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Minimum allowable values and grades of the energy efficiency and water efficiency for dishwashers

洗碗机能效水效限定值及等级

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Minimum allowable values and grades of the energy efficiency and water efficiency for dishwashers

1 Scope

This document specifies the energy efficiency and water efficiency grades, technical requirements and test methods for electric dishwashers for household and similar purposes (hereinafter referred to as "dishwashers").

This document applies to dishwashers that use cold and/or hot water.

This document does not apply to commercial or similar dishwashers.

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 4214.3, *Test method for noise of household and similar electrical appliances -- Particular requirements for dishwashers*

GB/T 20290-2024, *Electric dishwashers for household use -- Methods for measuring the performance*

GB/T 23119, *Household and similar electrical appliances -- Water for performance testing*

GB 44498, *Household and similar electrical appliances -- Health technical specification*

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 20290-2024 as well as the followings apply.

3.1 standard washing program

The cleaning, rinsing and drying processes of dishwashers.

NOTE 1: At the end of the standard washing program, all washing activities stop.

NOTE 2: The manufacturer clearly states this program and it can be selected directly on the panel.

3.2 energy consumption per standard washing program

The amount of electricity consumed by a dishwasher to complete a standard washing cycle under the test conditions specified in this document.

3.3 water consumption per standard washing program

The amount of water used by a dishwasher to complete a standard wash cycle under the test conditions specified in this document.

3.4 minimum allowable values of the energy efficiency and water efficiency for dishwashers

The minimum energy and water efficiency index values allowed for a dishwasher to complete a standard washing program under the test conditions specified in this document.

4 Energy efficiency and water efficiency grades

Dishwasher energy and water efficiency grades are divided into five grades based on the energy efficiency index and water efficiency index, with grade 1 representing the highest energy and water efficiency level. The dishwasher energy and water efficiency grade is determined based on the lowest grade achieved in the two indices listed in Table 1. The measured energy and water efficiency indexes for each grade must meet the requirements in Table 1.

5 Technical requirements

5.1 Dryness index

The dryness index P_D shall not be less than 1.08.

5.2 Cleanliness index

The cleanliness index P_C shall not be less than 1.12.

5.3 Noise

Noise shall comply with the requirements of GB 44498.

5.4 Minimum allowable values of energy efficiency and water efficiency

The minimum allowable values of the energy efficiency and water efficiency for dishwashers are the energy efficiency index and water efficiency index specified in Grade 5 in Table 1.

5.5 Allowable deviation of stated value

The test shall be conducted according to the test method described in Chapter 6. The deviation between the measured values of the energy consumption per standard washing program, water consumption per standard washing program, cleanliness index, dryness index, and noise index and the manufacturer's stated values shall not exceed the requirements of Table 2.

6 Test methods

6.1 General requirements

6.1.1 Pre-test preparation

Install and set up the test sample according to the product instructions. Allow the sample to rest for 12 h under the test conditions described in 6.1.3. Then, use a standard detergent and rinse aid. Run at least 3 standard wash cycles to remove any residue from the sample.

6.1.2 Test device

Detergents, rinse aids, and salt shall comply with the requirements of Annex C. The amount of detergent shall be set according to the manufacturer's recommendations, but shall not exceed 8 g + (0.5 g × number of individual tableware sets). The amount of rinse aid and salt shall also be set according to the manufacturer's recommendations.

NOTE: When there is disagreement about the test results, test aids with national standard sample (substance) certificates shall be used for testing.

6.1.8 Standard dishwasher

Standard dishwashers shall comply with the provisions of Annex D.

NOTE: When there is disagreement about the test results, a standard dishwasher with a national standard sample (substance) certificate shall be used for the test.

