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# QB

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## QB/T 1520-2013

Replacing QB/T 1520-1992

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### Household and similar electrical dishwasher

家用和类似用途电动洗碗机

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## Foreword

This Standard is drafted in accordance with the rules provided by GB/T 1.1-2009.

This Standard is an revised edition of QB/T 1520-1992 *Electric Dishwashers for Household Use*. Compared with QB/T 1520-1992, the main differences are as follows:

- Delete the terms and definitions of full-automatic dishwasher, semi-automatic dishwasher, non-automatic dishwasher, spraying dishwasher, scroll dishwasher, detergent and rinse agent;
- Add the terms and definitions of cleaning index, drying index, energy efficiency index, left-on mode, off-mode, annual energy consumption, eliminating bacterial rate and antibacterial rate;
- Add the provisions of 5.9 "Mean Time Between Failure", 5.10 "Left-on power", 5.11 "Off power", 5.12 "Eliminating bacterial rate", and 5.13 "Allowable deviation of indicated value";
- Add the test methods of 6.3.5 "Left-on power", 6.3.6 "Off power", 6.3.10 "Mean Time Between Failure", 6.3.14 "Eliminating bacterial rate and antibacterial rate";
- Revise the original Annex A "Preparation of dishware pollutants and pollution methods" into "Grading and classification of key performance indexes";
- Revise the original Annex B "Standard dishware" to "Test method for eliminating bacterial";
- Revise Annex C "Detergent and rinse agent" to "Test failure examples in Mean Time Between Failure";
- Delete Annex D;
- Change the compiling structure of this Standard.

This Standard was proposed by China Light Industry Council.

This Standard shall be under the jurisdiction of National Technical Committee 46 on Household Electric Appliances of Standardization Administration of China (SAC/TC46).

Drafting organizations of this Standard: China Household Electric Appliance Research Institute, National Household Electric Appliance Quality Supervision and Inspection Center, Midea Washing Appliances Manufacturing Co. Ltd. in Shunde District, Foshan City, Zhongshan Galanz Household Electrical Appliances Co., Ltd., Qingdao Haier Dishwasher Co., Ltd., BSW Household Appliances (China) Co., Ltd., Panasonic Home Appliances Research and Development (Hangzhou) Co., Ltd., Jiangsu Oberoncn Dishwashing Equipment Manufacturing Co., Ltd. AND Vkan Certification & Testing Co., Ltd.

# Household and similar electrical dishwasher

## 1 Scope

This Standard specifies the terms and definitions, classification, requirements, test methods, inspection rules, marks, packaging, transportation and storage of household and similar electrical dishwasher (abbreviated as “dishwasher”).

This Standard is applicable to household and similar electrical dishwashers of which the rated voltage is not exceeding 250V under single-phase.

This Standard is not applicable to dishwashers designed for commercial purposes.

## 2 Normative references

The following documents are indispensable for application of this document. For the dated documents so quoted, only the dated versions apply to this document. For the undated documents so quoted, the latest versions (including all modification sheets) apply to this document.

GB/T 2423.17 Environmental testing for electric and electronic products - Part 2: Test method - Test Ka: Salt mist (GB/T 2423.17- 2008, IEC 60068-2-11:1981, IDT)

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 2828.1-2012, ISO 2859-1:1999, IDT)

GB/T2829 Sampling procedures and tables for periodic inspection by attributes (Apply to inspection of process stability)

GB/T 4086.2 Tables for statistical distributions;  $\chi^2$ -distribution

GB/T4214.3-2008 Household and similar electrical appliances - Test code for determination of airborne acoustical noise - Particular requirements for dishwashers (GB/T4214.3-2008, IEC 60704-2-3:2005 Ed.2.1, IDT)

GB 4706.25 Household and similar electrical appliances - Safety - Particular requirements for dishwashers (GB 4706.25-2008, IEC 60335-2-5:2005, IDT)

GB 5296.2 Instructions for use of consumer interest - Instructions for use of household

and similar electrical appliances

GB/T20290-2006 Electric dishwashers for household use - Methods for measuring the performance (IEC 60436:2004, IDT)

GB 21551.2 Antibacterial and cleaning function for household and similar electrical appliances - Particular requirements of material

GB/T 22939.5 Package of household and similar electrical appliances - Particular requirements for electric washing machine and dryer

GB/T23119 Household and similar electrical appliances - Performance - Hard water for testing (GB/T 23119-2008, IEC 60734:2001, IDT)

### **3 Terms and definitions**

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

#### **3.1 Electrical dishwasher**

Appliances that carry out washing, rinsing, drying, bacterial eliminating for bowls, plates, glassware, cutlery, chopsticks and other tableware by using electric drive and relying on chemistry, machinery and thermal energy.

