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

GB/T 18488-2024

Replacing GB/T 18488.1-2015

Drive motor systems for electric vehicles

电动汽车用驱动电机系统

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Table of Contents

1 Scope	
2 Normative References	
3 Terms and Definitions	
4 Model Naming	
5 Technical Requirements	
5.1 General Items	
5.1.2 Appearance	
5.2 Input & Output Characteristics...	
5.3 Safety...	
5.4 Environmental Adaptability...	
5.5 Electromagnetic Compatibility Performance...	
6 Test Methods	
6.1 Test Preparation	
6.1.2 Selection of test instruments	
6.2 Tests of General Items...	
6.3 Test of Input & Output Characteristics...	
6.4 Safety Test...	
6.5 Environmental Adaptability Test...	
6.6 Electromagnetic Compatibility Test...	
7 Inspection Rules	
7.1 Consistency Inspection	
7.2 Type Inspection	
7.2.4 Evaluation of test results	
8 Marking and Identification	
8.1 Lead Wires and Terminals...	
8.2 Nameplate of Drive Motor...	
8.3 Nameplate of Drive Motor Controller...	
8.4 Nameplate of Integrated Drive Motor System	

1 Scope

China's national standard for the drive motor system of an electric vehicle - the motor, the

controller and the two working together. It specifies the model naming, the technical requirements, the test methods, the inspection rules, and the marking and identification of drive motor systems for electric vehicles, and it applies to the systems, to the drive motors and to the drive motor controllers; motors that only generate, and their controllers, may refer to it. The 2024 edition merges into one document what was previously split between a requirements part and a test methods part, which matters because in a traction drive the two cannot be separated - almost every requirement here is meaningless without the operating point, the duty cycle and the thermal state at which it is verified. A traction motor is not an industrial motor with a different label. It runs from a battery whose voltage sags under load and rises under regeneration; it must deliver peak torque from standstill and hold power to high speed, which is a far wider constant-power range than an industrial drive ever needs; it must produce and absorb torque in both directions of rotation; it is cooled by a system that is itself part of the vehicle; and it spends its life in a duty cycle of accelerations and regenerative braking rather than at a rated point. The standard therefore covers the general items and the input and output characteristics - torque and power against speed, efficiency mapped over the operating plane, overload capability - and then safety, environmental adaptability and electromagnetic compatibility, with the test chapter running to the same structure and taking the larger part of the document. Inspection rules cover consistency and type inspection, and the marking chapter covers the lead wires and terminals, the nameplates of motor, controller and integrated system, and the danger warnings. Issued and in force since 28 May 2024, it replaces GB/T 18488.1-2015.

This document specifies the model naming, technical requirements, test methods, inspection rules, marking and identification of drive motor system for electric vehicles. This document is applicable to drive motor systems, drive motors and drive motor controllers for electric vehicles. Vehicle motors that only have the function of generating electricity, and their controllers may take this document as a reference.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document through normative references in the text. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 1971 Rotating Electrical Machines - Terminal Markings and Direction of Rotation

GB/T 2900.25 Electrotechnical Terminology - Rotating Electrical Machines

GB/T 2900.33 Electrotechnical Terminology - Power Electronics

GB/T 4208-2017 Degrees of Protection Provided by Enclosure (IP code)

GB/T 12673 Motor Vehicle Main Dimensions Measurement Method

GB/T 15089 Classification of Power-driven Vehicle and Trailers

GB 18384 Electrically Propelled Road Vehicles - Safety Specifications

GB/T 18655-2018 Vehicles, Boats and Internal Combustion Engines - Radio Disturbance Characteristics - Limits and Methods of Measurement for the Protection of On-board Receivers

GB/T 19596-2017 Terminology of Electric Vehicles

GB/T 21437.2 Road Vehicles - Test Method of Electrical Disturbances from Conduction and Coupling - Part

3 Terms and Definitions

The terms and definitions defined in GB/T 2900.25, GB/T 2900.33, GB/T 15089 and GB/T 19596, and the following are applicable to this document.

3.1 drive motor An electrical device that converts electrical energy into mechanical energy to provide driving force for the vehicle. This device also has the function of converting mechanical energy into electrical energy. [Source: GB/T 19596-2017, Definition 3.2.1.1.2.1, modified]

3.2 drive motor controller A device that controls the transmission of energy between a power source and a drive motor. NOTE. it consists of control signal interface circuit, drive motor control circuit, drive circuit and power electronic module, etc. [Source: GB/T 19596-2017, Definition 3.2.1.2, modified]

3.3 drive motor system A system installed on electric vehicles to provide driving force for vehicle driving and realize the mutual conversion between mechanical energy and electrical energy. NOTE. it includes drive motor, drive motor controller and auxiliary devices necessary for their operation. The auxiliary devices include transmission device integrated with the drive motor. [Source: GB/T 19596-2017, Definition 3.1.2.1.10, modified]

4 Model Naming

The drive motor, drive motor controller and integrated drive motor system shall have named models. See Appendix A for the naming.

5.1 General Items

5.1.1 General requirements The drive motor system shall be flexibly idling, without abnormal noise (such as. friction between the stator and rotor, periodic abnormal noise, abnormal noise after bearing damage, and abnormal noise caused by tiny foreign objects stuck in the rotating parts, etc.) or jamming.

5.1.2 Appearance

5.1.2.1 The outer surface of the drive motor system shall have no obvious damage or deformation, and the coating shall not peel off.

5.1.2.2 If a nameplate is installed, the nameplate of the drive motor system shall be squarely and firmly installed, with clear writing.

5.1.2.3 The lead wires or terminals of the drive motor system shall be intact, and the fastener connections shall not be loose.

5.1.2.4 The drive motor and drive motor controller shall satisfy the requirements of 5.1.2.1 ~ 5.1.2.3.

6.1 Test Preparation

6.1.1 Test environmental conditions Unless otherwise specified, all tests shall be conducted under the following environmental conditions.

- a) Temperature. 18 °C ~ 28 °C;
- b) Relative humidity. 10% ~ 90%;
- c) Atmospheric pressure. 86 kPa ~ 106 kPa.

6.1.2 Selection of test instruments

6.1.2.1 Instrument accuracy The accuracy or error of the instrument shall not be lower than the requirements of Table 3 and shall satisfy the accuracy requirements of the actual measured parameters. Especially for electrical parameter measurement instruments, they shall be able to satisfy the accuracy and waveform requirements of the corresponding DC parameter and AC parameter measurement.

6.1.2.2 Error of measurement process The requirements for the error between the control value (actual value) and the target value are as follows:

- a) Voltage. when it is not greater than 250 V, the error shall be 2.5 V; when it is greater than 250 V, the error shall be 1%.
 - b) Current. 1%.
 - c) Temperature. 2 °C.
- 0.5 L/min.

7.1 Consistency Inspection

7.1.1 The drive motor system shall undergo consistency inspection under one of the