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**Automotive diesel engines - Reduction agent filter for
selective catalytic reduction (SCR) system**

汽车柴油机 选择性催化还原（SCR）系统用还原剂过滤器

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Automotive diesel engines - Reduction agent filter for selective catalytic reduction (SCR) system

1 Scope

This document specifies the technical requirements, test methods, inspection rules, marking, packaging, transportation, storage of reduction agent filter for selective catalytic reduction (SCR) system of automobile diesel engines.

This document applies to reduction agent filter for selective catalytic reduction (SCR) system of automotive diesel engines, which have a rated volume flow rate of 40 L/h or less (referred to as filter).

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text. Among them, for dated references, only the version corresponding to the date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

GB/T 2423.4 Environmental testing for electric and electronic products - Part 2: Test method - Test Db: Damp heat, cyclic (12h + 12h cycle)

GB/T 2828.1-2012 Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection

GB/T 5923 Test methods of fuel filter for automotive compression ignition engines

GB/T 10125 Corrosion tests in artificial atmospheres - Salt spray tests

GB/T 17486 Hydraulic fluid power - Filters - Evaluation of differential pressure versus flow characteristics

GB/T 28950.1-2012 Road vehicles and internal combustion engines - Filter vocabulary - Part 1: Definitions of filters and filter components

GB/T 28950.2-2012 Road vehicles and internal combustion engines - Filter vocabulary - Part 2: Definitions of characteristics of filters and their components

GB 29518 Diesel engines NO_x reduction agent - Aqueous urea solution (AUS 32)

GB/T 35363 Diesel fuel and petrol filters for vehicle engines - The test method for filtration efficiency and contaminant retention capacity - Method of particle counting

QC/T 772 Test methods of diesel-fuel filter for automobiles

ISO 16232 Road vehicles - Cleanliness of components and systems

3 Terms and definitions

The terms and definitions as defined in GB/T 28950.1-2012 and GB/T 28950.2-2012, as well as the following terms and definitions, apply to this document.

3.1

Urea for AUS 32

Industrially produced urea, which has only trace impurities of biuret, ammonia and water, is free of aldehydes and other substances such as anti-caking agents, sulfur and sulfides, chlorides, nitrates or other compounds.

Note: For the pollutants mentioned above, they will have an impact in the urea production process, so the content and test methods must be strictly controlled. Urea produced as agriculture usually contains the above compounds.

[Source: GB 29518-2013, 3.2, with modifications]

3.2

NOx reduction agent-Aqueous urea solution (AUS 32)

The aqueous solution, which is prepared using special urea and pure water, without any other additives; the content of urea in the solution is 32.5% (mass fraction), which meets the technical requirements stipulated in Chapter 5, referred to as AUS 32.

Note: Tracers that meet the requirements of Table 1 can be used as additives.

[Source: GB 29518-2013, 3.4]

3.3

Direction of flow; flux direction

Indicates the direction of fluid flow through the filter or element.

Note: The direction of flow is generally indicated by an arrow.

4.6 filter element structural integrity and 4.7 tightness.

4.12 High pressure drop resistance of filter element

4.12.1 Forward flow resistance to high pressure drop

Under the action of rated flow rate and 100 kPa pressure drop, the filter element shall have no defects such as collapse and rupture; meanwhile it shall meet the requirements of 4.6 filter element structural integrity.

4.12.2 Reverse flow resistance to high pressure drop

Under the rated flow rate and 160 kPa pressure drop, the filter element shall have no defects such as collapse and rupture; meanwhile it shall meet the requirements of 4.6 filter element structural integrity.

4.13 Liquid corrosion resistance

After soaking in urea aqueous solution at a temperature of $60\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ for 22 hours, there shall be no obvious signs of structural rupture, damage or functional degradation; meanwhile it shall meet the requirements of 4.6 filter element structural integrity and 4.7 tightness.

4.14 Salt spray corrosion resistance

After 200 h of salt spray test, there shall be no visually visible defects such as white or red rust, peeling, etc. on the surface of the part; meanwhile it shall meet the requirements of 4.7 tightness.

4.15 Temperature and humidity resistance

Appearance inspection after 24 h cycle test: there is no phenomenon such as metal coating oxidation, blurred identification, filter element deformation; meanwhile it shall meet the requirements of 4.6 filter element structural integrity and 4.7 tightness.

