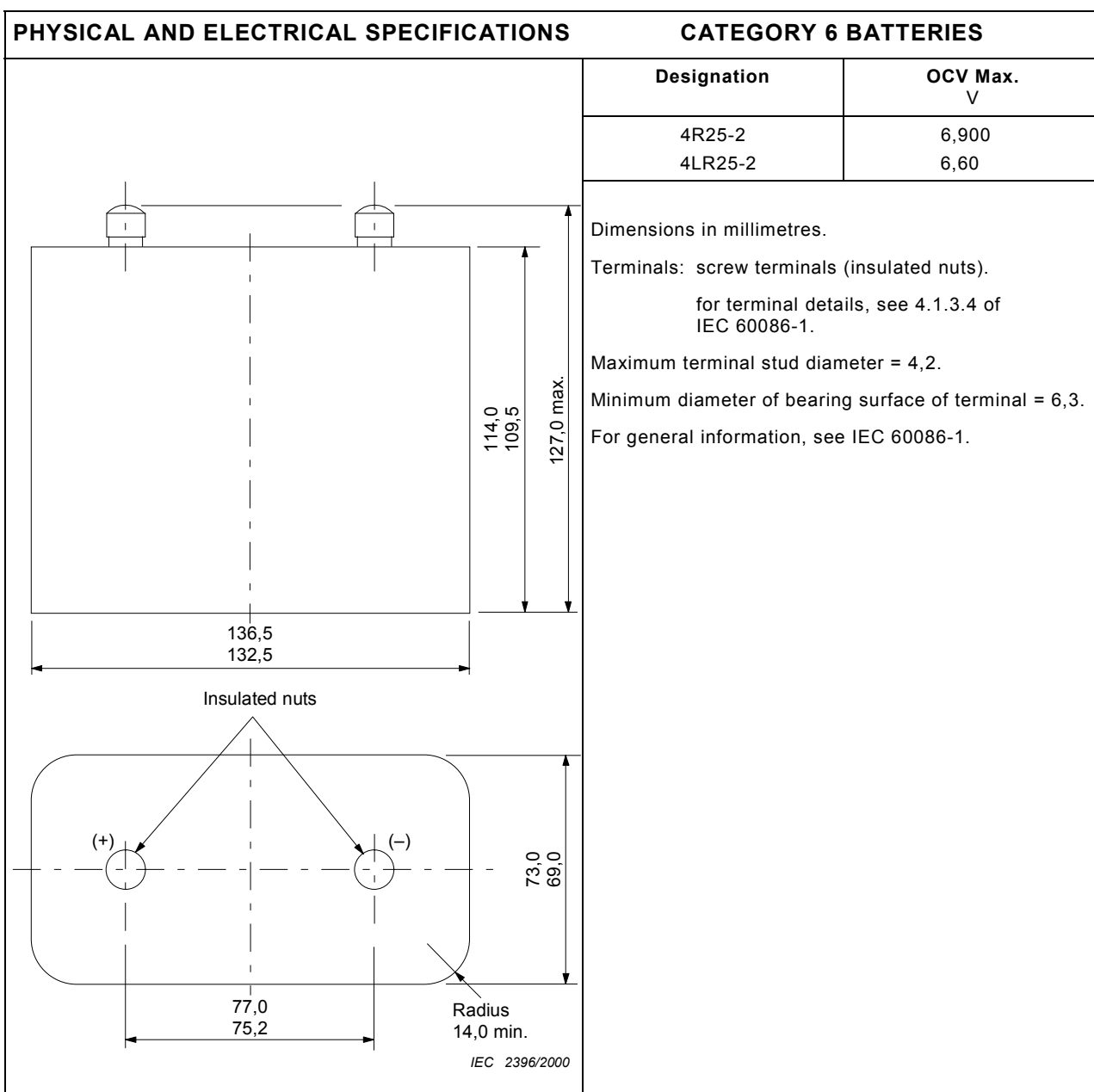
	Designation	OCV Max. V
<p style="text-align: center;">Conical spiral wire spring terminals</p>	4R25X	6,900
	4LR25X	6,60
<p>Dimensions in millimetres.</p> <p>Terminals: spiral springs having at least three complete windings compressible to within 3 mm of the flat surface of the box.</p> <p>This battery has rounded or bevelled corners and must pass freely through a gauge having a diameter of 82,6 mm.</p> <p>For general information, see IEC 60086-1.</p>		

