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GB XXXXX—XXXX

Energy efficiency limit value and energy efficiency grade of household gas cooker

Minimum allowable values of energy efficiency and energy efficiency grades for
domestic gas cooking appliances

(draft for approval)

XXXX - XX - XX Post

XXXX - XX - XX Implementation

中华人民共和国国家质量监督检验检疫总局 发布
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foreword

Article 4.3 of this standard is mandatory, and the rest are recommended. This standard is written in accordance with the rules given in GB/T 1.1-2009. This standard is proposed by the Department of Resource Conservation and Environmental Protection of the National Development and Reform Commission and the Department of Energy Conservation and Comprehensive Utilization of the Ministry of Industry and Information Technology. This standard is under the jurisdiction of the National Standardization Technical Committee on Energy Basics and Management (SAC/TC20). This standard was drafted by: China National Institute of Standardization, National Gas Appliance Quality Supervision and Inspection Center, Hangzhou Robam Electric Co., Ltd., Haier Group, Zhongshan Vantage Gas Appliance Co., Ltd., Foshan Midea Kitchen Appliance Manufacturing Co., Ltd., Ningbo Fangtai Kitchenware Co., Ltd., National Gas Appliance Product Quality Supervision and Inspection Center (Foshan), Guangdong Macro Gas Appliance Co., Ltd., Schindler Technology Group Co., Ltd., Guangdong Wanhe New Electric Co., Ltd., Bossier Electric (Jiangsu) Co., Ltd., Guangzhou Hong Sun Gas Co., Ltd., Guangdong Hesheng Metal Manufacturing Co., Ltd., Zhejiang Meida Industrial Co., Ltd., Zhejiang Shuaikang Electric Co., Ltd., Sakura Bathroom Kitchen (China) Co., Ltd., Zhejiang Putian Electric Co., Ltd., Shanghai Linnei Co., Ltd., Electrolux (Hangzhou) Household Appliances Co., Ltd., Zhejiang Supor Household Appliances Manufacturing Co., Ltd. The main drafters of this standard: Wang Geng, Liu Tong, Wu Weiliang, Chen Xiong, Yi Hongbin, Cao Ning, Zhang Bingwei, Xu Deming, Hu Yelong, Yu Shaoyan, Wu Binqiang, Zhao Gaohang, Liu Songhui, Liu Yanchun, Tan Liuming, Xia Zhisheng, Xia Deqi, Zhang Jingzong, Li Bo, Jiang Hua, Tan Zhi, Xiao Bing.

Energy efficiency limit value and energy efficiency grade of household gas cooker

1 Scope

This standard specifies the energy efficiency limit value, energy saving evaluation value, energy efficiency grade, test method and inspection rules of household gas cookers. This standard applies to domestic gas cookers with a single burner rated heat load not greater than 5.23kW using only city gas. This standard does not apply to gas cookers used in mobile transport vehicles.

2 Normative references

The following documents are essential for the application of this document. For dated references, only the dated version applies to this document. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 13611 Classification and basic characteristics of urban gas

GB 16410 Household Gas Cookers

3 Terms and Definitions

GB 16410 and the following terms and definitions apply to this document.

3.1

Minimum allowable values of energy efficiency for domestic gas cooking appliances

According to the test conditions specified in the standard, under the rated heat load, the minimum thermal efficiency value that the domestic gas cooker should achieve.

3.2

Evaluating values of energy conservation for domestic gas cooking appliances

According to the test conditions specified in the standard, the minimum thermal efficiency value that the energy-saving domestic gas cooker should achieve under the rated thermal load.

4 Technical requirements

4.1 Basic requirements

The gas cooker to which this standard applies shall meet the requirements of the GB 16410 product standard.

4.2 Energy efficiency class

The energy efficiency level of household gas stoves is divided into 3 levels, of which level 1 has the highest energy efficiency. The thermal efficiency value of each grade shall not be lower than that specified in Table 1.

Table 1 Energy Efficiency Levels of Household Gas Cookers				
		Thermal efficiency η (%)		
		Level 1	level 2	Level 3
Atmospheric stove	desktop	66	62	58
	built-in	63	59	55
	integrated	59	56	53
Infrared cooker	stove	68	64	60
	desktop	65	61	57
	built-in integrated stove	61	58	55
Note 1: The energy efficiency grade of the multi-burner stove is determined according to the energy efficiency grade of the burner with the lowest thermal efficiency value;				
Note 2: Atmospheric-infrared composite burners are determined according to the energy efficiency grade of infrared stoves.				

