

Secondary cells and batteries containing alkaline or other non-acid electrolytes — Portable sealed rechargeable single cells —

Part 1: Nickel-cadmium

The European Standard EN 61951-1:2003, with the incorporation of amendment A1:2006, has the status of a British Standard

ICS 29.220.30

National foreword

This British Standard is the official English language version of EN 61951-1:2003, including Amendment A1:2006. It is identical with IEC 61951-1:2003. It supersedes BS EN 61951-1:2001, BS EN 60285:1995 and BS EN 61440:1998, all of which will be withdrawn on 2006-06-01.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment is indicated in the text by **A1** **A1**.

The UK participation in its preparation was entrusted to Technical Committee PEL/21/1, Secondary cells and batteries containing alkaline and other non-acidic electrolytes, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

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

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 31 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments
16333	30 June 2006	See national foreword

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 26 September 2003

© BSI 2006

ISBN 0 580 42665 3

English version

**Secondary cells and batteries containing alkaline or
other non-acid electrolytes –
Portable sealed rechargeable single cells
Part 1: Nickel-cadmium
(IEC 61951-1:2003)**

Accumulateurs alcalins et autres
accumulateurs à électrolyte non acide -
Accumulateurs individuels portables
étanches
Partie 1: Nickel-cadmium
(CEI 61951-1:2003)

Akkumulatoren und Batterien mit
alkalischem oder anderen
nichtsäurehaltigen Elektrolyten -
Tragbare wiederaufladbare gasdichte
Einzelzellen
Teil 1: Nickel-Cadmium
(IEC 61951-1:2003)

This European Standard was approved by CENELEC on 2003-06-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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

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

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 21A/373/FDIS, future edition 2 of IEC 61951-1, prepared by SC 21A, Secondary cells and batteries containing alkaline or other non-acid electrolytes, of IEC TC 21, Secondary cells and batteries, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61951-1 on 2003-06-01.

This European Standard supersedes HD 561 S1:1991, EN 60285:1994 + A1:1995 + A2:1999, EN 61440:1997 and EN 61951-1:2001.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2004-03-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2006-06-01

Annexes designated "normative" are part of the body of the standard.
In this standard, annex ZA is normative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61951-1:2003 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 61434 NOTE Harmonized as EN 61434:1996 (not modified).

Foreword to Amendment A1

The text of document 21A/421/FDIS, future amendment 1 to IEC 61951-1:2003, prepared by SC 21A, Secondary cells and batteries containing alkaline or other non-acid electrolytes, of IEC TC 21, Secondary cells and batteries, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 61951-1:2003 on 2005-12-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2006-09-01
- latest date by which the national standards conflicting
with the amendment have to be withdrawn (dow) 2008-12-01

Endorsement notice

The text of amendment 1:2005 to the International Standard IEC 61951-1:2003 was approved by CENELEC as an amendment to the European Standard without any modification.



CONTENTS

1	Scope	5
2	Normative references	5
3	Definitions	5
4	Parameter measurement tolerances	6
5	Cell designation and marking	6
5.1	Cell designation	6
5.1.1	Small prismatic cells	6
5.1.2	Cylindrical cells	7
5.1.3	Button cells	8
5.2	Cell termination	8
5.3	Marking	8
5.3.1	Small prismatic cells and cylindrical cells	8
5.3.2	Button cells	8
6	Dimensions	9
6.1	Small prismatic cells and cylindrical cells	9
6.1.1	Small prismatic cells	10
6.1.2	Cylindrical cells	10
6.1.2.1	Cells dimensionally interchangeable with primary batteries	10
6.1.2.2	Cells not dimensionally interchangeable with primary batteries	11
6.2	Button cells	11
7	Electrical tests	12
7.1	Charging procedure for test purposes	12
7.2	Discharge performance	12
7.2.1	Discharge performance at 20 °C	12
7.2.2	Discharge performance at -18 °C	14
7.2.3	Discharge performance for rapid charge cells (R cells)	14
7.3	Charge (capacity) retention	15
7.4	Endurance	15
7.4.1	Endurance in cycles	15
7.4.1.1	Small prismatic and cylindrical cells	15
7.4.1.2	Cylindrical cells (accelerated test procedures)	16
7.4.1.3	Button cells	17
7.4.2	Permanent charge endurance	18
7.4.2.1	Small prismatic cells	18
7.4.2.2	L, M, H or X cylindrical cells and L, M or H button cells	18
7.4.2.3	LT, MT or HT cylindrical cells	19
7.4.2.4	LU, MU or HU cylindrical cells	21
7.5	Charge acceptance at constant voltage	22
7.6	Overcharge	22
7.6.1	Small prismatic cells	22
7.6.2	L, M, H or X cylindrical and button cells	23
7.6.3	LT/LU, MT/MU or HT/HU cylindrical cells	23
7.6.4	R cylindrical cells	23
7.7	Safety device operation	24
7.8	Storage	24
7.9	Charge acceptance at +55 °C for LT, MT or HT cylindrical cells	25
7.10	Internal resistance	25

