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PEOPLE'S REPUBLIC OF CHINA**

GB/T 44133-2024

**Technical guide for smart electrochemical energy storage
station**

智能电化学储能电站技术导则

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Table of Contents

Foreword	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 General requirements	5
5 System architecture	6
6 Intelligent operation and maintenance	7
7 Intelligent inspection and repair	8
8 Safety management	9
9 Intelligent operation	10
Appendix B (Informative) Overall architecture of smart electrochemical energy storage stations	16

Foreword

This document was issued on 28 May 2024 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 December 2024.

It is a GB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

1 Scope

GB/T 44133-2024 is the technical guide for smart electrochemical energy storage stations. A grid battery is unattended, contains tens of thousands of cells, and gives very little warning before a cell goes into thermal runaway; the case for instrumenting it heavily is that the only cheap moment to detect a failing cell is months before it fails. The standard sets the general requirements and the system architecture, then the intelligent operation and maintenance, the intelligent inspection and repair, the safety management, and the intelligent operation of the station - covering the monitoring, the diagnosis and prediction of cell and system state, the automated response and the dispatch interface - with an informative annex giving the overall architecture of a smart storage station. It took effect on 1 December 2024.

This document specifies the technical requirements for the system architecture,

intelligent running and maintenance, intelligent inspection and repair, safety management, and intelligent operation of smart electrochemical energy storage power stations.

This document applies to the construction and operation of smart electrochemical energy storage power stations.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the version corresponding to that date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

GB/T 34131, Battery management system for electrical energy storage

GB/T 36572, Guidelines of cyber security protection for electric power system supervision and control

GB/T 40090, Guidelines of cyber security protection for electric power system supervision and control

GB/T 42315, Code of maintenance for electrochemical energy storage station

GB/T 42726, Specification of supervision and control system for electrochemical energy storage station

3 Terms and definitions

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

3.1

smart electrochemical energy storage station

4.4 Smart electrochemical energy storage stations shall be provided with digital twin models to achieve the integration and sharing of production data and management data.

4.5 Smart electrochemical energy storage stations shall be equipped with a production operation management system that integrates operation and maintenance resource monitoring and control, operation and maintenance work order processing, operation and maintenance reports, operation and maintenance knowledge base, operation and

maintenance display center, marketing management, transaction management, and customer management.

4.6 Smart electrochemical energy storage stations shall meet the following cyber security requirements during the design, running, maintenance and operation phases:

- a) During the design phase, minimize the external interface exposure of various intelligent equipment in the power station, and the external interface supports access control mechanism based on authentication and authorization;
- b) During the running phase, use information encryption technology when transmitting and storing sensitive data and personal data. The situation awareness platform in the power station automatically collects and analyzes operation data information, and automatically perceives and predicts security risks;
- c) During the maintenance phase, timely repair vulnerabilities in intelligent equipment and systems, support automatic software reinforcement and upgrade, and automatically perform digital signature verification before upgrading;
- d) During the operation phase, support automatic detection of new software versions and prompt for upgrades, automatically verify network security configurations and generate risk assessment reports.

4.7 Smart electrochemical energy storage stations should have the capabilities of autonomous learning, automatic optimization, and iterative evolution.

5 System architecture

5.1 The system architecture of the smart electrochemical energy storage station shall include the perception and execution layer, the intelligent application layer, and the decision-making and command layer. The overall architecture is shown in Appendix B.

5.2 The perception and execution layer shall use the Internet of Things and various data collection technologies to perceive the information of key equipment such as energy storage batteries and converters in the smart electrochemical energy storage station and the information of the power station; it shall have functions such as equipment and

facility control and production personnel behavior management and control.

5.3 The intelligent application layer shall have the functions of operation management, maintenance management, service management, and safety management of the smart electrochemical energy storage station.

5.4 The decision-making and command layer should have functions such as analysis and evaluation, prediction and early warning, and intelligent formulation of control strategies, operational management and control, decision analysis, and emergency command.

6 Intelligent operation and maintenance

6.1 Smart electrochemical energy storage stations should - based on the key equipment information and power station information of the perception and execution layer - establish a power station operation and maintenance information database; - based on the safety performance evaluation information, electrical evaluation information, and life evaluation information - use before-and-after comparison method, horizontal comparison method, comprehensive evaluation method and other methods, combined with quantitative analysis and qualitative analysis, to compare and analyze the power station operation status in real time and issue early warnings on the health status of the equipment.

6.2 Smart electrochemical energy storage stations shall build a coordinated interactive strategy for load forecasting, dispatching, and operation, and set operation strategies based on market supply and demand, grid friendliness, economic benefits, equipment status, etc. Energy storage equipment shall self-determine and optimize operation according to the operation strategy. When operating in conjunction with other forms of power generation, it shall have the ability to make intelligent decisions and control to optimize joint operation.

6.3 Smart electrochemical energy storage stations shall conduct health assessments, fault diagnosis, and life predictions on batteries, and adjust equipment operation modes in a timely manner based on equipment fault alarms, status warnings, and other