

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Primary batteries – **STANDARD PREVIEW**
Part 2: Physical and electrical specifications
(standards.iteh.ai)

Piles électriques –
Partie 2: Spécifications physiques et électriques
<https://standards.iteh.ai/catalog/standards/sist/616272d-2195-4142-baac-245792ba33a2/iec-60086-2-2015>



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PRIMARY BATTERIES –**Part 2: Physical and electrical specifications****FOREWORD**

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

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

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

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

FDIS	Report on voting
35/1350/FDIS	35/1352/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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

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

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INTRODUCTION

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

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

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

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

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PRIMARY BATTERIES –

Part 2: Physical and electrical specifications

1 Scope

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

It specifies

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

2 Normative references

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

IEC 60086-1:2015, *Primary batteries – Part 1: General*

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

3 Terms, definitions, symbols and abbreviations

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

3.1 Terms and definitions

3.1.1

application test

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

3.1.2

closed-circuit voltage

CCV

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

3.1.3

end-point voltage

EV

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

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

3.1.4

minimum average duration

MAD

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

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

3.1.5

nominal voltage (of a primary battery)

V_n

suitable approximate value of the voltage used to designate or identify a cell, a battery or an electrochemical system

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

3.1.6

open-circuit voltage

OCV

voltage across the terminals of a cell or battery when it is off discharge

3.1.7

primary (cell or battery)

cell or battery that is not designed to be electrically recharged

3.1.8

round (cell or battery)

cell or battery with circular cross section

3.1.9

service output (of a primary battery)

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

3.1.10

service output test

test designed to measure the service output of a battery

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Note 1 to entry: A service output test may be prescribed, for example, when

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

3.1.11

storage life

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

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

3.1.12

terminals (of a primary battery)

conductive parts of a battery that provide connection to an external circuit

3.2 Symbols and abbreviations

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

4 Battery dimensions, symbols

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

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

Recesses are permitted in the negative flat contact surface defined by dimensions 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:

$$d_6 > d_3$$

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$$d_2 > d_7$$

$$h_3 > h_4$$

5 Constitution of the battery specification tables

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

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

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

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

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

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

5.7 Batteries are categorized into the following groups:

a) Category 1 batteries

R1, R03, R6P, R6S, R14P, R14S, R20P, R20S

LR8D425, LR1, LR03, LR6, LR14, LR20

FR10G445, FR14505

b) Category 2 batteries

CR14250, CR15H270, CR17345, CR17450, BR17335

c) Category 3 batteries

LR9, CR11108

d) Category 4 batteries

PR70, PR41, PR48, PR44

LR41, LR55, LR54, LR43, LR44

SR62, SR63, SR65, SR64, SR60, SR67, SR66, SR58, SR68, SR59, SR69, SR41, SR57,
SR55, SR48, SR54, SR42, SR43, SR44

CR1025, CR1216, CR1220, CR1616, CR2012, CR1620, CR2016, CR2025, CR2320,

CR2032, CR2330, CR2430, CR2354, CR3032, CR2450

BR1225, BR2016, BR2320, BR2325, BR3032

e) Category 5: Other round batteries – Miscellaneous

4LR44

2CR13252

4SR44

5AR40

f) Category 6: Non-round batteries – Miscellaneous

3R12P, 3R12S, 3LR12

4LR61

CR-P2

2CR5

4R25X, 4LR25X

4R25Y

4R25-2, 4LR25-2

6F22, 6LR61, 6LP3146

6AS4

6AS6

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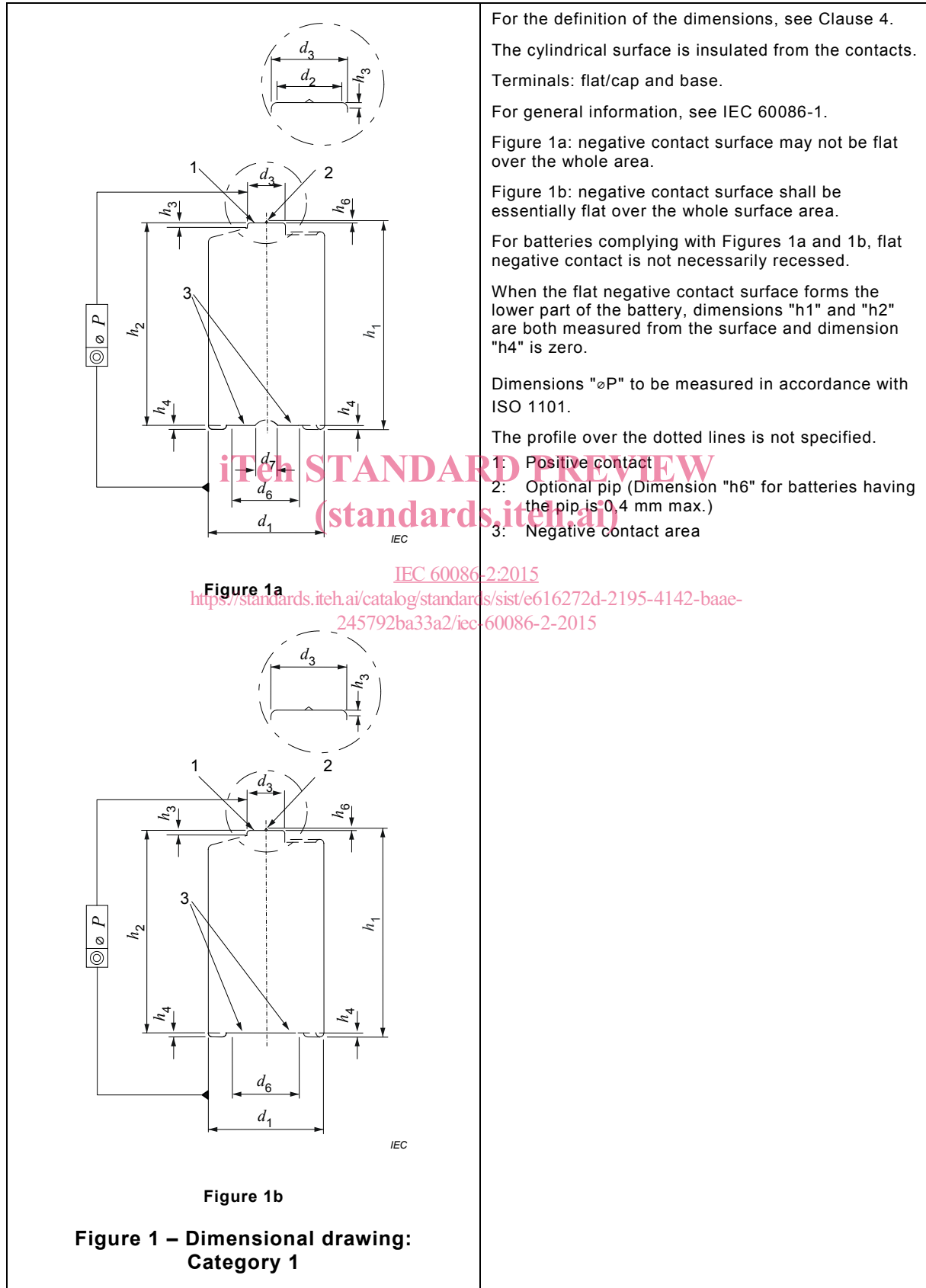
5.8 The specification drawings show the shape of the relevant batteries. Dimensions for each battery are shown in the tables of Clause 6.

