IEC 62620

Edition 1.1 2023-05
CONSOLIDATED VERSION

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary lithium cells and batteries for use in industrial applications

Accumulateurs alcalins et autres accumulateurs à électrolyte non acide – Eléments et batteries d'accumulateurs au lithium pour utilisation dans les applications industrielles

IEC 62620:2014-11+AMD1:2023-05 CSV(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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IEC 62620 edition 1.1 contains the first edition (2014-11) [documents 21A/561/FDIS and 21A/572/RVD] and its amendment 1 (2023-05) [documents 21A/795/CDV and 21A/812/RVC].

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 62620 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 publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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- withdrawn,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 LITHIUM CELLS AND BATTERIES FOR USE IN INDUSTRIAL APPLICATIONS

1 Scope

This International Standard specifies marking, tests and requirements for lithium secondary cells and batteries used in industrial applications including stationary applications.

When there exists an IEC standard specifying test conditions and requirements for cells used in special applications and which is in conflict with this standard, the former takes precedence. (e.g. IEC 62660 series on road vehicles).

The following are some examples of applications that utilize the cells and batteries under the scope of this standard.

- Stationary applications: telecom, uninterruptible power supplies (UPS), electrical energy storage system, utility switching, emergency power and similar applications.
- Motive applications: fork-lift truck, golf cart, AGV, railway, and marine, excluding road vehicles.

Since this standard covers batteries for various industrial applications, it includes those requirements, which are common and minimum to the various applications.

This standard applies to cells and batteries. If the battery is divided into smaller units, the smaller unit can be tested as the representative of the battery. The manufacturer clearly declares the tested unit. The manufacturer may add functions, which are present in the final battery, to the tested unit.

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

ISO/IEC Guide 51*, Safety aspects – Guidelines for their inclusion in standards*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-482 and ISO/IEC Guide 51 as well as the following apply.

3.1
charge recovery
capacity recovery
capacity that a cell or battery can deliver after the charge following the charge retention test

Note 1 to entry: Charge retention is defined in 3.2.

3.2
charge retention
capacity retention
capacity that a cell or battery can deliver after storage, at a specific temperature, for a specific time without subsequent recharge as a percentage of the rated capacity

3.3
final voltage
end-of-discharge voltage
specified closed circuit voltage at which the discharge of a cell or battery is terminated

3.4
nominal voltage
suitable approximate value of the voltage used to designate or identify a cell or a battery

Note 1 to entry: The cell or battery manufacturer may provide the nominal voltage.

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.]

3.5
rated capacity
capacity value of a cell or battery determined under specified conditions and declared by the manufacturer

Note 1 to entry: The rated capacity is the quantity of electricity Cn Ah (ampere-hours) declared by the manufacturer which a single cell or battery can deliver during a n h period when charging, storing and discharging under the conditions specified in 6.3.1. n is 5 for an E, M and H discharge rate type cell or battery. n is 8, 10, 20 or 240 for an S discharge rate type battery.

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

3.6
cell
secondary lithium cell
secondary cell where electrical energy is derived from the insertion/extraction reactions of lithium ions or oxidation/reduction reaction of lithium between the negative electrode and the positive electrode

Note 1 to entry: The cell typically has an electrolyte that consists of a lithium salt and organic solvent compound in liquid, gel or solid form and has a metal or a laminate film casing. It is not ready for use in an application because it is not yet fitted with its final housing, terminal arrangement and electronic control device.

3.7
cell block
group of cells connected together in parallel configuration with or without protective devices (e.g. fuse or PTC) and monitoring circuitry

Note 1 to entry: It is not ready for use in an application because it is not yet fitted with its final housing, terminal arrangement and electronic control device.

3.8
module
group of cells connected together either in a series and/or parallel configuration with or without protective devices (e.g. fuse or PTC) and monitoring circuitry

3.9
battery pack
energy storage device, which is comprised of one or more cells or modules electrically connected

Note 1 to entry: It may incorporate a protective housing and be provided with terminals or other interconnection arrangement. It may include protective devices and control and monitoring, which provides information (e.g. cell voltage) to a battery system.

