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Requirement and Test Method of Heating Performance for Motor Vehicle

汽车采暖性能要求和试验方法

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Requirement and Test Method of Heating Performance for Motor Vehicle

1 Scope

This document specifies the requirement, test method, data processing and test report of heating performance for motor vehicle.

This document is applicable to Category-M and Category-N motor vehicles.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document through the 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 12534 Motor Vehicles - General Rules of Road Test Method

GB/T 15089 Classification of Powder-driven Vehicles and Trailers

GB 18352.6 Limits and Measurement Methods for Emissions from Light-duty Vehicles

GB/T 19596 Terminology of Electric Vehicles

GB/T 27840 Fuel Consumption Test Methods for Heavy-duty Commercial Vehicles

GB/T 38146.1 China Automotive Test Cycle - Part 1: Light-duty Vehicles

GB/T 38146.2 China Automotive Test Cycle - Part 2: Heavy-duty Commercial Vehicles

3 Terms and Definitions

What is defined in GB/T 15089, GB/T 19596, GB/T 38146.1 and GB/T 38146.2, and the following terms and definitions are applicable to this document.

3.1 position of measuring temperature

Position of measuring temperature refers to the installation position of temperature sensor.

3.2 steady state condition

Steady state condition refers to the driving condition, in which, the vehicle speed remains

constant for a certain period of time.

3.3 transient condition

Transient condition refers to the driving condition, in which, the vehicle speed continuously changes within a certain period of time.

4 Performance Requirements

In accordance with the test conditions provided in 6.2.2, when conducting heating performance test at an ambient temperature of (–25 ± 3) °C for 40 min and 60 min, the heating performance of the vehicle shall reach the following requirements.

a) For Category-M_1 and Category-N vehicles:

   1) The temperature of the driver's and front passenger's feet shall not be lower than 15 °C;

   2) The temperature of other passengers' feet shall not be lower than 12 °C.

b) For Category-M_2 and Category-M_3 vehicles:

   1) The temperature of the driver's and front passenger's feet shall not be lower than 15 °C;

   2) In accordance with the number of seat rows of the sample vehicle, the temperature of the feet of the front row, middle row, behind the door and the last row of seats near the side wall in other passenger areas shall not be lower than 12 °C.

5 Test Conditions

5.1 Test Instrument

The measurement parameters, unit and accuracy requirements of the test instrument are shown in Table 1.

---For Category-M vehicles (excluding city buses) and Category-N vehicles whose maximum design total mass is greater than 3,500 kg, the test time is 60 min; successively carry out the test in accordance with the requirements of low-speed section, high-speed section and idle-speed section; each section lasts 20 min; the low-speed section is set at 45 km/h and the high-speed section is set at 80 km/h;

---For city buses, the test time is 60 min; successively carry out the test in accordance with the requirements of low-speed section, high-speed section and idle-speed section; each section lasts 20 min; the low-speed section is set at 25 km/h and the high-speed section is set at 55 km/h.

If the maximum speed of the test vehicle is lower than the speed requirements of the above-mentioned high-speed section, then, in accordance with 90% of the maximum vehicle speed, carry out the test.

6.2.3 Transient condition

The transient condition for the heating performance test of motor vehicle is shown in Appendix A.

6.3 Test Procedures

6.3.1 Road test procedures

6.3.1.1 The test vehicle shall be parked under the environmental conditions provided in 5.2 for at least 10 h. During vehicle immersion, the doors, windows and vent holes may be kept open. If it is confirmed that the temperature of engine coolant, engine oil, or system components, such as: power battery and motor, has been stabilized, and the temperature change within 1 h is less than ± 1 °C, the parking stage can be terminated in advance.

6.3.1.2 Check whether the radiator, radiator water pipes and heater water tank pipes are frozen. If they are frozen, the test shall be terminated.

6.3.1.3 Check the test instrument and clean the inner and outer surfaces of the windshield.

6.3.1.4 All test personnel enter the vehicle, close the doors, windows and vent holes, and in accordance with the following requirements, conduct the test:

---For Category-M_1 and Category-N_1 vehicles, as well as Category-M_2 vehicles whose maximum design total mass does not exceed 3,500 kg, after the test driver starts the engine (if necessary, some external equipment can be used to start the engine) or after the pure electric vehicle, hybrid electric vehicle and fuel cell electric vehicle are powered on and the system is adjusted to the READY state, in accordance with the requirements of 6.2.2, conduct the test;

---For Category-M vehicles and Category-N vehicles whose maximum design total mass is greater than 3,500 kg, after reaching the warm-up state specified by the automobile

manufacturer, in accordance with the requirements of 6.2.2, conduct the test.

For vehicles equipped with an independent combustion-type heating device, 10 min before the start of the test, light the heating device for pre-heating.

6.3.1.5 After the test begins, all heating devices shall be turned on and adjusted to the maximum heating state; the state of auxiliary heating devices (such as: steering wheel heating and seat heating, etc.) shall comply with the requirements of the vehicle manufacturer; the circulation mode shall be set to the outer circulation (no mode switching is in the automatic mode, and the passenger vehicle may set the circulation mode in accordance with the requirements of the vehicle manufacturer); the air outlet mode adjustment switch shall be placed at the foot position (if defogging is required, the defogging mode can be used and switch back to the foot blowing mode after the defogging is completed). For vehicles with different driving modes, the normal driving mode should be selected during the test.

6.3.2 Laboratory test procedures

6.3.2.1 For Category-M_1 and Category-N_1 vehicles, as well as Category-M_2 vehicles whose maximum design total mass does not exceed 3,500 kg, the setting of chassis dynamometer shall be carried out in accordance with the requirements provided in GB 18352.6; for Category-M and Category-N vehicles whose maximum design total mass is greater than 3,500 kg, the setting of chassis dynamometer shall be carried out in accordance with the requirements provided in GB/T 27840. The head-on fan shall be set to the vehicle speed following mode.

6.3.2.2 The presetting, inspection and preparation of the test vehicle shall be carried out in accordance with the requirements provided in 6.3.1.1 ~ 6.3.1.3.

6.3.2.3 The steady state condition or transient condition heating performance test shall be carried out in accordance with the steps provided in 6.3.1.4 ~ 6.3.1.5.

6.4 Test Records

In accordance with the test demands, record each parameter. For parameters that need continuous measurement, the measurement frequency should not be lower than 0.1 Hz.

7 Test Data Processing and Test Report

7.1 Record and draw the temperature - time change curve of each position of measuring temperature. The form of the test report is shown in Appendix B. The format of the test data record sheet is shown in Table B.1.

7.2 Record the gears during the test. The format of the steady state heating performance test data record sheet is shown in Table B.2.

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