#### **3.2 Standard washing program**

GB/T 20290-2006 or test procedures specified by the manufacturer.

#### **3.3 Cleaning index**

*P<sub>c</sub>*

The mathematical expression of cleaning ability.

#### **3.4 Drying index**

*P<sub>D</sub>*

The mathematical expression of drying ability.

#### **3.5 Energy efficiency index**

**E<sub>EI</sub>**

100 times of the RATIO of annual energy consumption AND standard annual energy consumption of dishwasher.

#### **3.6 Water efficiency index**

- Built-in dishwasher;
- Wall-mounted dishwasher.

## 4.2 Specifications

Specifications of the dishwasher are expressed in rated washing capacity (sets) in the model.

## 5 Requirements

### 5.1 Environmental conditions for use

- A) Ambient temperature: 5°C ~ 40°C;
- B) Ambient humidity: not greater than 95%RH (25°C);
- C) Inlet water temperature: not exceeding 60°C;
- D) Inlet water pressure: 0.02 Mpa ~ 1.0 Mpa.

### 5.2 Power supply, trial run

The dishwasher adopts single-phase AC power supply, rated voltage of 220V, rated frequency of 50Hz (except for special request).

Operated in accordance with the requirements of product operation instructions, the dishwasher shall be able to start running, and to complete the functions specified in operation instructions (in case these functional requirements are not specified in this Standard, the corresponding national standards, industry standards or the filing-enterprise standards may be followed).

### 5.3 Safety

The safety of dishwasher shall meet the requirements of GB 4706.25.

### 5.4 Cleaning index

The cleaning index of dishwasher shall not be less than 0.76.

### 5.5 Drying index

The drying index of dishwasher shall not be less than 0.55.

Note: It is applicable to that dishwashers that explicitly indicate having a drying function on the product or operation instructions.

### 5.6 Energy efficiency index

5.15.1.2.2 Upon corrosion resistance test is carried out for painted parts or plastic parts of dishwasher, the width of corrosion shall not be greater than 1mm.

### **5.15.2 Plastic parts**

The plastic parts of dishwasher shall have smooth surface, uniform color, anti-aging; there shall be no cracks, bubbles, shrinkage and other defects.

## **6 Test methods**

### **6.1 Test conditions**

#### **6.1.1 Power**

During the test, the power supply voltage shall be maintained at  $\pm 1\%$  of the rated voltage. If the rated voltage range is specified; test voltage is 220 ( $1 \pm 1\%$ ) V.

During the test, the power frequency shall be kept within  $\pm 1\%$  of the rated frequency. If the rated frequency range is specified, test voltage is 50 ( $1 \pm 1\%$ ) Hz.

The distortion degree of Left-on/Off test power supply voltage waveform is not more than 2%; and the ratio of peak value and effective value shall be in the range of 1.34-1.49.

#### **6.1.2 Water supply**

Throughout the test and load handling processes, test water hardness is ( $2.5 \pm 0.5$ ) mmol/L. If the water hardness requires adjustment, it shall be in accordance GB/T 23119.

If necessary, cold water inlet temperature is ( $15 \pm 2$ )°C; the measured water temperature shall be recorded in the report.

Throughout the test, the water pressure at water inlet shall be maintained at ( $240 \pm 20$ ) kPa; the measured water pressure shall be recorded in the report.

#### **6.1.3 Ambient temperature**

During the test, ambient temperature nearby the dishwasher shall be maintained at ( $23 \pm 2$ )°C; the measured ambient temperature shall be recorded in the report.

#### **6.1.4 Ambient relative humidity**

During the test, the relative humidity of laboratory shall be maintained at ( $55 \pm 5$ ) %; the measured ambient relative humidity shall be recorded in the report.

