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PEOPLE'S REPUBLIC OF CHINA**

GB/T 43528-2023

**Communication technical requirements for electrochemical
energy storage battery management**

电化学储能电池管理通信技术要求

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Foreword

This document was issued on 28 December 2023 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 July 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 43528-2023 covers the exchange of data inside an electrochemical energy storage installation - what the levels of a battery management system tell each other, and what that system tells the energy storage converter and the plant above it. Clause 5 sets the communication content link by link along that chain. Clause 6 fixes the physical interfaces and the protocols carried over them, with Controller Area Network, Ethernet and RS-485 as the interface options and the CAN link using extended frames, while the normative annexes bind the Modbus, DL/T 634.5104 and DL/T 860 mappings so that two vendors reading the same register mean the same measurement. Clause 7 adds network security for TCP/IP traffic, with identity authentication, access control and data encryption among the protective measures. The detail exists because a battery management system can only protect cells it can see: when a cell voltage or a temperature arrives late, in the wrong scale, or under a tag the receiving equipment interprets differently, protection acts on a picture of the battery

that no longer holds, and an overcharge or a runaway develops while the record still reads normal. Informative annexes give a typical architecture and a worked content list. Written for battery and BMS makers, converter and plant integrators, storage operators and test laboratories.

This document specifies the technical requirements for communication content, interfaces and protocols, and network security in the management of electrochemical energy storage batteries.

This document is applicable to the design, commissioning, operation, and maintenance of battery management communication for electrochemical energy storage systems of lithium-ion batteries, sodium ion batteries, lead-acid (carbon) batteries, flow batteries, and water electrolysis hydrogen/fuel cells.

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 19582.1, Modbus industrial automation network specification -- Part 1.

Modbus application protocol

GB/T 19582.2, Modbus industrial automation network specification -- Part 2.

Modbus protocol implementation guide over serial link

GB/T 19582.3, Modbus industrial automation network specification -- Part 3.

Modbus protocol implementation guide over TCP/IP

GB/T 20271, Information security technology -- Common security techniques requirement for information system

GB/T 22239, Information security technology -- Baseline for classified protection of cybersecurity

GB/T 25070, Information security technology -- Technical requirements of security design for classified protection of cybersecurity

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

GB/T 39786, Information security technology -- Baseline for information system

cryptography application

DL/T 634.5101, Telecontrol equipment and systems -- Part 5-101.Supporting

standards for transmission protocol basic telecontrol tasks

DL/T 634.5104, Telecontrol equipment and systems. Part 5-104.Transmission

protocols -- Network access for IEC 60870-5-101 using standard transport profiles

DL/T 860 (all parts), Communication networks and systems for power utility

automation

DL/T 1146, DL/T 860 implementation technical specification

DL/T 2528, Basic Terms of Electric Energy Storage

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in DL/T 2528 apply.

4 Overall requirements

4.1 The communication content for electrochemical energy storage battery management shall meet the requirements of GB/T 34131.

4.2 The interface and protocol for electrochemical energy storage battery management communication shall have universality and openness. The typical communication architecture for battery management is shown in Annex A.

4.3 The management and communication network security of electrochemical energy storage batteries shall meet the requirements of GB/T 20271, GB/T 22239, and GB/T 25070.

4.4 The equipment related to electrochemical energy storage battery management shall have a unique device code.

4.5 Electrochemical energy storage battery management communication shall include communication between various levels of the battery management system, between the battery management system and the monitoring system, between the battery management system and the energy storage converter, between the energy storage converter and the monitoring system, between the battery management system and the heating, ventilation, and air conditioning system, and between the battery management

system and the fire protection system.

5 Communication content

5.1 Communication content between different levels of the battery management system

5.1.1 The communication content between different levels of the management system for lithium-ion batteries, sodium ion batteries, and lead-acid (carbon) batteries can include voltage, current, temperature, state of energy (SOE), balance state, switch state, alarm information, protection information, as well as balance control, input and output control instructions. Please refer to Table B.1 in Annex B for detailed communication content.

5.1.2 The communication content between different levels of the flow battery management system can include voltage, current, electrolyte temperature, electrolyte level, electrolyte pressure, electrolyte flow rate, alarm information, protection information, and input and output control instructions. Please refer to Table B.2 for detailed communication content.

5.1.3 The communication content between different levels of the water electrolysis hydrogen production/fuel cell management system can include electrolysis cell voltage, electrolysis cell current, electrolysis cell temperature, stack voltage, stack current, stack temperature, electrolysis cell outlet gas pressure, input hydrogen flow rate, output hydrogen flow rate, hydrogen concentration in oxygen, oxygen concentration in hydrogen, micro oxygen content in purified hydrogen, dew point of purified hydrogen, switch status, alarm information, protection information, and input and output control instructions. Please refer to Table B.3 for detailed communication content.

5.2 Communication content between battery management system and monitoring system

5.2.1 The communication content between the management system and monitoring system of lithium-ion batteries, sodium ion batteries, and lead-acid (carbon) batteries shall include battery cell information, battery module information, battery cluster