

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Secondary cells and batteries containing alkaline or other non-acid electrolytes – Portable sealed rechargeable single cells – Part 2: Nickel-metal hydride

Accumulateurs alcalins et autres accumulateurs à électrolyte non acide – Accumulateurs individuels portables étanches – Partie 2: Nickel-métal hydrure



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SECONDARY CELLS AND BATTERIES CONTAINING
ALKALINE OR OTHER NON-ACID ELECTROLYTES –
PORTABLE SEALED RECHARGEABLE SINGLE CELLS –****Part 2: Nickel-metal hydride**

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International Standard IEC 61951-2 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 third edition cancels and replaces the second edition published in 2003 of which it constitutes a technical revision.

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

- clause 4: addition of 2 parameters;
- clause 5: addition of cells type “S” and cells type “T”;
- subclause 6.1.2: addition of new cylindrical cells;
- subclause 7.8: addition of a specific test for “S” cells.

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

FDIS	Report on voting
21A/484/FDIS	21A/487/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 of the IEC 61951 series can be found, under the general title *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Portable sealed rechargeable single cells*, 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 web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

Part 2: Nickel-metal hydride

1 Scope

This part of IEC 61951 specifies marking, designation, dimensions, tests and requirements for portable sealed nickel-metal hydride, 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 60050-482, *International Electrotechnical Vocabulary – Part 482: Primary and secondary cells and batteries*

IEC 60086 (all parts), *Primary batteries*

IEC 60086-1 (2006), *Primary batteries – Part 1: General*

IEC 60086-2 (2006), *Primary batteries – Part 2: Physical and electrical specifications*

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

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

IEC 62133, *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*

3 Terms and definitions

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

3.1

nominal voltage

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

NOTE 1 The nominal voltage of a sealed nickel-metal hydride rechargeable single cell is 1,2 V.

NOTE 2 The nominal voltage of a battery of *n* series connected cells is equal to *n* times the nominal voltage of a single cell.

3.2**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 7.3.2

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

3.6**nickel-metal hydride cell**

cell containing a nickel hydroxide compound for the positive electrode, a hydrogen absorbing alloy for the negative electrode, and potassium hydroxide or other alkaline solution as electrolyte. Positive electrodes are isolated from negative electrodes by a separator

3.7**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

NOTE The nickel-metal hydride cell, however, may release gas towards the end of its life due to the accumulation of hydrogen in the cell.

3.8**portable cell**

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

3.9**surface temperature limited cell**

cell which performs a function that prevents the temperature increase from a certain standard point even at the moment of anomaly occurrence such as short circuit of cell

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) $\pm 2\%$ 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 designation and marking

5.1 Cell designation

5.1.1 Small prismatic cells and cylindrical cells

5.1.1.1 General

Sealed nickel-metal hydride small prismatic rechargeable single cells and cylindrical rechargeable single cells shall be designated by a 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 $7,0 I_t$ A.

When a cell is intended for permanent charge at elevated temperatures, typically higher than $40\text{ }^\circ\text{C}$, 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 higher than $50\text{ }^\circ\text{C}$, a letter "U" is placed after the letter L, M, H or X.

When a cell is intended for surface temperature limitation, a letter "S" is placed after the letter L or M.

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.

5.1.1.2 Small prismatic cells

Sealed nickel-metal hydride small prismatic rechargeable single cells shall be designated by the letters "HF" followed by a letter L, M, H or X followed by three groups of figures, each group being separated by a solidus, as follows:

- 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 HFL 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-metal hydride cylindrical rechargeable single cells shall be designated by the letters "HR" followed by a letter L, M, H or X followed by two groups of figures, each group being separated by a solidus, as follows:

- 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 cell, the designation of Table 2 shall also be marked on the cell.

EXAMPLE 1 HRL 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 HRLT 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 HRXR 23/43 designation identifies a cylindrical cell of very 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, R or S may indicate:

- 20- Size D;
- 14- Size C;
- 6- Size AA;
- 03- Size AAA.

NOTE Cells dimensionally interchangeable with primary cells correspond to M type unless otherwise specified

For the purpose of this explanation, an example is given below.