3.10
battery system
battery
system which incorporates one or more cells, modules or battery packs; it has a battery management system

Note 1 to entry: It may have cooling or heating units.

3.11
battery management system
BMS
electronic system associated with a battery which monitors and/or manages its state, calculates secondary data, reports that data and/or controls its environment to influence the battery's safety, performance and/or service life and has the functions to cut off in case of over charging, over current and over heating

Note 1 to entry: The function of the BMS can be assigned to the battery pack or to equipment that uses the battery.

Note 2 to entry: A BMS is sometimes also referred to as a BMU (battery management unit).

4 Parameters measurement tolerances

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

a) ±0,5 % for voltage;

b) ±1 % for current;

c) ±2 °C for temperature;

d) ±0,1 % for time;

e) ±1 % for dimensions.

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 any report of results.

5 Marking and designation

5.1 Marking

The marking items shown in Table 1 are indicated on the cell, battery system or instruction manual. When marked on the cell or battery system, each cell or battery system that is installed or maintained shall carry clear and durable markings giving the information.

The following options are allowed:

- if there are designations on a battery system, designations are not necessary on the battery pack, module or cell;

- if there are designations on a battery pack, designations are not necessary on the module and cell;
- if there are designations on a module, designations are not necessary on the cell.

However, for a transportable unit (i.e. a unit that is being shipped), it is necessary to provide the marking information on the main transportable unit or in its instruction manual. Furthermore, if there is a marking matter of arrangement between the purchaser and the manufacturer, it shall comply with the agreement.

See Table 1.

Each cell or battery that is installed or maintained shall carry clear and durable markings giving the following information:

- secondary (rechargeable) Li or Li-ion;
- polarity (can be deleted if there is an agreement between cell and pack manufacturer);
- date of manufacture (which may be in code);
- name or identification of manufacturer or supplier;
- rated capacity;
- nominal voltage;
- appropriate caution statement.

The model name and manufacturing traceability shall be marked on the cell and battery surface. The other items listed above can be marked on the smallest package or supplied with the cell or the battery.

The following information shall be marked on or supplied with the cell or the battery:

- disposal instructions;
- recommended charge instructions.

The following information shall be marked on the cell or when there is no marking place on the cell, it shall be marked in the manual.

- cell designation as specified in 5.2.

Table 1 – Marking

Marking information	Cell	Cell block Module or Battery pack	Battery system
Secondary (rechargeable) Li or Li-ion	R	R	R
Polarity (see NOTE 1)	R	R	R
Date of manufacture (which may be in code)* (see NOTE 2)	R	R	R
Name or identification of manufacturer or supplier	R	R	R [a]
Rated capacity	R	R	R [b]
Calculated rated capacity* [c]	--	--	R
Method for calculating rated capacity* [c]	--	--	R
Nominal voltage	R	R	R
Watt-hour* (see NOTE 3)	V	V	V
Appropriate caution statement (Including disposal instructions)	R	R	R
Cell designation as specified in 5.2	R	--	--
Battery designation as specified in 5.4	-	R	R
Recommended charge instructions	R	R	R
"R" = required; "V" = voluntary, "--" = unnecessary or not applicable			

a It is necessary to mark designations on the main battery system.

b Tested by main battery system; shall be indicated on the main battery system.

c If evaluated by testing the split unit of a battery system; it shall be indicated as the rated capacity and shall be the amount calculated by a reasonable method.

For example:
Measured rated capacity of module: 10 Ah
Number of modules connected in parallel: 5
Calculated rated capacity (Ah) = 10 Ah × 5 = 50 Ah

NOTE 1 There is an exception, see 5.1.

NOTE 2 The date can be in the form of a code.

