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**Household and similar purposes
drinking water treatment equipment**

家用和类似用途饮用水处理装置

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Household and similar purposes drinking water treatment equipment

1 Scope

This standard specifies the terms and definitions, classification and naming, technical requirements, test methods, inspection rules, marking, packaging, transportation and storage of household and similar purposes drinking water treatment equipment.

This standard applies to household and similar purposes drinking water treatment equipment (hereinafter referred to as “drinking water treatment equipment”).

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 standard.

GB/T 191 Packaging - Pictorial marking for handling of goods

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

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 2829 Sampling procedures and tables for periodic inspection by attributes (Apply to inspection of process stability)

GB 4214.1 Acoustics - Household and similar electrical appliances - Test code for determination of airborne acoustical noise - Part 1: General requirements

GB 4706.1 Safety of household and similar electrical appliances - Part 1: General requirements

GB 5749-2006 Standards for drinking water quality

Ultrafiltration

The physical screening process of using the pressure difference as a driving force to separate a molecular weight which ranges from several hundred to several millions at a membrane pore size of about $0.001\ \mu\text{m} \sim 0.2\ \mu\text{m}$, abbreviated as UF.

3.6

Nanofiltration

The membrane separation process of using pressure as the driving force to remove the divalent or higher polyvalent ions as well as the organic matter which has a molecular weight of 200 or more, abbreviated as NF.

3.7

Reverse osmosis

The process of applying an external pressure higher than the osmotic pressure of the solution to the water inlet side of the membrane, which only allows the water and some components in the solution to selectively permeate, whilst the other substances are not permeable and are trapped on the surface of the membrane, abbreviated as RO.

3.8

Mineralization

The process of adding one or several mineral components beneficial to the human body to the water.

3.9

Ion exchange

The process of the chemical reaction of reversible exchange between the ions present in the solution and the ion exchange solid medium, which has no change to the solid structure, abbreviated as IE.

3.10

Electrodialysis

The process of using the ion exchange membrane as a separation medium, the potential difference as a power, to cause the anion and cation in the water to migrate at certain direction and pass through the ion exchange membrane, thereby performing ion separation process, abbreviated as ED.

The ratio of the decrease in the amount of a substance in the influent to the total content of the substance in the influent, expressed as a percentage.

3.19

Recovery

After purification, the ratio of purified water to total influent, which is expressed as a percentage.

3.20

Rate of regeneration

Under the specified operating conditions, the ratio of the main functional index to the those at the initial state of the water treatment unit after regeneration, which is expressed as a percentage.

3.21

Purified water flow rate

Under the specified operating conditions, the amount of water produced per nominal unit time of the manufacturer, expressed in liters per hour (L/h).

3.22

Total production capacity

Under the specified operating conditions, when the effluent quality of the drinking water treatment equipment meets the requirements and the purified water flow rate is not less than the nominal purified water flow rate, the accumulated water production when any of the purification units are regenerated or replaced, in liters (L)

3.23

Influent pressure

The water pressure at the water inlet of the drinking water treatment equipment during operation, in megapascals (MPa).

3.24

Maximum working pressure

The maximum value of the working pressures as nominally used by the manufacturer or the upper limit of the working pressure range, in megapascals (MPa).

- a) Municipal tap water or other centralized water supply;
- b) Pressure: ≤ 0.4 MPa (gauge pressure);
- c) Water temperature: $5\text{ }^{\circ}\text{C} \sim 38\text{ }^{\circ}\text{C}$.

5.1.2 Power supply

Voltage: $187\text{ V} \sim 242\text{ V}$;

Frequency: 50 Hz .

5.1.3 Environmental conditions

- a) Temperature: $4\text{ }^{\circ}\text{C} \sim 40\text{ }^{\circ}\text{C}$;
- b) Relative humidity: $\leq 90\%$ (at $25\text{ }^{\circ}\text{C}$).

5.2 Appearance requirements

5.2.1 The appearance of drinking water treatment equipment shall be clean, tidy, free of rust.

5.2.2 The surface of the exposed structure of the drinking water treatment equipment shall be flat and smooth, with uniform color and no sharp edges.

5.2.3 The surface of the coating of drinking water treatment equipment shall be flat and bright; the color is uniform; the coating is firm. The surface shall not have obvious defects such as flowing marks, scratches, wrinkles, pits, blistering, holiday, collection of sand.

The decorative plating of the electroplated parts shall be smooth and fine, the color shall be uniform. There shall be no defects such as spots, rust spots, pinholes, blisters, peeling of plating.

The surface of the plastic parts shall be smooth and even; the color shall be uniform. There shall be no defects such as cracks, blisters, obvious shrinkage or deformation.

