
Sekundarni litij-ionski členi za pogon električnih cestnih vozil - 1. del: Preskušanje zmogljivosti

Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 1:
Performance testing

Lithium-Ionen-Sekundärzellen für den Antrieb von Elektrostraßenfahrzeugen - Teil 1:
Prüfung des Leistungsverhaltens

Éléments d'accumulateurs lithium-ion pour la propulsion des véhicules routiers
électriques - Partie 1: Essais de performance

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TITLE:

Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 1: Performance testing

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**Secondary lithium-ion cells for the propulsion of electric road vehicles -
Part 1: Performance testing**

FOREWORD

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IEC 62660-1 has been prepared by IEC technical committee 21: Secondary cells and batteries. It is an International Standard.

This third edition cancels and replaces the first edition published in 2010. This edition constitutes a technical revision.

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

- a) The purpose of each test has been added.
- b) The power test has been revised for clarification, and an informative part of the current-voltage characteristic test has been moved to the new [Annex C](#).

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

Draft	Report on voting
21/XX/FDIS	21/XX/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all the 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 document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

The commercialization of electric road vehicles including battery, hybrid and plug-in hybrid electric vehicles has been accelerated in the global market, responding to the global concerns on CO₂ reduction and energy security. This, in turn, has led to rapidly increasing demand for high-power and high-energy-density traction batteries. Lithium-ion batteries are estimated to be one of the most promising secondary batteries for the propulsion of electric vehicles. In the light of the rapid spread of hybrid electric vehicles and the emergence of battery and plug-in hybrid electric vehicles, a standard method for testing performance requirements of lithium-ion batteries is indispensable for securing a basic level of performance and obtaining essential data for the design of vehicle systems and battery packs.

This document specifies performance testing for automobile traction lithium-ion cells that basically differ from the other cells including those for portable and stationary applications specified by other IEC standards. For automobile application, it is important to note the usage specificity; i.e. the design diversity of automobile battery packs and systems, and specific requirements for cells and batteries corresponding to each of such designs. Based on these facts, the purpose of this document is to provide a basic test methodology with general versatility, which serves a function in common primary testing of lithium-ion cells to be used in a variety of battery systems.

This document is associated with [ISO 12405-4:2018 \[1\]](#) .

[IEC 62660-2:2018 \[2\]](#) specifies the reliability and abuse testing for lithium-ion cells for electric vehicle application.

[IEC 62660-3:2022 \[3\]](#) specifies the safety requirements of lithium-ion cells for electric vehicle application.

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1 Scope

This part of IEC 62660 specifies performance and life testing of secondary lithium-ion cells used for propulsion of electric vehicles including battery electric vehicles (BEV) and hybrid electric vehicles (HEV).

This document specifies the test procedures to obtain the essential characteristics of lithium-ion cells for vehicle propulsion applications regarding capacity, power density, energy density, storage life and cycle life.

This document provides the standard test procedures and conditions for testing basic performance characteristics of lithium-ion cells for vehicle propulsion applications, which are indispensable for securing a basic level of performance and obtaining essential data on cells for various designs of battery systems and battery packs.

NOTE 1 Based on the agreement between the cell manufacturer and the customer, specific test conditions can be selected in addition to the conditions specified in this document. Selective test conditions are described in [Annex A](#).

NOTE 2 The test specification for lithium-ion battery packs and systems is defined in [ISO 12405-4:2018 \[1\]](#).

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.

ISO/TR 8713:2019, *Electrically propelled road vehicles — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TR 8713:2019 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

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

3.3

hybrid electric vehicle

HEV

vehicle with both a rechargeable energy storage system and a fuelled power source for propulsion

3.4**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: The subscript n in C_n is the time base in hours (h). In this document, $n = 3$ for BEV application and $n = 1$ for HEV application unless otherwise specified.

Note 2 to entry: Term and definition based on IEC 60050-482:2004, 482-03-15.

3.5 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.

3.6**room temperature**

temperature of $25\text{ °C} \pm 2\text{ K}$

3.7**secondary lithium-ion cell**

cell

secondary single cell whose electric energy is derived from the insertion and extraction reactions of lithium ions between negative electrode and positive electrode

Note 1 to entry: A secondary lithium-ion cell is a manufactured unit providing a source of electric 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; the 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 a mixture of liquid and solid.] The cell is designed to be charged electrically.

Note 2 to entry: Where the term "cell" is used alone in this document, it refers to a secondary lithium-ion cell".

3.8**state of charge**

SOC

quantity of [electricity] stored in a cell expressed as a percentage of rated capacity charge retention ability of a cell to retain capacity on open circuit under specified conditions of storage

3.9**pouch cell**

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

3.10**prismatic cell**

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

[SOURCE: IEC 60050-482:2004, 482-02-38, modified – The word "cell" has been added to the term, "qualifies a cell or a battery" has been replaced with "cell" in the definition, and "and with a prismatic hard case housing" has been added.]