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**Testing methods for household water
purifiers**

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Contents

	Page
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Classification of tests	5
5 General condition of tests	6
6 Testing methods	7
6.1 Filtration flowrate test	7
6.2 Minimum hydrodynamic pressure test	10
6.3 Recovery test	10
6.4 Removal performance tests	10
6.5 Filtration capability tests	18
6.6 Filtered water volume test	24
6.7 Test of minimum water pressure for activation	24
6.8 Discharged water flowrate test	24
7 Record	25
Annex A (normative) Test method of alternative material (surrogate material) for volatile organic compounds	26
Annex B (informative) Bacteria removal performance test	28

Foreword

This Japanese Industrial Standard has been revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Water Purifier Association (JWPA)/Japanese Standards Association (JSA) with a draft being attached, based on the provision of Article 12, paragraph (1) of the Industrial Standardization Act applied mutatis mutandis pursuant to the provision of Article 16 of the said Act. This edition replaces the previous edition (**JIS S 3201:2017**), which has been technically revised.

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NOTE Based on Article 9 of the Supplementary Provisions to the Unfair Competition Prevention Act etc., any submission of proposal, or employment of procedures such as deliberation by the Japanese Industrial Standards Committee under the previous Industrial Standardization Act shall be deemed to have been conducted pursuant to the provision of Article 12, paragraph (1) of the revised Industrial Standardization Act.

Testing methods for household water purifiers

1 Scope

This Japanese Industrial Standard specifies the testing methods for filtration flowrate, minimum hydrodynamic pressure, recovery, removal performance, filtration capability, etc. of water purifiers mainly used in households (hereafter referred to as water purifiers).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 7505-1 *Aneroid pressure gauges — Part 1 : Bourdon tube pressure gauges*

JIS B 8302 *Measurement methods of pump discharge*

JIS K 0125 *Testing methods for volatile organic compounds in industrial water and waste water*

JIS K 8563 *Lead (II) nitrate (Reagent)*

JIS S 3242 *Household reverse osmosis water purifiers*

JIS Z 8703 *Standard atmospheric conditions for testing*

3 Terms and definitions

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

3.1

water purifier

water treatment implement having a function to reduce the substances etc. dissolved in tap water, using a filter medium such as activated carbon, microfiltration membrane and reverse osmosis membrane

3.2

water

water conforming to the Ministerial Ordinance concerning the water quality standard (No. 101 Ministerial Ordinance of Ministry of Health, Labour and Welfare of 2003) based on Article 4 of Waterworks Act (Act No. 177 of 1957)

NOTE Refer to the latest Ministerial Ordinance because the water quality standard is constantly revised.

3.3

solution

solution used for the preparation of raw water containing each removal target substance

3.4

raw water

water prepared to have a definite condition, to be passed through a water purifier

3.5

turbidity

index to indicate the degree of turbidness of water

The turbidness equivalent to that when 1 mg of standard kaolin is included in 1 000 ml of purified water is taken as Degree 1.

3.6

filtered water

treated water obtained by passing raw water through a water purifier

3.7

sample

water collected and used in various analyses of the tests specified in this Standard, such as raw water and filtered water

3.8

filtration flowrate

amount of filtered water flowing out from a water purifier per unit time

In the case of the water purifiers having a storage tank for filtered water, this indicates the amount of filtered water flowing into the storage tank per unit time.

3.9

filtered water volume

volume of the stored filtered water which can be used at one time

In the case of the water purifiers having multiple storage tanks, this indicates the volume of each storage tank.