EXAMPLE 4 HRMR03 designation identifies a sealed nickel-metal hydride 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-metal hydride button rechargeable single cells shall be designated by the letters "HB" followed by two groups of figures separated by a solidus, as follows:

- 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 HB 116/054 designation identifies a button cell, with a maximum diameter of 11,6 mm and a maximum height of 5,4 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-metal hydride or Ni-MH;
- 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-metal hydride 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:

- 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

6.1.1 General

Figures 1 and 2 show the shape of the cells.

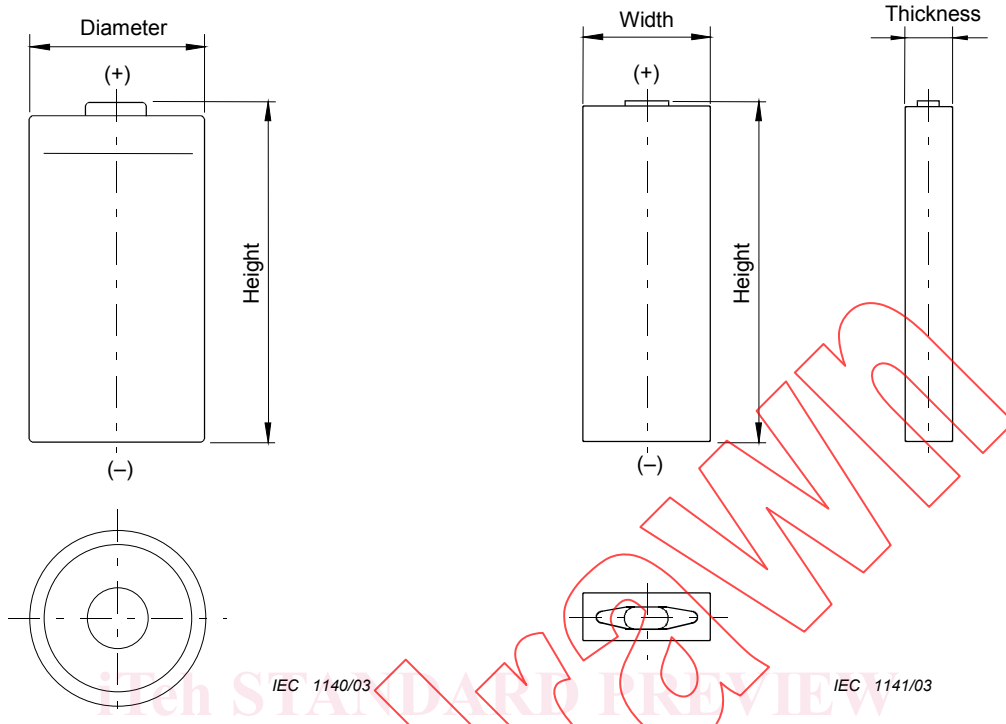


Figure 1 – Jacketed cylindrical cells

Figure 2 – Jacketed small prismatic cells

6.1.2 Small prismatic cells

Table 1 shows the dimensions for jacketed small prismatic cells.

Table 1 – Dimensions of jacketed small prismatic cells

Cell designation	Width mm	Thickness mm	Height mm		
HF 15/08/49	14,5 } 0 -1,0	7,4	48,2 } 0 -1,0		
HF 15/09/49		8,3			
HF 16/07/34 ^a		6,6			
HF 18/07/36		6,1		0 -0,7	
HF 18/07/49		6,1			
HF 18/09/49		8,3		48,2	
HF 18/07/68		6,1		67,3	
HF 18/11/68		10,7		0 -1,0	67,3
HF 18/18/68		17,3			67,3
HF 23/11/68		22,7			67,3
HF 23/15/68		22,7		14,5	67,3

^a New cell.

6.1.3 Cylindrical cells

6.1.3.1 Cells dimensionally interchangeable with primary cells

Table 2 gives the requirements relative to the dimensions for jacketed cylindrical cells which are dimensionally interchangeable with primary cells.

Table 2 – Jacketed cylindrical cells dimensionally interchangeable with primary cells

Cell Designation a	Type designation (reference) b	Corresponding primary cell CEI 60086 c	Nominal voltage (V)	Dimensions (mm)										
				A	B	C	D _d	E	F		G	Φ		ΦP
				Max	Min	Min	-	Max	Max	Min	Min	Max	Min	Max
HR03	AAA	R03 LR03	1,2	44,5	(43,3)	4,3	-	0,5	3,8	(2,0)	0,8	10,5	9,5	0,4
HR6	AA	R6 LR6		50,5	(49,2)	7,0	-	0,5	5,5	(4,2)	1,0	14,5	13,5	0,5
HR14	C	R14 LR14		50,0	(48,6)	13,0	-	0,9	7,5	(5,5)	1,5	26,2	24,9	1,0
HR20	D	R20 LR20		61,5	(59,5)	18,0	-	1,0	9,5	(7,8)	1,5	34,2	32,3	1,0

NOTE Figures in parentheses are reference values.