Electro-chemical system	Designation	Vn V	Discharge conditions			MAD ^a (initial)	Applications
			R Ω	Daily period	EV V		
See note 1	4R25X	6,0	8,2	30 min	3,6	350 min	Portable lighting 1
			9,1	^b	3,6	270 min	Portable lighting 2
			110	12 h	3,6	155 h	Road warning lamps
L (see note 2)	4LR25X	6,0	8,2	30 min	3,6	900 min	Portable lighting 1
			9,1	^b	3,6	1 020 min	Portable lighting 2
			110	12 h	3,6	310 h	Road warning lamps

NOTE 1 Delayed discharge performance after 12 months is 80 % of MAD.
 NOTE 2 Delayed discharge performance after 12 months is 90 % of MAD.

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

PHYSICAL AND ELECTRICAL SPECIFICATIONS			CATEGORY 6 BATTERIES				
			Designation		OCV Max.		
			4R25Y		V 6,900		
<p>Dimensions in millimetres.</p> <p>Terminals: screw terminals (insulated or metallic nuts). for terminal details, see 4.1.3.4 of IEC 60086-1.</p> <p>The maximum terminal stud diameter is 3,5.</p> <p>This battery has bevelled or rounded corners and must pass freely through a gauge having a diameter of 82,6 mm.</p> <p>For general information, see IEC 60086-1.</p>							
Electro-chemical system	Designation	Vn V	Discharge conditions.			MAD ^a (initial)	Applications
			R Ω	Daily period	EV V		
See note	4R25Y	6,0	8,2	30 min	3,6	350 min	Portable lighting 1
			9,1	^b	3,6	270 min	Portable lighting 2
			110	12 h	3,6	155 h	Road warning lamps
NOTE Delayed discharge performance after 12 months is 80 % of MAD.							
^a Standard conditions.							
^b 30 min beginning at hourly intervals for 8 h per day.							



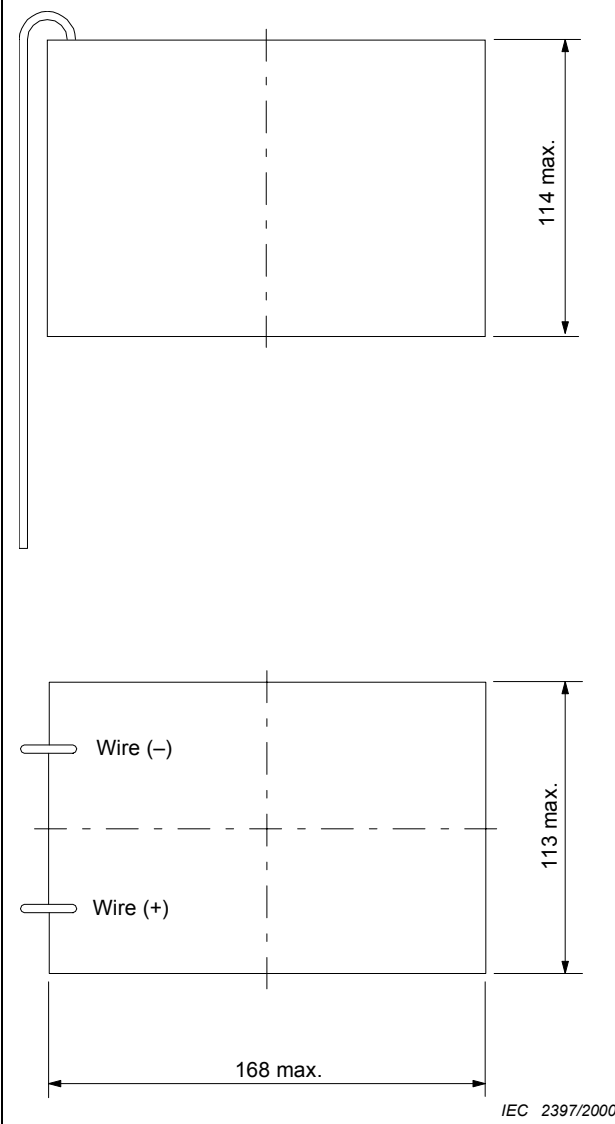
Electro-chemical system	Designation	Vn V	Discharge conditions			MAD^a (initial)	Applications
			R Ω	Daily period	EV V		
See note 1	4R25-2	6,0	8,2	30 min	3,6	900 min	Portable lighting 1
			9,1	^b	3,6	696 min	Portable lighting 2
			110	12 h	3,6	200 h	Road warning lamps
L (see note 2)	4LR25-2	6,0	8,2	30 min	3,6	1 800 min	Portable lighting 1
			9,1	^b	3,6	2 040 min	Portable lighting 2
			110	12 h	3,6	620 h	Road warning lamps

