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Requirements and measurement methods of catalytic converters for petrol vehicles

汽油车用催化转化器的
技术要求和试验方法

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Foreword

This Standard is made to implement *Environmental Protection Law of the People's Republic of China* and *Atmospheric Pollution and Control Law of the People's Republic of China*, control the automobile pollutant emission and improve the environmental air quality.

With respect to the content of replacement catalytic converters, this Standard references and adopts part of the content of United Nations Economic Commission for Europe (ECE) ECE R103, Uniform Provisions Concerning the Approval of Replacement Catalytic Converters for Power-Driven Vehicles, which enters into force in March 1997.

This Standard was proposed by State Administration of Machinery Industry.

This Standard shall be under the jurisdiction of the National Technical Committee of Auto Standardization.

The drafting organizations of this Standard: China Automotive Technology and Research Center, Hubei Tongda Auto Parts (Group) Co., Ltd., Shanghai Honghu Mufflers Factory.

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Requirements and measurement methods of catalytic converters for petrol vehicles

1 Scope

This Standard specifies the technical requirements and test methods of catalytic converters for petrol vehicles.

This Standard applies to catalytic converters for petrol vehicles.

This Standard also applies to catalytic converter for fuel liquefied petroleum gas (LPG) vehicles.

2 Normative References

The provisions in following documents become the provisions of this Standard through reference in this Standard. When this Standard is published, all the versions shown are effective. However, all standards will be revised. Parties whose use this Standard shall study if the latest versions of the following standards are applicable.

GB/T 10125-1997, *Corrosion tests in artificial atmospheres - Salt spray tests* (eqv ISO 9227:1990)

GB/T 12534-1990, *Motor vehicles - General rules of road test method*

GB/T 14761-1999, *Limits and measurement methods for emissions of pollutants from motor vehicles*

GB/T 14762-1993, *Test method for exhaust pollutants from gasoline engine of vehicle*

QC/T 630-1999, *Test method for automobile exhaust mufflers*

3 Definitions

For the purposes of this Standard, the following definitions apply.

3.1 catalytic converter

A device which uses catalysts to reduce hydrocarbon (HC), carbon monoxide (CO) and nitric oxide (NO_x) in automotive exhaust.

3.2 original equipment catalytic converter

4 Test conditions

4.1 For all test items which are carried out on the road or in test site, the test conditions and vehicle preparation etc. shall comply with the general provisions of GB/T 123534.

4.2 For all test items which are carried out inside test room, the test conditions etc. shall comply with the general provisions of GB 14761 or GB 14762.

4.3 The vehicle for the evaluation test for the replacement catalytic converter shall be driven for 3 000 km at least. The vehicle emission control system shall be free from any defect; any original equipment part related to emission control shall be repaired or replaced in case of excessive wear or malfunction. Before emission test, the vehicle shall be adjusted correctly according to the technical specifications of the manufacturer.

4.4 The engine for the accelerated ageing test of the catalytic converter shall be repaired and maintained correctly to ensure all properties comply with the technical specifications of the manufacturer, especially that during the accelerated ageing test of the catalytic converter, the excess air coefficient of the engine under steady working conditions shall be controlled within the range of 1 ± 0.02 .

5 Requirements

5.1 General requirements

5.1.1 The catalytic converter shall be marked indelibly of manufacturer name or trademark, type of the catalytic converter and direction of inlet and outlet.

5.1.2 The design, manufacture and installation of the catalytic converter shall ensure that the vehicle comply with all provisions of national standards.

5.1.3 The design, manufacture and installation of the catalytic converter shall prevent the possible corrosion or oxidation during the use of the vehicle, to a certain extent.

5.1.4 The design and manufacture of the catalytic converter shall ensure that when the leakage test is carried out as specified in 6.1, its pressure drops shall not be greater than 10 kPa. During the installation of the catalytic converter, it shall be ensured that the interfaces are sealed.

5.1.5 The replacement catalytic converter shall be installed at the same position of original equipment catalytic converter; the ground clearance of the vehicle shall not be reduced; and the position of oxygen sensor in exhaust pipe shall not be altered.

5.1.6 The catalytic converter shall be provided with thermal insulation measures to ensure use safety.

5.4.1 For original equipment catalytic converter, its endurance mileage is 80 000 km under the conditions of normal use and maintenance of the vehicle.

5.4.2 For replacement equipment catalytic converter, its endurance mileage is 50 000 km under the conditions of normal use and maintenance of the vehicle.

5.5 Other performance requirements for replacement catalytic converter

5.5.1 Compared with the original equipment catalytic converter, the gas emission back pressure shall not exceed 0.2 kPa when the replacement catalytic converter is installed to carry out test as specified in 6.6.

5.5.2 Compared with the original equipment catalytic converter, the vehicle acceleration noise shall not exceed 1 dB when the replacement catalytic converter is installed to carry out test as specified in 6.7.

6 Test methods

6.1 Leakage test

Apply the air of 200 kPa pressure in the sample; and measure the pressure drop within 30 s.

6.2 Preconditioning of catalytic converter

The sample for the catalytic converter shall be preconditioned as specified in 6.2. The excess air coefficient of the engine during preconditioning is 1 ± 0.02 ; the airspeed of the catalytic converter is $(60\,000 \pm 600) \text{ h}^{-1}$; the temperature at the inlet is above 700°C ; and the duration is 1 h.

6.3 Ignition temperature and air-fuel ratio characteristic test

Before test, the sample shall be preconditioned as specified in 6.2. The analytical instruments and measuring instruments and sampling probes for test shall comply with relevant provisions of GB/T 14762. The distance from the measuring point of inlet temperature to the front-end face of carrier shall not be less than 300 mm.

6.3.1 Ignition temperature test

6.3.1.1 The excess air coefficient of the engine during test is 1 ± 0.02 ; and the airspeed of the catalytic converter is $(40\,000 \pm 400) \text{ h}^{-1}$.

6.3.1.2 The inlet temperature is within the range of $200 \sim 500^{\circ}\text{C}$; change it gradually by the interval not greater than 20°C ; after the inlet temperature of the catalytic converter becomes steady, measure the emission concentration values before and after the catalytic converter. Plot the ignition temperature characteristic curve using the inlet temperature as abscissa and the conversion coefficient as ordinate.

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