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**Limits and Measurement Methods for Emissions from
Gasoline Vehicles under Two-speed Idle Conditions and
Short Driving Mode Conditions**

汽油车污染物排放限值及测量方法

（双怠速法及简易工况法）

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Limits and Measurement Methods for Emissions from Gasoline Vehicles under Two-speed Idle Conditions and Short Driving Mode Conditions

1 Scope

This Standard specifies the limits and measurement methods for emissions from gasoline vehicles under two-speed idle conditions, steady-state loaded mode, transient loaded mode and simple transient loaded mode. Meanwhile, this Standard also specifies the methods and determination bases for the appearance inspection, OBD inspection and evaporative emission control system detection of gasoline vehicles.

This Standard is applicable to the inspection for new produced vehicle at end of production line, inspection for register vehicle and inspection for in-use vehicle. This Standard also applies to other vehicles equipped with ignition engines.

2 Normative References

The clauses of the following documents become clauses of this Standard through the references in this Standard. In terms of references without a specified date, the latest version is applicable to this Standard.

GB 5181-2001 Automotive Emission - Terms and Definitions

GB 14762-2008 Limits and Measurement Methods for Exhaust Pollutants from Gasoline Engines of Heavy-duty Vehicles (III, IV)

GB/T 15089-2001 Classification of Power-driven Vehicles and Trailers

GB 17691 Limits and Measurement Methods for Exhaust Pollutants from Compression Ignition and Gas Fueled Positive Ignition Engines of Vehicles

GB 17691-2018 Limits and Measurement Methods for Emissions from Diesel Fueled Heavy-duty Vehicles (China VI)

GB 17930 Gasoline for Motor Vehicles

GB 18047 Compressed Natural Gas as Vehicle Fuel

GB 18352 Limits and Measurement Methods for Emissions from Light-duty Vehicles

GB 19159 Automotive Liquefied Petroleum Gases

6 Appearance Inspection

6.1 Inspection for New Produced Vehicle at End of Production Line

6.1.1 Check whether the pollution control device of the vehicle is consistent with the content of the accompanying list of environmental protection information.

6.2 Registration

6.2.1 Check whether the content of the accompanying list of environmental protection information is consistent with the information disclosure.

6.2.2 Check whether the pollution control device of the vehicle is consistent with the accompanying list of environmental protection information.

6.3 In-use Vehicle

6.3.1 Check whether the condition of the vehicle under inspection is normal. If there is any abnormality, the owner shall be requested to repair it.

6.3.2 Check whether the vehicle manifests engine oil burning or serious emission of black smoke. If so, the owner shall be requested to repair it.

6.3.3 Check whether the connection of the connecting pipes of the evaporative emission control system is correct and complete. If ageing, fracturing, damage or blockage is found, the owner shall be requested to repair it. This inspection is not required for mono-fuel vehicles.

6.3.4 Check whether the appearance of the engine exhaust pipe, exhaust muffler and exhaust post-treatment device, and whether the installation and fastening parts are in good condition. If corrosion, air leakage, damage or looseness is found, the owner shall be requested to repair it.

6.3.5 Check whether the vehicle is equipped with an OBD system.

6.3.6 Determine whether the vehicle is suitable for the simple driving mode detection, if not (such as: full-time four-wheel drive and timely four-wheel drive that cannot manually switch the two-wheel drive mode), it shall be marked. If the simple driving mode detection is conducted, it shall be confirmed whether there is foreign matter on the surface of the vehicle tires.

6.3.7 During the inspection for altered registration and transferred registration, check whether the pollution control device is in good condition.

7 On-board Diagnostic (OBD) System Inspection

7.1 New Produced Vehicle at End of Production Line

7.1.1 Automobile manufacturers shall check the communication of the OBD system of each vehicle and confirm that the communication of the OBD system is properly working before it exits the factory.

7.2 Registration

7.2.1 Check whether the OBD interface of the vehicle satisfies the specified requirements, whether the OBD communication is normal, and whether there is a fault code.

7.3 In-use Vehicle

7.3.1 For in-use vehicles equipped with the OBD system, after completing the appearance inspection, the OBD diagnostic instrument shall be connected for OBD inspection. During the subsequent pollutant emission inspection, the OBD diagnostic instrument must not be disconnected.