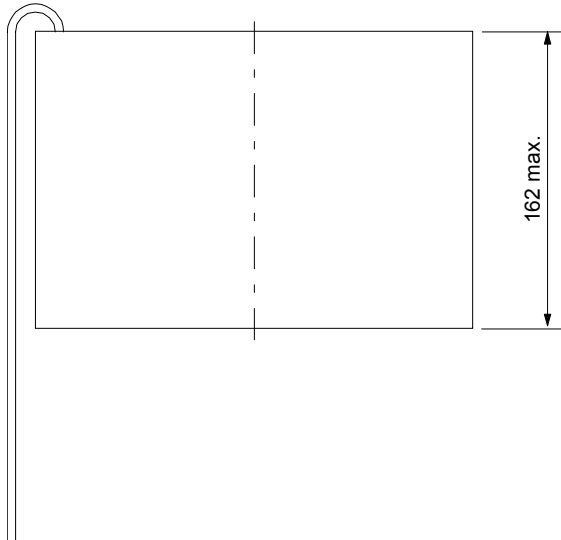
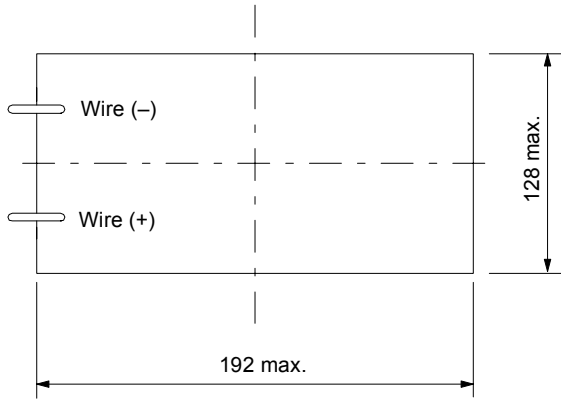
NOTE 1 Delayed discharge performance after 12 months is 80 % of MAD.

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

^a Standard conditions.

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

PHYSICAL AND ELECTRICAL SPECIFICATIONS			CATEGORY 6 BATTERIES				
			Designation		OCV Max.		
			6AS4		V 9,30		
			<p>Dimensions in millimetres.</p> <p>Terminals: wire.</p> <p>for terminal details, see 4.1.3.9 of IEC 60086-1.</p> <p>Minimum free length of connecting wires = 200 mm.</p> <p>For general information, see IEC 60086-1.</p>				
Electro-chemical system	Designation	Vn V	Discharge conditions			MAD ^a (initial)	Applications
			R Ω	Daily period	EV V		
A (see note)	6AS4 ^b	8,4	300	24 h	5,4	80 days	Electric fence controllers
NOTE Delayed discharge performance after 12 months is 80 % of MAD.							
^a Standard conditions.							
^b Equipment designers' attention is drawn to the importance of ensuring that air access is not impeded for "A" system batteries.							