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

6 Physical and electrical specifications

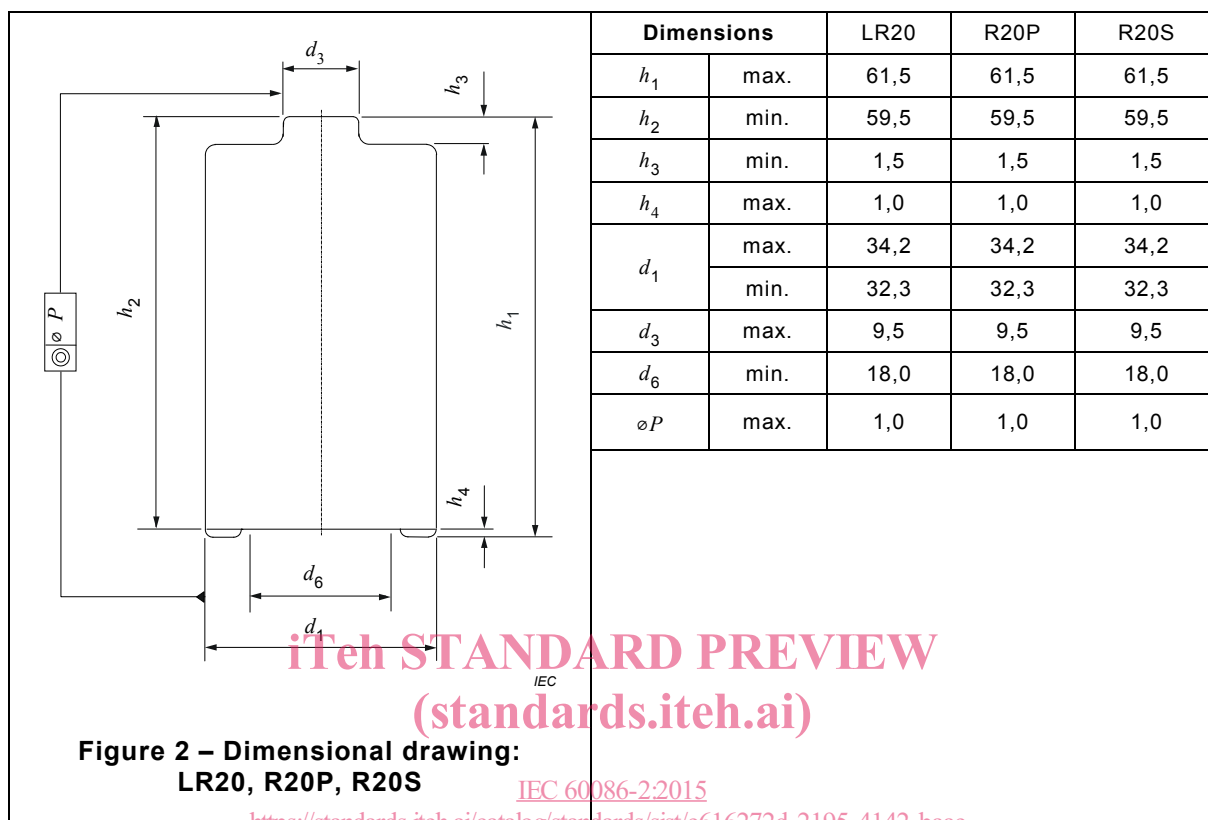
6.1 Category 1 batteries

6.1.1 General



6.1.2 Category 1 – Specifications: LR20, R20P, R20S

Dimensions in millimetres



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

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