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**Cestna vozila - Polnilne baterije z notranjim shranjevanjem energije - Delovanje alkalno-ionskih (Li-Ion, Na-Ion), Pb, NiMH in kombiniranih kemikalij Moduli in baterije za električna vozila**

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

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

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

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EUROPEAN STANDARD  
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**prEN 18060**

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ICS

English Version

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

Véhicules routiers - Batteries rechargeables avec stockage d'énergie interne - Performance instantanée des modules et batteries Li-Ion, Pb, NiMH et 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

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 301.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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**prEN 18060:2024 (E)****European foreword**

This document (prEN 18060:2024) has been prepared by Technical Committee CEN/TC 301 “Road vehicles”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

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

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## Introduction

European Commission published the standardization request M/579 to the European standardization organisations as regards to performance and sustainability 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 battery systems, battery packs and battery modules.

It enables vehicle manufacturers to choose test procedures to evaluate the characteristics of EV battery systems, battery packs and battery modules 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 and battery modules to obtain performance values for rated capacity, rated power, internal resistance, and energy round trip efficiency.

NOTE EV cells performance standard is under drafting in CLC/TC21X/WG 7.

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## prEN 18060:2024 (E)

### 1 Scope

This document describes the performance test procedures and calculation methods for alkali-ion (for example Li-ion, Na-ion), Pb, NiMH and combined chemistries EV battery systems, battery packs and battery modules. 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 values for:

- rated capacity (in Ah);
- power (in W);
- internal resistance (in  $\Omega$ );
- energy round trip efficiency (in %);
- expected lifetime (number of reference cycles).

The tests in this document are relevant for EV battery systems, battery packs and battery modules intended for the following applications:

- motor vehicles, including M, N and O categories referred to in Article 2 of Regulation (EU) 2018/858 of the European Parliament and of the Council with traction battery;
- L-category vehicles referred to in Article 2 of Regulation EU 168/2013 of the European Parliament and of the Council with traction battery of more than 25kg.

NOTE 1 Other chemistry can be included in the scope of this document.

NOTE 2 These procedures could be used for type testing of a model/product at begin of life (status 'original') and for individual battery testing after change of status (status 'reused' and 'remanufactured').

These tests for parameters above are performed at component level outside the vehicle.

### 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, including a battery that has been subject to preparing for re-use, preparing for repurpose or repurposing, or remanufacturing

[SOURCE: regulation (EU) 2023/1542]

#### 3.2

##### **battery cell**

basic functional unit in a battery constituted by 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* (3.8) 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]

**prEN 18060:2024 (E)****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, that manages and stores the data on the parameters for determining the state of health (and expected lifetime of batteries laid down in Annex VII) and that communicates with the vehicle, light means of transport (with a weight above 25 kg) or appliance in which the battery is incorporated, or with a public or private charging

[SOURCE: regulation (EU) 2023/1542]

**3.6****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 stand-alone or in combination with other modules

[SOURCE: regulation (EU) 2023/1542]

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

**3.7****battery pack**

set of battery cells or modules that are connected together or encapsulated within an outer casing, so as to form a complete unit that the end-user is not intended to split up or open

[SOURCE: regulation (EU) 2023/1542]

**3.8****battery producer**

manufacturer, importer or distributor or other natural or legal person who, irrespective of the selling technique used, including by means of distance contracts as defined in Article 2(7) of Directive 2011/83/EU, alternatively:

(i) is established in a Member State and manufactures batteries under its own name or trademark, or has batteries designed or manufactured and supplies them for the first time under its own name or trademark, including those incorporated in appliances, light means of transport or vehicles, within the territory of that Member State;

(ii) is established in a Member State and resells within the territory of that Member State, under its own name or trademark, batteries, including those incorporated in appliances, light means of transport or vehicles, manufactured by others. A reseller is not regarded as the 'producer' if the brand of the manufacturer appears on the batteries, as provided for in point (i);

(iii) is established in a Member State and supplies for the first time in this Member State on a professional basis, batteries, including those incorporated in appliances, light means of transport or vehicles, from a third country or from another Member State;

(iv) sells batteries, including those incorporated in appliances, light means of transport or vehicles, by means of distance communication directly to end-users, that are either private households or other than private households, in a Member State, and is established in another Member State or in a third country

### 3.9

#### **battery system**

energy storage device that includes cells or cell assemblies or *battery pack(s)* (3.6) as well as electrical circuits and electronics

Note 1 to entry: Examples of electronics are the BCU and contactors.

[SOURCE: ISO 12405-4:2018, 3.3]

### 3.10

#### **capacity fade**

decrease over time and upon usage in the amount of charge that a battery can deliver at the rated current, with respect to the original rated capacity

Note 1 to entry: The EU regulation states rated voltage instead of rated current under reference condition and the test is defined in 4.1.X.

[SOURCE: regulation (EU) 2023/1542]

### 3.11

#### **cell electronics**

electronic device that collects and possibly monitors thermal or electric data of cells or cell assemblies and contains electronics for cell balancing, if necessary

Note 1 to entry: The cell electronics can include a cell controller. The functionality of cell balancing can be controlled by the cell electronics or by the BCU.

[SOURCE: ISO 12405-4:2018, 3.5]

### 3.12

#### **charge level**

ratio of available charge in relation to actual capacity

Note 1 to entry: Actual capacity means the amount of charge that a fully charged battery can deliver.

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### 3.13

#### **charge rate**

electric current at which a secondary cell or battery is charged

Note 1 to entry: The charge rate is expressed as the reference current  $I_t = C_r/n$  where  $C_r$  is the rated capacity declared by the manufacturer and  $n$  is the time base in hours for which the rated capacity is declared.

[SOURCE: IEC 60050-482:2004, 482-05-45]

### 3.14

#### **combined battery and capacitor systems**

systems combining both battery component and capacitor component which are used to supply electric energy