7.3.2 The OBD inspection items include: fault indicator status, fault indicator status actually read by the diagnostic instrument, fault code, traveled distance after the MIL light is on and diagnostic readiness value. The specific inspection procedures shall comply with the stipulations of Appendix F.

7.3.3 If the fault indicator fault (including circuit fault), fault indicator activation, communication fault between the vehicle and the OBD diagnostic instrument, and instrument panel fault indicator status of the vehicle are inconsistent with the fault indicator status recorded in ECU, the vehicle shall be determined as disqualified in the OBD inspection. If more than 2 items of diagnostic readiness are not completed, the owner shall be requested to conduct a re-inspection after the vehicle has been fully driven.

7.3.4 The inspection institution shall use the computer data management system to store the OBD data of all inspected vehicles, and must not tamper with the data.

7.3.5 The OBD diagnostic instrument shall be able to implement real-time automatic transmission of OBD inspection data. As part of the emission inspection, the information obtained by the OBD shall be automatically saved to the computer system.

7.3.6 For in-use vehicles that require the allocation of an on-board remote emission management terminal, check whether the communication of the device is normal.

7.3.7 If the pollution control device of the vehicle is removed, and the OBD fault indicator light does not light up to issue an alarm, the OBD of the vehicle shall be deemed to be disqualified.

8 Exhaust Pollutant Detection

8.1 Emission Limits and Measurement Methods

8.1.1 New Produced Vehicle at End of Production Line

Appendix A, Appendix B, Appendix C, Appendix D, Appendix F and Appendix H.

If the exhaust detection result is negative or zero, it shall be recorded as “not detected”.

9.2 The inspection institution shall transmit inspection information in real time to the competent department of ecological environment.

9.3 The lower-level competent department of ecological environment shall submit the inspection information to the higher-level competent department of ecological environment in real time or on a regular basis in accordance with the contents specified in Appendix G and Appendix H.

9.4 The storage life of paper files of the inspection reports shall be no less than 6 years; the storage life of electronic files shall be no less than 10 years.

9.5 During the inspection (including OBD inspection), if it is found that the emission of a certain vehicle model intensively exceeds the standard, the competent department of ecological environment shall properly keep records and collect evidences; fill in the *Environmental Protection Inspection Record Form for Concentrated Excessive Vehicle Models* (Appendix G) and submit it to the competent department of ecological environment of the State Council. Meanwhile, the recorded information shall be reported to the higher-level competent department of ecological environment, as well as the public security traffic management department and the market supervision department at the same level.

9.6 The inspection information of the automobile manufacturers at end of production line shall be automatically detected, recorded, transmitted and stored in real time through the computer system, and shall be submitted online to the competent department of ecological environment of the State Council.

9.7 The inspection information of imported vehicles at end of production line shall be submitted to the competent department of ecological environment of the State Council before entry.

10 Emission Monitoring of In-use Vehicles

10.1 Since the date of implementation of this Standard, the emission inspection of in-use vehicles (including regular emission inspection and supervisory sampling inspection) shall comply with the requirements of this Standard.

10.1.1 The exhaust detection of in-use vehicles shall comply with Limit a specified in this Standard. For cities with more than 5 million vehicle ownerships, or where the pollutants emitted by motor vehicles are the primary source of local air pollution, or where low-emission control zones are set up pursuant to laws and regulations, on the basis of thoroughly soliciting opinions from all sectors of society, after being approved by the provincial people's government and the competent department of ecological environment of the State Council, Limit b may be selected in advanced, but a sufficient transition period for implementation shall be set.

10.1.2 In principle, the same detection method shall be adopted in the same province. The detection results using different methods specified in this Standard shall be mutually recognized by all regions. For cross-regional detection, if there is an enforcement of Limit b in the vehicle registration state or detection site, then, the requirements of Limit b shall be abided by. For the measurement methods, the measurement method specified by the detection site is allowed.

The provincial competent department of ecological environment may adopt the method specified in Appendix E for the detection of the evaporative emission control system of the vehicle in accordance with condition of ozone pollution.

10.1.3 Vehicles shall use the specified vehicle oil products and be maintained as required. For vehicles with disqualified results in the first inspection, after maintenance, the detection method of the first environmental protection inspection shall be adopted for re-inspection.

