

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Secondary cells and batteries containing alkaline or other non-acid electrolytes
– Secondary sealed cells and batteries for portable applications –
Part 1: Nickel-cadmium**

**Accumulateurs alcalins et autres accumulateurs à électrolyte non-acide –
Accumulateurs étanches pour applications portables –
Partie 1: Nickel-cadmium**



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IEC 61951-1

Edition 4.1 2023-02
CONSOLIDATED VERSION

INTERNATIONAL STANDARD

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.220.30

ISBN 978-2-8322-6464-5

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REDLINE VERSION

VERSION REDLINE



**Secondary cells and batteries containing alkaline or other non-acid electrolytes
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IEC 61951-1:2017

<https://standards.iteh.ai/catalog/standards/sist/77f96561-6318-4d57-b0a0-6665acd0c9fa/iec-61951-1-2017>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SECONDARY CELLS AND BATTERIES CONTAINING ALKALINE OR OTHER NON-ACID ELECTROLYTES – SECONDARY SEALED CELLS AND BATTERIES FOR PORTABLE APPLICATIONS –

Part 1: Nickel-cadmium

FOREWORD

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IEC 61951-1 edition 4.1 contains the fourth edition (2017-03) [documents 21A/622/FDIS and 21A/630/RVD] and its amendment 1 (2023-02) [documents 21A/821/FDIS and 21A/828/RVD].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 61951-1 has been prepared by subcommittee 21A: Secondary cells and batteries containing alkaline or other non-acid electrolytes, of IEC technical committee 21: Secondary cells and batteries.

This fourth edition constitutes a technical revision.

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

- addition of battery type;
- revision of Figure 3 (6.1.3.1);
- addition of “Optional pip” note to positive contact;
- changed leader line position from pip to flats of positive contact (B and G).

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

A list of all parts of the IEC 61951 series can be found, under the general title *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary sealed cells and batteries for portable applications*, on the IEC website.

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site under webstore.iec.ch in the data related to the specific publication. At this date, the publication will be

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

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SECONDARY CELLS AND BATTERIES CONTAINING ALKALINE OR OTHER NON-ACID ELECTROLYTES – SECONDARY SEALED CELLS AND BATTERIES FOR PORTABLE APPLICATIONS –

Part 1: Nickel-cadmium

1 Scope

This part of IEC 61951 specifies marking, designation, dimensions, tests and requirements for secondary sealed nickel-cadmium small prismatic, cylindrical and button cells and batteries, suitable for use in any orientation, for portable applications.

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

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

IEC 60086-2, *Primary batteries – Part 2: Physical and electrical specifications*

IEC 61959, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Mechanical tests for sealed portable secondary cells and batteries*

IEC 62133-1, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells and for batteries made from them, for use in portable applications – Part 1: Nickel systems*

IEC 62902, *Secondary cells and batteries – Marking symbols for identification of their chemistry*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-482 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

nominal voltage

suitable approximate value of voltage used to designate or identify a cell or a battery

Note 1 to entry: The nominal voltage of a sealed nickel-cadmium rechargeable single cell: 1,2 V.

Note 2 to entry: The nominal voltage of a battery of n series connected cells is equal to n times the nominal voltage of a single cell.

[SOURCE: IEC 60050-482:2004, 482-03-31, modified – Addition of Notes 1 and 2 to entry.]

3.2

rated capacity

capacity value of a cell or a battery determined under specified conditions and declared by the manufacturer

Note 1 to entry: The rated capacity is the quantity of electricity C_5 Ah (ampere-hours) declared by the manufacturer which a single cell can deliver during a 5 h period when charging, storing and discharging under the conditions specified in 7.3.2.

Note 2 to entry: The capacity of a battery is the quantity of electricity C_5 Ah (ampere-hours) declared by the manufacturer which a battery can deliver during a 5 h period, when charged, stored and discharged under the conditions specified in 7.3.2.

[SOURCE: IEC 60050-482:2004, 482-03-15, modified – Addition of Notes 1 and 2 to entry.]