- a Cell designations shall be in accordance with the nomenclature rules given in IEC 60086-1.
- b In some countries, these cell types are also known as AAA (R 03); AA (R 6); C (R 14); D (R 20).
- c Carbon zinc cells (R) and alkaline primary cells (LR) shall be compliant with the provisions of IEC 60086-2, respectively.
- d There is no specification for the value "D" for sealed nickel-metal hydride cylindrical rechargeable single cells interchangeable with primary cells.

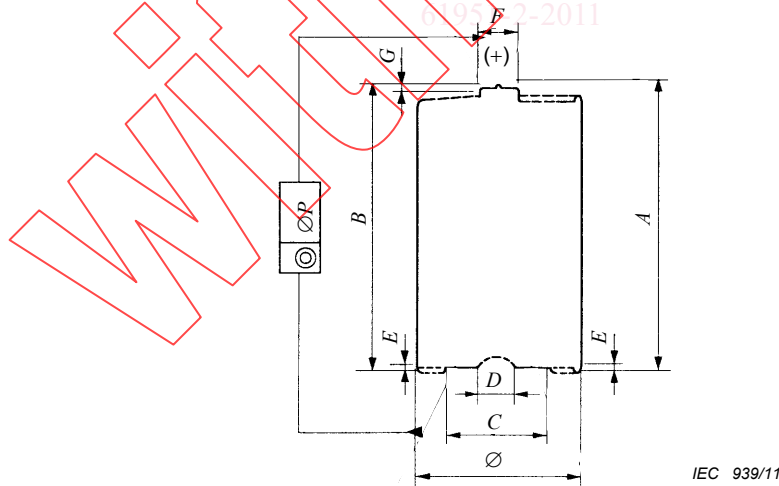


Figure 3 – Jacketed cells dimensionally interchangeable with primary cells

The cell dimensions of Figure 3 are given below:

- a) A: maximum overall height of the cell;
- b) B: minimum distance between the flats of the positive and the negative contacts;
- c) C: minimum outer diameter of the negative flat contact surface;
- d) D: maximum inner diameter of the negative flat contact surface;

- e) E : maximum recess of the negative flat contact surface;
- f) F : maximum diameter of the positive contact within the specified projection height;
- g) G : minimum projection of the flat positive contact;
- h) \varnothing : maximum and minimum diameters of the cell;
- i) $\varnothing P$: concentricity of the positive contact.

6.1.3.2 Cells not dimensionally interchangeable with primary cells

Table 3 shows the dimensions for jacketed cylindrical cells not dimensionally interchangeable with primary cells.

Table 3 – Jacketed cylindrical cells not dimensionally interchangeable with primary cells

Cell designation ^a	Diameter mm	Height mm
HR 11/45	10,5	44,5
HR 11/51	10,5	50,5
HR 11/67	10,5	67,0
HR 15/43	14,5	43,0
HR 15/49	14,5	49,0
HR 15/51	14,5	50,5
^b HR 15/67	15,0	67,0
HR 17/29	17,0	28,5
HR 17/43	17,0	43,0
HR 17/50	17,0	50,0
HR 17/67	17,0	67,0
^b HR 18/44	18,0	43,5
^b HR 18/67	18,0	67,0
^b HR 19/67	19,0	67,0
HR 23/34	23,0	34,0
HR 23/43	23,0	43,0
^b HR 23/44	23,0	43,5
^b HR 23/50	23,0	50,0
^b HR 23/60	23,0	61,0
HR 26/47	25,8	47,0
HR 26/50	25,8	50,0
HR 33/36	33,0	36,0
HR 33/62	33,0	61,5
HR 33/91	33,0	91,0
^b HR 34/60	33,5	59,5

^a The letters HR to be followed by L, M, H or X and T and/or R as appropriate (see 5.1).

^b 8 new cells.