5.3 Structural requirements

5.3.1 Structural design shall consider easy maintenance or replacement of the filter element.

5.3.2 The layout of the pipeline is reasonable; the connection is firm.

5.3.3 Drinking water treatment equipment (except for non-continuous treatment equipment for drinking water) shall, when subjected to the hydrostatic pressure test, rupture pressure test, cyclic pressure test as specified in Table 1, be free

5.6.2 Total production capacity

The total production capacity shall be greater than the nominal total production capacity.

5.6.3 Purified water flow rate

- a) The purified water flow rate of the non-continuous treatment equipment for drinking water shall be not less than 2 L/h.
- b) The purified water flow rate of the continuous treatment equipment for drinking water shall be not less than 6 L/h.
- c) The purified water flow rate shall not be lower than the nominal purified water flow rate.

5.6.4 Noise

When the drinking water treatment equipment is operating normally, the sound power level of noise must not exceed 65 dB (A).

5.6.5 Control performance

The control device is sensitive and reliable. It has automatic protection and control functions.

5.7 Requirements for special use performance

5.7.1 Water purifier

5.7.1.1 The rate of regeneration of the water treatment element of water purifier is $\geq 70\%$.

5.7.1.2 Nanofiltration water purifier.

- a) Recovery rate $\geq 40\%$;
- b) The efficiency of rejection of divalent ion is $\geq 90\%$.

5.7.2 Water softener

5.7.2.1 The water softener shall have measures to maintain the water content of the cation exchange resin.

5.7.2.2 For the water softener which has control valve, the control valve shall work normally after 10000 cycles of operation.

5.7.2.3 Within the working pressure range, when the water softener is in the water injection state, the liquid level of the salt water tank shall be controlled at

Turbidity: < 1.0 NTU;

Sodium: ≤ 85.5 mg/L.

b) Water purification machine:

TDS: 200 ~ 500 mg/L;

pH value: 7.5 ± 0.5 ;

Turbidity: < 1.0 NTU;

TOC: ≤ 1 mg/L.

c) Drinking water treatment equipment other than the above: municipal tap water or other centralized water supply in accordance with GB 5749.

6.1.3 Test water's pressure: It is (0.2 ± 0.02) MPa for the continuous treatment equipment for drinking water. It is atmospheric pressure for the non-continuous treatment equipment for drinking water

6.1.4 Test of structural integrity shall be carried out in a closed and isolated environment, to prevent the risk of personal injury or property damage during the test.

6.1.5 Installation of the drinking water treatment equipment, flushing or regeneration of the water treatment unit shall be carried out in accordance with the manufacturer's instructions for use.

6.1.6 Main measuring instruments and their requirements:

- a) The instrument for measuring temperature shall reach an accuracy of ± 0.3 °C for type inspection and ± 1 °C for exit-factory inspection;
- b) The accuracy of the ammeter, voltmeter, etc. in the electrician's instrument shall not be less than grade 0.5 in the type inspection, and not less than grade 1.0 in the exit-factory inspection;
- c) Noise test instrument: Use a noise tester;
- d) The test instrument for surface vibration of drinking water treatment equipment requires a frequency response range of 10 ~ 1000 Hz. Within the frequency range, the relative sensitivity is based on the relative sensitivity of 80 Hz as a reference. The relative sensitivity of other frequencies shall not exceed -10% ~ +20%;
- e) The accuracy of volume measurement of the container with scale shall not be less than 10 mL. The measuring range is determined according to the measurement needs;

shall be adjusted so that no condensation water will form on the surface of the test device;

- b) Connect the water inlet of the specimen to the test device as shown in Figure 1. Allow the open-close state of the valve and pipeline of the specimen to be consistent with the normal state of use;
- c) Inject water to fill the specimen and rinse it, to empty the air from the specimen. Close the water outlet of the specimen. Adjust the control valve of the specimen to the normal working position. For all components of the specimen that may be subjected to pressure from the system pipeline in the normal working process, including the components of the water inlet and outlet, apply the pressure;
- d) At a pressure-rising rate of not more than 0.4 MPa/s, increase the hydrostatic pressure to the pressure value as specified in Table 1 within 5 min;
- e) Maintain the test pressure for 15 min. During the entire test, continuously check the water tightness of the specimen. Observe whether there is leakage.

6.3.3.3 Rupture test - Pressure-bearing parts

Follow the requirements below to carry out the rupture pressure test:

- a) The temperature of the test water shall be maintained at 13 ~ 24 °C. It shall be adjusted so that no condensation water will form on the surface of the test device;
- b) Complete assembly in accordance with normal installation and operating requirements;
- c) Use the pump system to connect the specimen to the water supply end of the test device as shown in Figure 1;
- d) As far as practicable, use threaded parts to close all remaining openings in the specimen. Fill water and rinse it to empty the air from the specimen;
- e) At a pressure-rising rate of not more than 0.4 MPa/s, increase the water pressure to the rupture pressure as specified in Table 1 within 70 s after the beginning of the test, or otherwise make the specimen fails at a lower pressure. After reaching to the specified rupture pressure value, maintain the pressure for another 5 s. Release the pressure.