PHYSICAL AND ELECTRICAL SPECIFICATIONS		CATEGORY 6 BATTERIES	
	Designation	OCV Max.	
	6AS6	V 9,30	
<p>Dimensions in millimetres.</p> <p>Terminals: wire.</p> <p>for terminal details, see 4.1.3.9 of IEC 60086-1.</p> <p>Free length of connecting wires is approximately 200 mm.</p> <p>The wire ends may be fitted with special terminals.</p> <p>For general information, see IEC 60086-1.</p>			
 <p style="text-align: right;"><small>IEC 2398/2000</small></p>			

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

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

^a Standard conditions.

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

PHYSICAL AND ELECTRICAL SPECIFICATIONS	CATEGORY 6 BATTERIES	
	Designation	OCV Max. V
	6F22 6LR61	10,350 9,90
<p>Dimensions in millimetres.</p> <p>Terminals: miniature snap fasteners; for terminal details, see 4.1.3.8 of IEC 60086-1.</p> <p>For general information, see IEC 60086-1.</p>		

Electro-chemical system	Designation	Vn V	Discharge conditions			MAD ^a (initial)	Applications
			R Ω	Daily period	EV V		
See note 1	6F22	9,0	620	2 h	5,4	24 h	Radio
			43 k ^b 620	24 1 s per h	7,5	14 days	Smoke detector ^c
			270	1 h	5,4	7 h	Toy
L (see note 2)	6LR61	9,0	620	2 h	5,4	33 h	Radio
			43 k ^b 620	24 1 s per h	7,5	28 days	Smoke detector ^c
			270	1 h	5,4	12 h	Toy

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

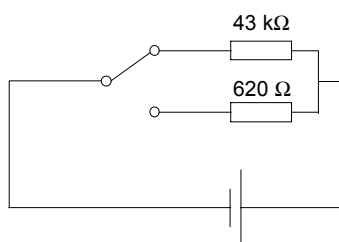
NOTE 2 Delayed discharge performance after 12 months is 90 % of MAD.

^a Standard conditions.

^b The pulse load of 620 Ω alone shall be applied across the battery for 1 s per h. It is the *effective load*. It is not added in series or parallel to the 43 kΩ background load. See example below.

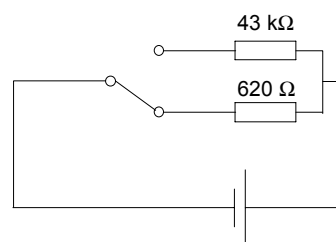
^c This is an accelerated test.

Example (smoke detector test)



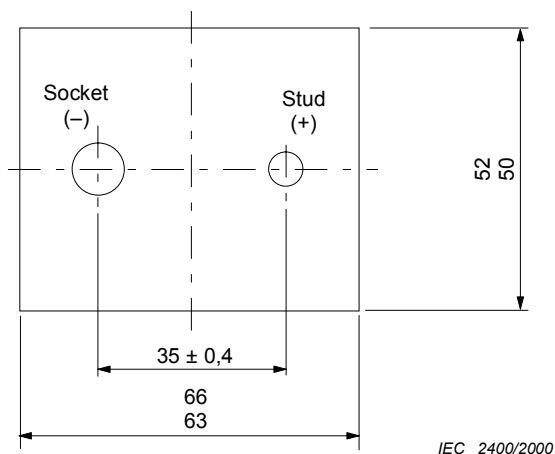
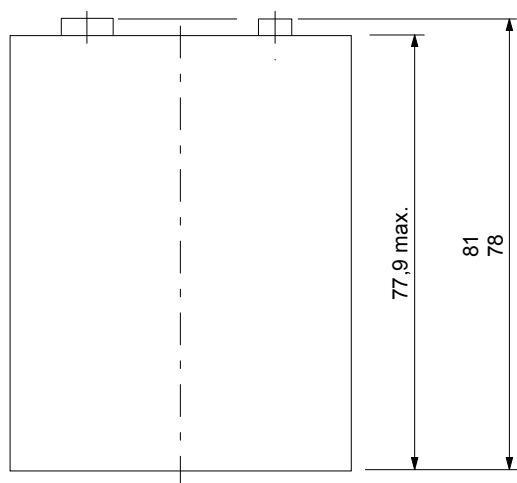
Background load

