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Sanitary Ware – Pressure Assistant Water Flushing Devices

卫生洁具 便器用压力冲水装置

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Sanitary Ware – Pressure Assistant Water Flushing Devices

1 Scope

This Standard specifies the terms and definitions, product classification, materials and spare parts, technical requirements, test methods, inspection rules, marking and labelling, packaging, transportation and storage of pressure assistant water flushing devices.

This Standard applies to pressure assistant water flushing devices installed on water supply pipelines with a static pressure no greater than 0.6MPa and used in conjunction with various toilets.

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) is applicable to this Document.

GB/T 2423.1 Environmental Testing for Electric and Electronic and Electronic Products - Part 2: Test Methods - Tests A: Cold

GB/T 2423.2 Environmental Testing for Electric and Electronic and Electronic Products - Part 2: Test Methods - Tests B: Dry Heat

GB/T 2423.3 Environmental Testing for Electric and Electronic and Electronic Products - Part 2: Test Methods – Test Cab: Damp Heat Steady State

GB/T 2828.1 Sampling Procedures for Inspection by Attribute - Part1: 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/T 6461-2002 Methods for Corrosion Testing of Metallic and Other Inorganic Coatings on Metallic Substrates - Rating of Test Specimens and Manufactured Articles Subjected to Corrosion Tests

GB 6952 Sanitary Wares

GB/T 7306.1 Pipe Threads with 55 Degree Thread Angle where Pressure-Tight Joints are Made on the Threads - Part 1: Parallel Internal and Taper External Threads

3.6 Dynamic pressure

The steady pressure value in the pipeline when the flushing device is fully open.

3.7 Backflow preventer

A device or structure that is used to prevent water from flowing back into a water supply system in the event of a system failure.

3.8 Consumption

The water consumption that is measured in a flushing cycle.

3.9 Water hammer

The instantaneous increase of pressure in the pipeline increases due to the closing of the valve, when water flows normally in the pipeline.

3.10 Control distance

In the axial direction of the non-contact flushing device sensor receiving (or transmitting), when the flushing device is reliably opened, the furthest distance between the analog board and the sensor window.

4 Product Classification

4.1 Pressure assistant water flushing devices

It can be divided into pressure assistant flush tank and pressure flushing valve.

4.2 Pressure assistant flush tank

4.2.1 According to the mode of operation, it is divided into mechanical pressure assistant flush tank and non-contact pressure assistant flush tank.

4.2.2 According to the installation form, it is divided into surface-mounted pressure assistant flush tank and hidden pressure assistant flush tank.

4.3 Pressure flushing valve

4.3.1 According to the application, it is divided into closet pressure flushing valve and urinal pressure flushing valve.

4.3.2 According to the mode of operation, it is divided into flushometer valve and non-contact pressure flushing valve.

4.3.3 According to the pipe diameter, it is divided into DN15, DN20, DN25 and DN32 flushing valves.

4.3.4 According to the installation form, it is divided into surface-mounted pressure flushing valve and hidden pressure flushing valve.

4.3.5 The flushometer valves are divided into button type, wrench type, pedal type, twist handle type and other operating modes of pressure flushing valves according to the drainage start mode.

5 Materials, Spare and Accessory Parts

5.1 All materials used in the product that are in direct contact with drinking water shall comply with the provisions of GB/T 17219.

5.2 Products with electrical accessories shall comply with the provisions of GB 14536.1.

5.3 Other materials shall make the product meet the use requirements specified in this Standard.

6 Technical Requirements

6.1 Pressure assistant flush tank

6.1.1 General requirements

6.1.1.1 Working range

The working range of pressure assistant flush tank is static pressure of (0.10~0.90) MPa.

6.1.1.2 Installation and maintenance

The pressure assistant flush tank shall be designed so that it can be replaced and repaired with standard tools.

6.1.1.3 Operating force

The tensile load of the wrench-driven chain or traction wire shall be no less than 60N; and its fixed load of the opening mechanism and wrench shall be no less than 30N.

