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Range hoods and other cooking fume extractors

吸油烟机及其他烹饪烟气吸排装置

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Range hoods and other cooking fume extractors

1 Scope

This document specifies the technical requirements for air performance, noise, odor reduction, grease absorption factor of range hoods and other cooking fume extractors (hereinafter referred to as "appliances"), which have a rated voltage not exceeding 250 V; describes the corresponding inspection rules, test methods; specifies the content of marking, packaging, transportation, storage, etc.; at the same time provides product classification for technical requirements.

This document does not cover:

- Appliances installed for industrial and commercial purposes;
- Appliances installed in special places, such as where corrosive or explosive gases (dust, steam or flammable gases) are present.

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 191 Packaging - Pictorial marking for handling of goods

GB/T 1019-2008 General requirements for the package of household and similar electrical appliances

GB/T 1236-2017 Industrial fan - Performance testing using standardized airways

GB/T 1312 Lamp holders for tubular fluorescent lamps and starter holders

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 3767-2016 Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane

GB/T 3785.1-2010 Electroacoustics - Sound level meters - Part 1: Specifications

accessible parts of the appliance shall not have any defects, that may harm the human body, such as sharp edges.

5.8 Service life

5.8.1 Carry out the test according to the method in 6.5.1. The switch shall not be damaged OR the control shall not fail.

5.8.2 Carry out the test according to the method in 6.5.2. The appliance shall be able to operate normally, under the conditions specified in 6.1.

5.9 Odor reduction factor

Test according to the method in Appendix D. The instantaneous odor reduction factor of the appliance shall not be less than 60%.

5.10 Grease absorption factor

Carry out the test according to the method in Appendix E. The grease absorption factor degree of the appliance shall not be less than 85%.

5.11 Packaging performance

5.11.1 Appliance packaging shall be designed and finalized, in accordance with the anti-vibration packaging, which is specified in GB/T 1019-2008.

5.11.2 According to the category of "circulation condition 2" of "products that cannot be inverted" in GB/T 1019-2008, conduct a drop test on the packaged appliance; the results shall meet the requirements in 5.9.3 of GB/T 1019-2008.

5.11.3 According to GB/T 1019-2008, carry out the stacking test on the packaged appliances; the results shall meet the requirements in 5.7 of GB/T 1019-2008.

5.11.4 According to GB/T 1019-2008, carry out the vibration test on the packaged appliance; the result shall meet the requirements in 4.5 of GB/T 1019-2008.

5.12 Structural dimensions

5.12.1 In order to better match the appliance with the kitchen furniture, the overall length (including exposed screws) should be an integer multiple of M, as shown in Table 3.

Note: M is the international building modulus symbol, where 1 M is 100 mm.

machine, the maximum input power of replaceable lighting lamps;

e) Production date or serial number.

8.1.3 The user manual, which is attached to the appliance, shall at least include the following information and description:

a) Product name and model;

b) Air performance characteristic curve and resistance curve;

c) Working air volume under the maximum speed setting;

d) Maximum total pressure efficiency;

e) Noise and working noise in the lower half of the anechoic chamber, at the highest rotational speed;

f) The rated input power of the main motor and the rated input power of the complete machine;

g) The maximum input power of replaceable lamps;

h) Odor reduction factor;

i) Grease absorption factor;

j) Shape and installation dimensions;

k) Power supply method and installation method;

l) Use, maintenance, maintenance methods, precautions;

m) The name, quantity, specification of product accessories;

n) After-sales service matters;

o) Manufacturer's name and address.

Note: The air performance characteristic curve and resistance curve are not used as the basis for the consistency evaluation of the indicated parameters.

8.1.4 The pictorial marks for packaging, storage, transportation shall comply with the relevant provisions of GB/T 191. The marks on the packaging box shall include the following contents:

a) Product name and model;

b) Manufacturer's name;

c) Trademarks;

d) Production date or serial number;

e) Mass (gross mass), in kilograms (kg);

f) Dimensions of the packaging box: length × width × height, in millimeter (mm).

The implementation standard of the product shall be indicated on the package.

8.2 Packaging

There shall be accompanying documents (including at least the user manual, product quality certificate, warranty) and accessories in the packaging box.

8.3 Transportation

8.3.1 During transportation and storage, the appliance shall be protected from severe vibration, extrusion, exposure to rain and snow, chemical corrosion.

