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Internal-combustion engine industry filter paper

内燃机工业滤纸

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The Ministry of Industry and Information Technology approved 230 industry standards including the "Calculation method for attenuation of atmospheric and rainfall at satellite communication links" (Refer to the Annex for the standard number, name, main content and implementation date), including 62 communications industry standards, 5 petrochemical industry standards, 2 building materials industry standards, 88 machinery industry standards, 8 pharmaceutical equipment industry standards, 8 automotive industry standards, 29 aviation industry standards, 2 shipping industry standards, 26 light industry standards, which are hereby announced.

The above communications industry standards are published by People's Posts and Telecommunications Publishing House. The petrochemical industry standards are published by China Petrochemical Publishing House. The building materials industry standards are published by China Building Materials Industry Publishing House. The machinery industry standards are published by Machinery Industry Publishing House. The pharmaceutical equipment industry standards are published by China Standard Press. The automotive industry standards are published by Beijing Science and Technology Press. The aviation industry standards are published under the organization of the China Institute of Aviation Technology. The ship industry standards are published under the organization of the China Shipbuilding Industry Technical and Economic Research Institute. The light industry standards are published by China National Light Industry Press.

Annex: Number, name and date of implementation of 8 automobile industry standards.

Ministry of Industry and Information Technology of PRC

August 31, 2020

Annex:**Number, name and date of implementation of 8 automobile industry standards**

No.	Standard number	Standard name	Replaced standard number	Date of implementation
166	QC/T 1131-2020	Methods of detecting polycyclic aromatic hydrocarbons in automotive materials		2021-01-01
167	QC/T 1132-2020	Measurement methods of the noise of electric power train system for electric vehicles		2021-01-01
168	QC/T 1134-2020	Engine intake air water separation test procedure		2021-01-01
169	QC/T 1133-2020	Safety filter element of air filter for commercial automobile		2021-01-01
170	QC/T 770-2020	Dry air filter assembly for automobile	QC/T 770-2006	2021-01-01
171	QC/T 1135-2020	Water filter for automobile engine		2021-01-01
172	QC/T 793-2020	Air filters for motorcycles and scooters	QC/T 793-2007	2021-01-01
173	QC/T 794-2020	Internal-combustion engine industry filter paper	QC/T 794-2007	2021-01-01

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Internal-combustion engine industry filter paper

1 Scope

This document specifies the terms and definitions, classification, requirements, test methods, inspection rules and marking, packaging, transportation, storage of internal-combustion engine industry filter paper (hereinafter referred to as filter paper).

This document applies to filter paper for internal combustion engine filters.

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 applies to this document; for undated references, the latest version (including all amendments) applies to this document.

GB/T 450 Paper and board - Sampling for testing and identification of machine and cross direction wire side and felt side

GB/T 451.1 Paper and board - Determination of size and deviation

GB/T 451.2 Paper and board - Determination of grammage

GB/T 451.3 Paper and board - Determination of thickness

GB/T 454 Paper - Determination of bursting strength

GB/T 462 Paper, board and pulp - Determination of moisture content of analytical sample

GB/T 742 Fibrous raw material, pulp, paper and board - Determination of ash (575 °C and 900 °C)

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

GB/T 30512 Requirements for prohibited substances on automobiles

GB/T 4687 Paper board pulps and related terms - Vocabulary

GB/T 5249 Permeable sintered metal materials - Determination of bubble test pore size

GB/T 5453 Textiles - Determination of the permeability of fabrics to air

GB/T 10342 Paper - Package and mark

GB/T 10739 Paper, board and pulps - Standard atmosphere for conditioning and testing

GB/T 14041.2 Hydraulic fluid power - Filter elements - Part 2: Verification of material compatibility with fluids

GB/T 14656 Test method for burning behavior of flame-retardant paper and board

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

GB/T 35348 Diesel engines - Fuel filters - Method for evaluating fuel/water separation efficiency

JB/T 12651.2-2016 Internal combustion engine - Filter paper for filters - Part 2: Testing method

3 Terms and definitions

The terms and definitions, as defined in GB/T 4687 and GB/T 28950.2, as well as the following terms and definitions, apply to this document.