6.1.1.4 Connection of water supply

6.1.1.4.1 The precision of the pipe thread connecting the pressure assistant flush tank and the water inlet pipeline shall meet the requirements of Class-B precision in GB/T 7307.

6.1.1.4.2 Connection thread torque and tensile strength

Carry out the test according to Appendix A, apply a torque of 6Nm to the thread of G3/8, and apply a torque of 10Nm to the thread of G1/2, and the threaded connection parts shall not be damaged.

6.1.2.6 All surfaces shall be free from sharp edges and corners that may cause harm to the human body.

6.1.3 Performance

6.1.3.1 Flushing water consumption

Whether the pressure assistant flush tank has a water volume adjustment device or a flow adjustment device is determined by the manufacturer. The water consumption of the pressure assistant flush tank matched with the toilet shall meet the water consumption requirements of the toilet in GB 6952 or the water consumption requirements specified by the product. For pressure assistant flush tank that are not matched with sanitary ware, the flushing water consumption of the product shall be indicated; and the flushing water consumption shall be determined according to 7.2.4.3.

For products with adjustable flushing water volume, the method of water volume adjustment shall be clearly stated on the product manual.

6.1.3.2 Influent flow

Carry out the test according to 7.1.3.1. Under the dynamic pressure (0.10 ± 0.01) MPa, the influent flow shall be no less than 0.05L/s.

6.1.3.3 Influent stability

Carry out the test according to 7.1.3.2. The water drainage of the pressure assistant flush tank shall not exceed 10% of the indicated water consumption.

6.1.3.4 Sealing performance

Carry out the test according to 7.1.3.3. There shall be no leakage from the drain port and any other parts of the pressure assistant flush tank.

6.1.3.5 Pressure resistance performance

Carry out test according to 7.1.3.4. The pressure assistant flush tank shall not have leakage, deformation, sweating and any other damage when it is subjected to a static pressure of (3.5 ± 0.2) MPa.

6.1.3.6 Resistance to cold and heat aging

Carry out test according to 7.1.3.5. The pressure assistant flush tank shall not have surface cracking, rupture, obvious deformation, etc.

6.1.3.7 Creep resistance

After carrying out the cold and heat aging test according to 7.1.3.5, test according to 7.1.3.6. After the pressure assistant flush tank is maintained at (1.0 ± 0.1) MPa static pressure for 500h,

there shall be no leakage, deformation, sweating or any other damage.

6.1.3.8 Anti-siphon performance

The pressure assistant flush tank shall have a vacuum breaking device; and the minimum air intake gap diameter of the air inlet shall be no less than 4mm or the equivalent diameter shall be no less than 4mm. When testing according to 7.1.3.7, there shall be no siphon.

6.1.3.9 Water hammer

Carry out the test according to Appendix B. When the water inlet is closed or stopped, the pressure rise value shall not exceed 0.2MPa.

6.1.3.10 Anti-influent failure

Destroy the water inlet control device according to 7.1.3.8; then feed water under a static pressure of 1.0MPa; keep it for 30 min, and water tank shall not burst or be damaged.

6.1.3.11 Overflow performance

Carry out test according to 7.1.3.9; the overflow capacity of the internally-overflowed pressure assistant flush tank shall be no less than 20L/min.

6.1.3.12 Discharge pressure

Carry out the test according to 7.1.3.10, and the discharge pressure of the pressure assistant flush tank shall be no less than 0.02MPa.

6.1.3.13 Lifespan

After 150 000 cycle tests according to 7.1.3.11, the pressure assistant flush tank shall be able to meet the requirements of 6.1.3.2, 6.1.3.3, 6.1.3.4 and shall not have any other failures.

6.2 Flushometer valve

6.2.1 Working range

The pressure working range of the flushometer valve is (0.10~0.90) MPa static pressure.

