

ICS 43.040
CCS T 40

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ASSOCIATION STANDARD

T/CSAE 143-2020

Test and assessment specifications for integrated electric drive system of battery electric passenger cars (English Translation)

Issued on: August 7, 2020

Implemented on: January 1, 1970

Issued by: China Society of Automotive Engineers

Table of Contents

Foreword	
1 Scope	
2 Normative references	
3 Terms and definitions	
4 Test conditions and requirements	
4.1 Test environmental conditions	
4.2 Instrumentation	
4.3 Test equipment requirements	
4.4 Test requirements	
5 Test methods and technical requirements	
5.1 General test	
5.1.1 Appearance and quality	
5.1.2 Tightness	
5.1.3 Insulation resistance	
5.1.4 Withstand voltage	
5.1.5 Grounding resistance	
5.2 Performance test	
5.2.1 Dynamic sealing	
5.2.2 Input and output characteristics	
5.2.3 Differential reliability	
5.2.4 Drag moment	
5.3 Safety test	
5.3.1 Temperature rise	
5.3.2 Overspeed test	
5.3.3 High voltage control module support capacitor discharge time	
5.4 Environmental adaptability test	
5.4.1 Temperature and humidity test	
5.4.2 Mechanical load test	
5.4.3 Chemical load test	
5.4.4 Flowing mixed gas corrosion test	
5.4.5 Salt spray test	
5.4.6 IP protection level test	

5.5 EMC test

5.5.1 Conducted emissions

5.5.2 Radiated emissions

5.5.3 Radiation immunity (anechoic chamber method, large current injection method)

5.5.4 Magnetic field immunity

5.5.5 Handheld transmitter immunity

5.5.6 Transient conduction immunity along the power line

5.5.7 Electrostatic discharge

5.5.8 Coupling electrical transient emission immunity

5.6 NVH test

5.7 Reliability test

5.7.1 Assembly endurance test

5.7.2 Pulsation reliability of cooling circuit

1 Scope

This standard specifies the test conditions, test requirements, test methods, and judgment standards for the integrated electric drive assembly of pure electric passenger vehicles.

This standard applies to the integrated electric drive assembly (hereinafter referred to as the assembly) of pure electric drive passenger car, namely the high-voltage control module, the drive motor module Combination of block, single-stage reducer module and/or differential module. Other integrated electric drive assemblies can be implemented as reference.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this article Pieces. For undated reference documents, the latest version (including all amendments) is applicable to this document.

GB/T 2423.18-2012 Environmental test Part 2: Test method Test Kb. Salt spray, alternating (sodium chloride solution) GB/T 10592-2008 Technical conditions of high and low temperature test chamber GB/T 18386-2017 Electric vehicle energy consumption rate and driving range test method GB/T 18488.1 Drive motor system for electric vehicles Part 1: Technical conditions GB T 18488.2 Drive Motor System for Electric Vehicle Part 2: Test Method GB/T 18655-2018 Limits and measurement methods of radio disturbance characteristics of vehicles, ships and internal combustion engines used to protect on-board receivers GB/T 28046.4-2011 Environmental Conditions and Tests of Electrical and

Electronic Equipment of Road Vehicles Part 4 Climatic Load GB/T 28046.3-2011
Environmental conditions and tests for electrical and electronic equipment of road vehicles-Part 3 Mechanical load GB/T 28046.5-2013 Environmental conditions and experiments of electrical and electronic equipment for road vehicles-Part 5 Chemical load GB/T 30038-2013 Road vehicle electrical and electronic equipment protection level (IP code) GB/T 36282-2018 Electromagnetic compatibility requirements and test methods for drive motor systems for electric vehicles QC/T 1022-2015 Technical requirements for reducer assembly for pure electric passenger car QC/T 1132-2020 Noise measurement method for electric power system of electric vehicles

3 Terms and definitions

The following terms and definitions defined in GB/T 19596 apply to this document.

Integrated electric drive system the power drive assembly unit of a pure electric drive passenger car. The coupled components include but are not limited to the following parts. drive motor module, reducer Module, high voltage control module.

High-voltage control module Motor controller or all-in-one controller.

c) When the assembly performs input and output characteristics, drag torque, temperature rise, overspeed, NVH, and reliability tests, complete the grinding according to the following conditions Combined test.

- 1) The output speed maintains 50% of the maximum design speed, and the maximum allowable deviation is ± 10 r/min;
- 2) The output torque is 10% of the peak torque, and the maximum allowable deviation is ± 5 N·m;
- 3) Running-in time. forward rotation for 2 hours, reverse rotation for 1 hour;
- 4) The lubricating oil of the reducer should be replaced after running-in.

If there is no special requirement, during the test, the speed difference between the two shaft ends of the assembly should not exceed 1%. The difference between the output torque and the total output torque should not exceed 1%.

When the total output torque is greater than 1000 N·m, the percentage shall not exceed 1% or specified by the design, and it shall not exceed 10 N·m in other cases.

5.1.1 Appearance and quality

The appearance is mainly based on visual inspection. The sample has no abnormal appearance and no stains, that is, no visible oil leakage, scratches, deformation, corrosion, cracking, etc.

Measure and record the mass of the assembly with a weighing instrument that meets the requirements of measurement accuracy.

The assembly should be marked with the polarity of the DC power supply, the direction of water inlet and outlet, high voltage danger, and grounding.

5.1.2.1.1 Test requirements

The test requirements are as follows.

- a) For this test, all cooling circuits of the assembly should be jointly measured;
- b) If there is no corresponding coating requirement in the manufacturing, it is not allowed to coat the surface of the drive motor or the drive motor controller before the test.

Coating to prevent leakage, but allows chemical anti-corrosion treatment without sealing effect;

- c) The test medium can be liquid or gas, and the liquid medium can be water, kerosene or non-corrosive with a viscosity not higher than water.

Liquid, gas medium can be air, nitrogen or inert gas;

- d) The range of the gas or liquid pressure measuring instrument is 1.5 to 3 times the test pressure.

5.1.2.1.2 Test methods and criteria

During the test, the temperature of the test medium should be consistent and stable with the temperature of the test environment; block one end of the cooling circuit of the sample under test, but it can't produce the deformation that affects the sealing performance; Fill the circuit with the test medium, and use the pressure meter to measure the applied medium pressure.

- a) When using a gaseous medium to test, keep the cooling circuit dry, and gradually increase the pressure until the test pressure is not less than 200 kPa.

After 60 s, the pressure drop should not be greater than 1 kPa, or during the pressure maintaining process, the leakage rate meter display value should not drop more than 4 mL/min;

- b) When using a liquid medium to test, the air in the cooling circuit cavity should be evacuated and gradually pressurized until the test pressure is not less than 200 kPa.

And keep the pressure for at least 15 minutes without leakage.