
**Road vehicles — Environmental
conditions and testing for electrical
and electronic equipment for
drive system of electric propulsion
vehicles —**

Part 6:
Traction battery packs and systems

*Véhicules routiers — Spécifications d'environnement et essais
de l'équipement électrique et électronique pour les véhicules à
propulsion électrique —*

Partie 6: Packs et systèmes de batterie de traction





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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 (see www.iso.org/directives).

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For an explanation of 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 World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 32, *Electrical and electronic components and general system aspects*.

A list of all parts in the ISO 19453 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

For over fifty years, traction batteries for electric vehicles have been developed to achieve high energy density and high power output. Specifically, lead-acid battery, Ni-Cd battery and Ni-MH battery with aqueous electrolyte were most applied to electric vehicles in the early days. Thermal activated batteries, such as molten salt batteries like sodium sulphur battery and Zebra battery were also examined. Lithium ion battery penetrated the consumer market in portable battery application from 1991. Currently, it is the most promising candidate of traction battery for electric vehicles. ISO 6469-1 specifies safety requirement of RESS (Rechargeable Energy Storage System) and the ISO 12405 series has been published to specify performance and reliability tests. This document focuses on environmental and endurance tests of lithium ion battery systems.

The ISO 19453 series specifies the test conditions on environment and reliability for electrical and electric equipment for the drive system of electric propulsion vehicles. The battery pack or system is the electric system which charges and discharges electricity through the converter. The test condition for mechanical load in ISO 19453-3 is too severe to apply to the battery pack or system from the standpoint of frequency range and amplitude of vibration in the test input spectrum. The test conditions for climatic load in ISO 19453-4 is also excessive to apply to the battery pack or system, because lithium ion battery pack is designed to control temperature within adequate operational range. That is the reason why appropriate conditions for the lithium ion battery are specified in this document.

The purpose of this document is to assist its user in systematically defining and/or applying a set of internationally accepted environmental conditions, tests and operating requirements, which are based on the anticipated actual environment in which the equipment will be operated and exposed to during its life cycle. This document has been developed based on fundamental investigations and vehicle measurements on voltage class A and B battery pack/system. The following environmental factors have been considered in the development of the ISO 19453 series.

— World geography and climate

Electric propulsion vehicles are operated in nearly all terrestrial regions of the earth. Significant variation in environmental conditions due to climatic environment, including diurnal and seasonal cycles, can therefore be expected. Consideration has been given to worldwide ranges in the temperature, humidity, precipitation and atmospheric conditions including dust, pollution and altitude.

— Type of electric propulsion vehicle

Operating environment in an electric propulsion vehicle can depend on its electric powertrain architecture as well as its mass, size, supply voltage and so on. Consideration has been given to typical types of series production electric propulsion vehicle architectures such as hybrid electric vehicles, battery electric vehicles, range extender hybrid electric vehicles and fuel cell vehicles, but not including equipment specific for fuel cell system.

— Vehicle use conditions and operating modes

Environmental conditions in and on the vehicle vary significantly with vehicle use (e.g. driving, charging during parking, etc.). Operating modes, such as starting, driving, braking, stopping and so on, have been considered, in particular, for traction battery system.

— Battery durability

For battery system, it is necessary to be resistant to environmental conditions experienced during manufacture, shipping, handling, storage, vehicle assembly, vehicle usage and vehicle maintenance and repair.

— Component mass and volume

The mass of battery pack is generally in the range of around 20 kg up to 60 kg for HEV, 80 kg to 150 kg for PHEV, more than 200 kg for BEV (weight assumptions from year 2020). The battery pack has generally