4.16 High and low temperature resistance

After the sample is placed at $-40\text{ }^{\circ}\text{C}$ for 2 hours, the temperature is evenly raised to $85\text{ }^{\circ}\text{C}$, at a rate of not less than $5\text{ }^{\circ}\text{C}/\text{min}$. After being placed at $85\text{ }^{\circ}\text{C}$ for 2 hours, the temperature is reduced to $-40\text{ }^{\circ}\text{C}$, at rate of not less than $5\text{ }^{\circ}\text{C}/\text{min}$. This forms 1 cycle. This is repeated, after completing 60 cycles. It shall meet the requirements of 4.6 filter element structural integrity and 4.7 tightness.

4.17 Pulling strength of filter element end cover

When calculated according to the surface area of the upper and lower end caps, the pull-off force of the filter element end cap shall not be less than $0.17\text{ N}/\text{mm}^2$.

5 Test method

5.1 Test conditions

Unless otherwise stated, performance tests shall be conducted under the following conditions:

- a) Test fluid temperature: $25\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$;
- b) Test ambient temperature: $25\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$;
- c) Test ambient air pressure: $101.3\text{ kPa} \pm 15\text{ kPa}$;
- d) If there is no special instruction in the test specification, the test fluid shall comply with the specification of GB 29518 Diesel engines NO_x reduction agent - Aqueous urea solution (AUS 32) or other test medium confirmed by both the supplier and the purchaser.

5.2 Measurement of original resistance

Follow the provisions of 6.3 in GB/T 5923.

Note: The connecting pipeline requirements shall comply with the provisions of GB/T 17486.

5.3 Original filtration efficiency test

Under the rated volume flow rate, follow the provisions of GB/T 35363.

5.4 Dust holding capacity test

Under the rated volume flow rate, follow the provisions of GB/T 35363.

5.5 Cleanliness test

5.5.1 Gravimetric method

Follow the provisions of 6.1 in GB/T 5923.

5.5.2 Particle counting method

Follow the provisions of ISO 16232.

5.6 Element structural integrity

Follow the provisions of 6.2 in GB/T 5923.

5.7 Tightness test

The parameters of the vibration test are carried out according to Table 3; it is vibrated for 22 h in each of the three directions of X, Y, Z.

5.12 Test of resistance to filter element's high pressure drop

5.12.1 It is carried out, in accordance with the provisions of 6.6 in GB/T 5923.

5.12.2 The test process shall be divided into two steps: Forward flow and reverse flow.

5.13 Test of liquid corrosion resistance

5.13.1 Before the test, the appearance of the filter, the integrity and tightness of the filter element shall be inspected.

5.13.2 The test liquid must meet the requirements of GB 29518, for aqueous urea solution. The container containing the liquid shall be clean and resistant to corrosion by aqueous urea solution.

5.13.3 Put the filter under test into the test container completely, so that the urea aqueous solution completely soaks the filter under test.

5.13.4 Raise the temperature of the liquid to $60\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$. Keep the temperature for 22 hours. Then take out the filter under test.

5.13.5 After inspecting the appearance of the filter, carry out the test of 4.6 filter element integrity and 4.7 tightness.

5.14 Test of neutral salt spray resistance

It is carried out, according to GB/T 10125 neutral salt spray test method.

5.15 Test of temperature and humidity resistance

5.15.1 The appearance and tightness of the sample shall be detected, before the test. In the "Ready to use" state, put it into the working space of the test box (chamber), according to its normal working position, OR according to the state agreed by both parties. If the test sample is installed in a special way and a mounting frame is required, the thermal conductivity of the mounting frame shall be as low as possible.

5.15.2 It is carried out, in accordance with method 1 of GB/T 2423.4-2008.

significantly, which may affect the product performance;

- c) According to the requirements of the product audit quality control plan, when periodic performance inspection is required;
- d) When the national quality supervision agency requests type inspection;
- e) When requested by the user.

6.5 Spot check

When the buyer conducts spot checks on product quality, it shall follow the provisions of GB/T 2828.1-2012. The inspection items, group-batching principles, sampling plans, judgment and re-inspection rules shall be carried out, in accordance with the technical documents, which are agreed between the manufacturer and the customer.

7 Marking, packaging, transportation, storage

7.1 Marking

7.1.1 The outer surface of each product shall be marked with:

- a) The name or trademark of the manufacturer;
- b) Product name and model;
- c) Instructions for use and maintenance.

7.1.2 The certificate shall indicate:

- a) The name or trademark of the manufacturer;
- b) Product name and model;
- c) Date of production or exit-factory number.

7.1.3 The outer surface of the packing box shall be marked with:

- a) The name and address of the manufacturer;
- b) Product name and model;
- c) Quantity and total mass;
- d) Signs such as "Handle with care", "Avoid pressure", "Avoid moisture";
- e) Dimensions: length x width x height, in millimeters (mm);

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