Example (smoke detector test)



Pulse load

PHYSICAL AND ELECTRICAL SPECIFICATIONS



IEC 2400/2000

Designation

OCV Max.

V

6F100

10,350

Dimensions in millimetres.

Terminals: standard snap fasteners.

for terminal details, see 4.1.3.8 of IEC 60086-1.

For general information, see IEC 60086-1.

Electro-chemical system	Designation	Vn V	Discharge conditions			MAD ^a (initial)	Applications
			R Ω	Daily period	EV V		
See note	6F100	9,0	240	4 h	5,4	126 h	Transistor radios

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

^a Standard conditions.

Annex A (informative)

Tabulation of batteries by application

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

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

Table A.1 – Road warning lamps

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

Table A.2 – Industrial equipment

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

Table A.3 – Electric fence controllers

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

Table A.4 – Transistor radios

Designation	Nominal voltage
	V
R03	1,5
LR03	1,5
R6C	1,5
R6P	1,5
R6S	1,5
LR6	1,5
R14C	1,5
R14P	1,5
R14S	1,5
LR14	1,5
R20C	1,5
R20P	1,5
R20S	1,5
LR20	1,5
3R12C	4,5
3R12P	4,5
3R12S	4,5
3LR12	4,5
6F22	9,0
6LR61	9,0
6F100	9,0

Table A.5 – Electronic equipment

Designation	Nominal voltage
	V
4LR61	6,0

Table A.6 – Paging test

Designation	Nominal voltage
	V
LR1	1,5

Table A.7 – Hearing aids

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

Table A.8 – Photo test

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

Table A.9 – Portable lighting

Designation	Nominal voltage
	V
LR8D425	1,5
R1	1,5
LR1	1,5
R03	1,5
LR03	1,5
R14C	1,5
R14P	1,5
R14S	1,5
LR14	1,5
R20C	1,5
R20P	1,5
R20S	1,5
LR20	1,5
2R10	3,0
3R12C	4,5
3R12P	4,5
3R12S	4,5
3LR12	4,5
4R25X	6,0
4LR25X	6,0
4R25Y	6,0
4R25-2	6,0
4LR25-2	6,0

Table A.10 – Pocket calculators

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

Table A.11 – Toys (motor)

Designation	Nominal voltage
	V
R6C	1,5
R6P	1,5
LR6	1,5
R14C	1,5
R14P	1,5
R14S	1,5
LR14	1,5
R20C	1,5
R20P	1,5
R20S	1,5
LR20	1,5
6F22	9,0
6LR61	9,0

Table A.12 – Accelerated application test for automatic camera

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

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

Designation	Nominal voltage
	V
R03	1,5
LR03	1,5
R6C	1,5
R6P	1,5
LR6	1,5
R14C	1,5
R14P	1,5
R14S	1,5
LR14	1,5
R20C	1,5
R20P	1,5
R20S	1,5
LR20	1,5

Annex B (informative)

Cross-reference index

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

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

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

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

Category 1 batteries	
Round batteries according to figures 1a and 1b	
Ranking by electrochemical system	Ranking by shape/volume
R1,R03,R6C,R6P,R6S,R14C,R14P,R14S, R20C, R20P, R20S, 2R10 LR8D425, LR1, LR03, LR6, LR14, LR20 CR12A604	LR8D425 R1, LR1 R03, LR03 R6C, R6P, R6S, LR6 R14C, R14P, R14S, LR14 R20C, R20P, R20S, LR20 CR12A604 2R10

