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

GB/T 43962.1-2024

**System integration of power battery digital workshop - Part 1:
General requirements**

动力电池数字化车间集成 第1部分：通用要求

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Foreword

This document was issued on 25 April 2024 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 November 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 43962.1-2024 is Part 1 of the Chinese series on the system integration of power battery digital workshops. A power battery line is one of the most heavily instrumented factories in China: electrode coating, winding or stacking, formation and grading all generate process data that has to be tied to a single cell identity and kept for the life of the battery, which means the workshop is an integration problem before it is a manufacturing one. Part 1 sets the general requirements. It defines the integration architecture and its layering and the process flow through it, then the basic management requirements at the resource layer including personnel, equipment and the data dictionary, the technical requirements at the facility layer, the technical requirements at the platform layer, the requirements on the service layer, and the data integration requirements that hold the layers together. It took effect on 1 November 2024.

This document specifies the integration architecture, basic management requirements for the resource layer, technical requirements for the facility layer, technical requirements for the platform layer, service layer requirements, and data integration requirements of the power battery digital workshop integration.

This document applies to the planning, construction, and acceptance of the power battery digital workshop integration. It is also a reference for digital workshop integration for energy storage batteries (including future battery types, such as semi-solid and solid-state).

2 Normative references

The provisions of the following documents constitute the essential clauses of this document through normative references in this text. Among them, for referenced documents with dates, only the versions corresponding to the dates are applicable to this document; for referenced documents without dates, the latest versions (including

all amendments) are applicable to this document.

GB/T 37413-2019 Digital factory - Terms and definitions

GB/T 38331-2019 General technical requirements for Li-ion battery made machine

3 Terms and definitions

The terms and definitions defined in GB/T 37413-2019 and the following apply to this document.

3.1 battery

A device that converts chemical energy into electrical energy.

3.2 power battery

Batteries that provide energy to the power system.

A collection of information that defines and describes the data items, data structures, data flows, data storage, processing logic, etc., of all data elements used in the system.

4 Abbreviations

The following abbreviations apply to this document.

BOM. Bill Of Material

TLS. Transport Layer Security

MES. Manufacturing Execution System

PLC. Programmable Logic Controller

RFID. Radio Frequency Identification

SDK. Software Development Kit

SQL. Structured Query Language

5 Integration architecture

5.1 Process flow

The power battery production and manufacturing system includes four manufacturing units. electrode manufacturing, cell manufacturing, module manufacturing, and pack manufacturing. This document takes the liquid power battery production and manufacturing system as an example, as shown in Figure 1.

6 Basic management requirements for the resource layer

6.1 Basic requirements

The resource layer shall be able to realize data collection and monitoring, edge computing, and network management of productive resources such as production equipment, personnel, material, energy, environment, auxiliary equipment, and auxiliary tools. At the same time, it shall have certain digital production management functions. The workshop shall use a production line monitoring and management system to perform data monitoring and productive process management on the processes of electrode manufacturing, cell manufacturing, module manufacturing, and pack manufacturing, respectively.

6.2 Personnel requirements

Personnel management within the workshop shall collect information such as personnel identity, start time, end time, and work activities, monitor and manage the consistency of personnel job responsibilities and the compliance of operational activities, and establish a system of responsibility for each post and of assigning everyone to a definite position.

Personnel management within the workshop should adopt methods such as identification and manual data entry to collect and manage relevant data of workshop personnel. The managed personnel shall include process developers, production plan developers, equipment operators and quality inspectors related to the manufacturing process.

6.3 Equipment requirements

Equipment management in the workshop shall meet the following requirements.

- a) The equipment in the production workshop meets the relevant requirements of GB/T 38331-2019;
- b) The digital equipment in the power battery manufacturing process has one or more standard communication interfaces, such as fieldbus, industrial Ethernet, and industrial wireless;