QC

AUTOMOTIVE INDUSTRY STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

ICS 43.060.20

CCS T 13

QC/T 922-2023

Replacing QC/T 922-2013

Air Cleaner Elements for Automobiles

汽车用空气滤清器滤芯

Issued on: December 20, 2023 **Implemented on: July 1, 2024**

Issued by: Ministry of Industry and Information Technology of the People's Republic of China

Table of Contents

Foreword

This Document was drafted as per the rules specified in GB/T 1.1-2020 *Directives for Standardization – Part 1: Rules for the Structure and Drafting of Standardizing Documents*.

This Document replaced QC/T 922-2013 *Specifications of Paper Element for Automobile Air Filters*. Compared with QC/T 922-2013, the major technical changes of this Document are as follows besides the structural adjustments and editorial modifications:

a) Changed the standard name "Specifications of Paper Element for Automobile Air Filters" to "Air Cleaner Elements for Automobiles" (see 2013 Edition);

b) Change the scope " paper element of air filter" to "air cleaner element"; and change "paper element of air filter for automobiles (except for cars)" to "air cleaner element for automobiles" (see 2013 Edition);

c) Delete "General " (see 4.1 of 2013 Edition);

d) Delete "Filter element manufacturing integrity test" (see 4.3.9 of 2013 Edition);

e) Add the types and test methods of "prohibited substances" (see 4.1, 5.1 of this Edition);

f) Add the test methods and requirements of "cleanliness" (see 4.2, 5.2 of this Edition);

g) Change "original resistance of filter element" to "original resistance"; subdivide by filter element type, and change the requirements (see 4.3, 5.3 of this Edition; 4.2.1 of the 2013 Edition);

h) Change "initial filtration efficiency of filter element" to "initial filtration efficiency"; subdivide by filter element type, and change the requirements (see 4.4, 5.4 of this Edition; 4.2.2 of the 2013 Edition);

i) Change "full life filtration efficiency of filter element" to "full life filtration efficiency"; subdivide by filter element type, and change the requirements (see 4.5, 5.5 of this Edition; 4.2.2 of the 2013 Edition);

j) Change "ash storage capacity of filter element" to "ash holding capacity"; subdivide by filter element type, and change the requirements (see 4.6, 5.6 of this Edition; 4.2.3 of the 2013 Edition);

k) Add the test and requirements of "resistance recovery" (see 4.7, 5.7 of this Edition);

1) Added the test and requirements of "water resistance" (see 4.8, 5.8 of this Edition);

m) Add the test and requirements for "combustion performance of filter element" (see 4.9 of this Edition);

Air Cleaner Elements for Automobiles

1 Scope

This Document specifies the technical requirements, test methods, inspection rules, marking, packaging, transportation and storage of air cleaner elements for automobiles.

This Document is applicable to the design, manufacture and inspection of air cleaner elements (hereinafter referred to as "filter elements") for automobiles with a volume flow rate of less than 3,000 m^3/h. Air cleaner elements for construction machinery, agricultural and forestry machinery, ships and stationary power can also be used as a reference.

2 Normative References

The provisions in following documents become the essential provisions of this Document through reference in this Document. For the dated documents, only the versions with the dates indicated are applicable to this Document; for the undated documents, only the latest version (including all the amendments) is applicable to this Document.

GB/T 1182-2018 Geometrical product specifications (GPS) - Geometrical tolerancing - Tolerances of form, orientation, location and run-out

GB/T 1804-2000 General Tolerances - Tolerances for Linear and Angular Dimensions without Individual Tolerance Indications

GB/T 2828.1 Sampling procedures for inspection by attribute - Part1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection

GB/T 3730.1-2022 Terms and definitions of motor vehicles, trailers and combination vehicle - Part 1: Types

GB/T 28949-2012 Inlet air cleaning equipment for internal combustion engines and compressors - Performance testing

GB/T 28957.1-2012 Road vehicles - Test dust for filter evaluation - Part 1: Silicon dioxide test dust

GB/T 30512-2014 Requirements for Prohibited Substances on Automobiles

GB/T 35358.1-2017 Inlet air cleaning equipment for vehicle engines and compressors - Part 1: Fractional efficiency testing with fine particles (0.3μm to 5μm optical diameter)

HG/T 4785-2014 Rubber seals for air cleaner of automobile

HG/T 4910-2016 Hot melt adhesives for paper element of automotive - Part 1: adhesives for air filter

JB/T 11788.1-2014 Internal combustion engines - Sealing polyurethane for filter elements - Part 1: For air filter elements

QC/T 32-2017 Test methods of air cleaners for automobiles

QC/T 770-2020 Dry type air cleaner assembly of automobiles

QC/T 794-2020 Internal-combustion engine industry filter paper

QC/T 970-2014 Passenger Car Air Filter Technical Specification

QC/T 1000.2-2015 Performance Requirements and Test Methods of Non-woven on Automotive Filter - Part 2: Non-woven of filters for Air Filter

3 Terms and Definitions

For the purposes of this Document, the terms and definitions given in GB/T 3730.1-2022, GB/T 28949-2012, QC/T 32-2017 apply.

4 Technical Requirements

4.1 Prohibited substances

The materials used for the filter element shall comply with the content limit requirements for Prohibited substances in 4.2 of GB/T 30512-2014; and are not limited to the component types involved in Appendix A.

4.2 Cleanliness

The cleanliness of the filter element shall not exceed $0.12q_{ve}$, in mg.