4.3 Energy efficiency limit value

The energy efficiency limit value of household gas stoves shall be Class 3 of the energy efficiency class in Table 1.

4.4 Energy saving evaluation value

The energy-saving evaluation value of household gas stoves is 2 of the energy efficiency grades in Table 1.

5 Test and calculation methods

5.1 Test conditions

The requirements for the thermal efficiency test conditions for domestic gas cookers are as follows:

- a) The room temperature is $20\pm5^{\circ}\text{C}$, and the fluctuation of the room temperature during each test should be less than 5°C ;
- b) Determination method of room temperature: Fix the temperature sensing part of the thermometer on the cooker at a distance of 1m from the front, left and right sides of the cooker.
Measure the temperature of the above three points and take the average value;
- c) The ventilation is good, the carbon monoxide content in the indoor air should be less than 0.002%, and the carbon dioxide content should be less than 0.2%.
The horizontal air flow velocity at the surrounding 1m is not more than 0.1m/s;
- d) Power supply conditions: the AC power supply used in the laboratory, the voltage fluctuation range is within $\pm 2\%$;
- e) Test gas: the test gas code is in accordance with the provisions of GB/T 13611, using 0-2 gas. The relative low calorific value Huabai number of the test gas
The deviation from the standard value should be within $\pm 2\%$, and the variation of low calorific value Huabai number during the test should be within $\pm 0.5\%$. The cooker stops working
The static pressure during operation should be less than or equal to 1.25 times the gas supply pressure during operation.

5.2 Test status

The thermal efficiency test status of domestic gas cookers shall meet the following requirements:

- a) The distance from the edge of the test stove to the wall and other obstructions should be greater than 150 mm;
- b) The test stove is connected according to the method shown in Appendix A, the pressure measuring tube is processed according to the legend in Appendix A, and the stirrer is processed according to the method shown in Appendix B.
Or other devices that can stir the water temperature evenly;
- c) The amount of air required for the burner to burn should be adjusted to the best state of the combustion flame with 0-2 gas, and then the damper should be fixed.
Do not adjust the damper again;
- d) Calculate the measured heat load according to the method given in GB 16410. The upper limit pot and lower limit pot and the heating water quantity for the test are according to Table C.1 of Appendix C.
optional.

5.3 Test and calculation method

The test method and calculation method for the thermal efficiency of domestic gas stoves are as follows:

- Ignite the burner, adjust the gas valve to the maximum, and adjust the gas supply pressure to the rated value;
- Turn on the oil fume suction and discharge device of the integrated stove, and the fan works at the highest speed;
- Sit on the lower limit pot in the attached table C.1, and put on the test pot after burning for 15 minutes. The initial water temperature should be room temperature plus 5 K, and the final water temperature should be the initial water temperature.

Warm plus 50 K. 5 K before the initial temperature of the water, start stirring (evenly stirring, the frequency is not less than 30 times/min, the same below), until the initial temperature of the water

When it is warm, stop stirring and start measuring gas consumption. Start stirring again at 5 K before the final water temperature, and record all the

parameter, the measured thermal efficiency is calculated by formula (1);

$$\eta_{\text{real}} = \frac{M \times (t_2 - t_1)}{V \times Q_1} \times \frac{273 + t_g}{288} \times \frac{101.3}{p_{\text{atm}} + p_{\text{m}}} \times 100 \quad (1)$$

$$M = M_1 + 0.213M_2$$

where:

η_{real} - Measured thermal efficiency, %;

M - The actual amount of water added is converted into the sum of the equivalent amount of water added by the aluminum pot, and the unit is kilograms (kg);

M_1 - the mass of water added to the pot, in kilograms (kg);

M_2 - the mass of the aluminum pan (including the lid and stirrer), in kilograms (kg);

C - The specific heat of water, $C = 4.19 \times 10^{-3}$ in megajoules per kilogram per degree Celsius (MJ/kg.°C);

t_1 - the initial temperature of the water, in degrees Celsius (°C);

t_2 - the final temperature of the water, in degrees Celsius (°C);

$V_{\text{consumption}}$ - Measured gas consumption, in cubic meters (m³);

Q_1 - The low calorific value of the test gas at 15°C and 101.3 kPa, the unit is megajoules per cubic meter (MJ/m³);

p_{m} - The relative static pressure of the gas in the measured gas flowmeter, in kilopascals (kPa);

p_{atm} - the atmospheric pressure at the time of the test, in kilopascals (kPa);

t_g - The gas temperature in the gas flowmeter during measurement, in degrees Celsius (°C);

S - Saturated water vapor pressure at temperature, in kilopascals (kPa); (when measured with a dry flowmeter, the S value should be multiplied by the relative humidity of the test gas for correction).