6.2.2 Processing and assembly

6.2.2.1 The castings must not have defects such as shrinkage cavities, cracks and pores; and the core sand attached to the inner cavity shall be removed.

6.2.2.2 There shall be no obvious defects such as dents and broken teeth on the thread surface; and the surface roughness Ra shall be no greater than 3.2 μ m.

6.2.2.3 For metal parts that cooperate with rubber seals, the surface roughness Ra is no greater than 3.2 μ m.

Working environment temperature: (1~55)°C.

Working medium: water.

Working water temperature: no more than 45°C.

Ambient relative humidity (RH): no more than 93%.

Working static pressure: no less than 0.05MPa, no more than 0.6MPa.

6.3.2 Processing and assembly

6.3.2.1 The castings shall be free from defects such as shrinkage cavities, cracks and pores, and the core sand attached to the inner cavity shall be removed.

6.3.2.2 There shall be no obvious defects such as dents and broken teeth on the thread surface, and the surface roughness Ra shall be no greater than 3.2 μ m.

6.3.2.3 The surface roughness Ra of metal parts that cooperate with rubber seals shall be no greater than 3.2 μ m.

6.3.2.4 There shall be no obvious filling spots, ripples, flashes, sink marks, warping and welding marks on the surface of plastic parts. There shall be no visible scrapes, scratches, trim damage and dirt.

6.3.2.5 There shall be no sharp edges and corners or other hidden dangers that may cause personal injury to the surface of the product.

6.3.3 Surface quality

6.3.3.1 The exposed surface coating and plating layer after installation shall be well bonded, the surface shall be smooth, and the color and luster should be uniform.

6.3.3.2 The exposed polished outer surface after installation shall be bright, and there shall be no defects such as blistering, detachment, and scratches.

6.3.3.3 The exposed metal coating after installation shall meet the requirements of Level-10 in GB/T 6461-2002 after the 24h acid salt spray test according to GB/T 10125-1997.

6.3.3.4 After the test for adhesion of the exposed sprayed coating after installation according to GB/T 9286-1998, there shall be no peeling phenomenon on the surface of the sprayed coating.

6.3.4 Dimensional properties

The precision of pipe thread shall comply with the provisions of GB/T 7306.1 or GB/T 7306.2 or GB/T 7307; and the external thread according to GB/T 7307 shall be no lower than the Level-B precision.

6.3.16.1 After taking high temperature test according to 7.3.12.1, the requirements of 6.3.6, 6.3.11 and 6.3.12 shall be met.

6.3.16.2 After taking low temperature test according to 7.3.12.2, the requirements of 6.3.6, 6.3.11 and 6.3.12 shall be met.

6.3.17 Humidity test

After testing according to 7.3.13, the requirements of 6.3.6, 6.3.11 and 6.3.12 shall be met.

6.3.18 Battery box performance

Carry out the test according to 7.3.14. For battery-powered products, the battery shall be placed in an independently sealed battery box. The battery shall be easily replaced. After the battery has been replaced more than 3 times, the battery box shall not be damaged, and the screws shall not be loosened. After the humidity test in 6.3.17, the metal parts in the battery box shall not be rusted.

6.3.19 Lifespan test

Carry out test according to 7.3.15. After 200 000 life cycle tests, the requirements of 6.3.6, 6.3.11, and 6.3.12 shall be met.

7 Test Methods

7.1 Test method for pressure assistant flush tank

7.1.1 General requirements

7.1.1.1 Installation and maintenance

Simulate the installation and disassembly of the various parts of the pressure assistant flush tank, and conduct the test by hand feeling. It shall be possible to use standard tools for replacement and maintenance.

7.1.1.2 Operating force

The tensile load and fixed load of the chain or traction wire driven by the wrench are measured by a dynamometer or a weight corresponding to the force value.

7.1.1.3 Water supply connection thread

7.1.1.3.1 The thread accuracy shall be measured by the thread gauge used to measure the accuracy level.

7.1.1.3.2 The tensile performance and torque resistance performance of connecting threads shall be carried out according to Appendix A.