10.2 The supervisory sampling inspection of in-use vehicles by the competent department of ecological environment at or above the county level may be carried out in centralized parking areas and maintenance areas of the motor vehicles, and on actual roads. The content of the sampling inspection may include exhaust detection and OBD inspection, and inspection of pollution control devices and accompanying lists, etc.

When the two-speed idle conditions are used for the supervisory sampling inspection of the vehicle, 1.1 times of the limit specified in this Standard may be adopted for determination.

10.3 The registration inspection shall include appearance inspection, OBD inspection and exhaust detection. Vehicles that comply with the inspection exemption shall comply with the relevant regulations on inspection exemption. The environmental protection inspection for vehicles with altered registration or transferred registration shall be conducted in accordance with the regulations of the local government, but at least the inspection of pollution control devices and the OBD inspection (if applicable) shall be conducted.

10.4 For vehicles that are equipped with the on-board remote emission management terminal and submit the emission-related data to the competent department of ecological environment in real time as required, the provincial competent department of ecological environment may exempt them from the environmental protection online inspection in accordance with the submitted data.

11 Implementation of the Standard

11.1 This Standard shall be implemented since May 1, 2019. The periodic environmental protection inspection of vehicles carried out nationwide shall adopt the simple driving mode conditions specified in this Standard. For vehicles that cannot use the simple driving mode conditions, the two-speed idle conditions specified in this Standard may be adopted.

11.1.1 The inspection of newly produced vehicle at end of production line shall be implemented since November 1, 2019.

Appendix A

(normative)

Two-speed Idle Conditions

A.1 Overview

This Appendix specifies the requirements for the measurement instruments, measurement procedures, detection systems and detection software technology of the two-speed idle conditions.

A.2 Measurement Instruments

The emission test instruments used for the two-speed idle conditions shall satisfy the stipulations of Appendix AA of this Appendix.

A.3 Measurement Procedures

A.3.1 It shall be ensured that the vehicle being tested is in the normal state specified by the manufacturer; the engine air intake system shall be equipped with an air filter; the exhaust system shall be equipped with an exhaust muffler and an exhaust after-treatment device; no leakage is allowed in the exhaust system.

A.3.2 When performing emission measurement, the temperature of engine coolant or lubricating oil shall be not lower than 80 °C, or reach the thermal state specified in the instruction manual of the vehicle.

A.3.3 The engine is accelerated from the idle state to 70% of the rated speed or the warm-up speed specified by the manufacturer, after running for 30s, it drops to the high idle state. Insert the sampling probe of the two-speed idle emission test instrument into the exhaust pipe to a depth of not less than 400 mm; fix it on the exhaust pipe. After maintaining for 15s, the average value within 30s is read by the two-speed idle emission test instrument, which has the function of average value calculation; this value is the measurement result of high-idle speed pollutants. For vehicles using closed-loop control electronic fuel injection system and ternary analytic converter technology, the value of excess air coefficient (λ) shall also be calculated at the same time.

A.3.4 15s after the engine is dropped from high idle to idle state, the average value within 30s is read by the two-speed idle emission test instrument, which has the function of average value calculation; this value is the measurement result of idle speed pollutants.

A.3.5 During the test, if the sum of CO and CO₂ concentrations is less than 6.0%, or if the engine is turned off, the test shall be terminated, the emission measurement result is invalid, and the test needs to be re-conducted.

Commercially available fuels that comply with the stipulations shall be used, such as: automotive gasoline, automotive natural gas, automotive LPG, etc. During the test, the fuel in the vehicle is directly used for the emission test, and there is no need to replace the fuel.

A.4 Requirements for Detection System

A.4.1 The emission detection system and equipped equipment of in-use vehicles shall comply with the requirements of this Standard and the relevant standards on emission.

A.4.2 The emission detection system consists of a two-speed idle emission test instrument and a computer control system, and shall be equipped with a complete instruction manual and operation specifications.

A.4.3 The test instruments and equipment shall be periodically verified in accordance with relevant stipulations. For instruments and equipment that do not have a clearly specified verification cycle, they shall be verified at least once a year. For instruments that have passed the verification, if a key component that may affect the measurement accuracy of the instrument is replaced, or if the instrument is subject to major maintenance, the instrument shall be re-verified.

A.4.4 The instruments and equipment shall be used within the validity period of the verification, and the instruments shall be regularly inspected. The inspection content includes the appearance, self-inspection and operational performance of the instrument. Before using the two-speed idle emission test instrument every day, the instrument shall be self-inspected with standard gas in accordance with the requirements of the instruction manual.

