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Recycling of traction battery used in electric vehicle - Specifications for secondary cell disassembly

车用动力电池回收利用 单体拆解技术规范

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Table of Contents

Recycling of traction battery used in electric vehicle - Specifications for secondary cell disassembly

1 Scope

This document specifies the terms and definitions, general requirements, operation requirements, storage and management requirements, safety and environmental protection requirements, for disassembly of secondary cell, which is used in electric vehicles.

This document is applicable to the disassembly of retired power lithium-ion single secondary cell for vehicles.

2 Normative references

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, for dated references, only the version corresponding to the date applies to this document; for undated references, the latest version (including all amendments) is applicable to this document.

GB/T 2900.41 Electrotechnical terminology - Primary and secondary cells and batteries

GB 8978 Integrated wastewater discharge standard

GB/T 11651 Code of practice for selection of personal protective equipments

GB 12348 Emission standard for industrial enterprises noise at boundary

GB 16297 Integrated emission standard of air pollutants

GB 18597 Standard for pollution control on hazardous waste storage

GB 18599 Standard for pollution control on the storage and disposal site for general industrial solid wastes

GB/T 19596 Terminology of electric vehicles

GB/T 26989 Automobile recovery - Terminology

GB/T 33598 Recycling of traction battery used in electric vehicle - Dismantling specification

The internal components, after encapsulation such as the housing and cover plate of the secondary cell are removed, which are mainly composed of positive and negative electrodes, diaphragms, electrolytes.

3.4

Powder of battery material

A powder material, which is obtained after the secondary cell is disassembled, composing one or more valuable components, such as lithium, nickel, cobalt, manganese, iron, graphite.

3.5

Separation rate of jelly roll

The percentage -- of the number of secondary cells whose jelly roll is completely dissembled TO the number of secondary cell in the separation system.

4 General requirements

4.1 General requirements

4.1.1 The dismantling enterprise shall formulate dismantling operation procedures or work instructions, according to the dismantling information, which is provided by the automobile manufacturer.

4.1.2 Dismantling and separation shall not be carried out by hand or in the open air.

4.1.3 The secondary cell (hereinafter referred to as "cell") shall be subject to information collection and traceability management, before dismantling.

4.2 Site requirements

4.2.1 The dismantling site shall be an enclosed or semi-enclosed building, which shall be kept ventilated, dry, well-lit.

4.2.2 The dismantling and storage site shall be equipped with safety protection and environmental protection facilities, including but not limited to:

a) Firefighting facilities, such as sandboxes, fire hydrants, carbon dioxide fire extinguishers, etc.;

b) Alarm facilities;

c) Emergency facilities;

d) Monitoring facilities;

e) Waste gas collection/disposal facilities;

f) Waste liquid collection/disposal facilities.

4.2.3 The ground of the dismantling and storage site shall be hardened and anti-leakage; the anti-seepage shall be implemented, in accordance with the requirements of HJ 610.

4.2.4 The general solid waste storage site shall meet the requirements of GB 18599; the storage site of hazardous waste shall meet the requirements of GB 18597.

4.3 Equipment requirements

4.3.1 It shall have the functions of cell cutting, separating, crushing, sorting.

4.3.2 It shall have the ability to handle cells of different sizes.

4.3.3 The process of product separation and collection shall adopt a closed form OR a device with negative pressure gas gathering.

4.3.4 It should have the functions of cell positioning, voltage detection, automatic fixation, precise dismantling, product separation and collection, fault early warning, accident emergency stop, fire and explosion protection.

4.3.5 It shall not use open flame cutting processes, such as oxygen glow to cut the cell.

4.4 Personnel requirements

4.4.1 Protective equipment shall be worn and used, in accordance with the provisions of GB/T 11651, including but not limited to protective gloves, hard hats, work clothes, goggles, labor protection shoes, etc.

4.4.2 It shall be familiar with and master the dismantling operation process; pass the professional training in standardized operation, safety and environmental protection and emergency treatment, etc.; pass the examination, before they can take up their posts.