NOTE 1: q_{ve} is the rated volume flow of the filter element, in m^3/h.

NOTE 2: The coefficient (0.12) in front of q_{ve} is in $[mg/(m^3/h)]$.

4.3 Original resistance

At the rated air volume flow, the original resistance of the filter element shall comply with the provisions of Table 1.

d) The full life filtration efficiency shall be no less than 95% of the average full-life filtration efficiency of the same batch of test samples.

e) The ash holding capacity shall not be less than 85% of the average ash holding capacity of the same batch of test samples.

4.9 Filter element combustion performance

The filter element combustion performance shall meet the requirements of Table 4 in QC/T 970-2014.

4.10 Damage resistance

When the pressure difference of the filter element reaches 10 kPa, there shall be no damage, deformation, or filter material rupture.

4. 11 Weather resistance

The filter element shall be free of defects such as deformation, rupture, plastic swelling, degumming, and rust.

4.12 Filter element and components

4.12.1 The dimensional tolerance of the filter element can be measured with a general measuring tool; and the shape and position tolerance shall be measured in accordance with the provisions of GB/T 1182-2008. The appearance quality shall be inspected by visual inspection.

4.12.2 The filter element shall be clean; and the inner and outer surfaces shall be free of dirt, impurities, and damage; and the components shall be complete.

4.12.3 The paper filter material used in the filter element shall be folded and shaped and heat-cured according to the process requirements, and shall comply with the provisions of QC/T 794-2020.

4.12.4 The non-woven filter material used in the filter element shall be folded and shaped according to the process requirements, and shall comply with the provisions of QC/T 1000.2-2015.

4.12.5 For the inner fold distance of the filter element, the paper filter element should be no less than 2.5 times the thickness of the filter material; and for non-woven filter element, it should be no less than 1.5 times the thickness.

4.12.6 The fold deviation of the filter element shall comply with the provisions of Table 5.

According to the provisions of 5.1.3 in QC/T 32-2017, but make the following changes to the test device:

a) The outer cover of the filter element test shall be in accordance with the provisions of Figures 3 and 4 in GB/T 35358.1-2017. When the outlet diameter of the radial air inlet cylindrical filter element in Figure 4 exceeds the size of the pressure measuring tube, the structure of the ideal airflow inlet in Figure C.10 c) of QC/T 32-2017 shall be adopted.

b) The size of the resistance pressure measuring tube is determined. The size of the pressure measuring tube of the cylindrical filter element shall be consistent with the size of the filter element outlet; and the size of the pressure measuring tube of the plate filter element shall meet the requirements of the pipe diameter and flow range in Table 1 of GB/T 35358.1-2017. When the outlet size of the filter element cannot be determined, the size of the pressure measuring tube shall be determined according to the air flow rate of 15 m/s in the tube; and the test record shall indicate the size of the pressure measuring tube.

5.4 Initial filtration efficiency

According to the provisions of 5.1.4 in QC/T 32-2017, the connection between the filter element and the test bench shall meet the requirements of 5.3.

5.5 Full life filtration efficiency

According to the provisions of 5.1.6 in QC/T 32-2017, the connection between the filter element and the test bench shall meet the requirements of 5.3; and the termination condition of the test is that the resistance increases by 2.5 kPa.

5.6 Ash holding capacity

According to the provisions of 5.1.7 of QC/T 32-2017, the connection between the filter element and the test bench shall meet the requirements of 5.3; and the termination condition of the test is that the resistance increases by 2.5 kPa.

5.7 Resistance recovery

According to the provisions of 5.1.11 of QC/T 32-2017, and the recovery rate R is calculated according to Formula (13) in QC/T 32-2017; the termination condition of the test is that the resistance increases by 2.5 kPa.

5.8 Water resistance

According to the provisions of 5.1.12 of QC/T 32-2017, remove the filter element packaging or remove the filter element from the assembly and soak it in clean water at room temperature for 4 h; then take it out and drain it in the laboratory environment for 30 min; and then conduct the tests on original resistance recovery, original filtration efficiency, full life filtration efficiency, and ash holding capacity performance.

5.9 Filter element combustion performance

According to the provisions of Table 5 in QC/T 970-2014.

5.10 Filter element damage test

According to the provisions of 6.6 in GB/T 28949-2012.

5.11 Weather resistance

According to the provisions of 5.12 in QC/T 32-2017.

6 Inspection Rules

6.1 Each product shall be inspected and qualified by the quality inspection department of the manufacturer, and shall be accompanied by a product certificate before leaving the factory.

6.2 The exit-factory inspection adopts visual appearance inspection and dimensional inspection.

6.3 When the ordering organization conducts random inspection of products, it shall be conducted in accordance with the provisions of GB/T 2828.1. The sampling plan, inspection items and accepted quality level (AQL) value shall be determined through negotiation between the supplier and the purchaser; and the quantity shall be no less than 3 pieces.

6.4 Type inspection shall be carried out in any of the following cases:

a) When conducting finalization and identification of new products;

b) When the product structure, materials, and processes have changed significantly, which may affect the product performance, after normal production;

c) When in normal production, type inspection shall be carried out every 2 years;

d) When the exit-factory inspection results of the product are significantly different from the previous type inspection results;

e) When the purchaser and user require type inspection;

f) When the national quality supervision agency requires type inspection.

6.5 The type inspection items shall be carried out in accordance with the provisions of 4.1 to 4.9.

This is an excerpt of the PDF (Some pages are marked off intentionally)

------ The End ------