- Do more than two tests under the same conditions, when the difference between the two consecutive thermal efficiencies is less than 1%, take the average value as the measured thermal efficiency, otherwise

The test shall be repeated until satisfactory;

- After testing the measured thermal efficiencies of the upper and lower boilers, use the formula (2) to calculate the thermal efficiency of the test burner.

$$\eta = \eta_{\text{down}} - \frac{5.47}{q_{\text{down}} - q_{\text{previous}}} \times (\eta_{\text{real, real}} - \eta_{\text{real}}) \quad (2)$$

where:

η - Thermal efficiency, %;

$\eta_{\text{real, down}}$ - The measured thermal efficiency when using the lower limit pot, %;

$\eta_{\text{real, up}}$ - The measured thermal efficiency when using the upper limit pot, %;

q_{down} - The heat strength of the bottom of the pot when using the lower limit pot test (the heat strength of the bottom of the pot = the measured heat load (W) / the test pot is placed in the front

The area of the shadow surface (cm²)), in watts per square centimeter (W/cm²);

q - The thermal strength of the bottom of the pot when using the upper limit pot test, the unit is watts per square centimeter (W/cm²).

Note: For low-power burners with a thermal load less than 1.72KW, the thermal efficiency test is repeated more than two times under the same conditions, and the difference between the two consecutive thermal efficiencies is When it is less than 1%, the average value is taken as the final thermal efficiency.

6 Inspection Rules

6.1 Factory inspection

6.1.1 Energy effect is an item of factory inspection for household gas cooker products.

6.1.2 Products whose energy efficiency does not meet the energy efficiency limit value in Article 4.3 are not allowed to leave the factory.

6.2 Type inspection

6.2.1 The energy efficiency type inspection shall be carried out when one of the following situations occurs in the household gas cooker

product: a) It is a new product that is trial-manufactured; b) When the product design, process or the materials used are changed

obviously affecting its performance; c) The inspection is proposed by the quality and technical supervision department when requested.

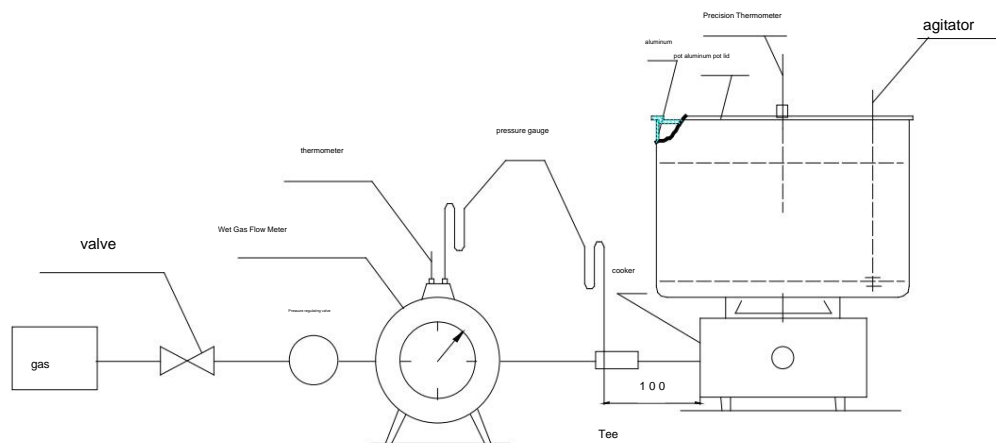
6.2.2 For the sampling of energy efficiency inspection, 3 sets are selected each time, of which two sets are tested and one set is reserved. If both of the test results meet the requirements of this standard, it will be judged as qualified; if both of them do not meet the requirements of this standard, it will be judged as unqualified. If there is an energy efficiency limit value that does not meet the requirements of this standard, the standby gas stove should be tested. If the test results meet the requirements, it will be judged as qualified; if the test results still do not meet the requirements, it will be judged as unqualified.

Appendix A

(normative appendix)

Thermal efficiency test device

A.1 The thermal efficiency test device of the gas stove is shown in Figure A.1.