3.1

Filter paper

Paper, which is made of natural or synthetic fibers or their mixtures with additives and binders capable of separating solid particles or other substances from the fluids (air, lubricating oil, fuel, other fluids), in which they are suspended.

3.2

Cured filter paper

Filter paper, which is impregnated with thermosetting resin.

3.3

Non-cured filter paper

Filter paper, which is impregnated with thermoplastic resin.

3.4

Mean pore size

Using the bubble test, the capillary's equivalent pore diameter, which is corresponding to the group bubble point pressure, when the group bubbles continuously and stably emerge from the surface of the filter paper, expressed in μm . The amount of group bubbles is adjusted according to the corresponding instrument.

3.12**Resistance to humidity**

The ability of air filter paper to retain its original performance, after being treated in a high-humidity environment for a specified period of time, which is expressed by the stiffness retention rate of the treated sample.

3.13**Resistance to liquid medium**

The ability of engine oil and fuel filter paper to retain its original performance, after soaking in a specified medium for a certain period of time, expressed by the burst strength value after sample treatment, in the unit of kPa.

4 Categories

4.1 According to the resin treatment method, it is divided into cured filter paper and non-cured filter paper.

4.2 According to the filter medium, it is divided into air filter paper, engine oil filter paper, fuel filter paper (diesel filter paper, gasoline filter paper).

4.3 According to whether it is flame retardant, air filter paper is divided into flame retardant air filter paper and non-flame retardant air filter paper.

4.4 According to the shape, it is divided into corrugated filter paper and flat filter paper.

4.5 According to the composition of the functional layer, it can be divided into single-layer and multi-layer composite filter paper.

5 Requirements**5.1 Quantification**

The quantitative nominal value of the filter paper is specified by the manufacturer, expressed in g/m^2 . The quantitative limit deviation is $\pm 5\%$ of the quantitative nominal value.

The resin content of the filter paper shall not be less than 18%. For special customized filter paper, the resin content is determined through negotiation between the supplier and the buyer.

5.11 Ash content

The ash content of the filter paper shall not exceed 5%. For special customized filter paper, the ash content shall be determined, through negotiation between the supplier and the buyer.

5.12 Humidity resistance

5.12.1 The stiffness retention rate of non-cured air filter paper shall not be less than 30%.

5.12.2 The stiffness retention rate of cured air filter paper shall not be less than 70%.

5.13 Flame retardancy

The combustion performance results of flame-retardant air filter paper shall meet the following requirements:

- a) The average after-flame time is not greater than 5 s;
- b) The average carbonization length is not greater than 115 mm.

5.14 Resistance to liquid medium

After the lubricating oil filter paper and fuel oil filter paper are immersed in the specified engine working medium, under high temperature or low temperature conditions, the residual burst strength shall not be less than 50% of the nominal value of burst strength.

5.15 Filtration efficiency and dust holding capacity

The original graded filtration efficiency, dust holding capacity, test method of the filter paper are determined, through negotiation between the supplier and the user.

5.16 Water separation efficiency

The water separation efficiency and test method of fuel filter paper shall be determined, through negotiation between the supplier and the user.

5.17 Prohibited substances

It shall comply with the provisions of GB/T 30512.

5.18 Dimension tolerance

The tolerance of filter paper roll's width shall not be greater than 5‰ of the specified size. The paper roll adopts a standard core, which has an inner diameter of $\Phi 76$ mm.

Note: The size (tolerance) and core diameter of the filter paper roll can also be implemented, according to the order contract.

5.19 Appearance

5.19.1 The number of joints for each roll of paper shall not exceed 2. Marks shall be made on the end of the paper roll. The joints shall be firm.

5.19.2 The cut edge of the paper shall be neat. The end face of the paper roll shall be smooth and clean. The roll shall be tight. The core shall not be loose.

5.19.3 The paper surface shall be clean. There shall be no appearance defects, such as holes, wrinkles, cracks, stains, color spots, pulp blocks, etc. that affect the use.

5.19.4 The corrugation of corrugated paper shall be complete. The corrugations shall be evenly arranged. The corrugated surface shall not be cracked.

