DRAFT IN WIDE CIRCULATION

DOCUMENT DESPATCH ADVICE	
Ref	**Date**
MHD 22 /T-02	**13-12-2011**

TECHNICAL COMMITTEE: MHD 22

ADDRESSED TO:

1. All members of Water Purification System Sectional Committee, MHD 22
2. All Members of Medical Equipment and Hospital Planning Division Council (MHDC)
3. All others interested

Dear Madam(s)/Sir(s),

Please find enclosed the following documents :

DOC NO: **MHD 22 (187)**
TITLE: Draft Indian Standard for Reverse Osmosis based POU water purifiers for house hold purpose- Specification

Kindly examine the draft Indian Standard and forward your views stating any difficulties which you are likely to experience in your business or profession, if this is finally adopted as National Standards .

Last date for comments**:** 13-03-2012

Comments if any, may please be made in the format enclosed and mailed to the undersigned at the above address. In case no comments are received or comments received are of editorial nature, you will kindly permit us to presume your approval for the above document as finalized. However, in case of comments of technical in nature are received then it may be finalized either in consultation with the Chairman, Sectional Committee or referred to the Sectional committee for further necessary action if so desired by the Chairman, Sectional Committee.

The document is also hosted on BIS website www.bis.org.in

Thanking you,

Yours faithfully,

(Rakesh Kumar)
Scientist'F' & Head (MHD)

Encl: As Above

FORMAT FOR SENDING COMMENTS ON BIS DOCUMENTS

(Please use A4 size sheet of paper only and type within fields indicated. Comments on each clauses/sub-clauses/table/fig. etc be started on a fresh box. Information in Column 5 should include reasons for the comments and suggestions for modified wording of the clauses when the existing text is found not acceptable. Adherence to this format facilitates Secretariat's work)

DOC NO: **MHD 22 (187)**
TITLE Draft Indian Standard for Reverse Osmosis based POU water purifiers for house hold purpose- Specification

LAST DATE OF COMMENTS: 13-03-2012

NAME OF THE COMMENTATOR/ORGANIZATION: _____

Sl. No.	Clause/Sub-lause para/table/fig.	Commentator Orgn (Abbreviation)	Comments	Justification & Proposed change

Draft for Comments only Doc:No MHD 22(187)

Draft *Indian Standard*

Reverse Osmosis based POU water purifiers for house hold purpose- Specification

BUREAU OF INDIAN STANDARDS
(Not to be reproduced without permission of BIS or used as standard)

Last date of receipt of comments is 13 March 2012

Water Purification System Sectional Committee, MHD 22

NATIONAL FOREWORD
(Formal clauses will be added later)

The quality of water available for human consumption is a direct measure of the health of the population / community and indirectly to that of the country. In populated countries like India, the quality of drinking water has detiorated due to contamination of soil and water by biological and industrial wastes and over exploitation of ground water .Tapping of ground water for drinking purpose has also increased in urban and semi-urban areas to meet the growing demand. Ground water is characterized by high dissolved solids; mineral contents and sometime contaminated by heavy metals and harmful natural elements like fluoride and arsenic etc

Reverse Osmosis technology combined with sediment filter and carbon filter has proven to be very effective water treatment method for removing various inorganic, organic and microbiological contaminants from the water. Realizing the fact, many organized and un-organized sectors have entered RO technology based water purification market. This trend necessitates the importance and urgency of drawing a standard for RO based water purification systems. This standard also covers the testing of water contact materials for their safety under Global migration test.

1. SCOPE

This draft Standard covers Reverse Osmosis based POU water purifier that reduces TDS of water, reduces chemical contamination to safe level and removes physical particles-including microbiological impurities .

TERMINOLOGY

For the purpose of this standard the following definition shall apply

1.1 Reverse Osmosis:- Reverse Osmosis is a pressure driven membrane separation technique to reduce dissolved solutes such as minerals, salts, organic species etc. from water. Reverse Osmosis is often used in commercial and residential water purification. It

is also one of the methods used for desalination of brackish water and seawater. In Reverse Osmosis based water purifiers, normally a spiral wound membrane element is used along with pretreatment filters consisting of sediment filters, activated carbon filters etc.