7.1.3.1 Influent flow rate test

Install the pressure assistant flush tank on the testing equipment according to the state of use; connect the water inlet to the water supply device of the equipment; adjust the dynamic pressure of the influent to (0.10 ± 0.01) MPa; make the pressure assistant flush tank supply water to the natural closed state; and open the drainage device to make the water tank drain and close naturally. At the same time, use a stopwatch to test the time from opening the drain valve to the closing of influent. Use a flow meter or other instruments that can obtain the same result to measure the amount of water entering the pressure assistant flush tank. If there is water replenishment, the water volume entering into the pressure assistant flush tank shall include the water replenishment volume. Divide the influent volume by the water inflow time to get the influent flow rate; test three times; and take the arithmetic average.

7.1.3.2 Influent stability test

Influent stability at static pressure: Install the pressure assistant flush tank according to the use state; feed water under static pressure (0.10 ± 0.01) MPa until it is completely closed; keep for 5 min; drain until the drainage is automatically closed; record the total discharging amount T_0 . Re-feed water at static pressure (0.10 ± 0.01) MPa until the influent is completely closed; and keep it for 5 min; then increase the static pressure to (0.30 ± 0.03) MPa; keep it for 5 min; drain until the drainage is automatically closed; and record the total discharging amount T_1 . Adjust the static pressure to (0.10 ± 0.01) MPa, and then enter the water until the influent is completely closed; and keep it for 5 min; increase the static pressure to (1.0 ± 0.05) MPa; keep it for 5 min; drain until the drainage is automatically closed; and record the total discharging amount T_2 . Calculate the change value of water volume (L): $T_j = T_2 - T_0$ and $T_j = T_1 - T_0$, take the maximum value of the absolute value of the two.

Influent stability at dynamic pressure: Install the pressure assistant flush tank according to the state of use; enter the water under the dynamic pressure (0.10 ± 0.02) MPa until the influent is completely closed; keep for 5 min; drain until the drainage is automatically closed; record the total discharging amount T_0 . Enter the water under the dynamic pressure of (0.30 ± 0.03) MPa until the influent is completely closed; keep for 5 min; drain until the drainage is automatically closed; record the total discharging amount T_1 . Feed water under the dynamic pressure of (0.60 ± 0.05) MPa until the influent is completely closed; keep for 5 min; drain until the drainage is automatically closed; record the total discharging amount T_2 . Calculate the change value of water volume (L): $T_d = T_2 - T_0$ and $T_d = T_1 - T_0$, take the maximum value of the absolute value of the two.

If there is water replenishment, the total water volume shall include the discharge water volume and the water replenishment volume from when the drainage device is turned on to when the influent is completely closed.

7.1.3.3 Sealing performance test

Sealing at static pressure: Install the pressure assistant flush tank on the testing equipment according to the state of use; connect the water inlet to the water supply device of the equipment;

adjust the static pressure of the influent to (0.10 ± 0.01) MPa; and make the pressure assistant flush tank feed water to the naturally closed state; keep it for 5min; check whether there is any leakage in the water outlet and various parts of the product. Then adjust the static pressure of the influent to (1.0 ± 0.05) MPa; keep it for 5 min; and check whether there is leakage in the water outlet and various parts of the product. Repeat three times in the order of first low pressure and then high pressure; and record the inspection results.

Sealing at dynamic pressure: Install the pressure assistant flush tank on the test equipment according to the state of use; connect the water inlet to the water supply device of the equipment; adjust the dynamic pressure of influent to (0.10 ± 0.02) MPa; make the pressure assistant flush tank feed water to the naturally closed state; and keep it for 5 min; check whether there is any leakage in the water outlet and various parts of the product. Then adjust the dynamic pressure of the influent to (0.60 ± 0.05) MPa; keep it for 5 min; and check whether there is leakage in the water outlet and various parts of the product. Repeat three times in the order of first low pressure and then high pressure; and record the inspection results.

