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**Motor vehicle inspection - Technical requirements and testing
methods for zero gas source**

机动车检验 零气源技术要求及测试方法

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1 Scope

This Document specifies the technical requirements and test methods for zero gas source used in motor vehicle inspection and test.

This Document applies to the design, production, test, and use of zero gas source used in motor vehicle inspection and test.

2 Normative References

GB 3847

GB/T 11606

GB 18285

JJF 2159

3 Terms and Definitions

For the purposes of this Document, the terms and definitions given in GB 18285, GB 3847, JJF 2159 and the following apply.

3.1 Zero gas

Gases that meet the requirements of GB 18285 and GB 3847 and are used for zero adjustment and oxygen span calibration of automotive exhaust gas testers and diesel vehicle nitrogen oxide detectors.

[SOURCE. JJF 2159-2024, 3.1, modified]

3.2 Zero gas source

A device that generates and outputs zero gas.

NOTE. It is also called a zero gas generator.

3.3 Zero gas composition analyzer

An analytical instrument for measuring the composition content of zero gas.

4.1 Appearance requirements

4.1.1 The zero gas source shall have a nameplate and be securely fixed. The nameplate shall indicate the name, model, power supply voltage, manufacturer's name, exit-factory date, and the complete machine's exit-factory number. The zero gas source using catalytic converters shall be marked with the exit-factory number. The catalytic converter housing shall also be marked with the exit-factory number, which shall be consistent with the number on the external chassis nameplate.

4.1.2 All switches, buttons, and cable connectors on the zero gas source shall have good contact and function properly.

4.2 Functional requirements

4.2.1 The zero gas source shall be able to purify the input gas.

4.2.2 The zero gas source should be able to display the zero gas dew point or gas temperature and humidity. The dew point display resolution shall be no less than 0.1°C. For zero gas source with gas temperature and humidity display, the temperature display resolution shall be no less than 0.1°C, and the relative humidity display resolution shall be no less than 0.1%.

4.2.3 The zero gas source shall be able to display and adjust the flow rate.

4.2.4 The zero gas source should be able to display the condenser temperature.

4.2.5 The zero gas source using catalytic conversion shall be able to display the temperature.

The temperature display resolution shall be no less than 1°C. The operating temperature of the catalytic converter shall reach 350°C above.

4.2.6 The zero gas source shall display the effective life of internal consumables and automatically prompt the user to replace them.

5.1.1 Environmental conditions

The test environment shall meet the following requirements.

- a) Temperature. 0°C to 40°C;
- b) Relative humidity. no greater than 85%;
- c) Power supply. operating voltage of (220±22) V (AC), frequency of (50±1) Hz;
- d) Electromagnetic interference at the work site shall not affect the test results.

5.1.2 Test equipment

Test instruments and equipment shall be available, measured, traceable and used within their validity period. Key instruments and equipment shall meet the requirements in Table 2. Key. 1 - Standard gas cylinder; 2 - Pressure reducing valve; 3 - Zero gas source; 4 - Float flowmeter with flow adjustment; 5 - Zero gas analyzer.

Figure 2 -- Schematic diagram of the connection of the input standard gas testing instrument

- b) Open the valve of the standard gas cylinder and respectively introduce the standard gas specified in A.1. Adjust the pressure of the standard gas pressure reducing valve and each stage of the zero gas source pressure reducing valve according to the instructions in the zero gas source instruction manual;
- c) Adjust the zero gas output flow rate of the zero gas source to 4 L/min (for zero gas sources with 2 or fewer zero gas output channels, open any channel and introduce it into the zero gas analyzer for test; for zero gas sources with more than 2 zero gas output channels, open any two channels and select one channel to connect with the zero gas analyzer for test). Adjust the flow meter in Figure 2 to ensure that the standard gas flow rate entering the zero gas analyzer meets the requirements of the zero gas analyzer;
- d) The aerating time shall be at least 5 min. After the zero gas analyzer reading stabilizes, record the zero gas analyzer indication once every 30 s (for hydrocarbon compositions, if the zero gas analyzer displays HC composition, read the HC indication; if the zero gas analyzer does not display HC composition, read the C3H8 indication and multiply it by the conversion factor 0.515). Record the data 6 times consecutively; and calculate the average value using Formula (1). This value represents the volume fraction (mole fraction) of each gas composition in the zero gas source for this test.

5.3.2 Repeatability test

The repeatability test shall be conducted as follows.

- a) After completing the input ambient air test according to 5.3.1.1, calculate the repeatability according to Formula (2);
- b) After completing the input standard gas test according to 5.3.1.2, calculate the repeatability according to Formula (2).