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Air cleaner

空气净化器

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Air cleaner

1 Scope

This document specifies the terms and definitions, classification and model nomenclature, requirements, test conditions, test methods, inspection rules, marks, instructions for use, packaging, transportation and storage of air cleaners.

NOTE 1: The air cleaners involved in this document include independent air cleaning appliances and various air cleaning modules.

This document applies to the household and similar air cleaners (hereinafter referred to as "the cleaners") that have the function of removing one or more of the above-mentioned target pollutants such as particulate matter, gaseous pollutants, microorganisms (bacteria, fungi, viruses), odors and allergens.

This document is applicable to but not limited to the cleaners with the following working principles: filter type, adsorption type, complex type, chemical catalytic type, photocatalytic type, electrostatic type, plasma type, composite type.

NOTE 2: A composite cleaner refers to the cleaner that uses two or more cleaning principles to remove one or more air pollutants.

The following products can be implemented with reference to this document:

- Small, portable cleaners, passenger car cleaners;
- Air duct type cleaning device and other similar cleaners;
- Other products with air cleaning function.

NOTE 3: For example, air conditioners, dehumidifiers, fresh air fans, fans, humidifiers, heaters and vacuum cleaners.

This document does not apply to:

- Cleaners designed for industrial use;
- Cleaners used in special environments of corrosive and explosive gases (such as dust, steam and gas);
- Cleaners designed for medical use.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 191, *Packaging and storage marks*

GB/T 1019, *General requirements for the package of household and similar electrical appliances*

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 2829, *Sampling procedures and tables for periodic inspection by attributes (apply to inspection of process stability)*

GB/T 4214.1-2017, *Test method for noise of household and similar electrical appliances - General requirements*

GB 4706.1, *Household and similar electrical appliances-Safety Part 1: General requirements*

GB 4706.45, *Household and similar electrical appliances - Safety - Particular requirements for air-cleaning appliances*

GB/T 5296.2-2008, *Instructions for use of products of consumer interest - Part 2: Household and similar electrical appliances*

GB/T 18883, *Standards for indoor air quality*

GB 19489, *Laboratories - General requirements for biosafety*

GB 21551.3, *Antibacterial and cleaning function for household and similar electrical appliances - Particular requirements of air cleaner*

GB/T 35758-2017, *Household electrical appliances - Measurement of standby power*

QB/T 5364-2019, *Requirement and evaluation method of test chamber for air cleaner*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

The operation mode that under no human operation, relies on sensors, algorithms to automatically adjust the running gear.

3.5.4 off mode(s)

When the power supply unit of the cleaner is connected to the mains power supply, there is no standby mode, network mode or active mode, and any mode in which the state is continuous.

NOTE: An indicator that only informs the user that the cleaner is in the off position is included in the category of off mode(s). For mode and function guidance, see Annex A of GB/T 35758-2017.

[Source: GB/T 35758-2017, 3.5, modified]

3.5.5 non-network standby mode(s)

Any mode that when the cleaner is connected to the main power supply, there is no network connectivity function, and one or more of the following user-oriented functions or protection functions are provided, and it is continuous.

- Other modes (including active mode on or off) can be triggered by triggering remote switches (including remote control), internal sensors, timers;
- Information or status display including a clock;
- Basing on sensor capabilities.

NOTE: For mode and function guidance, see Annex A of GB/T 35758-2017. A timer is a clock function (with or without a display) that performs a regularly scheduled task (such as a switch) and works continuously.

[Source: GB/T 35758-2017, 3.6, modified]

3.5.6 network standby mode(s)

The mode in which the cleaner is connected to mains power and at least one of the network functions has been activated (such as restarting by network command or complete network communication), but the main function has not been activated.

NOTE: This mode cannot be used if the network function is not enabled and/or not connected to the network. Network functions can be triggered by preset command sets or network request responses. "Network" as used in this document includes communications between two or more independently powered devices or products. A network does not contain one or more controls for a single product. A network mode may include one or more standby functions.

[Source: GB/T 35758-2017, 3.7, modified]

3.6 standby power

The corresponding power consumption of the cleaner in off, standby, and network modes.