#### **6.15 Load**

Use the test load specified in Annex A of GB/T 20290-2006; standard machine shall be loaded in accordance with the provisions of Annex E of the standard; prototype-machine

shall be loaded in accordance with the provisions of manufacturer's operation instructions.

## **6.2 Test instruments and meters**

### **6.2.1 Quantity of electricity**

The accuracy of electric quantity measurement shall be accurate to 0.0001KW·h.

### **6.2.2 Power**

The accuracy of power measurement is as follows:

- When  $\leq 10W$ , accurate to 0.01W;
- When  $>10W \sim 100W$ , accurate to 0.1W;
- When  $>100W$ , accurate to 1W.

### **6.2.3 Temperature**

Temperature measurement shall be accurate to 0.5°C.

### **6.2.4 Water quantity**

Water quantity measurement shall be accurate to  $\pm 2\%$ .

### **6.2.5 Water pressure**

Water pressure measurement shall be accurate to  $\pm 5\%$ .

### **6.2.6 Time**

Time measurement shall be accurate to  $\pm 5s$ .

## **6.3 Test methods**

### **6.3.1 General requirements**

Each prototype-machine shall be carried out at least 5 times of effective washing cyclic tests. The results of each test item adopt the arithmetic mean value of all valid washing cycles.

### **6.3.2 Cleaning index**

Cleaning index is tested in accordance with the method specified in Chapter 6 of GB/T20290-2006; the test results are evaluated and calculated as per 6.7 in GB/T20290-2006.

### **6.3.3 Drying index**



### 7.3 Inspection classification

Inspection of dishwasher can be divided into exit-factory inspection and type inspection.

### 7.4 Exit-factory inspection

#### 7.4.1 Required inspection items

Required inspection items of exit-factory inspection are No. 1, 3, 14, 15, 16, 17, 18, 19 and 20 of Table 3.

#### 7.4.2 Sampling-inspection items

7.4.2 .1 Sampling-inspection items of exit-factory inspection are No.1, 3, 4, 5, 6 and 7 of Table 3.

**Table 3 Exit-factory inspection**

No.	Inspection item	Requirement	Test method	Type of disqualification			Critical defect
1	Mark	8.1	Visual inspection	√			
2	Vibration test for package	8.2	GB/T 22939.5		√		
3	Trial run	5.2	Visual inspection		√		
4	Cleaning index	5.4	6.3.2				√
5	Drying index	5.5	6.3.3		√		
6	Energy efficiency index	5.6	6.3.4, 6.3.7				√
7	Water efficiency index	5.7	6.3.4, 6.3.8				√
8	Noise	5.8	6.3.9			√	
9	MTBF	5.9	6.3.10		√		
10	Left-on power	5.10	6.3.5			√	
11	Off power	5.11	6.3.6			√	
12	Eliminating bacterial rate	5.12	Annex B				√
13	Allowable deviation of indicated value	5.13	-			√	
14	Structure and component	5.14.1	Visual inspection		√		
15	Liner of dishwasher	5.14.2	Visual inspection	√			
16	Surface inspection of metal workpieces	5.15.1	Visual inspection	√			
17	Surface inspection of electroplated parts	5.15.2	Visual inspection		√		
18	Adhesion inspection of coated or plastic-coated parts	5.15.3.1	Visual inspection		√		
19	Corrosion resistance test of coated or plastic-coated parts	5.15.3.2	6.3.11		√		
20	Surface inspection of plastic parts	5.15.4	Visual inspection		√		

Note 1. Items checked by “√” are regarded as defects for not conforming to the provisions of this Standard.

Note 2. All items listed in this table are main inspection or visual inspection items.

Note 3. For the dishwasher without eliminating bacterial function, the test item of eliminating bacterial rate is not applicable.

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1	Second sampling	$n_2=4$	1	2	3	4	4	5
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Note: Another three sets shall be sampled for failure-free operation test.

7.5.4 The period of type inspection shall be determined by manufacturing plant as specified in 7.5. Samples of type inspection shall be taken randomly from qualified products of exit-factory inspection.

7.5.5 If the type inspection is qualified, the batches of the products of the representative group produced in this period can be put in storage or leave factory as qualified products after passing inspection. Type inspection shall be re-conducted if leaving factory again, after being in storage for more than two years.