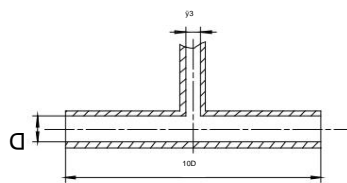


Note: The precision thermometer should be placed in the central position at half the depth of the water;

Note 2: The stirrer should be placed in a position that does not touch the temperature probe of the thermometer;

Notes: The gas pressure measurement point in front of the cooker should be the tee position as shown in the figure, and the distance from the air inlet should be no more than 100 mm.

a) Test device connection diagram



b) Gas piezometer

Note 1: $D = (1 \times 1.1) \quad d;$

Note 2: D - the inner diameter of the tee; d - the inner diameter of the gas pipe, in millimeters.

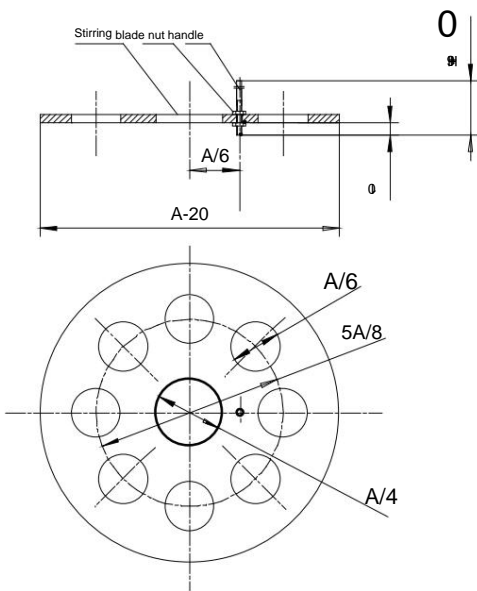
Figure A.1 Thermal efficiency test device

Appendix B

(normative appendix)

agitator

B.1 The stirrer used for the thermal efficiency test of the gas stove is shown in Figure B.1.



- Note 1: A is the inner diameter of the aluminum pot. H Depth for aluminum pan.
- Note 2: Parts material: The stirring plate is made of 1mm aluminum plate, and the handle is used \bar{Y} 4 stainless steel rods.
- Note 3: Unit: mm.

Figure B.1 Stirrer

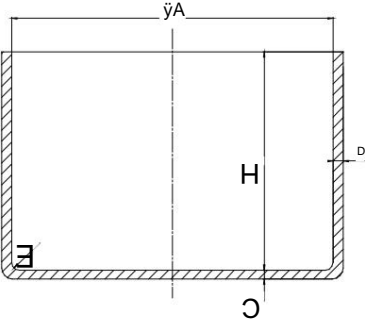
Appendix C

(normative appendix)

Gas stove test pot and heating water

C.1 The pot and heating water for the gas stove test are shown in Table C.1.

Table C.1 Pot and heating water for gas stove test

Measured heat load /kW	pot ^a size/mm								heating water Amount/kg
	Pot inner diameter ȳA	Bottom thickness C	Pot wall thickness D	pot depth H	corner radius E	Bottom area /cm2	pot quality /g	pot lid ^b mass/g	
~1.72	200	2	1.5	130	2.5	314	540	125	3
2.08	220			140	3	380	680	149	4
2.48	240			150	3.5	452	800	177	5
2.91	260	2.5	1.8	160		531	965	208	6
3.36	280			170		615	1130	290	8
3.86	300			180		707	1350	323	10
4.40	320			190		804	1520	360	12
4.95ȳ	340			200	4	907	1800	402	14
tolerance	±1.5	±0.1	±0.1	±1.5	0ȳ0.5		±5%	±5%	
<p>a</p> <p>—The geometric dimensions and various parameters of the pot refer to EN30-1-1:2008+A1:2010</p> <p>Table C.1, Aluminium (specific gravity 2 700 kg/m³).</p> <p>—The use of the test pot is: matt black bottom pot, the chromaticity value satisfies: L*ȳ50, -10ȳ</p> <p>a*ȳ10, -10ȳb*ȳ10. Test conditions: using SCI (including specular reflection light)</p> <p>method, the standard viewing angle is 10°, and the D65 standard light source is used.</p> <p>—Description of the upper limit pot and the lower limit pot, if the measured heat load is 3.5 kW, between 3.36</p> <p>Between kW and 3.86 kW, the upper limit pot is 300mm and the lower limit pot is 280mm.</p> 					<p>b</p> <p>- Use screw-on fittings to secure the thermometer, through holes ranging from 3.0 mm to 7.0 mm.</p> <p>—ȳA is the inner diameter of the pot, tolerance.</p> 