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Performance of Room Heater for Household and Similar Purposes - Part 1: General Requirements

家用和类似用途室内加热器的性能 第 1 部分：通用要求

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Foreword

The serial standard of QB/T 4096 *Performance of Room Heater for Household and Similar Purposes* can be divided into the following parts:

--- Part 1: General Requirements;

--- Part 2: Particular Requirements.

This Part belongs to Part 1 of QB/T 4093.

This Part's Appendix is informative; while Appendix B is normative.

This Part was proposed by China Light Industry Council.

This Standard shall be under the jurisdiction of National Technical Committee for Standardization of Household Appliances.

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This Part was first-time published.

Performance of Room Heater for Household and Similar Purposes - Part 1: General Requirements

1 Scope

This Part specifies the scope, terms and definitions, product classification, requirements, test methods, inspection rules, and mark, package, transportation, storage of room heater for household and similar purposes (hereinafter referred to as “heater”).

This Part is applicable to the heater of which the single-phase rated voltage is not greater than 250V; and other appliances of which the rated voltage is not greater than 480V. They can be portable, fixed, standing or embedded heaters.

This Part is not applicable to:

--- Heater installed in the building structure;

--- Central heating system;

--- Heater connecting with air duct;

--- Wallpaper, blanket, curtain or pipe equipped with soft electric heating elements;

--- Thermal-storage room heater for household;

--- Heater in bathroom (bath heater).

2 Normative References

The following documents are essential to the application of 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) are applicable to this document.

GB/T 191-2008 Packaging - Pictorial Marking for Handling of Goods

GB/T 1019-2008 General Requirements for the Package of Household and Similar Electrical Appliances

GB/T 2421-1999 Environmental Testing for Electric and Electronic Products - Part 1: General and Guidance

GB/T 2423.17-1993 Basic Environmental Testing Procedures for Electric and Electronic Products Test Ka: Salt Mist

GB/T 2828.1-2003 Sampling Procedures for Inspection by Attribute - Part 1: Sampling Schemes Indexed by Acceptance Quality Limit (AQL) for Lot-by-Lot Inspection

GB/T 2829-2002 Sampling Procedures and Tables for Periodic Inspection by Attributes (Apply to Inspection of Process Stability)

GB/T 4214.1-2000 Acoustics - Household and Similar Electrical Appliances - Test Code for Determination of Airborne Acoustical Noise - Part 1: General Requirements

GB 4706.1 Household and Similar Electrical Appliance - Safety - Part 1: General Requirements

GB 4706.23 Safety of Household and Similar Electrical Appliances - Particular Requirements for Room Heater

GB 5296.2 Instructions for Use of Consumer Interest - Instructions for Use of Household and Similar Electrical Appliances

GB/T 15470-2002 Household Electric Direct-Acting Room Heaters - Methods for Measuring Performance

GB/T 21097.1-2007 General Requirements on Fixed Number of Years of Safety Use and Recycling for Household and Similar Electrical Appliances

QB/T 3901-1999 The General Rule of Naming Model of Household Electrical Appliances

3 Terms and Definitions

In addition to the terms and definitions stipulated in GB 4706.1, GB 4706.23 and GB/T 15470-2002, this Part also adopts the following terms and definitions.

3.1 Multiunit heater

The composite appliance with at least 2 kinds of heating functions to heat the room.

4 Product Classification

4.1 Classification as per types

5.2 Appearance

5.2.1 The surface of electroplate part shall be fine, uniformly-colored, and exempted from the following defects such as spots, peeling, threadbare, pinhole, bubbling, obvious flaws and scratches, etc. After the corrosion resistance test, its surface, edges and corners shall appear no rust point with diameter of 2mm above.

5.2.2 The surface of paint-coated (plastic-coated) parts shall be flat, light, uniformly-colored, firm paining layer, strong adhesion; its main surface shall be exempted from the following defects that affect the appearance such as flow-paint (flow-plastic), scars, orange peels, primer exposed, cracks, peeling, etc.

5.2.3 The surface of plastic part shall be smooth, uniformly-colored, and exempt from the obvious scars, scratches, or depression.

5.2.4 The nameplate and decorative plate of the heater shall be durable; after the durability test, it shall be exempted from deformation, peeling; and its pattern and writing are legible.

5.3 Length of power cord

For the heater with plug power cord, its power cord length shall be no less than 1.3m.

