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

GBZ 114-2006

**Nanomanufacturing - Technical specifications - Nano-enabled
energy storage - Part 1: Blank detail specification - Nanoporous
activated carbon for the electrochemical capacitors**

(English Translation)

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Table of Contents

Preface
Introduction
1 Scope
2 Normative References
3 Terms, Definitions, Symbols, and Abbreviations
4 General Rules for Measurement Methods
5 Information on nanoporous activated carbon for electrochemical capacitors
6 Test Methods
Appendix A (Normative) KCC Measurement Procedures --- Supporting Information
References

Foreword

This document is a standard or guiding technical document.

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is Part 1 of GB/Z 114 "Nano Manufacturing Technology Specification for Nano Energy Storage". GB/Z 114 has published the following...

part.

---Part 1: Blank Detailed Specification for Nanoporous Activated Carbon for Electrochemical Capacitors;

---Part 2: Blank Detailed Specification for Electrode Sheets for Electrochemical Capacitors
this document is equivalent to IEC TS62565-5-1:2023 "Specifications for Nanomanufacturing Products - Part 5-1.Nanoporous Activated Carbon".

Blank Detailed Specification. Electrochemical Capacitors, the document type has been changed from IEC technical specification to my country's national standardization guidance technical specification.

document.

The following minimal editorial changes have been made to this document.

---To align with existing standards, the document name has been changed to

"Nanomanufacturing Technology Specification for Nanoenergy Storage Part 1: Blank Details" Fine-grained specifications for nanoporous activated carbon used in electrochemical capacitors.

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the Chinese Academy of Sciences.

This document is under the jurisdiction of the National Technical Committee on Standardization of Nanotechnology (SAC/TC279).

Introduction

The GB/Z 114 series of documents, "Nano Manufacturing Technology Specification for Nano Energy Storage," consists of the following two parts.

---Part 1: Blank Detailed Specification for Electrochemical Capacitors Using Nanoporous Activated Carbon. The purpose is to determine how to report electrochemical...

Key Controlled Characteristics (KCCs) of Nanoporous Activated Carbon for Capacitors, and How to Incorporate These Characteristics into Supplier and User Processes the bilateral detailed specifications between the parties also provide measurement methods and relevant information on current standards for determining the KCC of electrochemical capacitors.

It provides detailed specifications for writers, outlining requirements for format, layout, and minimum content.

---Part 2: Blank Detailed Specification for Electrode Sheets in Electrochemical Capacitors. The purpose is to determine how to report on electrode sheets used in electrochemical capacitors.

The various KCCs of electrode sheets, and how to incorporate these characteristics into detailed bilateral specifications between suppliers and users, are also provided.

This document describes the measurement methods for KCC on electrode pads and provides relevant information on current standards. It also offers formatting, arrangement, and most recent specifications for those writing detailed guidelines.

The requirement is minimal content.

Electrochemical capacitors are valued for their ultra-fast charge/discharge capability, long cycle life, wide operating temperature range, high safety and reliability, and low maintenance costs.

Due to its advantages, nanoporous activated carbon is widely used in electric vehicles, high-speed trains, aircraft, photovoltaics, wind power generation, and electronic equipment.

Nanoporous materials that are active electrodes for electrochemical capacitors (see Figure 1) are one of the most critical factors determining the electrochemical performance of the device.

The precursors and preparation processes of nanoporous activated carbon significantly affect its chemical, physical, and structural properties.

Precursors include biomass, coal, bitumen, or resin, and their activation processes include physical methods based on low concentrations of oxygen, water vapor, and CO₂.

Activation methods include chemical activation based on H₃PO₄, ZnCl₂, KOH, etc. The chemical, physical, and structural aspects of nanoporous activated carbon (KCC) will be discussed.

Significantly affecting its electrochemical performance. For example, metallic impurities can affect self-discharge and cycle stability; pore size distribution affects specific capacitance and DC current.

However, the relationship between the chemical, physical, and structural properties of active materials and their application performance remains unclear to date.

For manufacturers of nanoporous activated carbon, accurate characterization of KCC is crucial for product optimization, finalization, and quality control.

For manufacturers of electrochemical capacitors using nanoporous activated carbon, accurate evaluation of KCC can be a crucial selection criterion before large-scale production.

Selecting suitable raw materials and achieving key quality assurance indicators are crucial. Therefore, accurate characterization and reporting of KCC, including its electrochemical properties, is essential.

important.

To enable the application of general-purpose processing equipment and unit process flows in different manufacturing production lines, while ensuring product performance and...

The stability and consistency of quality, the proper description and evaluation of the properties of nanoporous activated carbon, and the quality control of the manufacturing process.

Standardizing the law is of great significance.

Figure 1.Upstream and downstream industrial chain of electrochemical capacitors

Nanotechnology Specifications for Nanoenergy Storage Part 1: Detailed Specifications for Blank Spaces Nanoporous activated carbon for electrochemical capacitors

1 Scope

This document provides a blank detailed specification for nanoporous activated carbon used in electrochemical capacitors.

This document applies to the detailed specification writing of nanoporous activated carbon for electrochemical capacitors. Numerical values for key control characteristics are left blank.

This will be clearly defined in the detailed specifications between the customer and the supplier. In these detailed specifications, if the customer and the supplier reach an agreement, key controls...

Features can be added or removed.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

ISO 3923-1 Determination of apparent density of metal powders - Part 1: Funnel method
Note. GB/T 1479.1-2011 Determination of the apparent density of metal powders - Part 1: Funnel method (ISO 3923-1:2008, IDT) Note. GB/T 5162-2021 Determination of tap density of metal powders (ISO 3953:2011, IDT) Note. GB/T 19077-2024 Particle size distribution laser diffraction method (ISO 13320:2020, IDT) Note. GB/T 21649.1-2024 Particle size analysis - Image analysis - Part 1: Static image analysis (ISO 13322-1:2014, IDT) Note. GB/T 21649.2-2017 Particle size analysis - Image analysis - Part 2: Dynamic image analysis (ISO 13322-2:2006, IDT) ISO 15901-2 Determination of pore size distribution and porosity of solid materials by mercury porosimetry and gas adsorption methods - Part 2: Gas adsorption methods Note. GB/T 21650.2-2008 Determination of Pore Size Distribution and Porosity of Solid Materials by Mercury Intrusion Porosimetry and Gas Adsorption Methods - Part 2: Analysis of Media by Gas Adsorption Method Holes and macroholes (ISO 15901-2:2006, IDT) Note. GB/T 33502-2017 Specification requirements for data recording and reporting of X-ray photoelectron spectroscopy (XPS) for surface chemical analysis (ISO 16243.

2011, IDT)

ISO 19050 Determination of metal content in raw rubber and vulcanized rubber by inductively coupled plasma atomic emission spectrometry (ICP-AES)