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

GB/T 44639.4-2024

**Railway applications - Energy measurement system on board
trains - Part 4: Communication**
(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 part 4 of GB/T 44639 "Electric Energy Measurement System for Rail Transit Trains". GB/T 44639 has been published for the following part.

--- Part 1: General;

--- Part 2: Electrical energy measurement;

- Part 3: Data processing;
- Part 4: Communications;
- Part 5: Conformance test;
- Part 6: Requirements other than billing.

This document is modified to adopt IEC 62888-4:2018 "Rail transit train energy measurement system Part 4: Communications".

This document has made the following structural adjustments compared to IEC 62888-4:2018.

- Appendix A corresponds to Appendix B of IEC 62888-4:2018;
- Appendix B corresponds to Appendix A of IEC 62888-4:2018.

The technical differences between this document and IEC 62888-4:2018 and their reasons are as follows.

- Delete the term Internet Engineering Task Force (IEC 62888-4:20183.1.16);
- Added the "user defined" communication protocol stack only applicable to level 3 EMS (see 4.2.2) to avoid level 1 and level 2 Uncertainty in the basis for testing and verification of EMS products;
- Changed "FIP" to "WorldFIP" (see Table 1, Table 1 of IEC 62888-4:2018) to comply with the development of technology and terminology;
- Added USB2.0 and its reference standard as communication protocol stack examples (see Table 1);
- Added "if applicable" as a requirement for binding procedures and data encryption (see 4.2.3.2.3) to meet different levels of interface communication the need for safety;
- Replace IEC 62888-3:2018 (see 4.2.7) with the normative reference GB/T 44639.3-2024.

The consistency degree is modified to adapt to my country's technical conditions and increase operability;

- LTE is added as a carrier for vehicle-to-ground communication (see Figure 5) because it is used in my country's rail transit field;
- Changed the VEI data transmission encryption and decryption requirements from "the decryption key is provided by the ECF unit to the VMF/CMF, or embedded in the ECF software during debugging" is changed to "The key is provided by the ECF unit through the binding program VMF/CMF, or embedded in ECF and VMF/CMF software when debugging in an application without a binder.

More operational (see A.3, B.3 of IEC 62888-4:2018);

--- Deleted the description of "CPID consists of 13 characters" in B.1.3.3 (see A.1.3.3 of IEC 62888-4:2018) to Adapt to changes in the definition of VIN;

--- Replace IEC 62888-1:2018 (see B.1.3.3) with the normative reference GB/T 44639.1-2024. The difference between the two documents the consistency level is modified to adapt to my country's technical conditions and increase operability;

--- Added normative reference document IEC 61162-1 (see Table B.2) to regulate the position information received by the global navigation satellite system unit Information string format;

--- Changed the description of VIN in B.1.3.3 (see B.1.3.3, A.1.3.3 of IEC 62888-4:2018) to match GB/T 44639.1-2024 consistent;

--- Changed "GPS" to "GNSS" and "NEMA" to "IEC 61162" (see Table B.2, Table A.2 of IEC 62888-4:2018) to Covers China's BeiDou navigation system;

--- Deleted the voltage types of traction power supply system not used in China (see A.2.3 of IEC 62888-4:2018), which is not applicable to my country's rail transit the power supply system is more targeted.

The following editorial changes were made to this document.

--- Deleted the normative references IEC 60870-5, IEC 61375, ISO/IEC 8482, ISO/IEC/IEEE8802-3.

2017, ISO 11898-1:2015, ISO 11898-2:2016, IEC 61158-2 and other documents (see IEC 62888-4:2018 Part 2 Chapter), because the references to these documents in Table 1 are informative references;

--- Changed the definition of 3.1.3 "Marshaling network" (see 3.1.3, 3.1.3 of IEC 62888-4:2018) to make it consistent with the definition in GB/T 28029.1 is consistent;

--- Added GB/T 15127, GB/T 16657.2, GB/T 18657, GB/T 28029, GB/T 41588.1 cited in Table 1 2022, GB/T 41588.2-2022, IEC 61158-3-7, IEC 61158-4-7, IEC 61158-5-7, IEC 61158-6-7, ISO/IEC/IEEE8802-3.2021 and other documents as references.

Introduction

Energy efficiency is essential to meet the challenges of supporting energy policies, protecting the environment and conserving natural resources.

Energy efficiency, especially the standardization of overall energy efficiency of rail transit vehicles, has attracted great attention from the rail transit industry, and relevant standards are being gradually formulated.

The main contents include the definition and boundary of energy efficiency, influencing

factors, test methods, etc. GB/T 44639 "Electric Vehicles for Rail Transit" the Energy Measurement System is designed to standardize the process of acquiring train power data and ensure the reliability of the data. It consists of six parts.

--- Part 1: General. The purpose is to specify the system-level requirements of the energy measurement system and to implement one or more General requirements for equipment with multiple functions.

--- Part 2: Electric energy measurement. The purpose is to specify the requirements for electric energy measurement functions for measuring the electric energy consumed and regenerated by traction units, and Requirements for the voltage measurement function, current measurement function and energy calculation function that make up the energy measurement function.

--- Part 3: Data processing. The purpose is to specify the data processing system and ground data collection service in the electric energy measurement system requirements.

--- Part 4: Communications. The purpose is to specify the requirements for on-board data communication services and vehicle-to-ground communication services of the energy measurement system.

These communication services enable data to be transferred between functions within the energy measurement system, between the energy measurement system and other on-board units, and between data Handles exchanges between the system and ground servers.

--- Part 5: Conformance test. The purpose is to specify the consistency test of new energy measurement systems installed on traction units Arrangements, and conformance testing procedures for replacement of equipment and auxiliary components.

--- Part 6: Requirements other than billing. The purpose is to clarify the requirements for energy consumption benchmark testing, daily energy consumption monitoring, and technology research and development.

Able to measure the specific requirements of the system.

The functional structure, main sub-functions and data flow of the train power measurement system are shown in Figure 1.

Figure 1 Schematic diagram of EMS functional structure and data flow

Rail transit train power measurement system Part 4: Communications

1 Scope

This document specifies the use of digital interfaces between functions within an Energy Measurement System (EMS) and between the EMS and other on-board subsystems.