7.5.6 Before the end of this type inspection, Quality Inspection Department of supplying party or ordering party may carry out acceptance of products in reference to the results of last type inspection, however, the results of this type inspection shall prevail.

7.5.7 A complete type inspection report shall be provided by supplying party within one year as required by ordering party.

7.5.8 At least three prototype-machines shall be sampled for the test of indicated values; the arithmetic mean value of the three prototype-machines' test results is the indicated value of this batch of product. If the difference between the measured value and average value of each prototype-machine does not meet the requirements of 5.13, another 3 prototype-machines shall be sampled for testing.

## 8 Mark, packaging, transportation and storage

### 8.1 Mark

The marks on dishwasher and packaging shall comply with the corresponding requirements of the provisions of GB 5296.2; the deviation of nominal size, quality (gross, net) on packaging shall not exceed  $\pm 8\%$ .

The attainable values of dishwasher's cleaning index, drying index, energy efficiency index, water efficiency index, and eliminating bacterial rate shall be marked on the nameplate or operation instructions; the allowable deviation of indicated values shall comply with the requirements of 5.13.

The operation instructions of dishwashers with eliminating bacterial function shall include the following contents:

- a) Eliminating types of bacterial and the reached eliminating bacterial rate;
- b) The normal attenuation and performance changes of eliminating bacterial function

during the life cycle;

c) Application parts and effect of antibacterial materials.

## **8.2 Packaging**

Dishwasher shall use solid boxes, which shall conform to the requirements of GB/T22939.5.

## **8.3 Transportation and storage**

8.3.1 Collision and drench of rain and snow shall be avoided in the transport and storage process of dishwasher.

8.3.2 Dishwasher shall be stored in a well-ventilated warehouse with no corrosive gases in the ambient air; the original package shall not be opened.

## Annex B

(Normative)

### Test methods for eliminating bacterial

#### B.1 Summary of method

Apply the microbial suspension liquid on tableware; load the appliance after drying; then run a specified eliminating bacterial program. Analyze the amount of bacteria on the contaminated tableware before and after running the eliminating bacterial program; calculate the eliminating bacterial rate.

#### B.2 Test bacteria and instruments

##### B.2.1 Bacteria

- Escherichia coli;
- Staphylococcus aureus.

Other bacteria or bacterial strains may also be used as test bacteria in accordance with the use requirements of household appliances, however, all bacteria or bacterial strains shall be provided by corresponding national Bacteria Preservation and Management Center; and test species and class numbers of bacteria shall be marked in the report.

Concentration of bacterium is diluent of  $1.0 \times 10^9$  cfu/mL ~  $9.0 \times 10^9$  cfu/mL.

##### B.2.2 Instruments

- Biochemical incubator: precision of temperature control  $\pm 1^\circ\text{C}$ ;
- Freezer:  $5^\circ\text{C} \sim 10^\circ\text{C}$ ;
- Drying oven:  $0^\circ\text{C} \sim 300^\circ\text{C}$ ;
- Clean bench (level 100) or biosafety cabinet;
- Pressure steam sterilizer;
- Plates, test tubes, pipette (precision of 0.01mL), inoculating loop, alcohol lamps and other commonly used laboratory instruments.

#### B.3 Test procedure

Except as follows, other test conditions and test instruments shall comply with relevant requirements of GB/T 20290-2006.

## Annex C

(Informative)

### Test failure examples in failure-free operation time

**Table C.1 Test failure examples in failure-free operation time**

S/N	Failure components	Failure phenomena
1	Power lines and internal wiring	Short circuit or open circuit
2	Power switch	Contact can not be connected or disconnected
3	Inlet valve	Normally-opened or normally-closed actions fail
4	Program controller	Contact can not be connected or disconnected
5	PC version	Does not work or stop, running program is disordered
6	Display	Does not display or act
7	Water level switch	Contact can not be connected or disconnected
8	Washer pump	Does not work or stop
9	Temperature controller	Contact can not be connected or disconnected
10	Insulation lagging	Short circuit caused by failure or damage
11	Door switch	Contact can not be connected or disconnected
12	Drain pump	Does not work or stop

**END**