8.3.2 It shall be handled with care, stacked neatly; rolling and throwing are strictly prohibited.

8.4 Storage

8.4.1 Appliances shall be stored in a dry, ventilated warehouse, where there is no corrosive or harmful gas around.

8.4.2 Appliances shall be stored according to type. The stacking height shall take into account the bearing strength of the packaging box. It shall be easy to pick and place. It shall not exceed the stacking limit, to prevent extrusion and stacking collapse.

Appendix B

(Normative)

Test method for noise in semi-anechoic room

Note: The noise in this Appendix refers to the noise of the semi-anechoic room.

B.1 Test environment

The noise test of the appliance shall be carried out, in a semi-anechoic room, that meets the requirements in 4.4 of GB/T 4214.1-2017.

B.2 Measuring instruments

Measuring instruments shall meet the requirements in Chapter 5 of GB/T 4214.1-2017. When necessary, a windscreen shall be used, meanwhile the measured sound pressure level shall be corrected.

B.3 Operation and positioning of the appliance under test

B.3.1 Assembly and pretreatment of the appliance under test

Appliances shall be equipped with fittings, accessories, etc., that are provided by the manufacturer and have the intended purpose and function. The air-extraction appliances shall be fitted with a transition cover of the largest diameter, which is provided by the manufacturer (excluding covers such as check valves). Appliances, if designed with additional filters, shall be kept clean and properly installed.

Care shall be taken to ensure that the exhaust pipe of the appliance does not radiate a large amount of sound energy to the test environment OR change the sound energy output of the appliance (see 6.4 of GB/T 6881.2, GB/T 6881.3, GB/T 3767-2016).

Appliances are installed according to the user manual, which is provided by the manufacturer. Before the noise test, the appliance shall be warmed up and run for at least 4 h, at the highest continuous setting for normal use, under normal use conditions. Before each noise test, run at the highest continuous setting for normal use, for 10 minutes to reach a steady state.

B.3.2 Power supply

The power supply of the appliance under test shall meet the requirements of Clause 6.2.1 of GB/T 4214.1-2017.

B.3.3 Loading and operation of the appliance during the test

C.2.3 Appliances shall be connected to rated voltage and rated frequency.

C.2.4 Before the noise test, the appliance shall be preheated and run for at least 30 minutes at the highest continuous setting for normal use, under normal use conditions. Before each noise test, run it at the highest continuous setting for normal use, for 10 minutes to reach a steady state.

C.2.5 Air-extraction appliances shall be equipped with the exhaust pipe, which is provided by the manufacturer, AND the transition cover used to connect with the exhaust pipe. If the range hood is designed with an additional filter device, a clean filter device shall be installed.

C.2.6 The ventilation window of the simulated kitchen is kept open, whilst the door of the room is kept closed. Except when there shall be a test operator operating the appliance, the presence of the test operator shall be avoided as much as possible. When the test operator shall be present, only one person is allowed to be present. The test operator shall stay away from the sound source under test AND at least 0.5 m away from the noise measuring instrument. Test operators shall not wear clothing with significant sound-absorbing characteristics, that could affect measurement results.

C.2.7 The sound pressure measuring equipment, which is used for the test, shall meet the performance requirements of level 1 in GB/T 3785.1-2010.

C.3 Test procedure

C.3.1 Install the appliance in the simulated kitchen laboratory, according to the user manual provided by the manufacturer. Place the noise measuring instrument at the centerline of the appliance, in front of the stove; the probe is 700 mm from the installation wall and 1500 mm from the ground.

C.3.2 Before the noise test, the appliance shall be warmed up at the highest speed for at least 30 minutes. Before each noise test, run it at the highest continuous setting for normal use, for 10 minutes to reach a steady state.

The A-weighted sound pressure level noise collection shall be carried out, when the appliance is running at the highest continuous setting for normal use. The observation period shall not be less than 30 s. The sound level may be the average value of the maximum and minimum sound levels, during the observation period.

The test under the non-continuous setting for use (if any) shall be carried out, after the test of the highest continuous setting for normal use is completed. The observation period is not less than 30 s. The sound level takes the maximum value during the observation period. Make 3 measurements, to take the average value.