1.2 Membrane: - A semi-permeable barrier that allows preferential passage of water. Commonly used reverse osmosis membranes include cellulose triacetate and aromatic polyamide polymers popularly known as TFC membrane.

1.3 **Drinking water:-**Water that is intended for human consumption for drinking and cooking purpose from any source in compliance with IS:10500 drinking water specification.

1.4 **Daily production rate: -** The volume of product water produced by a system per day.

1.5 Point of use drinking water treatment system:- A plumbed-in or faucet-mounted system used to treat the feed water from a single tap for direct consumption or use , but not used to treat the water majority of the facility or for distribution

1.6 Recovery rating: - The percentage of the influent water to the membrane portion of the system that is available to the user as reverse osmosis treated water when the system is operated without a storage tank or when the storage tank is bypassed.

1.7 Flow control: - A device for controlling the flow rate of a specified stream.

1.8 **Product water: -** Water that has been treated by a system.

1.9 **Influent challenge level: -** The mixture of water and contaminants entering a system.

1.10 Chemical reduction: - A reduction in the quantity of one or more specified organic or inorganic contaminations in drinking water.

1.11Contaminant:- An undesirable physical, chemical, or microbiological substance or parameter in water that may have an adverse health effect, aesthetic effect, or both.

1.12 Treatment technique (**TT):-** A process intended to reduce or remove the level of a contaminant in drinking water.

2. REFERENCES

The following Indian standards contain provisions, which, through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

IS 302: Part 1: 1979	Safety of household and similar electrical appliances: Part 1- General requirement" (5th revision)
IS 3025: Part 10:1984	Method of sampling and test (physical and chemical) for water and waste water part 10: - Turbidity (first revision)
IS 3025: Part 25: 1986	Methods of sampling and test (physical and chemical) for water and wastewater: Part 25 Chlorine, demand (first revision)
IS 14724: 1999	Ultraviolet water disinfection system- Specification
IS10500	Drinking water specification (Second revision)
IS 9845:1998	Determination of overall migration of constituents of plastics material and articles intended to come in contact with foodstuffs – Method of analysis"
APHA	Standard Methods for the Examination of Water and Wastewater, 21st edition.
EPA	(Environmental Protection Agency) methods for the analysis of water

3. **CONSTRUCTION**

3.1 Inlet port: - Their inlet port shall be so designed that it can be connected to the tap.

3.2 Method of mounting:-The units for domestic use shall facilitate wall-mounting or counter top ,under the sink installation etc.

3.3 Main components and installation

Reverse Osmosis Water purifier shall have the following components.

a) **Sediment filter /clarity filter**. An effective filtration system required to remove the suspended solids like fine particles from water and to remove the turbidity before R.O membrane treatment.
b) Filter or media for the removal of Chlorine and organic matter from water.
c) Reverse Osmosis membrane cartridge
d) Taste enhancer Media or/and carbon to improve the taste of R.O treated water
e) Booster pump
f) Reject water control valve or similar mechanism to control the water flow or/and pressure
g) Power supply
h) Auto shut-off mechanism to avoid over flow and protect the dry running of pump
i) Flushing mechanism

4. MATERIALS

4.1 Materials in contact with drinking water shall not impart levels of extractable contaminants that exceed the permissible level for various polymeric materials when tested as per IS 9845:1998.

4.2 Materials of construction

4.2.1 Those surfaces of the components of the purifier, which are expected to get wetted by the flow of water through the purifier, shall be made of corrosion–resistant materials or shall have corrosion–resistant treatment or coating of food grade quality. The coatings when applied shall not be soluble in water and shall not peel off at the maximum flow-velocity expected at the surface.

4.2.2 The materials used for construction of the filter chamber shall be pressure resistant to the extent of maximum pressure exerted by the booster pressure. All the material shall be non-leaching type up to the time duration, which is declared by the manufacturer.

