SLOVENSKI STANDARD
oSIST prEN IEC 62660-3:2021

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Sekundarni litij-ionski členi za pogon električnih cestnih vozil - 3. del: Varnostne zahteve

Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 3: Safety requirements

Lithium-Ionen-Sekundärzellen für den Antrieb von Elektrostraßenfahrzeugen - Teil 3: Sicherheitsanforderungen

Eléments d'accumulateurs lithium-ion pour la propulsion des véhicules routiers électriques - Partie 3: Exigences de sécurité

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COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 62660-3 ED2**	
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IEC TC 21 : SECONDARY CELLS AND BATTERIES	
SECRETARIAT: France	SECRETARY: Mr Yves Boudou
OF INTEREST TO THE FOLLOWING COMMITTEES: SC 21A,TC 69	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☒ SAFETY	
☒ SUBMITTED FOR CENELEC PARALLEL VOTING **Attention IEC-CENELEC parallel voting** The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 3: Safety requirements

PROPOSED STABILITY DATE: 2025

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SECONDARY LITHIUM-ION CELLS FOR THE PROPULSION OF ELECTRIC ROAD VEHICLES –

Part 3: Safety requirements

FOREWORD

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International Standard IEC 62660-3 has been prepared by IEC technical committee 21: Secondary cells and batteries.

This second edition cancels and replaces the first edition published in 2016. This edition constitutes a technical revision.

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

a) The new method for the internal short-circuit test has been added in 6.4.4.2.2 and Annex C, as an alternative option to the test in 6.4.4.2.1.

b) The vibration test has been deleted.

c) The test conditions of overcharge (6.4.2.2) have been partially revised.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
21/XX/FDIS	21/XX/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 62660 series, published under the general title *Secondary lithium-ion cells for the propulsion of electric road vehicles*, 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

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

A bilingual version of this publication may be issued at a later date.

The National Committees are requested to note that for this publication the stability date is 20XX.

THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE PUBLICATION STAGE.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

SECONDARY LITHIUM-ION CELLS FOR THE PROPULSION OF ELECTRIC ROAD VEHICLES –

Part 3: Safety requirements

1 Scope

This part of IEC 62660 specifies test procedures and acceptance criteria for safety performance of secondary lithium-ion cells and cell blocks used for propulsion of electric vehicles (EV) including battery electric vehicles (BEV) and hybrid electric vehicles (HEV).

This document intends to determine the basic safety performance of cells used in a battery pack and system under intended use and reasonably foreseeable misuse or incident, during the normal operation of the EV. The safety requirements of the cell in this document are based on the premise that the cells are properly used in a battery pack and system within the limits for voltage, current and temperature as specified by the cell manufacturer (cell operating region).

The evaluation of the safety of cells during transport and storage is not covered by this document.

NOTE 1 The safety performance requirements for lithium-ion battery packs and systems are defined in ISO 6469-1. The specifications and safety requirements for lithium-ion battery packs and systems of electrically propelled mopeds and motorcycles are defined in ISO 18243. IEC 62619 covers the safety requirements for the lithium-ion cells and batteries for industrial application including, e.g. forklift truck, golf cart, and automated guided vehicle.

NOTE 2 Information on the cell operating region is provided in Annex A.

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 61434, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Guide to the designation of current in alkaline secondary cell and battery standards*

IEC 62619:20--, [1] *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications*

IEC 62660-2:2018, *Secondary lithium-ion cells for the propulsion of electric road vehicles – Part 2: Reliability and abuse testing*

ISO/TR 8713, *Electrically propelled road vehicles – Vocabulary*

[1] Under development

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TR 8713 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
battery electric vehicle
BEV
electric vehicle with only a traction battery as power source for vehicle propulsion

3.2
cell block
a group of cells connected together in parallel configuration with or without protective devices, e.g. fuse or positive temperature coefficient resistor (PTC), not yet fitted with its final housing, terminal arrangement and electronic control device

3.3
cylindrical cell
cell with a cylindrical shape in which the overall height is equal to or greater than the diameter

[SOURCE: IEC 60050-482:2004, 482-02-39]

3.4
explosion
failure that occurs when a cell container, open violently and major components are forcibly expelled

3.5
fire
emission of flames from a cell or cell block for more than 1 s

Note 1 to entry: Sparks and arcing are not considered as flames.

