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**Electrically propelled road vehicles —  
Test specification for lithium-ion  
traction battery packs and systems —**

Part 4:  
**Performance testing**

*Véhicules routiers à propulsion électrique — Spécifications d'essai  
pour packs et systèmes de batterie de traction aux ions lithium —*

*Partie 4: Essais de performance*



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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. [www.iso.org/directives](http://www.iso.org/directives)

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. [www.iso.org/patents](http://www.iso.org/patents)

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 37, *Electrically propelled vehicles*.

This document cancels and replaces ISO 12405-1:2011 and ISO 12405-2:2012 by summarizing the test specifications.

## Introduction

Lithium-ion-based battery systems are an efficient alternative energy storage system for electrically propelled vehicles. The requirements for lithium-ion based battery systems for use as a power source for the propulsion of electric road vehicles are significantly different from those batteries used for consumer electronics or stationary usage.

This document provides specific test procedures for lithium-ion battery packs and systems specially developed for propulsion of road vehicles. This document specifies such tests and related requirements to ensure that a battery pack or system is able to meet the specific needs of the automobile industry. It enables vehicle manufactures to choose test procedures to evaluate the characteristics of a battery pack or system for their specific requirements.

ISO 12405 specifies test procedures for lithium-ion battery packs and systems which are connected to the electric propulsion system of electrically propelled vehicles.

The objective of ISO 12405 is to specify standard test procedures for the basic characteristics of performance, reliability and electrical functionality of lithium-ion battery packs and systems and to assist the user in comparing the test results achieved for different battery packs or systems.

NOTE 1 The general safety relevant tests and requirements are given in ISO 6469-1<sup>1)</sup>.

NOTE 2 Environmental conditions and testing will be given in the future ISO 19453-6<sup>2)</sup>.

For specifications for battery cells, see IEC 62660-1 to 3.

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1) Under preparation. Stage at the time of publication: ISO/DIS 6469-1.

2) Under preparation. Stage at the time of publication: ISO/CD 19453-6.

# Electrically propelled road vehicles — Test specification for lithium-ion traction battery packs and systems —

## Part 4: Performance testing

### 1 Scope

This document specifies test procedures for the basic characteristics of performance, reliability and electrical functionality for the battery packs and systems for either high-power or high-energy application. Unless otherwise stated, the test applies to both applications.

NOTE 1 Typical applications for high-power battery packs and systems are hybrid electric vehicles (HEVs) and some type of fuel cell vehicles (FCVs).

NOTE 2 Typical applications for high-energy battery packs and systems are battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs) and some type of fuel cell vehicles (FCVs).

NOTE 3 Testing on cell level is specified in IEC 62660 series.

### 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 6469-1<sup>3)</sup>, *Electrically propelled road vehicles — Safety specifications — Part 1: On-board rechargeable energy storage system (RESS)*

ISO 6469-3<sup>4)</sup>, *Electrically propelled road vehicles — Safety specifications — Part 3: Protection of persons against electric shock*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions 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 <https://www.iso.org/obp>

#### 3.1

##### **battery control unit**

##### **BCU**

electronic device that controls, manages, detects or calculates electric and thermal functions of the *battery system* (3.3) and that provides communication between the battery system and other vehicle controllers

Note 1 to entry: See A.3.1 for further explanations.

3) Under preparation. Stage at the time of publication: ISO/DIS 6469-1.

4) Under preparation. Stage at the time of publication: ISO/DIS 6469-3.