NOTE 3 Watt-hour (Wh) designation on cell, module, battery pack or battery system is the rated capacity (Ah) or calculated rated capacity (Ah) as defined in table footnote [c] multiplied by the nominal voltage of the cell, module, battery pack or battery system according to the following formula:

Watt-hour (Wh) = Rated capacity (Ah) or Calculated rated capacity (Ah) × Nominal voltage (V)

5.2 Cell designation

Cells shall be designated with following form:

~~$A_1A_2A_3/N_2/N_3/N_4/A_4/T_LT_H/N_C$~~

$A_1A_2A_3N_2/N_3/N_4/A_4/T_LT_H/N_C$

where

A_1 designates the negative electrode basis in which:

I is carbon;

T is titanium;

X is other material.

***A*$_2$** designates the positive electrode basis in which:

C is cobalt;

F is iron;

Fp is iron phosphate;

N is nickel;

M is manganese;

Mp is manganese phosphate;

V is vanadium;

X is other material.

***A*$_3$** designates the shape of the cell in which:

R is cylindrical;

P is prismatic (including cell with laminate film case).

***A*$_4$** designates the rate capability of the cell in which:

E is low rate long-time discharge type;

M is medium rate discharge type;

H is high rate discharge type.

NOTE 1 These types of cells are typically but not exclusively used for the following discharge rates at +25 °C:

- E up to 0,5 I_t A,
- M up to 3,5 I_t A,
- H ~~up to and~~ above ~~7,0~~ 3,5 I_t A.

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

***T*$_L$** is the low temperature grade defined in 6.3.2. The information shall be indicated by the sign + or – followed by the temperature value in °C (e.g. -30, 0, +10);

***T*$_H$** is the high temperature grade defined in 6.6.2. The information shall be indicated by the sign + or – followed by the temperature value in °C (e.g. +40, +50). If a cell is designed only for cycle application, ***T*$_H$** should be mentioned as “NA”;

***N*$_C$** is the percentage (rounded down to every 5 % step) obtained by the ratio of capacity at 500 cycles by the rated capacity. Refer to 6.6.1 and 6.3.1. If a cell is designed only for stand-by application, ***N*$_C$** should be mentioned as “NA”;

***N*$_2$** is the maximum diameter (if R) or the maximum thickness (if P) in mm rounded up to the next whole number;

N*$_3$** is the maximum width (if P) in mm rounded up to the next whole number (N*$_3$** not shown if R);

***N*$_4$** is the maximum overall height in mm rounded up to the next whole number.

NOTE 3 If any dimension is less than 1 mm, the units used are tenths of millimetres and the single number is written tN such as ”t1” for 0,1 mm.

EXAMPLE 1 ----**INR54/222/H/-20+50/70** would designate a cylindrical Li-ion secondary cell, with a nickel-based positive electrode. Its maximum diameter is between 53 mm and 54 mm, and its overall height is between 221 mm and 222 mm. It is designed for high discharge rate. Its low temperature grade is -20 °C. Its high temperature grade is 50 °C. It applies for both cycle and stand-by application. Its capacity retention after 500 cycles to rated capacity is between 70 % and 74 %.

EXAMPLE 2 ---**ICP25/150/150/E/0+60/60** would designate a prismatic Li-ion secondary cell, with a cobalt-based positive electrode. Its maximum thickness is between 24 mm and 25 mm, its maximum width is between 149 mm and 150 mm, and its overall height is between 149 mm and 150 mm. It is designed for low discharge rate over a long period. Its low temperature grade is 0 °C. Its high temperature grade is 60 °C. It applies for both cycle and stand-by application. Its capacity after 500 cycles to rated capacity is between 60 % and 64 %.

EXAMPLE 3 ---**INR50/150/M/-30NA/75** would designate a cylindrical Li-ion secondary cell, with a nickel-based positive electrode. Its maximum diameter is between 49 mm and 50 mm, and its overall height is between 149 mm and 150 mm. It is designed for medium discharge rate. Its low temperature grade is -30 °C. Its high temperature grade is NA. It applies for cycle application only. Its capacity retention after 500 cycles to rated capacity is between 75 % and 79 %.