4.2.3 All materials which are expected to get wetted by the flow of water through the purifier shall be of food grade material.

4.3 Membrane preservatives

The manufacturer shall declare the chemical preservative used in the membrane and flushing requirement etc in the user guide for consumer.

5. PERFORMANCE REQUIREMENTS

5.1 General

A R.O based POU water purifier system shall be so designed and constructed that its intended purpose is accomplished when installed and operated in accordance with the manufacturer's instructions.

5.2 Flow control

5.2.1 If the performance of a system or component is dependent on a specified flow rate, a pre-set flow control shall be provided as an integral part of the system to regulate the flow.

5. 3 Performance

5.3.1 *TDS reduction*

Reverse Osmosis drinking water treatment systems shall reduce the influent challenge level of maximum operating TDS ppm, recommended by manufacturer by at least 75 % or the output TDS shall be less than or equal to 500 mg/l as per the maximum desirable concentration specified in IS: 10500 when tested as per IS: 3025 (Part 16) . For testing,

the feed water shall have min 1500 mg/l of TDS; if the manufacturer's operating TDS is more than 1500 mg/l, the same shall be taken as input TDS for testing. The test water may be generated by adding sodium chloride in to demineralized water to adjust the maximum TDS level recommended by manufacturer. TDS analysis shall be done on product water, only after adequate flushing of the system is carried out as specified by manufacturer.

5.6.2 *Chemical Reduction*

The manufacturer shall declare on the product performance with regards to reduction capabilities of RO membrane for chemical pollutants namely, pesticides, Nitrate, Fluoride, Arsenic, Lead, Mercury etc. These tests shall be conducted as per Table No. 1. The manufacturer's claims shall be less than or equal to Maximum allowable product water level as shown in the Table No.1.

5.6.3 *Microbiological reduction*

When tested in accordance with Annex A, the RO unit shall deliver microbiologically safe drinking water.

5.7 PERCENT RECOVERY OF PURIFIED WATER AND DAILY PRODUCTION RATE CLAIMS

5.7.1 The minimum recovery shall equal to or more than 20%.

5.7.2 Recovery of purified water shall be tested at both the minimum and maximum points of the operating range as per manufacturer's specification range. The production rate shall be assessed after setting the recovery conditions by measuring the product volume (in liters) for 10 continuous minutes and dividing the volume in litres by 10. The tests shall be conducted when the unit and the input water have been conditioned at 27 ± 2 °C.

5.7.3 Daily production rate should not be less than 5 litres in an hour.

5.7.4 The manufacture shall declare the recovery TDS range of purified water and production rating along with input (feed TDS) and operating pressure.

Table No. 1

Claims for inorganic, organic chemicals and microbiological reduction shall be made for the specific contaminants shown in below table. To qualify for a specific contaminant reduction claim, the system shall reduce the level of the contaminant from the influent challenge to the specified limits.

Contaminant	Influent challenge level mg/l	Maximum allowable product water level mg/l	Method of testing
Arsenic (as Ag), mg/l, *Max*	0.30 ± 10%	0.01	IS: 3025 (part 37)
Cadmium (as Cd), mg/l, *Max*	0.03 ± 10%	0.003	IS:3025 (part 41)
Chromium (as Cr), mg/l, *Max*	0.30 ±10%	0.05	IS:3025 (part 52)
Copper (as Cu), mg/l, *Max*	3.00 ±10%	0.05	IS:3025 (part 42)
Fluoride(as F), mg/l, *Max*	8.00 ±10%	1.0	IS:3025 (part 60)
Lead (as Pb), mg/l, *Max*	0.15 ±10%	0.01	IS:3025 (part 47)
Mercury(as Hg), mg/l, *Max*	0.006 ±10%	0.002	IS:3025 (part 48)
Nitrate (as No_3), mg/l, *Max*	30.00 ±10%	10	IS:3025 (part 34)
Iron (as Fe), mg/l, *Max*	0.9 ±10%	0.3	IS:3025 (part 53)
Pesticides total µg/l, *Max*	0.03 of each pesticide	0.01 (of each pesticide) 0.05 (Total pesticides)	Table 5 of IS 10500 (Second revision)
E.Coli	10 7 / 100 ml	99.9999 % reduction	Table 6 of IS 10500 (Second revision)
MS2 (Viruses)	10 7 / 100 ml	99.99 % reduction	Clause 4.2 of 10500 (Second revision)
Cryptosporidium	5 X10 3/ 100 ml	99.9 % reduction	Clause 4.3 of 10500 (Second revision)
Giardia lamblia	5 X10 3/ 100 ml	99.9 % reduction	Clause 4.3 of 10500 (Second revision)
Uranium	To be decided later	To be decided later	