3.3

small prismatic cell

cell in the form of a rectangular parallelepiped whose width and thickness dimensions are not more than 25 mm

3.4

cylindrical cell

cell of circular cross-section in which the overall height is equal to, or greater than, the overall diameter

3.5

button cell

cell of a circular cross-section in which the overall height is less than the overall diameter

3.6

nickel-cadmium cell

cell containing a nickel hydroxide compound for the positive electrode, a cadmium compound for the negative electrode, and potassium hydroxide or other alkaline solution as electrolyte

Note 1 to entry: Positive electrodes are isolated from negative electrodes by a separator.

3.7

nickel- cadmium battery

assembly of secondary cell(s) as a source of electrical energy characterized by its voltage, size, terminal arrangement, capacity and rate capability

3.8

sealed cell

cell which remains closed and does not release either gas or liquid when operated within the limits of charge and temperature specified by the manufacturer

Note 1 to entry: The cell is equipped with a safety device to prevent dangerously high internal pressure.

Note 2 to entry: The cell does not require addition to the electrolyte and is designed to operate during its life in its original sealed state.

[SOURCE: IEC 60050-482:2004, 482-05-17, modified – The existing note has been developed into Notes 1 and 2 to entry.]

3.9

portable cell

cell designed mainly for use in an easily hand-carried battery

3.10

battery for portable applications

battery for use in device or appliance which is conveniently hand-carried

3.11

trickle charge

method of charge applied to a battery wherein the state of charge is maintained by a continuous, long term, regulated small electric current

Note 1 to entry: The trickle charge compensates self-discharge effects and maintains the battery in an approximately fully charged state.

4 Parameter measurement tolerances

The overall accuracy of controlled or measured values, relative to the specified or actual values, shall be within the following tolerances:

- a) $\pm 1 \%$ for voltage;
- b) $\pm 1 \%$ for current;
- c) $\pm 1 \%$ for capacity;
- d) $\pm 2 \text{ }^{\circ}\text{C}$ for temperature;
- e) $\pm 0,1 \%$ for time;
- f) $\pm 0,1 \text{ mm}$ for dimensions;
- g) $\pm 5 \%$ for humidity.

These tolerances comprise the combined accuracy of the measuring instruments, the measurement techniques used and all other sources of error in the test procedure.

The details of the instrumentation used shall be provided in each report of results.

5 Cell and battery designation and marking

5.1 Cell and battery designation

5.1.1 Small prismatic cells and cylindrical cells

5.1.1.1 General

Sealed nickel-cadmium small prismatic rechargeable single cells and cylindrical rechargeable single cells shall be designated by a letter L, M, J, H or X which signifies:

- low rate of discharge (L);
- medium rate of discharge (M);
- medium high rate of discharge (J);
- high rate of discharge (H);
- very high rate of discharge (X).

NOTE 1 These cells are typically but not exclusively used for the following discharge rates:

- L up to $0,5 I_t$ A;
- M up to $3,5 I_t$ A;

- J up to 5,0 I_t A;
- H up to 7,0 I_t A;
- X up to and above 15 I_t A.

NOTE 2 These currents are expressed as multiples of I_t A, where I_t A = C_5 Ah/1 h (see IEC 61434).

When a cell is intended for permanent charge at elevated temperatures, typically higher than 40 °C, a letter "T" is placed after the letter L, M, J, H or X.

When a cell is intended for permanent charge at elevated temperatures, typically higher than 50 °C, a letter "U" is placed after the letter L, M, J, H or X.

When a cell is intended for rapid charge, typically at 1,0 I_t A, a letter "R" is placed after the letter L, M, J, H or X.

5.1.1.2 Small prismatic cells

Sealed nickel-cadmium small prismatic rechargeable single cells shall be designated by the letters "KF" followed by a letter L, M, J, H or X followed by three groups of figures, each one separated by a solidus:

- the two figures to the left of the first solidus shall indicate the maximum width specified for the cell, expressed in millimetres, rounded up to the next whole number;
- the two figures in the middle shall indicate the maximum thickness specified for the cell, expressed in millimetres, rounded up to the next whole number;
- the two figures to the right of the second solidus shall indicate the maximum height specified for the cell, expressed in millimetres, rounded up to the next whole number.