7.10.1	Measurement of the internal a.c. resistance	26
7.10.2	Measurement of the internal d.c. resistance	26
8	Mechanical tests	26
9	Type approval and batch acceptance	27
9.1	Type approval	27
9.1.1	Type approval for small prismatic cells	27
9.1.2	Type approval for cylindrical and button cells	27
9.2	Batch acceptance	29

Annex ZA (normative)	Normative references to international publications with their corresponding European publications	30
----------------------	---	----

Bibliography	31
--------------------	----

Figure 1 – Jacketed cylindrical cells	9
Figure 2 – Jacketed small prismatic cells	9
Figure 3 – Button cells	11

Table 1 – Dimensions of jacketed small prismatic cells	10
Table 2 – Cylindrical cells dimensionally interchangeable with primary batteries	10
Table 3 – Dimensions of jacketed cylindrical cells not dimensionally interchangeable with primary batteries	11
Table 4 – Dimensions of button cells	12
Table 5 – Discharge performance at 20 °C for small prismatic cells	13
Table 6 – Discharge performance at 20 °C for cylindrical cells	13
Table 7 – Discharge performance at 20 °C for button cells	13
Table 8 – Discharge performance at –18 °C for small prismatic cells	14
Table 9 – Discharge performance at –18 °C for cylindrical cells	14
Table 10 – Discharge performance at –18 °C for button cells	14
Table 11 – Endurance in cycles for small prismatic and cylindrical cells	15
Table 12 – Endurance in cycles for H or X cells	16
Table 13 – Endurance in cycles for cylindrical X cells	16
Table 14 – Endurance in cycles for HR or XR cells	17
Table 15 – Endurance in cycles for button cells	17
Table 16 – Permanent charge endurance for L, M, H or X cylindrical cells	18
Table 17 – Permanent charge endurance for button cells	18
Table 18 – Permanent charge endurance for LT, MT, or HT cylindrical cells	20
Table 19 – Overcharge at 0 °C	23
Table 20 – Charge and discharge at +55 °C	25
Table 21 – Constant discharge currents used for measurement of d.c. resistance	26
Table 22 – Sequence of tests for type approval for small prismatic cells	27
Table 23 – Sequence of tests for type approval for cylindrical cells	28
Table 24 – Sequence of tests for type approval for button cells	28
Table 25 – Recommended test sequence for batch acceptance	29
Table 26 – Permanent charge endurance for LU, MU or HU cylindrical cells	22

SECONDARY CELLS AND BATTERIES CONTAINING ALKALINE OR OTHER NON-ACID ELECTROLYTES – PORTABLE SEALED RECHARGEABLE SINGLE CELLS –

Part 1: Nickel-cadmium

1 Scope

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

2 Normative references

The following referenced documents are indispensable for the application 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(486), *International Electrotechnical Vocabulary – Chapter 486: Secondary cells and batteries*

IEC 60051 (all parts), *Direct acting indicating analogue electrical measuring instruments and their accessories*

IEC 60086 (all parts), *Primary batteries*

IEC 60410, *Sampling plans and procedures for inspection by attributes*

IEC 60485, *Digital electronic d.c. voltmeters and d.c. electronic analogue-to-digital converters*

IEC 61959, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Mechanical tests for sealed portable secondary cells and batteries*¹

3 Definitions

For the purposes of this document, the definitions contained in IEC 60050-486 and the following apply.

3.3.1

small prismatic cell

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

3.3.2

cylindrical cell

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

¹ To be published.