5.4 Start-up

For the heater with motor, under the 0.85 times of rated voltage, the motor can be started-up normally.

5.5 Heating effect

5.5.1 The specific limits of the heating effect shall meet the special requirements of the corresponding types of heater.

5.5.2 For the convection heater and fan heater, their heating effect shall be inspected according to the temperature rise on the surrounding surface.

NOTE: the temperature rise on the surrounding surface indicates the temperature rise of the measuring points around the heater.

5.5.3 For the plate heater, radiant heater and visible glowing radiant heater, their heating effect shall be inspected according to the radiant temperature rise.

5.5.4 For the multiunit heater, its heating effect shall be inspected as per the heating type by the temperature rise on surrounding surface and radiant temperature rise.

NOTE: the temperature rise on the surrounding surface indicates the temperature rise of the measuring points around the heater.

Place the 1.5m-wide, 1.0m-high, 20mm-thick plywood coated berlin black on the position where it forms right angle with the radiation direction of the heater; and at a distance of 1m from the most protruding point at the furthest end on the external surface of the heater radiation direction. The plywood center shall coincide with the projection center of the heater radiation surface on the plywood.

As shown in Figure 4, separately arrange the 5 thermocouples on the center and at the furthest end on the long and short shaft of the radiation projection surface.

Figure 5 is the radiation temperature-rise test schematic diagram.

Energize the heater; meanwhile use the temperature measurement and record instrument to record the heating curve from the room temperature to the steady-state temperature, which is shown in Figure 3. Record the measured temperature when the steady-state is established.

When the steady-state is established, measure the temperature. Single-point temperature-rise can be calculated by the difference between steady-state temperature of the thermocouple on the plywood and the thermocouple initial temperature. The above-mentioned 5-point temperature arithmetic mean is the radiation temperature-rise, which shall be rounded to the nearest 1K.

NOTE: if the heater top is 1m above the ground, such plywood can be placed vertically.

6.6 Temperature-rise time test

When measuring the time required for heater achieving 90% temperature-rise under the steady-state conditions, it is shown in Figure 3; the temperature-rise at the first-time steady-state shall be regarded as reference, the heating time shall be rounded to minute.

NOTE 1: the test methods and test points are the same as the provisions of 6.5.

NOTE 2: for the heating time of the radiation temperature-rise, select the center curve among the 5-point temperature-rise curves; measure the time required for rising the temperature from the room temperature T_0 to (90% temperature-rise $+T_0$), which is regarded as the heating time.

NOTE 3: the determination of heating time of the multiunit heater shall be performed as per its major heating time.

6.7 Cooling test

The cooling temperature for the heater with the cooling device shall be measured.

Place the heater into the climate laboratory (Appendix B).

temperature.

The temperature of freezing chamber in the climate laboratory shall be maintained at the value obtained during the test under the high energy ratio and with the heater conforming to the provisions of 6.7. Then start-up the anti-freezing device, and measure the ambient temperature at the steady-state.

Determine the minimum room temperature.

NOTE 1: if the ambient temperature controller doesn't cycle, then reduce the temperature in the freezing chamber.

NOTE 2: If the value exceeds (7±3) °C, then the heater shall not be regarded as the anti-freezing device.

6.9 Impact current test

Place the heater into the laboratory according to the normal using state or prescribed requirements of the instruction manual; under the rated voltage conditions, use the instrument that can perform real-time record of the current change, such as the memory-type oscilloscope with saving function, etc.; measure the working current of the heater; read the maximum current value from the heater is energized to reaching the steady-state; during the test, the power supply voltage drop doesn't exceed 2V.

6.10 Noise test

The installation and working conditions of the heater during the test shall be performed as per the requirements of Clause 6 in GB/T 4214.1-2000; the heater runs at the highest speed shift. The surface measuring position, measuring-point coordinates specific requirements, and test methods shall be performed as per the provisions of 7.1 in GB/T 4214.1-2000.

6.11 Durability test

At an ambient temperature of (20±5) °C, energize the heater for 156h under the 1.2 times of the rated voltage. For the heater with motor, its motor shall be supplied electricity separately at the rated voltage. The heater shall be closed for twice every day, it is no less than 15min each time. The closing time shall not be included in the heater durability test time. During the test, firstly stabilize the voltage at the rated voltage; then energize the heater. Then slowly rise the voltage to the test voltage at the rate of 50V/min.