7.1.3.4 Pressure resistance test

Install the pressure flushing water tank on the test equipment according to the state of use, connect the water inlet to the water supply device of the equipment, let the pressure flushing water tank enter the natural closed state under the water inlet dynamic pressure not less than (0.10 ± 0.02) MPa, adjust the water inlet static The pressure is (3.5 ± 0.1) MPa, keep it for 5 min, and check whether the product has leakage, deformation, sweating and any other damage. Products that have passed the withstand voltage test cannot be used for other tests.

7.1.3.5 Resistance to cold and heat aging test

Open the water outlet, water inlet, check valve and all non-sealed connections leading to the interior of the water tank to the maximum position; put them into the freezer; adjust the temperature to -5°C and keep it for 24h. After taking it out, check whether there are plastic parts cracked or seriously deformed on the outer surface of the product. If there is, the test shall be terminated. If there is not, after standing at the room temperature for 24h, continuously place it in the 70°C thermotank for 168h; take it out, and after cooling off at the room temperature, check whether there are plastic parts cracked or seriously deformed on the outer surface of the product. If there is, terminate the test. If there is not, place it at room temperature for 24h. Perform 10 000 cycle tests under static pressure no less than 0.62MPa, and dynamic pressure no less than 0.48MPa to check whether there are leakage and abnormal phenomena in each part of the product; and whether the water intaking and draining functions are normal.

7.1.3.6 Creep resistance test

According to 7.1.3.5, the pressure assistant flush tank shall be subjected to cold and heat aging treatment first, and then shall be kept under (1.0 ± 0.05) MPa static pressure for 500h. During this process, observe whether there is any leakage, deformation, sweating and any other damage phenomena.

Key:

- 1 – pressure regulator;
- 2 – flowmeter;
- 3 – DN40 ball valve;
- 4 – DN32 ball valve;
- 5 - galvanized straight pipe of the same diameter as the water inlet of flushing valve;
- 6 - galvanized elbow, internal thread - internal thread;
- 7 - Galvanized elbow, external thread - internal thread;
- 8 – pressure gauge;
- 9 – test sample;
- 10 – water tank;
- 11 – electronic display and record device.

NOTE 1: This waterway includes three 180° elbows, two 90° elbows and six sections of straight pipe; and an exhaust system is installed on the top. The total length of the pipeline between point B and point C shall be no less than 20m; and the length of each straight pipe shall be no less than 1m.

NOTE 2: Close the water path of ball valve 4 and open the water path of the ball valve 3, which can be used for testing the sealing performance, strength performance, flushing water consumption, and operation performance. Close the water path of ball valve 3 and open the water path of the ball valve 4, which can be used for testing the water hammer performance.

Figure 3 – Schematic Diagram of Test System

Connect the product to the water supply system; conduct a sealing test on each part of the product according to the provisions in Table 1, and the valve core state, water outlet state, test pressure and retention time shall be performed according to Table 1. During the entire test process, check the valve core, upper water level of valve body, and lower water level of valve body, respectively to see whether there is any leakage.

7.2.4.2 Strength performance test

Install the product on the testing equipment according to the state of use or the manufacturer's instructions. The testing equipment shall be equipped with a water supply system that can provide and maintain the static pressure and dynamic pressure specified in Table 2. The test system is shown in Figure 3. Other systems that can achieve the same effect can also be used. Water temperature is $\leq 30^{\circ}\text{C}$.

Connect the product to the water supply system; and carry out the strength test on each part of the product according to the provisions in Table 2. The state of the valve core, the state of the water outlet, the test pressure and the retention time shall be performed according to Table 2. During the whole test process, check each component on the upper water level and lower water

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Contact: Wayne Zheng, Sales@ChineseStandard.net

Linkin: <https://www.linkedin.com/in/waynezhengwenrui/>

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