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Replacing GB/T 31486-2015

**Electrical performance requirements and test methods for
traction battery of electric vehicle**

电动汽车用动力蓄电池电性能要求及试验方法

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Foreword

This document was drafted in accordance with the rules given in GB/T 1.1-2020 "Directives for standardization - Part 1: Rules for the structure and drafting of standardizing documents".

This document replaces GB/T 31486-2015 "Electrical performance requirements and test methods for traction battery of electric vehicle". Compared with GB/T 31486-2015, apart from structural and editorial changes, the main technical changes are as follows:

- the scope has been changed (see Clause 1; Clause 1 of the 2015 edition);

- the terms and definitions have been changed (see Clause 3; Clause 3 of the 2015 edition);
- the test object has been changed (see Clauses 5 and 6; 5.2 and 6.3 of the 2015 edition);
- requirements for the range of high-temperature charge retention capacity, recovery capacity and energy efficiency have been added (see 5.9);
- requirements for the range of storage recovery capacity and energy efficiency have been added (see 5.10);
- the vibration resistance requirements and test method for the battery module have been deleted (see 5.2.10 and 6.3.11 of the 2015 edition);
- the environmental conditions have been changed, and requirements for environmental adaptation and for the high and low temperature test chamber have been added (see 6.1.1; 6.1.1 of the 2015 edition);
- the test process error, the data recording and the recording interval have been added (see 6.1.3, 6.1.4 and 6.2.6);
- the standard charge has been changed (see 6.2.4; 6.2.4 of the 2015 edition);
- the discharge currents for room temperature discharge capacity, room temperature rate discharge capacity, low temperature discharge capacity, high temperature discharge capacity, charge retention and capacity recovery, and storage have been changed (see 6.2.5, 6.2.6, 6.2.8, 6.2.9, 6.2.10 and 6.2.11; 6.3.5, 6.3.6, 6.3.8, 6.3.9, 6.3.10 and 6.3.12 of the 2015 edition);
- the specific power test has been deleted (see 6.3.6 of the 2015 edition);
- the charging current for the room temperature rate charge performance test has been changed (see 6.2.7; 6.3.7 of the 2015 edition);
- the test temperature for the high temperature discharge capacity has been changed (see 6.2.9; 6.3.9 of the 2015 edition).

The previous versions of this document, and of the document it replaces, are: first issued in 2015 as GB/T 31486-2015; this is the first revision.

1 Scope

This document specifies the electrical performance requirements for traction battery cells used in electric vehicles - referred to below as "battery cells" - and describes the corresponding test methods.

It applies to lithium-ion battery cells and nickel-metal hydride battery cells fitted to electric vehicles. Cells of other types may be tested by reference to this document.

2 Normative references

The contents of the following documents constitute indispensable provisions of this document through normative reference in the text. For dated references, only the version corresponding to that date applies; for undated references, the latest version - including all amendments - applies.

GB/T 10592-2023 High and low temperature test chambers - Technical requirements · GB/T 19596 Terminology of electric vehicles · GB 38031 Electric vehicles traction battery safety requirements

3 Terms and definitions

The terms and definitions given in GB/T 19596 and GB 38031, together with the following, apply to this document.

3.1 high energy battery - a battery whose ratio of maximum allowable output electrical power (W) to discharge energy at the $3I?$ rate (Wh) is below 10 at room temperature. Note: high energy batteries are generally used in battery electric vehicles and plug-in hybrid electric vehicles. [SOURCE: GB/T 19596-2017, 3.3.1.1.1.3, modified]

3.2 high power battery - a battery whose ratio of maximum allowable output electrical power (W) to discharge energy at the $1I?$ rate (Wh) is not below 10 at room temperature. Note: high power batteries are generally used in hybrid electric vehicles. [SOURCE: GB/T 19596-2017, 3.3.1.1.1.4, modified]

3.3 rated capacity - the capacity value in Ah, declared by the manufacturer, measured at room temperature after a full charge, at a discharge current of $1I?$ for a high energy battery and $1I?$ for a high power battery. [SOURCE: GB/T 19596-2017, 3.3.3.4.2, modified]

3.4 rated energy - the energy value in Wh, declared by the manufacturer, measured at room temperature after a full charge, at a discharge current of $1I?$ for a high energy battery and $1I?$ for a high power battery. [SOURCE: GB/T 19596-2017, 3.3.3.5.3, modified]

3.5 initial capacity - the capacity in Ah delivered by a newly manufactured traction battery at room temperature, after a full charge, when discharged at $1I?$ for a high energy battery or $1I?$ for a high power battery down to the end-of-discharge condition specified by the manufacturer. [SOURCE: GB/T 19596-2017, 3.3.3.5.1, modified]

4 Symbols

The following symbols apply to this document. $I?$ is the 3 h rate discharge current in A, numerically equal to one third of the rated capacity. $I?$ is the 1 h rate discharge current in A, numerically equal to the rated capacity.

5 Performance requirements

5.1 Appearance. Examined in accordance with 6.2.1, the cell shall show no deformation or cracks; its surface shall be free of burrs, dry, undamaged and free of contamination, and shall carry clear and correct markings.

5.2 Polarity marking. Examined in accordance with 6.2.2, the polarity marking of the terminals shall be correct and clear.

5.3 Mass and overall dimensions. Examined in accordance with 6.2.3, the mass and the overall dimensions of the cell shall comply with the product technical specification provided by the manufacturer.

5.4 Room temperature discharge capacity. Tested in accordance with 6.2.5, the initial capacity shall be not lower than the rated capacity and shall not exceed 110 % of it; at the same time the range of initial capacity across all test objects shall not exceed 5 % of the mean initial capacity. Note: the range is the difference between the highest and the lowest value among the samples.

5.5 Room temperature rate discharge capacity. Tested in accordance with 6.2.6.1, the discharge capacity of a high energy cell shall be not lower than 95 % of its initial capacity; tested in accordance with 6.2.6.2, the discharge capacity of a high power cell shall be not lower than 80 % of its initial capacity.

5.6 Room temperature rate charge performance. Tested in accordance with 6.2.7, the discharge capacity shall be not lower than 80 % of the initial capacity.

5.7 Low temperature discharge capacity. Tested in accordance with 6.2.8, the discharge capacity of a lithium-ion cell shall be not lower than 70 % of its initial capacity, and that of a nickel-metal hydride cell not lower than 80 %.

5.8 High temperature discharge capacity. Tested in accordance with 6.2.9, the discharge capacity shall be not lower than 95 % of the initial capacity.

5.9 Charge retention and capacity recovery. Tested in accordance with 6.2.10, a lithium-ion cell shall retain at room temperature and at high temperature not less than 90 % of its initial capacity, and shall recover not less than 95 % of it; at the same time the range of high-temperature retained capacity and of high-temperature recovered capacity across all test objects shall not exceed 5 % of the mean initial capacity, and the range of energy efficiency shall not exceed 5 % of the mean energy efficiency of all test objects. A nickel-metal hydride cell shall retain not less than 83 % of its initial capacity at room temperature and not less than 70 % at high temperature, and shall recover not less than 95 %, with the same limits on the ranges.

5.10 Storage. Tested in accordance with 6.2.11, the recovered capacity shall be not lower than 95 % of the initial capacity; at the same time the range of recovered capacity across all