Category 2 batteries	
Round batteries	
Ranking by electrochemical system	Ranking by shape/volume
CR14250, CR17345, CR17450 BR17335, BR17345	CR14250 BR17335 CR17345, BR17345 CR17450

Category 3 batteries	
Round batteries according to figures 2 and 3	
Ranking by electrochemical system	Ranking by shape/volume
LR9, LR53 CR11108	CR11108 (figure 2) LR9 (figure 3) LR53 (figure 3)

Category 4 batteries	
Round batteries according to figure 4	
Ranking by electrochemical system	Ranking by shape/volume
PR70, PR41, PR48, PR43, PR44	SR62
	SR63
LR41, LR55, LR54, LR43, LR44	SR65
	SR64
SR62, SR63, SR65, SR64, SR60, SR67, SR66, SR58, SR68, SR59, SR69, SR41, SR57, SR55, SR48, SR56, SR54, SR42, SR43, SR44	SR60
	SR67
	SR66
	PR70
CR1025, CR1216, CR1220, CR1616, CR2012, CR1620, CR2016, CR2025, CR2320, CR2032, CR2330, CR2430, CR2354, CR3032, CR2450	SR58
	SR68
	SR59
	SR69
BR1225, BR2016, BR2020, BR2320, BR2325, BR3032	PR41, LR41, SR41
	SR57
	CR1025
	CR1216
	LR55, SR55
	CR1220
	PR48, SR48
	SR56
	BR1225
	CR1616
	LR54, SR54
	CR2012
	SR42
	CR1620
	PR43, LR43, SR43
	CR2016, BR2016
	PR44, LR44, SR44
	BR2020
	CR2025
	CR2320, BR2320
	CR2032
	BR2325
	CR2330
	CR2430
	CR2354
	CR3032, BR3032
	CR2450

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

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

Annex C (informative)

Index

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

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

Table C.1 – Index

Battery	Page	Battery	Page	Battery	Page
LR1	13	R40	27	PR70	21
R1	11	LR41	22	6F100	42
BR-P2	33	PR41	21	LR8D425	13
CR-P2	33	SR41	23	CR12A604	15
LR03	14	SR42	24	CR1025	25
R03	11	LR43	22	CR1216	25
6AS4	39	PR43	21	CR1220	25
S4	30	SR43	24	BR1225	26
2CR5	34	LR44	22	CR1616	25
6AS6	40	4LR44	28	CR1620	25
LR6	14	PR44	21	CR2012	25
R6C	11	SR44	24	BR2016	26
R6P	11	4SR44	28	CR2016	25
R6S	11	PR48	21	BR2020	26
LR9	19	SR48	23	CR2025	25
2R10	13	LR53	19	CR2032	25
3LR12	31	LR54	22	BR2320	26
3R12C	31	SR54	24	CR2320	25
3R12P	31	LR55	22	BR2325	26
3R12S	31	SR55	23	CR2330	25
LR14	14	SR56	24	CR2354	25
R14C	12	SR57	23	CR2430	25
R14P	12	SR58	23	CR2450	25
R14S	12	SR59	23	BR3032	26
LR20	14	SR60	23	CR3032	25
R20C	12	4LR61	32	2EP3863	35
R20P	13	6LR61	41	CR11108	19
R20S	13	SR62	23	2CR13252	28
6F22	41	SR63	23	CR14250	17
4LR25X	36	SR64	23	BR17335	17
4LR25-2	38	SR65	23	BR17345	17
4R25X	36	SR66	23	CR17345	17
4R25Y	37	SR67	23	CR17450	17
4R25-2	38	SR68	23		
5AR40	29	SR69	23		



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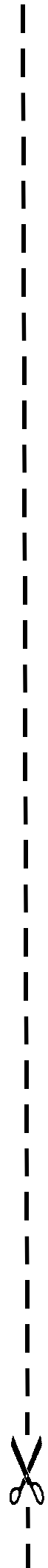
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