6.3.3.4 Cyclic pressure test

Follow the requirements below to carry out the cyclic test:

The electrical safety of drinking water treatment equipment is tested in accordance with the method of GB 4706.1.

6.6 Test of general use performance

6.6.1 Test of purified water quality

The test indicators of purified water and sampling methods of the drinking water treatment equipment are carried out in accordance with the relevant regulations of the national health management department. The test method is in accordance with GB/T 5750.1 ~ 5750.13-2006.

6.6.2 Test of total production capacity

According to the relevant regulations of the national health management department, the total production capacity that meets the requirements after final testing is the total production capacity of the equipment.

6.6.3 Test of purified water flow rate

Start and run the test prototype. When the total production capacity reaches the nominal total production capacity, collect the purified water at the water outlet for $300\text{ s} \pm 2\text{ s}$. Determine the water effluent amount. Make collection at the interval of 5 min, totally making three collections. Take the arithmetic mean of the three test values as the test result.

6.6.4 Noise test

Determine it according to the method of 7.1.1 and 7.1.4 in GB/T 4214.1.

6.6.5 Test of control device's performance

Start and run the test prototype. Operate it according to the requirements of the product's instruction, to confirm the sensitivity and reliability of each control function.

6.7 Test of special use performance

6.7.1 Water purifier

6.7.1.1 Test of rate of regeneration

- a) According to the requirements of product's instruction, regenerate the test prototype.
- b) Start the test prototype. According to the methods of 6.6.2 and 6.6.3, test the cumulative water production and water production flow after regeneration. Calculate the ratio of it to the total purified water and to the purified water flow rate, both of which shall be $\geq 70\%$.

6.7.2.4 Test of effluent hardness

Carry out sampling and testing according to the methods as specified by the relevant regulations of the national health management department. The test method is carried out in accordance with GB 5750.1 ~ 5750.13-2006.

6.7.2.5 Test of rate of regeneration

It is carried out according to the method of 6.7.1.1.

6.7.3 Water purification machine

6.7.3.1 Test of rate of desalinization

a) The sampling method shall be implemented in accordance with the relevant regulations of the National Health Administration of the People's Republic of China.

b) It is tested according to the method of 6.2.1 in GB/T 19249-2003.

6.7.3.2 Test of recovery rate

It is carried out according to the method of 6.7.1.2.

6.7.4 Test of mineralization index

6.7.4.1 The sampling method shall be implemented in accordance with the relevant provisions of the National Health Administration of the People's Republic of China.

6.7.4.2 It is tested according to the method as specified in GB/T 8538.

7 Inspection rules

7.1 Inspection is divided into exit-factory inspection and type inspection.

7.2 Exit-factory inspection

7.2.1 It can only exit-factory after passing the inspection.

7.2.2 Exit-factory inspection items, requirements, inspection methods, inspection forms, classification of nonconformances are as shown in Table 2.

7.2.3 The group-batch, sampling scheme, judgment of the exit-factory inspection shall be carried out in accordance with the provisions of GB/T 2828.1. The inspection level and the upper limit of acceptance quality level (AQL) shall be determined by the manufacturer according to its own control needs or otherwise according to the needs of both parties.

7.3.5 Samples of type inspection shall not be delivered to the user as qualified products.

8 Marking, packaging, transportation, storage

8.1 Marking

8.1.1 The drinking water treatment equipment shall be provided with a label at an eye-catching position, which shall be clearly marked with at least the following contents:

- a) Product name, specification, model;
- b) Name of manufacturer;
- c) Product number or date of manufacture (which may be marked at other appropriate positions);
- d) Total production capacity, purified water flow rate, working pressure;
- e) Relevant compulsory certification marking;
- f) Health approval number and implemented standard.

8.1.2 For the drinking water treatment equipment through which the flow direction of water likely causes confusion, it shall be marked of the direction of the water inflow and water outflow.

8.2 Packaging

8.2.1 Packaging and transportation pictorial signs shall comply with GB/T 191.

8.2.2 The packaging of drinking water treatment equipment shall comply with GB/T 1019.

8.2.3 The outer surface of the product's packaging box shall at least clearly indicate the following:

- a) Product name, trademark, specification and model;
- b) Name, address, zip code, service phone number of manufacturer;
- c) Gross weight, net weight;
- d) Dimensions of packaging box (length × width × height).
- e) Pictorial signs of packaging, storage, transportation;

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