If there is any doubt about the result of the above test, the following test method shall be adopted.

Under the rated voltage and rated frequency, in the laboratory with ambient temperature of (20±5) °C, the heater shall be energized for 2h, cut off power for 1h,

methods are shown in Table 1.

7.2.2 When the product is delivered, if the ordering-part has any doubts on the product quality, it has the right to request to add exit-factory inspection items into the type inspection items; at this time, sampling according to GB/T 2828.1-2003; the sampling plan and the added inspection items shall be coordinated between the ordering-party and the manufacturer.

7.2.3 If the ordering party and the manufacturer encounter dispute when choosing the sampling plan type of exit-factory inspection, it shall subject to this item provision; namely, adopt normal inspection double sampling plan stipulated in GB/T 2828.1-2003; the judgment level is Level-I; the acceptance quality level (AQL) is: for Class-A disqualified one, AQL=2.5; for Class-B disqualified one, AQL=4.0; for Class-C disqualified one, AQL=6.5.

7.3 Type inspection

7.3.1 The type inspection shall be performed in one of the following cases.

a) Trial-production of new products;

b) When there is significant change in the design, process and used material;

c) When re-product the infrequently produced products;

d) Conduct regular sampling again the batches or mass-produced products at least once a year.

7.3.2 The content of type inspection shall include each requirement stipulated in Clause 5, Clause 8 in GB 4706.23. The test items, requirements, and disqualified categories shall conform to the provisions of Table 2.

7.3.3 For the type inspection performed under the three conditions of Item a), b), c) in 7.3.1; the sample quantity shall be no less than 5 sets; thereof 3 sets (or take another 3 sets) shall also do the safety requirement test. In the type inspection, when any set of samples do not meet any requirement of this Part, then double the sample-quantity from this batch of products; perform the re-inspection against the disqualified items and the requirements related to this inspection results. If the re-inspection results are qualified, then such batch of products are judged to meet the requirements of this Part; if there is any one sample that doesn't meet any one requirement in the re-inspection result, then such batch of products are judged disqualified.

7.3.4 For the type inspection performed under the condition of Item d) in 7.3.1, its sampling shall adopt double sampling stipulated GB/T 2829-2002; judgment level is Level-I, the sample size, disqualified quality level and its judgment can refer to Table 3. Thereof, 2 sets in the first sample (or take another 2 sets) can also do the safety requirements test.

Appendix B

(Normative)

Climate Laboratory

The climate laboratory consists of a laboratory simulating the indoor temperature and a freezing chamber simulating the outdoor temperature; use the wallboard regarded as the external wall shown in Figure B.1 to separate the above two laboratories.

Generate the heat required by the laboratory through changing the freezing chamber temperature; the laboratory volume is $30m^3$~$40m^3$, length is 3m~4m, width is 3m~4m, height is 2.4m~2.6m.

There is at least one 3m×1.5m glass window with thermal conductivity no greater than $3W/(m^2K)$; the height of retaining wall below the window is no less than 0.8m, the thermal conductivity is no greater than $0.5W/(m^2K)$; the thermal conductivity of the rest part of external wall is no greater than $0.1W/(m^2K)$; the thermal conductivity for other wallboard, floor and ceiling is no greater than $0.6W/(m^2K)$.

The cold air from the freezing chamber is supplied to the laboratory through two symmetrical air outlets above the glass window; the air is returned to the freezing chamber through a tube placed in the corner of the wall; the laboratory air outlet is located on the opposite wall of the external wall at a distance of no more than 0.4m from the ground.

The air exchange between the freezing chamber and laboratory shall be approximately one lab volume per hour.

The freezing chamber shall be able to generate heat through the external wall at least 1000W.

When adjusting the ambient temperature controller as per 6.7, the difference between the surrounding temperature of climate laboratory and the average temperature of laboratory shall not exceed 2°C.

According to the requirements of instruction manual, place the heater under the laboratory window center against the wall; if the heater is too high to place under the window, then the heater shall be placed against the adjacent wall; the heater center is about 2m away from the external wall; the edge of heater with ambient temperature controller shall close to the external wall. Except for the electrical appliances under test, no heat source is allowed to place in the laboratory.

Use a thermocouple placed in the center of thin-wall black ball with diameter of 10cm; measure the laboratory temperature; such ball shall be place on a position where it is

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