5 Work requirements

5.1 Workflow

5.1.1 The dismantling operation process of a cell shall be as shown in Figure 1, OR in accordance with the dismantling operation instructions, which are formulated by the dismantling enterprise.

5.1.2 The type, weight and other information of the cell shall be collected, before dismantling the cell.

5.3.2 For cells, which are discharged by external circuit method or immersion method, voltage detection shall be carried out, according to the requirements of 5.2.

5.3.3 If the enterprise has live treatment technology, it can carry out live treatment, under the premise of ensuring safety.

5.4 Classification

5.4.1 The cells shall be classified. The appropriate dismantling operation process and supporting dismantling equipment and facilities shall be selected, according to the classification.

5.4.2 The following cells should be finely dismantled. The housing and jelly roll shall be obtained, by separating and disassembling the core from housing:

a) Square hard housing, large-sized soft pack or cylindrical cell, which has intact shape and structure;

b) Cells with potential safety hazards in the direct pyrolysis, crushing, sorting process.

5.4.3 The cells, other than 5.4.2, shall be directly pyrolyzed, crushed, sorted.

5.5 Core-housing separation

5.5.1 The cells, that meet the classification in 5.4.2, should be subject to core-housing separation, by fixing, cutting, separating operations, to obtain a complete jelly roll and housing; simultaneously collect the electrolyte and exhaust gas.

5.5.2 When the cell's core-housing is separated, the separation rate of jelly roll shall not be lower than 97%. The calculation method of the separation rate of jelly roll shall comply with A.1 of Appendix A.

5.6 Separation of jelly roll

5.6.1 For the jelly roll, that can be finely disassembled and recycled, it should separate the positive electrode sheet, the negative electrode sheet, the diaphragm in the jelly roll by peeling off the housing from core; collect the dismantling products synchronously.

5.6.2 For the jelly rolls, other than 5.6.1, they shall be directly subjected to pyrolysis, crushing, sorting processes.

5.6.3 When the jelly roll is peeled off, try to ensure that the diaphragm is completely separated; avoid it from sticking to the pole piece.

5.7 Separation of pole piece

5.7.1 Separate the pole piece, which is obtained by peeling off the jelly roll, to obtain

the active material and the current collector.

5.7.2 The separation rate of the active material, in the pole piece, shall not be lower than 98%. The calculation method of the separation rate of the pole piece shall comply with A.2 of Appendix A.

5.8 Pyrolysis/crushing and sorting

5.8.1 The part involving pyrolysis treatment shall meet the relevant requirements of HG/T 5816.

5.8.2 The parts involving crushing and sorting shall meet the relevant requirements of YS/T 1174.

5.8.3 Electrode material powder, copper/aluminum powder, or iron powder is obtained, by pyrolysis/crushing and sorting. The comprehensive recovery rate of positive active substances, in the electrode material powder, shall not be less than 98%; the content of copper and aluminum impurities shall not be higher than 1%. See A.3 in Appendix A, for the calculation method of the comprehensive recovery rate of positive active substances in the electrode material powder; the calculation method for the content of copper and aluminum impurities shall comply with A.4 in Appendix A.

6 Storage and management requirements

6.1 The storage before the dismantling of the cell shall not damage the safety valve. Measures shall be taken, to prevent short circuit, leakage, spillage, to ensure the integrity of the battery; it follow the relevant requirements specified in WB/T 1061. Hazardous cells shall be stored separately.

6.2 After dismantling, the electrode material powder, copper foil, aluminum foil, diaphragm, housing shall be removed from the electrolyte, then placed in a general solid waste storage site; the collected electrolyte shall be placed in a hazardous waste storage site.

6.3 Storage shall be classified and marked, stored in different zones, subject to routine inspection.

7 Safety and environmental protection requirements

7.1 The dismantling workshop shall be implemented, in accordance with the management provisions of GB/T 45001.

7.2 The collection, storage, transportation of hazardous waste shall comply with the relevant provisions of GB 18597 and HJ 2025. The disposal of hazardous wastes shall be handed over to enterprises, which have hazardous waste disposal qualifications.

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