NOTE: The unit is watts (W).

3.7 total decay

Under the specified space and conditions, due to the joint action of natural decay and cleaning operation, the concentration of target pollutants in the air is reduced.

NOTE: Natural decay refers to the reduction of the concentration of target pollutants in the air due to non-human factors such as settlement, agglomeration, surface deposition, chemical reaction and air exchange under specified space and conditions.

3.8 clean air delivery rate; CADR

Q

The parameter of the cleaning ability of the cleaner for the target pollutants (particulate matter and gaseous pollutants) under the specified test conditions. It indicates the rate at which the cleaner provides clean air.

NOTE: The unit is cubic meter per hour (m^3/h).

3.9 cumulate clean mass; CCM

M

The parameter of the cleaner's cumulative cleaning capacity against target pollutants (particulate matter and gaseous pollutants) under specified test conditions. It indicates the total mass of the target pollutants accumulated for cleaning treatment when the measured value of the clean air rate of the cleaner decays to 50% of the initial value.

NOTE: The unit is milligram (mg).

3.10 cleaning energy efficiency; η

The amount of clean air produced per unit power consumption by the cleaner in rated mode.

NOTE: The unit is cubic meter per watt hour [$\text{m}^3/(\text{W}\cdot\text{h})$].

4 Classification and model naming

4.1 Classification

4.1.1 Classification according to cleaning principle

- b) The test power supply is a single-phase AC sine wave. The fluctuation range of voltage and frequency shall not exceed $\pm 1\%$ of the rated value;
- c) The tested prototype shall be tested in the rated mode or other modes that need to be tested according to the usage method specified in the instructions for use;
- d) Before the test, check that the target pollutant generation, measurement and recording equipment shall be in normal use.

6.2 Measuring instruments

6.2.1 General measuring instruments

The test general measuring instruments shall meet the following requirements:

- a) The electrical measuring instruments used for type tests, except for those specified specifically, shall have an accuracy of not less than level 0.5. It shall not less than level 1.0 for the exit-factory test;
- b) Thermometer: the maximum allowable error is $\pm 0.5^{\circ}\text{C}$;
- c) Hygrometer: the maximum allowable error of relative humidity is $\pm 2\%$;
- d) Chronograph instrument: the maximum allowable error is $\pm 1\text{s}/24\text{h}$.

6.2.2 Special measuring instruments

For different test contents, special measuring instruments shall meet the requirements of the corresponding appendix.

6.3 Test chamber

If there is no special regulation, the test chamber shall meet the requirements of 3m^3 , 10m^3 , 30m^3 and 81m^3 test chambers specified in QB/T 5364-2019.

6.4 Test prototype

6.4.1 Working mode setting

Unless otherwise specified, the test shall be carried out in the rated mode of the cleaner. If the cleaner has no rated mode, the highest gear is turned on by default for testing.

NOTE: For products, whose cleaning function is an auxiliary function, such as air conditioners, dehumidifiers and fresh air fans, it is only necessary to start the rated mode of the cleaning function according to the instruction manual or turn on the highest gear for testing.

6.4.2 Placement position

The placement of the test prototype shall meet the following requirements.

a) 3m³ test chamber

If the height of the air outlet is less than 400mm, it shall be placed on a table with a height of 400mm. If the height of the air outlet is greater than or equal to 400mm, it shall be placed on the ground.

b) 10m³, 30m³, 81m³ test chambers

Center position: Floor type (on the ground), desktop type (700mm above the table), wall-mounted type (the lower edge is 1800mm from the ground).

Other models not specified above, if not specified, are classified according to the height of the air outlet. When the height of the air outlet is less than 700mm, put the cleaner on the table for the test. When the height of the air outlet is greater than or equal to 700mm, the cleaner is placed on the ground for the test.

6.5 Target pollutant

For different tests, the target pollutants shall meet the corresponding requirements. See the corresponding tests for details.

7 Test methods

7.1 Particulate matter cleaning

7.1.1 Clean air rate

The test method of particle clean air rate shall be carried out according to Annex A.

NOTE: See Annex B for the calculation method of the clean air rate corresponding to the applicable area.