D.1.3 Drip system

The dripping system is used to drip liquid regularly and quantitatively to the test pot, which is heated to 170 °C ± 5 °C on the electric furnace. The position of the test pot is as shown in Figure D.1 (applicable to range hoods) or Figure D.2 (applicable to other cooking fume extractors). The distance between the dripper and the bottom of the pot is 225 mm ± 5 mm. The drop solution is a mixture of 300 g ± 1 g distilled water at room temperature and 12 g ± 0.1 g butanone (analytical pure). All the mixed solution shall be dripped, at a constant speed within 30 min ± 15 s. The mixed solution in the pan shall be completely evaporated, within 1 min at the latest after the measurement.

D.1.4 Sampling system

According to the sampling positions specified in Figure D.1 (applicable to range hoods) or Figure D.2 (applicable to other cooking fume extractors), arrange 4 sampling points, at equal intervals of 500 mm perpendicular to the ground. Fix 4 polytetrafluoroethylene (PTFE) tubes, which have a length of 2.5 mm and an inner diameter of 2.5 mm, respectively at 4 sampling points. Every two of the 4 sampling tubes are connected through a three-way pipe. After combining into one trunk pipe finally, the sampling is completed by the sampler; then the concentration is determined through the analyzer. Each sampling shall ensure equal sampling volume or the same sampling time. The sampling shall be carried out, after the gas in the room is stirred evenly AND the fan is turned off; then the stable value shall be recorded.

D.2 Test conditions

D.2.1 Environmental conditions

The initial environment shall meet the following conditions, before carrying out the test:

a) Ambient temperature: 20 °C ± 5 °C;

b) Relative humidity: 40% ~ 70%;

c) Atmospheric pressure: 86 kPa ~ 106 kPa.

D.2.2 Laboratory tightness requirements

After closing the ventilation windows, doors, air outlet wall holes in the laboratory, adjust the temperature, according to D.1.2. Drip liquid, according to D.1.3. Take samples, according to D.1.4. After measuring the maximum odor concentration for 1 hour, take sample again according to D.1.4, to measure the odor concentration after 1 hour. The reduction factor shall not be greater than 5%.

D.2.3 Laboratory air cleanliness requirements before test

Before the end of the last test and the next test, the laboratory shall be carefully

ventilated and cleaned. At the end of the treatment, close the laboratory AND carry out air sampling of the laboratory. The test results of the air samples shall reach the base value of the original clean air sample test data in the laboratory.

D.2.4 Installation requirements for appliances

During the test, the vertical distance -- between the lowest part of the range hood and the surface of the heating plate of the electric furnace -- is the minimum installation height, which is marked in the user manual provided by the manufacturer. Other cooking fume extractors shall be installed, according to the method specified in the instruction manual.

D.3 Test procedure

D.3.1 Determination of odor reduction factor of air-extraction appliances

D.3.1.1 Determination of the maximum odor concentration (b_1) in laboratory

Open the ventilation window of the laboratory. The cooking fume extractor runs continuously for 30 minutes, to carry out the ventilation cleaning of the laboratory, to prepare for the test. The test conditions shall meet the requirements of D.2.

Close the ventilation window. Turn off the appliance. Close the air outlet wall hole. Adjust the bottom temperature of the pan, according to D.1.2. Turn off the temperature control system, according to D.1.3 after dripping. Stir for 10 minutes, by a fan placed in the middle of the floor, to distribute the evaporated gas evenly into the laboratory. Take samples according to D.1.4. The measured odor concentration is the maximum odor concentration in the laboratory (b_1).

D.3.1.2 Determination of the maximum odor concentration (b_2) in the laboratory when the appliance is running for 3 minutes

After measuring the maximum odor concentration (b_1) in the laboratory, start the appliance to the highest continuous setting for normal use, during normal operation. Meanwhile open the ventilation window and the wall hole of the air outlet. Turn off the appliance, immediately after working for 3 minutes. Close the ventilation window and the wall hole of the air outlet at the same time. Stir with a fan, which is placed in the middle of the floor for 10 minutes. Spread the evaporated gas evenly into the laboratory. Then take samples, according to D.1.4. The measured odor concentration is the maximum odor concentration in the laboratory, when the cooking appliance is turned on for 3 minutes (b_2).