3.10

discharged water flowrate

amount of filtered water discharged from the storage tank per unit time in the case of the server type water purifiers

3.11

hydrodynamic pressure

kinetic energy of running water expressed by the water pressure

3.12

minimum hydrodynamic pressure

hydrodynamic pressure minimally required to maintain a definite filtration flowrate, except the water purifiers in which the supplied water is stored and used

3.13

minimum water pressure for activation

water pressure necessary for the pump activation, if the water purifier has a pump

3.14

concentrated drainage

concentrated water drained from a reverse osmosis water purifier according to the water treatment through the reverse osmosis membrane

3.15

recovery

ratio of the flowrate of filtered water to the flowrate of water supplied to the water purifier in the case of the reverse osmosis water purifiers

3.16

removal performance

performance of water purifier which can be expressed by the removal rate of the target substance when water is passed under a definite condition

3.17

filtration capability

total amount of filtered water obtained up to the time when the removal rate of the target substance falls to the definite value when water is passed under a definite condition

In the case where the removal target is a clogging substance such as turbidity which reduces the filtration flowrate, this indicates the total amount of filtered water obtained up to the time when the filtration flowrate falls to 1/2 of the marked filtration flowrate while the specified removal performance is maintained.

3.18

filter medium

material such as activated carbon, woven texture, non-woven texture, and membrane used for the purpose of removal of dissolved substances in water by filtering, adsorbing, etc.

3.19

reverse osmosis membrane element

object to be used in the reverse osmosis water purifier, in which the reverse osmosis membrane, support, flow channel material, etc. are integrated

3.20

reverse osmosis membrane module

vessel housing the reverse osmosis membrane element

3.21

pre-conditioning operation

breaking-in operation in which water-passing treatment is carried out under a definite condition (a pressurized operation) required for the stabilization of performances when an unused reverse osmosis membrane element is used for the first time

This operation shall be carried out initially according to the instruction designated by a manufacturer because the required time differs depending on the type, material, manufacturing method, etc. of reverse osmosis membrane.

3.22

continuous type water purifier

water purifier connected to a faucet etc. and used, through which the filtered water continuously flows without being stored in a tank or the like

3.23

batch operation type water purifier

water purifier in which water is supplied at every usage, or once stored then used

The type in which the filtered water is obtained by connecting to a faucet etc. and stored in a tank or the like is included.

3.24

pot/pitcher type water purifier

batch operation type water purifier in which filtered water is obtained by gravity-based filtration and the filtered water is stored in a filtered water receiver

A pot/pitcher integrated type and a separate type are available as the filtered water receiver.

3.25

server type water purifier (water-supply direct connection system)

batch operation type water purifier connected to the water-supply piping, faucet etc., having only the storage tank for filtered water and being used by storing the filtered water (including the type that filters water using pump etc.)

A gravity-based type and a pump type are available as the discharge method of filtered water. The type equipped with the heating and cooling function is included.

3.26

server type water purifier (water-supply/filtered water tank system)

batch operation type water purifier having the water-supply tank and the storage tank for filtered water, which is used by supplying water to the water-supply tank then storing the filtered water (including the type that filters water using pump etc.)

A gravity-based type and a pump type are available as the discharge method of filtered water. The type equipped with the heating and cooling function is included.

3.27**server type water purifier (water-supply tank system)**

batch operation type water purifier having only water-supply tank, in which water is supplied to the water-supply tank and the filtered water is used directly without passing through the storage tank (including the type that filters water using pump, etc.)

A gravity-based type and a pump type are available as the discharge method of filtered water. The type equipped with the heating and cooling function is included.

3.28**portable type water purifier**

batch operation type water purifier integrated to a portable bottle etc., from which the filtered water is obtained by gravity, suction, extrusion or contact

3.29**circulating type water purifier**

batch operation type water purifier in which water is circulated and passed through a filter medium by a pump, etc. to obtain the filtered water

3.30**reverse osmosis water purifier**

water purifier using a reverse osmosis membrane (reverse osmosis membrane module) as a filter medium

3.31**marking**

information on the water purifying performance, given to the relevant water purifier

4 Classification of tests

The tests are classified as follows.

The numeral in parentheses shows the subclause number.

