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

INTERNATIONAL
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 1: Performance testing

FOREWORD

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This Redline version provides you with a quick and easy way to compare all the changes between this standard and its previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

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

This second 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:

FDIS	Report on voting
21/975/FDIS	21/985/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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 "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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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 CO_2 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 ~~rapidly diffusing~~ 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 12405-1 and ISO 12405-2~~[1] ISO 12405-4 [1][2].

IEC 62660-2 [2] specifies the reliability and abuse testing for lithium-ion cells for electric vehicle application.

IEC 62660-3 [3] specifies the safety requirements of lithium-ion cells for electric vehicle application.

~~1 Under consideration.~~

2 Numbers in square brackets refer to the Bibliography.

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

Part 1: Performance testing

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).

NOTE 1 Secondary lithium-ion cell used for propulsion of plug-in hybrid electric vehicle (PHEV) can be tested by the procedure either for BEV application or HEV application, according to the battery system design, based on the agreement between the cell manufacturer and the customer.

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 2 Based on the agreement between the cell manufacturer and the customer, specific test conditions ~~may~~ can be selected in addition to the conditions specified in this document. Selective test conditions are described in Annex A.

NOTE 3 The performance tests for the electrically connected lithium-ion cells ~~may~~ can be performed with reference to this document.

NOTE 4 The test specification for lithium-ion battery packs and systems is defined in ~~ISO 12405-1 and ISO 12405-2 (under consideration)~~ ISO 12405-4 [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.

~~IEC 60050-482, *International Electrotechnical Vocabulary – Part 482: Primary and secondary cells and batteries*~~

~~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*~~

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

IEC 62660-1

Edition 2.0 2018-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

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

IEC 62660-1:2018-12(en-fr)

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

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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ÉLÉMENTS D'ACCUMULATEURS LITHIUM-ION POUR LA PROPULSION DES VÉHICULES ROUTIERS ÉLECTRIQUES –

Partie 1: Essais de performance

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Cette deuxième édition annule et remplace la première édition parue en 2010. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) L'objet de chaque essai a été ajouté.
b) L'essai de puissance a été révisé pour clarification, et une partie informative de l'essai des caractéristiques courant-tension a été transférée à la nouvelle Annexe C.

Le texte de cette Norme internationale est issu des documents suivants:

FDIS	Rapport de vote
21/975/FDIS	21/985/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette Norme internationale.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Une liste de toutes les parties de la série IEC 62660, publiées sous le titre général *Éléments d'accumulateurs lithium-ion pour la propulsion des véhicules routiers électriques*, peut être consultée sur le site web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "http://webstore.iec.ch" dans les données relatives au document recherché. À cette date, le document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

INTRODUCTION

La commercialisation des véhicules routiers électriques, comprenant les véhicules électriques à batterie, les véhicules électriques hybrides et les véhicules électriques hybrides rechargeables, a été accélérée sur le marché international, répondant ainsi aux préoccupations mondiales concernant la réduction du CO_2 et la sécurité en matière d'énergie. Par voie de conséquence, cela a conduit à une demande rapidement croissante de batteries de traction de forte puissance et de grande densité énergétique. Il est estimé que les batteries lithium-ion sont les accumulateurs les plus prometteurs pour la propulsion des véhicules électriques. Du fait de la diffusion rapide des véhicules électriques hybrides et de l'émergence des véhicules électriques à batterie et hybrides rechargeables, une méthode normalisée d'essai relative aux exigences de performance des batteries lithium-ion est indispensable pour fixer un niveau de performance de base et obtenir des données essentielles pour la conception des systèmes des véhicules et des packs de batteries.

Le présent document spécifie les essais de performance des éléments lithium-ion destinés à la traction automobile qui diffèrent fondamentalement des autres éléments y compris ceux destinés aux applications portatives et fixes spécifiées par d'autres normes IEC. Dans le cas d'une application automobile, il est important de tenir compte de la spécificité d'usage, c'est-à-dire la diversité de conception des packs et des systèmes de batteries pour automobile, ainsi que de la diversité des exigences spécifiques relatives aux éléments et aux batteries correspondant à chacune de ces conceptions. Basé sur ces faits, le but du présent document est de fournir une méthodologie fondamentale d'essai ayant une polyvalence générale, remplissant une fonction d'essais préliminaires communs pour les éléments lithium-ion destinés à être utilisés dans divers systèmes de batteries.

Le présent document est associé à l'ISO 12405-4 [1][1].

L'IEC 62660-2 [2] spécifie les essais de fiabilité et de traitement abusif des éléments lithium-ion pour application aux véhicules électriques.

L'IEC 62660-3 [3] spécifie les exigences de sécurité des éléments lithium-ion pour application aux véhicules électriques.

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1 Les chiffres entre crochets se réfèrent à la Bibliographie.

ÉLÉMENTS D'ACCUMULATEURS LITHIUM-ION POUR LA PROPULSION DES VÉHICULES ROUTIERS ÉLECTRIQUES –

Partie 1: Essais de performance

1 Domaine d'application

La présente partie de l'IEC 62660 spécifie les essais de performance et de durée de vie des accumulateurs lithium-ion utilisés pour la propulsion des véhicules électriques, incluant les véhicules électriques à batterie (BEV) et les véhicules électriques hybrides (HEV).

NOTE 1 Les éléments d'accumulateurs lithium-ion pour la propulsion des véhicules électriques hybrides rechargeables (PHEV) peuvent être soumis à l'essai avec la procédure pour application BEV ou pour application HEV, selon la conception des systèmes de batteries, sur la base de l'accord entre le fabricant de l'élément et le client.

Le présent document spécifie les procédures d'essai afin d'obtenir les caractéristiques essentielles des éléments lithium-ion destinés aux applications de propulsion de véhicules; ces caractéristiques concernent la capacité, la densité de puissance, la densité d'énergie, la durée de stockage et la durée de vie.

Le présent document spécifie les procédures d'essai et les conditions normalisées pour effectuer les essais des caractéristiques de performance fondamentales des éléments lithium-ion destinés aux applications de propulsion de véhicules; ces caractéristiques sont indispensables pour fixer un niveau de performance de base et obtenir des données essentielles pour différentes conceptions de systèmes de batteries et de packs de batteries.

NOTE 2 En plus des conditions spécifiées dans le présent document, des conditions d'essai spécifiques, basées sur un accord entre le fabricant de l'élément et le client, peuvent être choisies. Des conditions d'essai sélectives sont décrites à l'Annexe A.

NOTE 3 Les essais de performance des éléments lithium-ion connectés électriquement peuvent être effectués en faisant référence au présent document.

NOTE 4 La spécification d'essai pour les packs et systèmes de batteries est définie dans l'ISO 12405-4 [1].

2 Références normatives

Les documents suivants cités dans le texte constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

ISO/TR 8713, *Véhicules routiers électriques – Vocabulaire*