D.3.2 Determination of the purification effect of circulating appliances on abnormal odors

D.3.2.1 Determination of the maximum odor concentration (b_1) in the laboratory

In a laboratory, that has been ventilated and cleaned to meet the test conditions of D.2, close the doors and ventilation windows. Adjust the temperature at the bottom of the pan, according to D.1.2. Remove the filter of the circulating appliance. Run it at the highest continuous setting for normal use. After turning off the temperature control system after finishing drip according to D.1.3, the fan placed in the middle of the floor is used to stir for 10 minutes. Evenly distribute the evaporated gas into the laboratory. Take sample according to D.1.4. The measured odor concentration is the maximum odor concentration (b_1) of the laboratory.

D.3.2.2 Determination of the maximum odor concentration (b_3) in the laboratory when the appliance is running for 30 minutes

Before the test, place the new filter of the circulating appliance in an oven, at 50 °C ± 5 °C for 16 h, to dry it.

At the beginning of the test, in the laboratory that meets the test conditions of D.2, the dried filter is taken out of the oven and immediately loaded into the cooking fume extractor to be tested. After operating at the highest continuous setting for normal use, for 30 minutes at room temperature, adjust the temperature at the bottom of the pan, according to D.1.2. Finish dripping according to D.1.3. Stir with a fan, which is placed in the middle of the floor for 10 minutes, to evenly distribute the evaporated gas from the solution, in the laboratory. Take sample according to D.1.4. The measured odor concentration is the maximum odor concentration (b_3) in the laboratory, when the cooking fume extractor operates for 30 minutes.

After measuring the maximum laboratory odor concentration (b_3), when the appliance is running for 30 minutes, do not turn off it immediately, until the odor concentration in the laboratory drops from (b_3) to 15% of (b_1). Record the time taken for this process, which is the odor reduction time of the circulating cooking fume extractor.

D.3.3 Determination of odor reduction factor of island appliances

Island appliances are tested in the same way as wall-hung appliances. The appliance may be mounted directly on the ceiling, with the side cabinets removed.

D.4 Test calculation

D.4.1 The instantaneous odor reduction factor G_i can be calculated, according to formula (D.1):

$$G_i = \frac{b_1 - b_2}{b_1} \times 100\% \qquad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (D.1)$$

Where:

b_1 - The maximum odor concentration in the laboratory;

It is recommended to use corn oil, which has a viscosity of 70 mm^2/s ± 10 mm^2/s at 20 °C.

E.2.3 Installation height

During the test, the vertical distance -- between the lowest part of the range hood and the surface of the heating plate of the electric furnace -- is the minimum installation height, which is marked in the user manual provided by the manufacturer.

E.3 Test procedure

E.3.1 Weighing before the test

E.3.1.1 Accurately weigh and record the mass α_1 of the tested cooking fume extractor before the test, with a weighing accuracy of ±0.1 g. The mass of the cooking fume extractor does not include the mass of accompanying filters. The mass of the accompanying filter is weighed, immediately after being dried in an oven at 50 °C for 1 h. Record it as b_1.

E.3.1.2 Accurately weigh and record the mass c_1 of the independent filter, which is used in the test device before the test, with a weighing accuracy of ±0.1 g. The independent filter shall also be weighed, immediately after drying in an oven at 50 °C for 1 h.

E.3.1.3 Install the tested appliance in the test device, according to the requirements of E.1.1, as shown in Figure E.1. Ensure that all the fume inside the oil fume generating chamber flows through the tested appliance. For appliances with an external fan, it is not necessary to install an external fan during the test. An auxiliary fan may be used instead of the external fan, to achieve the required air volume.

E.3.1.4 Put the independent filter, which is used in the test device, into the test device, immediately after weighing according to E.3.1.2. It is required to be sealed, between each side of the filter and the wall of the test device. The exhaust port of the equalization chamber is connected with the auxiliary fan, for pressure control.

E.3.1.5 Add 400 mL ± 10 mL test oil into the pot. Start the device under test at the rated voltage, rated frequency and highest continuous setting for normal use. Start the auxiliary fan at the same time. Adjust the auxiliary fan, so that the static pressure of the equalization chamber is zero. The system operates in this state for 30 minutes. After adjusting the temperature at the bottom of the pot, according to E.1.2, start dripping according to E.1.3. Turn off the temperature control system, immediately after the dripping ends within the specified time. Then turn off the tested appliance after 10 minutes.

E.3.2 Weighing after the test

E.3.2.1 Remove the accompanying filter. Accurately weigh the mass α_2 of the appliance, after the test.

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