5.19.5 The impregnation is uniform. There shall be no defects, such as delamination or breakage when folding.

5.19.6 The marking lines on the wire side are continuous and evenly spaced. The wire marks cannot penetrate to the other side of the filter paper. The marking spacing is 30 mm, 40 mm, 50 mm, 100 mm. It can also be implemented according to the provisions of the order contract.

6 Test method

6.1 Collection and treatment of specimen

Specimens are collected according to the provisions of GB/T 450. The standard atmospheric conditions for specimen processing and testing shall comply with the provisions of GB/T 10739. If it is a filter paper treated with a thermosetting resin, it shall be cured before the test. The curing temperature is $160\text{ }^{\circ}\text{C} \pm 10\text{ }^{\circ}\text{C}$; the curing time is $15\text{ min} \pm 2\text{ min}$. The cured filter paper shall be placed at a relative humidity of $(50 \pm 2)\%$ and a temperature of $23\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ under standard atmospheric conditions for 4 hours, before testing.

6.2 Quantification

It shall comply with the provisions of GB/T 451.2.

6.3 Thickness

6.3.1 The thickness of flat paper shall comply with the provisions of GB/T 451.3.

6.15 Resistance to liquid medium

It shall comply with the provisions of GB/T 14041.2 and GB/T 454.

6.16 Filtration efficiency and dust holding capacity

6.16.1 The air filter paper shall comply with the provisions in 6.13.2 of JB/T 12651.2-2016.

6.16.2 The oil filter paper shall comply with the provisions in 6.13.3 of JB/T 12651.2-2016.

6.16.3 The fuel filter paper shall comply with the provisions in 6.13.4 of JB/T 12651.2-2016.

6.17 Water separation efficiency

The water separation efficiency of fuel filter paper shall comply with the provisions of GB/T 35348.

6.18 Prohibited substances

It shall comply with the provisions of GB/T 30512.

6.19 Determination of size deviation

It shall comply with the provisions of GB/T 451.1.

6.20 Visual inspection

The visual inspection shall be carried out, at a uniform illumination of about 300 lx AND an eye distance of 500 mm.

7 Inspection rules**7.1 General**

Each roll of filter paper shall pass the inspection of the inspection department of the manufacturer; it can only leave the factory, after the inspection report and certificate of conformity are attached.

7.2 Inspection classification

Inspections are divided into exit-factory inspection and type inspection.

7.3 Exit-factory inspection

The exit-factory inspection items shall be carried out according to the provisions in

Appendix A

(Normative)

Test method for corrugated paper thickness and corrugation depth

A.1 Measuring instruments

A.1.1 Measuring instruments include three parts: dial indicator, detection head, measuring table.

A.1.2 The detection head is linear (see Figure A.1); the contact with the paper is line contact. The detection head shall be parallel to the measuring platform; the degree of non-parallelism shall not be greater than 0.01 mm.

A.1.3 The test pressure is below 2N.

A.2 Specimen preparation

Take a full-width paper sample from the roll paper. The paper sample shall not be curled or compressed. Cut 5 paper specimens, along the horizontal direction.

A.3 Test procedure

A.3.1 Adjust the instrument to zero, before testing.

A.3.2 Measurement of corrugated paper thickness: Place the specimen on the measuring platform. The direction of corrugation is parallel to the detection head (see Figure A.2). Lower the detection head, to the lowest point of the corrugation. Move the specimen slightly. Read the lowest value, which is the thickness t of the corrugated paper (see Figure A.4). The test results are expressed as the average value of 5 specimens.

A.3.3 Determination of corrugation depth: Place the specimen on the measuring platform. The corrugation direction is perpendicular to the detection head (see Figure A.3). Put down the detection head. Read the value, which is the full corrugation height T of the specimen (see Figure A.4). Calculate the corrugation depth according to the thickness of corrugated paper and the overall corrugation height.

A.3.3.1 Corrugation depth is calculated, according to formula (A.1):

$$S=T-t \quad \dots\dots\dots (A.1)$$

Where:

S - Corrugation depth, in millimeters (mm);

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