3.6
hybrid electric vehicle
HEV
vehicle with both a rechargeable energy storage system and a fuelled power source for propulsion

3.7
internal short-circuit
unintentional electrical connection between the negative and positive electrodes inside a cell

3.8
leakage
visible escape of liquid electrolyte from a part except vent, such as case, sealing part and/or terminals of the cell

3.9
nominal voltage
suitable approximate value of the voltage used to designate or identify a cell

[SOURCE: IEC 60052-482:2004, 482-03-31, modified – Deletion of "a battery or an electrochemical system" at the end of the definition.]

3.10
pouch cell
cell having the shape of a parallelepiped whose faces are rectangular and with a prismatic flexible laminate film case housing

3.11
prismatic cell
cell having the shape of a parallelepiped whose faces are rectangular and with a prismatic hard case housing

[SOURCE: IEC 60050-482:2004, 482-02-38, modified − "qualifies a cell or a battery" has been replaced with "cell", and "and with a prismatic hard case housing" has been added.]

3.12
rated capacity
C_n

capacity value of a cell in ampere hours (Ah) determined under specified conditions and declared by the cell manufacturer

Note 1 to entry: n in Cn is the time base in hours (h). In this document, n = 3 for BEV application and n = 1 for HEV application unless otherwise specified.

3.13
reference test current
I_t
reference test current in amperes (A) which is expressed as

$$I_t = C_n / 1$$

Note 1 to entry: 1 has a dimension of time in hours (h).

Note 2 to entry: See IEC 61434:1996 [4], Clause 2.

3.14
rupture
mechanical failure of a container case of cell induced by an internal or external cause, resulting in exposure or spillage but not ejection of materials

3.15
secondary lithium-ion cell
cell
secondary single cell whose electrical energy is derived from the insertion/extraction reactions of lithium-ions between the negative electrode and the positive electrode

Note 1 to entry: The secondary cell is a manufactured unit providing a source of electrical energy by direct conversion of chemical energy. The cell consists of electrodes, electrolyte, container, terminals, and if any, separators. The electrode can be monopolar or bipolar. Current collector of the former has active material of single polarity and the latter has positive and negative electrode active materials. The electrolyte includes an ionic conductive liquid or solid, or a mixture of them. The cell is designed to be charged electrically.

3.16
state of charge
SOC
capacity in a cell expressed as a percentage of rated capacity

3.17
venting
release of excessive internal pressure from a cell in a manner intended by design to preclude rupture or explosion

4 Test conditions

4.1 General

Unless otherwise stated in this document, cells shall be tested at room temperature. The room temperature is 25 °C ± 2 K in this document.

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

Cell blocks can be tested as an alternative of cells according to the agreement between the cell manufacturer and the customer.

Concerning the cell for plug-in hybrid electric vehicle (PHEV), the cell manufacturer can select either the test condition of BEV application or HEV application.

NOTE Test and measurement can be conducted in a fixture as recommended by the cell manufacturer.

4.2 Measuring instruments

4.2.1 Range of measuring devices

The instruments used shall enable the values of voltage and current to be measured. The range of these instruments and measuring methods shall be chosen so as to ensure the accuracy specified for each test.

For analogue instruments, this implies that the readings shall be taken in the last third of the graduated scale.

Any other measuring instruments may be used provided they give an equivalent accuracy.

4.2.2 Voltage measurement

The resistance of the voltmeters used shall be at least 1 MΩ/V.

4.2.3 Current measurement

The entire assembly of ammeter, shunt and leads shall be of an accuracy class of 0,5 or better.

4.2.4 Temperature measurements

The cell temperature shall be measured by use of a surface temperature measuring device capable of an equivalent scale definition and accuracy of calibration as specified in 4.2.1. The temperature should be measured at a location which most closely reflects the cell or cell block temperature. The temperature may be measured at additional appropriate locations, if necessary.

The examples for temperature measurement are shown in Figure 1. The instructions for temperature measurement specified by the cell manufacturer shall be followed.