A.5 Detection Software

A.5.1 The detection software shall at least have the following functions: automatically determine whether the test results are qualified or not; automatically store the test data and ensure that it cannot be tampered with; before each test, perform system self-inspection; when there is an incompliance with the detection conditions, which may affect the normal detection, the system shall be able to issue an alarm and self-lock, until the detection conditions return to normal.

A.5.2 The detection software shall be able to transmit, store and determine data with the computer, automatically print the inspection report, and have the functions of networking and automatic reporting;

A.5.3 For each emission detection, whether it is qualified or not, the detection software must automatically record and collect the following data items.

A.5.3.1 Comprehensive information

---detection record No.;

---detection site and inspector No.;

Appendix AA

(normative)

Technical Conditions of Two-speed Idle Emission Test Instrument

AA.1 Overview

This Appendix specifies the technical conditions that the emission test instrument of Appendix A shall satisfy.

AA.2 Basic Technical Requirements

AA.2.1 It can at least measure the volume fraction (or concentration) of four components CO, CO₂, HC (expressed in n-hexane equivalent) and O₂ in the exhaust gas of automobiles, and calculate the excess air coefficient (λ) in accordance with the measurement results of the above-mentioned parameters.

AA.2.2 The measurement of CO, CO₂ and HC shall adopt non-dispersive infrared absorption (NDIR); the measurement of O₂ may adopt electrochemical cell method, or other equivalent methods.

AA.2.3 It shall have the function of measuring engine speed and oil temperature, or have a signal input port for speed and oil temperature.

AA.2.4 All parts of the gas analysis system shall be made of corrosion-resistant materials; the used materials shall have no effect on the composition of the exhaust gas; the sampling probe shall be able to withstand the high temperature of the exhaust gas, and have limiting and fixing devices.

AA.2.5 The system shall be equipped with idle and high-idle measurement procedures that comply with the requirements of this Standard.

AA.3 Structural Requirements

AA.3.1 General rules

In the emission test instrument, the sample exhaust gas is transmitted to the gas treatment system and the detector for analysis by a sampling pump, so as to determine the volume fraction (or concentration) of each pollutant of the vehicle and calculate the excess air coefficient (λ) value.

AA.3.2 Main components of the instrument

AA.3.2.1 Sampling probe

The sampling probe shall be able to be inserted into the exhaust tail pipe of a motor vehicle by

at least 400 mm, and shall be equipped with a depth positioning device. For vehicles with dual exhaust pipes that work independently, the symmetrical dual probes of the Y-shaped sampling pipe shall be used for simultaneous sampling; it shall be ensured that the sample gas in the two sampling pipes reaches the main sampling pipe at the same time.

AA.3.2.2 Sampling hose

Sampling hose is connected with the sampling probe, and is used as the sample gas inlet and outlet channels of the measurement system.

AA.3.2.3 Pump

Pump transmits the sample exhaust gas to the instrument.

AA.3.2.4 Water separator

The volume of the water separator shall be large enough to continuously remove the condensed water in the sample exhaust gas, so as to ensure that the sampling system manifests no phenomenon of water condensation. When the water vapor reaches saturation, it shall be able to ensure automatic disengagement or automatic stop of the measurement operation.

AA.3.2.5 Filter

It shall be able to remove the particulate matter that causes the contamination of various sensitive parts of the instrument. It is required that the filter shall be able to remove particles with a diameter greater than 5 μm ; the degree of contamination can be observed without taking it out, and it shall be easy for replacement. When measuring the sample gas with HC volume fraction of about 800×10^{-6} , it shall ensure a continuous working time of not less than 30 min.

AA.3.2.6 Zero air port and inspection port

The above-mentioned ports are located downstream of the water separator and the filter. They include ports for the introduction of pure ambient gas and standard gas for the zero-point adjustment of the measurement instrument.

AA.3.2.7 Detection element

The components in the gas sample are analyzed by volume fraction.

AA.3.2.8 Data system and display device

The data system processes signals, and the display device displays the measurement results.

AA.3.2.9 Control adjustment device

It completes the instrument initialization and start-up inspection, and adjusts the instrument parameters within the set range through manual, semi-automatic or fully automatic adjustment devices.

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