3.3.3**button cell**

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

3.3.4**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. The cell is equipped with a safety device to prevent dangerously high internal pressure. The cell does not require addition to the electrolyte and is designed to operate during its life in its original sealed state

3.3.5**nominal cell voltage**

nominal voltage of a sealed nickel-cadmium rechargeable single cell: 1,2 V

3.3.6**portable cell**

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

3.3.7**rated capacity**

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 7.2.1

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.

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

For assistance in selecting instrumentation, see the IEC 60051 series for analogue instruments and IEC 60485 for digital instruments. The details of the instrumentation used shall be provided in each report of results.

5 Cell designation and marking**5.1 Cell designation****5.1.1 Small prismatic cells**

Sealed nickel-cadmium small prismatic rechargeable single cells shall be designated by the letters "KF" followed by three groups of figures each one separated by a solidus.

- a) 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.

- b) 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.
- c) 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 KF 18/07/49 designation identifies a small prismatic cell, with a maximum width of 18 mm, a maximum thickness of 7 mm and a maximum height of 49 mm.

5.1.2 Cylindrical cells

Sealed nickel-cadmium cylindrical rechargeable single cells shall be designated by the letters "KR" followed by a third letter L, M, H or X which signifies :

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

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

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

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

The group of three (or four) letters shall then be followed by two groups of figures separated by a solidus.

- a) 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.
- b) 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 battery, 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.

5.1.3 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.

5.2 Cell termination

This standard does not specify cell termination.

5.3 Marking

5.3.1 Small prismatic cells and cylindrical cells

Each jacketed cell supplied without connections shall carry durable markings giving the following minimum information:

- sealed, rechargeable nickel-cadmium or Ni-Cd;
- cell designation as specified in 5.1 (in addition, it is permissible for a manufacturer to use his own type designation);
- rated capacity;
- nominal voltage;
- recommended charge rate and time or permanent charge current for “T” cells;
- polarity;
- date of manufacture (which may be in code);
- name or identification of manufacturer or supplier.

NOTE In general, sealed nickel-cadmium rechargeable single cells with connection tabs need no labels if they form an integral part of a battery, in which case, the battery itself is marked with the above information.

5.3.2 Button cells

Each button cell supplied without connection shall carry durable markings giving the following minimum information:

- cell designation as specified in 5.1;
- polarity;

- date of manufacture (which may be in code);
- name or identification of manufacturer or supplier.

6 Dimensions

6.1 Small prismatic cells and cylindrical cells

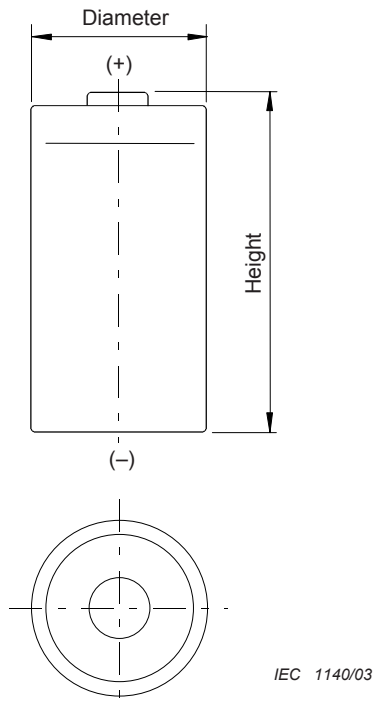


Figure 1 – Jacketed cylindrical cells

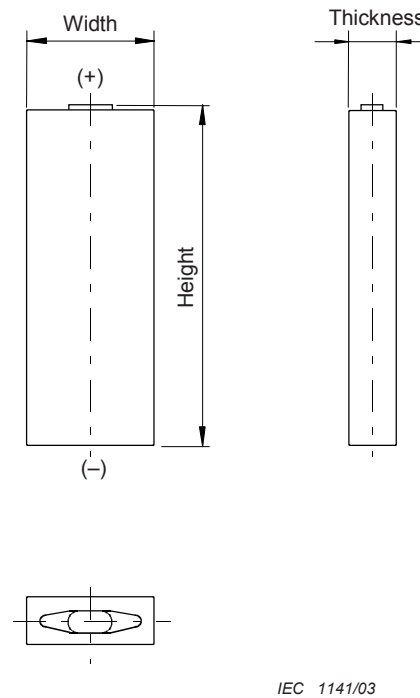


Figure 2 – Jacketed small prismatic cells