- a) **Filtration flowrate test (6.1)**
- b) **Minimum hydrodynamic pressure test (6.2)**
- c) **Recovery test (6.3)**

d) Removal performance tests (6.4)

- 1) Free residual chlorine removal performance test (6.4.2)
- 2) Turbidity removal performance test (6.4.3)
- 3) Volatile organic compounds removal performance test (6.4.4)
- 4) 2-chloro-4,6-bisethylamino-1,3,5-triazine (hereafter referred to as CAT) removal performance test (6.4.5)
- 5) 2-methylisoborneol (hereafter referred to as 2-MIB) removal performance test (6.4.6)
- 6) Soluble lead removal performance test (6.4.7)
- 7) Anionic surfactant removal performance test (6.4.8)
- 8) Phenols removal performance test (6.4.9)
- 9) Geosmin removal performance test (6.4.10)
- 10) Arsenic (pentavalent) removal performance test (6.4.11), only for reverse osmosis water purifier
- 11) Nitrate nitrogen and nitrite nitrogen removal performance test (6.4.12), only for reverse osmosis water purifier

e) Filtration capability tests (6.5)

- 1) Free residual chlorine filtration capability test (6.5.2)
- 2) Turbidity filtration capability test (6.5.3)
- 3) Volatile organic compounds filtration capability test (6.5.4)
- 4) CAT filtration capability test (6.5.5)
- 5) 2-MIB filtration capability test (6.5.6)
- 6) Soluble lead filtration capability test (6.5.7)
- 7) Anionic surfactant filtration capability test (6.5.8)
- 8) Phenols filtration capability test (6.5.9)
- 9) Geosmin filtration capability test (6.5.10)

f) Filtered water volume test (6.6)**g) Test of minimum water pressure for activation (6.7)****h) Discharged water flowrate test (6.8)****5 General conditions of tests**

Unless otherwise specified, tests shall be carried out at the ordinary temperature of $20\text{ }^{\circ}\text{C} \pm 15\text{ }^{\circ}\text{C}$ and the ordinary humidity (65 ± 20) % specified in **JIS Z 8703**.

In the pressure measurement, the Bourdon tube pressure gauge of Grade 1.6 specified in **JIS B 7505-1** or a pressure gauge at least equivalent thereto in precision shall

be used.

Unless otherwise specified, the tests shall be carried out by adjusting the temperature of raw water to $20\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$.

The concentration of raw water shall be checked by collecting at immediately upper stream side of the water purifier or the position considered to be equivalent thereto.

Unless otherwise specified, the filtered water shall be collected at immediately lower stream side of the water purifier or the position considered to be equivalent thereto, and checked.

In the case of the reverse osmosis water purifier, prior to the measurement procedure, the pre-conditioning operation of reverse osmosis membrane shall be carried out according to the usage method of relevant water purifier.

6 Testing methods

6.1 Filtration flowrate test

The filtration flowrate test shall be carried out by the method of **b)** or **c)** below according to the type of water purifier.

The filtration flowrate shall be rounded off to two significant digits.

- a) **Raw water** Water of which the turbidity is reduced to Degree 0.2 or under by removing the suspended matter utilizing the membrane filtration etc.
- b) **Continuous type water purifier** Shall be as follows.
 - 1) Attach the water purifier equipped with an unused filter medium to the testing apparatus consisting of a raw water preparation tank, a pump, a water pressure control valve, an integrating flowmeter, a flowmeter, a faucet and a pressure gauge as shown in Figure 1. Pass water initially according to the usage method of relevant water purifier, pass water continuously for 10 min at the marked filtration flowrate, adjust the indicated value of pressure gauge to 0.1 MPa without stopping the water pass, and measure the flowrate at this time by the method in accordance with **JIS B 8302**.
 - 2) In the case of the reverse osmosis water purifier of continuous type having a water feed pump, start the operation of the water purifier according to the usage method, and measure the flowrate at this time by the method in accordance with **JIS B 8302**.