



BSI Standards Publication

Road vehicles — Rechargeable batteries with internal energy storage — Performance and durability of alkali-Ion (Li-Ion, Na-Ion), Pb, NiMH and combined chemistries EV modules and batteries

National foreword

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The UK participation in its preparation was entrusted to Technical Committee PEL/21, Secondary cells and batteries.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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English Version

Road vehicles - Rechargeable batteries with internal energy storage - Performance and durability of alkali-Ion (Li-Ion, Na-Ion), Pb, NiMH and combined chemistries EV modules and batteries

Véhicules routiers - Batteries rechargeables avec stockage interne d'énergie - Performance et durabilité des modules et batteries alcalins-ion (Li-Ion, Na-Ion), Pb, NiMH et des chimies combinées pour véhicules électriques

Straßenfahrzeuge - Wiederaufladbare Batterien mit internem Speicher - Unmittelbare Leistung von Modulen und Batterien für Elektrofahrzeuge mit Li-Ion, Pb, NiMH und kombinierter Chemie

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European foreword

This document (EN 18060:2025) has been prepared by Technical Committee CEN/TC 301 “Road vehicles”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2026, and conflicting national standards shall be withdrawn at the latest by April 2026.

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For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

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Introduction

The European Commission published the standardization request M/579 to the European standardization organisations as regards to performance and durability requirements for batteries.

Battery systems are an efficient energy storage system for electrically propelled vehicles. The performance requirements for electric road vehicles battery systems are significantly different from those batteries used for consumer electronics or stationary energy storage. The state of charge window that is accessible for the vehicle application is defined by durability and safety requirements.

This document provides specific performance test procedures for EV batteries.

It enables vehicle manufacturers to choose test procedures to evaluate the characteristics of EV battery systems, battery packs, battery modules and battery cells for their specific requirements.

This document specifies test procedures for alkali-Ion (Li-ion, Na-ion), Pb, NiMH and combined chemistries for EV battery systems, battery packs, battery modules and battery cells to obtain performance and durability values for rated capacity, power, internal resistance, and energy round trip efficiency.

1 Scope

This document describes the performance and durability test procedures and calculation methods for alkali-ion (for example Li-ion, Na-ion), Pb, NiMH and combined chemistries EV battery systems, battery packs, battery modules and battery cells. This document considers the most appropriate metric based on application for electrical performance between different models/products on the market. It specifies performance test procedures and calculation methods to obtain performance and durability values for:

- rated capacity (in Ah) and capacity fade (in %);
- power (in W) and power fade (in %);
- internal resistance (in Ω) and internal resistance increase (in %);
- energy round trip efficiency and its fade (in %);
- expected lifetime (number of reference cycles).

2 Normative references

There are no normative references in this document.

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 <http://www.iso.org/obp>

3.1

battery

device delivering electrical energy generated by direct conversion of chemical energy, having internal or external storage, and consisting of one or more non-rechargeable or rechargeable battery cells, modules or of packs of them, and includes a battery that has been subject to preparation for re-use, preparation for repurposing, repurposing, or remanufacturing

[SOURCE: Regulation (EU) 2023/1542]

3.2

battery cell

basic functional unit in a battery, composed of electrodes, electrolyte, container, terminals and, if applicable, separators, and containing the active materials the reaction of which generates electrical energy

[SOURCE: Regulation (EU) 2023/1542]

3.3**battery control unit****BCU**

electronic device that controls, manages, detects or calculates electric and thermal functions of the *battery system* (3.9) and that provides communication between the battery system and other vehicle controllers

[SOURCE: ISO 12405-4:2018, 3.1]

3.4**battery electric vehicle****BEV**

vehicle equipped with a powertrain containing exclusively electric machines as propulsion energy converters and exclusively rechargeable electric energy storage systems as propulsion energy storage systems

[SOURCE: UNECE Global technical regulation No. 15 on Worldwide harmonized Light vehicles Test Procedures]

3.5**battery management system****BMS**

electronic device that controls or manages the electric and thermal functions of the battery in order to ensure the battery's safety, performance and service life, manages and stores the data for the parameters for determining the battery's state of health and expected lifetime and communicates with the vehicle, light means of transport or appliance in which the battery is incorporated, or with a public or private charging infrastructure

[SOURCE: Regulation (EU) 2023/1542]

3.6**battery manufacturer**

any natural or legal person who manufactures a battery or has a battery designed or manufactured, and markets that battery under its own name or trademark or puts it into service for its own purposes

[SOURCE: Regulation (EU) 2023/1542]

3.7**battery module**

set of battery cells that are connected together or encapsulated within an outer casing to protect the cells against external impact, and which is meant to be used either alone or in combination with other modules

Note 1 to entry: Battery modules may or may not include parts of the BMS such as sensors and/or electronics.

Note 2 to entry: Battery module encapsulation can also manage internal stress from the cells.

Note 3 to entry: Battery module is a voluntary design feature of an EV battery.

[SOURCE: Regulation (EU) 2023/1542]