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

GB/T 45306-2025

**Railway applications - Power supply with onboard energy
storage system for rolling stock - Series hybrid system
(English Translation)**

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is modified to adopt IEC 62864-1:2016 "Power supply for on-board energy storage systems for rail transit rolling stock Part 1: Series hybrid Combined Power System.

This document has made the following structural adjustments compared to IEC 62864-1:2016.

--- 4.2.4 in IEC 62864-1:2016 was deleted;

---Added 5.4;

--- 6.1.1.2 in IEC 62864-1:2016 was deleted;

--- 8.7.1 and 8.7.2 in IEC 62864-1:2016 are deleted and their contents are incorporated into 8.7;

--- Appendix C corresponds to Appendix D in IEC 62864-1:2016, and Appendix C in IEC 62864-1:2016 is deleted.

The technical differences between this document and IEC 62864-1:2016 and their reasons are as follows.

--- Replaced IEC 60050-811 (see 3.1) with the normative reference GB/T 2900.36 to adapt to my country's technical conditions and increase Operability;

--- The normative reference GB/T 21563 replaces IEC 61373 (see 6.1.1) to adapt to my country's technical conditions and increase operability.

Sex;

--- The normative reference GB/T 4208 replaces IEC 60529 (see 6.1.2) to adapt to my country's technical conditions and increase operability.

Sex;

--- The normative reference GB/T 21414 replaces IEC 61991 (see 6.6.1) to adapt to my country's technical conditions and increase operability.

Sex;

--- Replaced IEC 62262 (see 6.6.3) with the normative reference GB/T 20138 to adapt to my country's technical conditions and increase operability Sex;

--- Replaced IEC 61377:2016 with the normative reference GB/T 25117-2020 (see 8.4.1, 8.5, 8.6.1, 8.6.2.3), the consistency between the two documents is modified to adapt to my country's technical conditions and increase operability;

--- The normative reference GB/T 44386 replaces IEC 62928 (see 8.10) to adapt to my country's technical conditions and increase operability Sexuality;

--- Deleted IEC 60349-2, IEC 60349-4, IEC 61133:2016 and IEC 61287-1 (see IEC 62864-1:2016 Chapter 2), which is a reference in the text, shall be replaced by the corresponding Chinese standardization document and placed in the reference list;

--- Added the abbreviations "BR brake resistor" and "TE traction equipment" (see 3.2) to meet the actual needs of this document;

--- Changed the description of fuel cell system absorbing regenerative power (see 4.2.2) to meet national conditions;

--- Deleted the example of ESS and DC catenary series power supply vehicle (see 4.2.4 in IEC 62864-1:2016). There is no such vehicle in China.

application;

--- Added special environmental requirements (see 5.4) to meet national conditions;

--- Deleted the shock and vibration test statements (see 6.1.1.2 in IEC 62864-1:2016), the content of which has been covered in the referenced standards;

- Changed the external charge/discharge function (see 6.3.1), and charging is not mandatory to adapt to the current situation of domestic hybrid power applications;
- Changed the fire protection implementation standards (see 6.6.2) and implemented the latest domestic standards;
- Changed the research test (see 7.3) and factory inspection instructions (see 7.4), describing the research test and factory inspection according to the actual domestic situation.

test;

- The process of system operation test (see 8.5) and vehicle operation test (see 9.3) has been changed to conform to the actual situation of the test in my country;
- Deleted the simulation results instead of the physical test (see 8.6.1, 8.7.1 and 9.1 in IEC 62864-1:2016), which is not available in China.

Operability;

- Changed the energy efficiency and energy consumption measurement methods (see 8.6.2), because the accuracy of my country's on-board energy measurement system is lower than that of special test equipment Accuracy;
- Changed the noise measurement (see 9.8). Since noise measurement in my country is usually carried out on a complete vehicle, the noise in the bench stage has been deleted.

Measurement.

The following editorial changes were made to this document.

- To coordinate with the existing standards, the name of the standard will be changed to "Series hybrid power supply for on-board energy storage for rail transit locomotives and vehicles" system";
- Deleted the "Example" in 3.1.5~3.1.7 of IEC 62864-1:2006;
- Deleted the "Notes" in 4.1.2 and 5.3 of IEC 62864-1:2016;
- Deleted "Note 3" in 4.3.2 of IEC 62864-1:2006;
- Deleted "Fire laws and regulations applicable to this standard" in Appendix C.

1 Scope

This document specifies the basic requirements, characteristics, and functions of the hybrid system and describes the corresponding test methods, as follows.

- Energy management, used to control the power flow between the main power supply, on-board energy storage power supply and converter;

- Energy consumption, energy efficiency and renewable energy;
- Vehicle characteristics powered by on-board energy storage power supply;
- Test method for combined test.

Note: The converter in this document refers to a combined device consisting of one or more converters (such as rectifiers, inverters, choppers, etc.).

This document specifies the following power supply connection relationships.

- External power supply system;
- On-board energy storage power supply;
- Fuel cells and internal combustion engine units;
- Other power supplies.

For the combination of inverter and motor, including but not limited to asynchronous motor or synchronous motor powered by voltage source inverter.

This document applies to the electrically connected series hybrid power system with on-board energy storage for rail transit locomotives and vehicles (hereinafter referred to as the hybrid system).

The hybrid system includes two or more power sources (one of which is the on-board energy storage system), which can achieve the following features.

- Improve energy or fuel efficiency, acceleration performance, increase operating distance, and increase the power consumption of the main power supply by using energy storage systems in addition to the main power supply the ability to operate uninterruptedly in the event of a power source loss, thereby reducing the limitations of the main power source power and capacity (including when regenerating);
- Reduce fuel consumption and reduce emissions (such as CO₂, NO_x, PM, etc.);
- Reduce environmental impact (such as visible obstacles, noise, etc.).

In addition, this document is also applicable to systems that only contain on-board energy storage and no other main power supply.

This document applies to electrically connected systems (series hybrids) and does not include mechanical drive systems (parallel hybrids).

2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date