EXAMPLE KFL 18/07/49 designation identifies a small prismatic cell of low discharge rate capability, with a maximum width of 18 mm, a maximum thickness of 7 mm and a maximum height of 49 mm.

5.1.1.3 Cylindrical cells

Sealed nickel-cadmium cylindrical rechargeable single cells shall be designated by the letters "KR" followed by a letter L, M, J, H or X followed by two groups of figures, each one separated by a solidus:

- the two figures to the left of the solidus shall indicate the maximum diameter specified for the cell, expressed in millimetres, rounded up to the next whole number;
- the two figures to the right of the solidus shall indicate the maximum height specified for the cell, expressed in millimetres, rounded up to the next whole number.

When a manufacturer designs a cell with dimensions and tolerances which make it interchangeable with a primary cell, the designation of Table 2 shall also be marked on the cell.

EXAMPLE 1 KRL 33/62 designation identifies a cylindrical cell of low discharge rate capability, with a maximum diameter of 33 mm and a maximum height of 61,5 mm.

EXAMPLE 2 KRLT 33/62 designation identifies a cylindrical cell of low discharge rate capability, intended for permanent charge at elevated temperatures, with a maximum diameter of 33 mm and a maximum height of 61,5 mm.

EXAMPLE 3 KRHR 23/43 designation identifies a cylindrical cell of high discharge rate capability, intended for rapid charge, with a maximum diameter of 23 mm and a maximum height of 43 mm.

For cells dimensionally interchangeable with primary cells, the following single or double figures following the letter L, M or R may indicate:

- 20- size D;
- 14- size C;

- 6- size AA;
- 03- size AAA.

EXAMPLE 4 KRMR03 designation identifies a sealed nickel-cadmium cylindrical rechargeable single cell, of medium discharge rate capability, also intended for rapid charge, dimensionally interchangeable with primary cell and whose type designation is AAA.

5.1.2 Button cells

Sealed nickel-cadmium button rechargeable single cells shall be designated by the letters “KB” followed by a letter L, M or H which signifies:

- low rate of discharge (L);
- medium rate of discharge (M);
- high rate of discharge (H).

The group of three letters shall then be followed by two groups of figures separated by a solidus:

- a) the three figures to the left of the solidus shall indicate the maximum diameter specified for the cell, expressed in tenths of millimetres, rounded up to the next whole number;
- b) the three figures to the right of the solidus shall indicate the maximum height specified for the cell, expressed in tenths of millimetres, rounded up to the next whole number.

EXAMPLE KBL 116/055 designation identifies a button cell of low discharge rate capability, with a maximum diameter of 11,6 mm and a maximum height of 5,5 mm.

5.1.3 Batteries

Sealed nickel-cadmium rechargeable batteries shall be designated with the following form:

N1 single cell designation -N2 IEC 61951-1:2017

where

N1 is the number of series connected cells in the battery;

N2 is the number of parallel connected cells if 2 or greater (not shown if value is 1).

Sealed nickel-cadmium battery designation will be identified based on single cells within the series and not the battery as a whole.

- Small prismatic cells in batteries

EXAMPLE 1 2KFL 18/07/49 designation identifies a small prismatic cell of low discharge rate capability, with a maximum width of 18 mm, a maximum thickness of 7 mm and a maximum height of 49 mm with two series connected cells.

- Cylindrical cells in batteries

EXAMPLE 2 3KRL 33/62 designation identifies a cylindrical cell of low discharge rate capability, with a maximum diameter of 33 mm and a maximum height of 61,5 mm with three series connected cells

- Cells interchangeable with primary cells in batteries

EXAMPLE 3 KRMR03-3 designation identifies a sealed nickel-cadmium cylindrical rechargeable single cell, of medium discharge rate capability, also intended for rapid charge, dimensionally interchangeable with primary cell whose type designation is AAA with three parallel connected cells.

- Button cells in batteries

EXAMPLE 4 KB116/055-3 designation identifies a button cell, with a maximum diameter of 11,6 mm and a maximum height of 5,5 mm with three parallel connected cells.

5.2 Cell or battery termination

This standard does not specify cell or battery termination.