6.2 Test and calculations

6.2.1 Test

Except for the test methods specified below, other tests shall be carried out in accordance with the provisions of GB/T 20290-2024.

a) The noise test shall be completed before conducting other performance tests. The noise test load shall comply with the requirements of 6.1.6. The loading method shall be the same as that for other performance tests. The noise test additive shall comply with the requirements of 6.1.7. The dosage shall comply with the requirements of GB/T 4214.3.

b) The test prototype and the standard dishwasher shall be tested in parallel (using the same batch and contaminants prepared at the same time). The test prototype's power consumption, water consumption, drying performance, and cleaning performance shall be tested simultaneously. Use the tableware specified in Annex B. Prepare the contaminants according to the method in Annex A to achieve the specified contamination state. Dry the contaminated tableware according to the method in Annex E. Load the dried contaminated tableware into the test prototype according to the loading method provided by the manufacturer. Load the standard dishwasher according to Annex F. After loading, begin testing.

c) After the standard wash cycle is complete, the test sample and standard dishwasher shall remain connected to the power supply and undisturbed. After 30 min, immediately fully open the test sample door. Conduct a combined evaluation of drying and cleaning performance according to Annexes G and H. Simultaneously record power and water consumption.

6.2.2 Calculation

6.2.2.1 Energy efficiency index

Annex A

(normative)

Contaminants and tableware contamination methods

A.1 Contaminants

Contaminants include milk, tea, minced meat, eggs, oatmeal, spinach, and margarine.

A.2 Preparation and use of contaminants

A.2.1 General

Each test shall use freshly prepared contaminants. Once prepared, the contaminants shall be refrigerated in a sealed container. The time between final preparation of the contaminant and its application on tableware shall not exceed 12 h.

Based on the number of tableware sets in the test prototype and standard dishwasher, calculate the total mass of contaminants required (g/piece × number of tableware).

The contamination process began with preheating the milk. The tea and other contaminants are prepared simultaneously. During the tea pre-drying process (1 h), the preparation and use of the other contaminants are completed.

For tea and milk contamination, follow the procedures in A.2.2 and A.2.3. For other contaminants, use a dedicated contamination tool to apply a specified amount of contaminant to the designated tableware.

The contamination shall be evenly distributed.

Do not re-coat contaminated dishes after they have dried.

A.2.2 Milk

A.2.2.1 General requirements

Use ultra-heat-treated (U.H.T.) milk with a fat content of 1.5%~2%. Use within 30 days of the expiration date. Refrigerate opened milk. Use within 2 days.

If U.H.T. milk is unavailable, use fresh homogenized milk with a fat content of 1.5%~2%. Refrigerate after opening and use within 2 days.

A.2.2.2 Preparation of required tools

Microwave ovens shall comply with the requirements of Annex F of GB/T 20290-2024.

NOTE: When there is disagreement about the test results, use a microwave oven with a national standard sample (substance) certificate to conduct the test.

Glasses shall comply with the requirements of Annex B.

Pipette capacity shall be 10 mL.

A.2.2.3 Microwave preheating

Before cooking milk, preheat the microwave as follows:

a) Place six glasses containing 50 mL of water in a microwave oven at a temperature of (23 ± 2)°C. These glasses are not used as test loads;

b) Place the glasses evenly along a circle with a diameter of 160 mm (the center of the circle is the center of the glass turntable), see Figure A.1;

c) According to the requirements of Annex F of GB/T 20290-2024, the microwave oven heats $t_{u,1}$ at a nominal power of 780 W ($P_{u,1}$). Then, it heats $t_{u,2}$ at a nominal power of 150 W ($P_{u,2}$);

d) Once preheated, remove the glass from the microwave.

A.2.2.4 Preparation

Contaminated dishes: glass.

Contaminated amount: add 10 mL of milk to each glass.

Contamination method: before contamination, remove the milk from the refrigerator and shake it well (approximately 30 s). Immediately after shaking, pipette 10 mL of milk into each glass and boil.

Milk shall be refrigerated immediately after use.

A.2.2.5 Cooking process

After preheating, immediately place six glasses filled with milk into the microwave. First, cook continuously at 780 W. Then, continue cooking at 150 W. Cooking time shall be calculated according to Annex F of GB/T 20290-2024.

During each cooking operation, 6 contaminated milk glasses shall be kept in the microwave oven. The glasses shall be placed as shown in Figure A.1, with the bottoms of the glasses flat on the turntable.

NOTE: If more than 6 glasses are required for the test, brew the remaining 6 glasses immediately after the first set of 6 glasses have been brewed, without reheating.

After cooking in a microwave oven for a period of time, compare the color of the cooked

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