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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 47292.4-2026

**Lithium-ion battery good manufacturing practice - Part 4:
Battery pack process control and finished product testing**

锂离子电池生产质量管理 第4部分：电池组过程管控与成品测试

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Table of Contents

4 Introduction...	6
1 Scope...	7
2 Normative references...	7
3 Terms and definitions...	7
4 Abbreviated terms...	9
5 General requirements...	9
6 Qualification rate...	10
7 Overall equipment effectiveness...	11
8 Error-proofing and traceability...	12
8.1 General requirements...	12
8.2 Error-proofing...	12
8.3 Traceability...	12
9 Technical cleanliness...	13
10 Electrostatic discharge protection...	13
11 Cell pre-processing...	14
11.1 Printing...	14
11.2 Code spraying...	15
11.3 Performance test...	15
11.4 Tab forming and cutting...	16
11.5 Grouping...	16
12 Laser welding...	17
12.1 General requirements...	17
12.2 Process control...	17
12.3 Semi-finished product inspection...	17
13 Product attachment...	18
13.1 Process control...	18
13.2 Semi-finished product inspection...	19
14 Battery pack processing...	19

1 Scope

GB/T 47292.4-2026 is the Chinese national standard covering assembling cells into a pack

- the sorting and matching of cells, the welding of the interconnects and its inspection, the management system installation and the electrical, insulation and leak testing of the finished pack. Part 4 of the series, first edition, in force from 1 April 2027, completing the lithium battery GMP set. It was issued on 31 March 2026 and takes effect on 1 April 2027, as a first edition. This page is published from the official record of the 2026 edition; the clause text of a standard this recent is not yet in circulation, and the figures, limits and tables it contains are those of the document itself, delivered in full with the English translation.

This document specifies the general requirements, qualification rate, overall equipment effectiveness, error-proofing and traceability, technical cleanliness, electrostatic discharge protection, cell pre-processing, laser welding, product attachment, battery pack processing, cell grouping, module enclosure, structural connection, electrical connection, finished product testing and other requirements during the production process of lithium ion batteries. This document applies to the production process quality management of manufacturers of power, energy storage and consumer lithium ion batteries.

2 Normative references

The following referenced documents are indispensable for the application 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.

GB/T 16895.1, Low-voltage electrical installations - Part

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 lithium ion cell A rechargeable device that achieves the conversion between chemical energy and electrical energy through the movement of lithium ions between the positive electrode and the negative electrode. Note

1.It includes electrodes, separator, electrolyte, container and terminals, etc. Note

2.Lithium ion cell is also generally referred to as "cell".

3.2 Lithium ion battery An energy storage device consisting of one or more electrically connected cells or modules, capable of obtaining electrical energy from external sources and outputting electrical energy externally, and equipped with a battery management circuit. Note

1.The battery management circuit usually has the functions of management or protection against overcharge, overcurrent, over discharge and/or overtemperature, so as to ensure the safety, performance and/or service life of the battery. Note

2.The battery can be equipped with a protective enclosure and provided with terminals or other interconnection devices. Note

3.The battery is also generally referred to as "battery pack" or "battery system".

3.3 battery management system An electronic system associated with battery, which has current control functions under overcharge, overcurrent, overdischarge and overtemperature conditions, and can also monitor and/or manage the battery status, calculate secondary data, report such data and/or regulate the battery environment, so as to ensure the safety, performance and/or service life of the battery. Note

1.If otherwise agreed between the lithium ion cell manufacturer and the customer, the overdischarge cut-off function is not mandatory. Note

2.The functions of the battery management system can be either integrated into the lithium ion battery or distributed into the device using the battery. Note

3.The battery management system can be configured separately, with some functional modules located inside the lithium ion battery and the remaining parts deployed in the device using the battery. Note

4.The battery management system (BMS) is sometimes also referred to as the battery management unit (BMU). [Source: GB 38661-2020, 3.3, modified]

4 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply. BMS. Battery Management System CMK. Machine Capability Index CPK. Capability Process Index DOE. Design of Experiments ESD. Electrostatic Discharge LWM. Laser Welding Monitor MSA. Measurement System Analysis OCT. Optical Coherence Tomography OCV. Open Circuit voltage WDD. Welding Defects Detection %P/T. Percentage of Tolerance %GRR. Percentage of Gage Repeatability and Reproducibility

5 General requirements

5.1 According to the qualification rate, overall equipment effectiveness, structural connection, electrical connection, finished product testing and other aspects of the lithium ion battery production process, the requirements are classified into specified value (Grade C), target value (Grade B) and advanced value (Grade A) based on the current industry level. Lithium ion battery manufacturers shall at least meet the requirements of Grade C.

5.2 Enterprises shall continuously control the production level of lithium ion batteries (including but not limited to the indicators specified in 5.1), and shall implement systematic error-proofing for key parameters and materials throughout the entire production process, so as to achieve traceability throughout the product life cycle.

5.3 Key inspection equipment shall be subject to MSA evaluation before being put into use.

5.4 The qualification rate, overall equipment effectiveness and process capability shall be statistically analyzed during the stable mass production period of products (daily production capacity $\geq 70\%$ x the maximum designed daily production capacity, or after 60 d of production).

5.5 The applicable scope of key indicators for the production process of lithium ion batteries is shown in Table 1.

5.6 For other types of battery packs, the power/energy storage items or consumer items shall be selected according to the process. Table 1 - Applicable scope of key indicators for the production process of lithium ion batteries

6 Qualification rate

6.1 Enterprises shall monitor the qualification rate of each process. The qualification rate of key processes shall meet the requirements specified in Table 2.

a) The key processes of power battery products shall at least include. cell grouping, module enclosure, structural connection (bolt connection, adhesive bonding, laser welding), electrical connection (laser welding, electrical component connection), and airtightness testing and electrical performance testing in finished product testing;

b) The qualification rate should be collected in real time by an automated system, so as to reduce human errors. Table 2 - Qualification rate requirements for key processes

6.2 Defect types affecting product reliability and safety shall not be reworked. For example, cell damage (excluding appearance issues such as minor scratches or marks), cell weld penetration and other defects shall not be reworked.

Note. This chapter applies to power lithium ion cell enterprises. Energy storage and consumer lithium ion cell enterprises may refer to and implement this clause according to their actual conditions.

7 Overall equipment effectiveness

Overall equipment effectiveness = (equipment utilization rate x performance efficiency x total qualification rate) x 100%, which is a key indicator for measuring the comprehensive performance of equipment during the production process and is mainly used to evaluate the ratio of actual output of equipment to the theoretical maximum output. The calculation methods for equipment utilization rate and performance efficiency are as follows:

a) Equipment utilization rate = actual operating time / planned operating time. The statistics shall define the planned operating time and actual operating time, and the causes of downtime shall be accurately recorded;