7.1.2 Cumulate clean mass

The test method for the cumulate clean mass of particulate matter shall be carried out in accordance with Annex C.

NOTE: See Annex D for the conversion method of particle cleaning life.

GB/T 4214.1-2017.

7.6 Cleaning energy efficiency

7.6.1 Input power

Connect the cleaner to the electrical parameter test instrument. Turn on the power. The instrument enters the measurement state. After the cleaner has been running stably in the rated mode for at least 30min, start reading the measured value.

Within 30min after starting to read the measured value, the measured power change is less than 1%. The measured value can be read directly as the rated power.

If the measured power changes during this period is not less than 1%, the measurement shall be continued for another 60min. Divide the integral value of power consumption during this period by the test time to calculate the average power, which shall be the input power.

7.6.2 Calculation of cleaning energy efficiency

The cleaning energy efficiency of the cleaner is calculated according to formula (1):

$$\eta = \frac{Q}{P} \dots\dots\dots (1)$$

Where,

η - Cleaning energy efficiency, in cubic meter per watt hour [$\text{m}^3/(\text{W}\cdot\text{h})$];

Q - Measured value of clean air rate, in cubic meter per hour (m^3/h);

P - Measured value of input power, in watts (W).

NOTE: If the cleaner has other separable functions, the input power P when calculating the cleaning energy efficiency only considers the sum of the power values consumed when the cleaning function is realized.

7.7 Other properties

7.7.1 Allergen removal performance

See Annex I for the test method and evaluation requirements of the cleaner's allergen removal performance.

7.7.2 Odor removal performance

See Annex J for the test method and evaluation requirements of the odor removal performance of the cleaner.

7.7.3 Cleaning performance in auto mode

See Annex K for the cleaning performance test method and evaluation requirements of the auto mode of the cleaner.

7.7.4 Cleaning performance of air duct type cleaning device

See Annex L for the performance test method and evaluation requirements of the air duct type cleaning device installed in the air duct.

7.7.5 Performance of wearable cleaners

See Annex M for wearable cleaner performance test methods and evaluation requirements.

7.7.6 Simulating secondary odors

See Annex N for the test method and evaluation requirements of the simulated secondary odor of the cleaner.

7.7.7 Dynamic balance test (deozone performance)

See Annex O for dynamic balance test methods and evaluation requirements.

8 Inspection rules

8.1 Inspection classification

The inspection of the cleaner is divided into exit-factory inspection and type inspection.

8.2 Exit-factory inspection

8.2.1 Mandatory inspection items for exit-factory inspection

All cleaners that are formally proposed for delivery shall undergo exit-factory inspection.

The mandatory inspection items of the exit-factory inspection are No. 1 to No. 3 in Table 4.

8.2.2 Spot inspection items for exit-factory inspection

The sampling inspection of the cleaner when it leaves the factory is carried out

- 1) Particulate matter;
 - 2) Gaseous pollutants (single component, mixed component);
 - 3) Microorganisms (test strains or viruses);
 - 4) Other pollutants.
- b) Clean air rate (CADR), shall indicate the corresponding target pollutants and test conditions.
- NOTE:** Examples of target pollutants: formaldehyde, toluene, styrene, etc. Examples of test conditions: single component loading, mixed component loading, etc.
- c) Cumulate clean mass of particulate matter.
 - d) Cumulate clean mass of gaseous pollutants (standard selection), indicating the corresponding target pollutants and test conditions (single component, mixed component).
 - e) Noise.
 - f) Low noise mode (if available).
 - g) Removal of microbes and other features (if any).
 - h) Consumable replacement reminder.
 - i) If it is used in an environment contaminated by pathogenic microorganisms, there shall be necessary prompts and warning signs.
 - j) Other working modes and instructions.

9.2 Instructions for use

The instructions for use of cleaner shall meet the requirements of GB/T 5296.2-2008. In addition to the contents specified in 9.1, it shall at least include:

- a) Name, model and other performance indicators of the cleaner;
- b) Installation and use requirements, maintenance and maintenance precautions;
- c) Names of accompanying attachments;
- d) List of common faults and solutions, after-sales service items;
- e) Manufacturer's name and address;

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