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Recycling of traction battery used in electric vehicle - Recycling - Part 2: Materials recycling requirements

车用动力电池回收利用 再生利用 第2部分：材料回收要求

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Foreword

GB/T 33598 "Recycling of traction battery used in electric vehicle - Recycling" is published in four parts: Part 1: Dismantling specification; Part 2: Materials recycling requirements; Part 3: Discharging technical specification; Part 4: Specification for compiling the recycling and treatment report.

This part is Part 2 of GB/T 33598. It was drafted in accordance with the rules given in GB/T 1.1-2009.

This is the first edition of Part 2: it does not replace an earlier document.

This part was proposed by, and is under the jurisdiction of, the National Technical Committee of Auto Standardization (SAC/TC 114).

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1 Scope

This part of GB/T 33598 specifies the terms and definitions, the general requirements and the pollution control and management requirements for the materials recycling of traction batteries used in electric vehicles.

It applies to the materials recycling of lithium-ion traction battery cells and nickel-metal hydride traction battery cells used in electric vehicles.

2 Normative references

The following documents are indispensable to the application of this document. For dated references, only the edition bearing the date applies; for undated references, the latest edition (including all amendments) applies.

GB 5085.7 Identification standards for hazardous wastes - General specifications · GB 8978 Integrated wastewater discharge standard · GB/T 11651 Code of practice for selection of personal protective equipment · 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 50016 Code for fire protection design of buildings · GB 50034 Standard for lighting design of buildings · GB 50069 Code for structural design of water supply and sewerage engineering structures · GB 50140 Code for design of extinguisher distribution in buildings · GBZ 1 Hygienic standards for the design of industrial enterprises · GBZ 188 Technical specifications for occupational health surveillance · HJ 2025 Technical specifications for collection, storage and transportation of hazardous waste · YS/T 1174 Technical specification for crushing and sorting of waste batteries

3 Terms and definitions

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

3.1 Element recycling efficiency - the sum of the mass of one target element recovered during the treatment process, expressed as a percentage of the sum of the mass of that target element contained in the waste battery chemicals.

3.2 Comprehensive element recycling efficiency - the sum of the mass of several target elements recovered during the treatment process, expressed as a percentage of the sum of the mass of those target elements contained in the waste battery chemicals.

3.3 Selected electrode material for smelting - the electrode material enriched from traction battery cells through removal of organics, delamination, crushing and sorting, and usable

as a feedstock for chemical smelting.

4 General requirements

4.1 General. 4.1.1 A materials recycling enterprise should meet the requirements of GB/T 36132 and shall use the advanced and applicable technologies encouraged by the state. 4.1.2 The recycling and treatment process shall not cause secondary pollution; where hazardous waste is involved, the enterprise shall hold the corresponding hazardous waste operating licence or hand the material over to a third party holding one. 4.1.3 Traction battery cells, electrolyte, binder, separator and the like shall not be discarded, dumped, directly landfilled or directly incinerated without any treatment.

4.2 Personnel. 4.2.1 Before work, personal protective equipment shall be worn and used as required by GB/T 11651; anyone not complying shall not approach the working area or operate the equipment. 4.2.2 Personnel shall be familiar with emergency accident handling and first aid. 4.2.3 Personnel shall undergo regular medical examinations in accordance with GBZ 188, and their state of health shall suit the nature of the work. 4.2.4 Operators shall receive pre-job training and periodic training and shall pass the examination. 4.2.5 Where the collection, storage or transport of hazardous waste is involved, staff with the professional skills required for environmentally sound operation, safe operation and first aid shall be provided.

4.3 Site. 4.3.1 The plant buildings shall meet GBZ 1, and their fire resistance rating and lighting design shall meet GB 50016 and GB 50034. 4.3.2 The plant area shall be equipped with fire extinguishers in accordance with GB 50140, and where water supply and drainage works are designed they shall comply with GB 50069. 4.3.3 The workshop shall have ventilation equipment, waste liquid treatment facilities and waste residue collection facilities.

4.4 Treatment. 4.4.1 Recycling and treatment shall meet the requirements of YS/T 1174 and other relevant standards. 4.4.2 Recycling and treatment shall follow the principles of safety, environmental protection and reuse. 4.4.3 Recycling and treatment may use the directional recycling technology that combines mechanical pretreatment with hydrometallurgy; the technical requirements are given in Annex A.

4.5 Recovery efficiency and its calculation. 4.5.1 At the crushing and sorting stage of the traction battery cell, the crushing and sorting recovery efficiency shall meet the requirements of YS/T 1174. 4.5.2 From the traction battery cell to the purified metal solution, the comprehensive recovery efficiency of nickel, cobalt and manganese in lithium-ion traction battery material shall be not lower than 98 %, and the recovery efficiency of lithium shall be not lower than 85 %; the recovery efficiency of nickel in nickel-metal hydride traction battery material shall be not lower than 98 %, and the recovery efficiency of rare earths and other elements should be not lower than 95 %. 4.5.3 The comprehensive recovery efficiency of copper, iron and aluminium and that of nickel, cobalt and manganese are calculated as given in B.1 of Annex B; the element recovery efficiency

of lithium and of the rare earth elements is calculated as given in B.2.

5 Pollution control and management requirements

5.1 The discharge concentration of the wastewater produced by the recycling process shall meet GB 8978 and other relevant standards.

5.2 The solid waste produced by the recycling process shall be identified and classified in accordance with GB 5085.7, and shall meet the following: a) waste classified as hazardous shall be collected, stored and transported in accordance with GB 18597 and HJ 2025, or handed over to a qualified organization for treatment; b) waste classified as general solid waste shall be handled in accordance with GB 18599.

5.3 The waste gas and dust-laden gas produced by the recycling process shall be treated by a gas purification system, and the discharge shall meet GB 16297.

5.4 The noise level of the plant area shall meet GB 12348.

5.5 Treatment equipment and containers shall be provided with safety protection measures.

5.6 Procedures for handling emergencies shall be established, complete protective equipment and facilities shall be provided, and operation shall strictly follow the relevant national occupational safety and health regulations or standards.