5.8 ELECTRICAL SAFETY

5.8.1 The entire electrical circuit shall be insulated from the water purifier, such that leakage current shall not be more than 210 µA when tested in accordance with IS: 302.

5.8.2 The electrical circuit shall also be capable of withstanding for 1 minute, a high voltage test at 1500 V rms between body and live parts, when tested in accordance with IS: 302.

5.8.3 All parts of metallic construction shall be permanently and reliably connected to an earthing termination within the purifier and shall be free of rough or sharp edges or other hazards that may cause injury to persons adjusting, servicing, or using the system.

5.9 POWER SUPPLY

5..9.1 The purifier requiring power up to 1 kW, as of those for domestic use shall be capable of working with a single-phase, 220± 10 V, 50 Hz, a.c. supply.

5.9.2 The purifier requiring power above 1 kW shall be capable of working with a three-phase, 415± 20 V, 50 Hz, a.c. supply.

5.10 HYDROSTATIC TEST

5.10.1 All the portions of the purifier through which the water passes shall be checked by hydrostatic test at pressure at 294.24 Kpa. The membrane cartridge and other accessories connected to the system from the booster pump discharge like pipes, fittings, instruments etc. up to the product discharge valve and reject discharge point to the booster shall be tested at least 1.5 times exerted by the maximum pressure exerted by the booster pump.

5.10.2 Leakage of the unit to be tested by closing the outlet of the purifier. There shall not be any leakage from any of the joints, bowls, connectors etc when the pressurized unit is held for 15 minutes. Initially, hydrostatic pressure to be raised slowly so that the required pressure is reached within 5 minutes.

5.10.3 The pressurization to be done only on the filters after the booster pump which is subjected to clogging. Pressurization of the unit shall be done in following manner:

a) From the Inlet port till the outlet port of the Filter prior to the pump at 196.16 Kpa pressure.
b) From the inlet port of the Pump till the outlet port of the Product water (from where product water falls into the storage tank

6.0 MAINTENANCE OF THE PRODUCT

6.1 This Reverse Osmosis system contains a replaceable treatment component critical for effective reduction of total dissolved solids. The product water shall be tested periodically to verify that the system is performing satisfactorily.

6.2 For all filtration components like sediment filter, activated carbon filter and RO membrane filter, manufacturer shall declare the maximum possible life in terms of litres of water, which can be processed through each filter. Factors affecting the performance of the filters shall be mentioned. All these information shall be provided in the user manual.

6.1.1 The manufacture shall give explicit instructions in the user manual and also on the product for cleaning and disinfecting of the storage tank by halogenated solutions (usually chlorine) or any other equivalent disinfectant . The recommended frequency shall also be mentioned in the user manual.

7. 0 MARKING

7.1 A name plate shall be fixed on the body of the purifier, at a conspicuous location. The nameplate shall be marked with the following details:
a) Brand name;
b) Production serial number;
c) Model name or code;
d) Maximum flow-rate in l/h
e) Recovery Rating
f) TDS reduction %
g) Supply voltage whether single or three-phase, frequency, volts and wattage

8.0 INSTRUCTION MANUAL

8.1 An instruction manual for the proper method of operation and use of the purifier shall be supplied along with the purifier. It shall also include the life and specification of all the filters/consumables.

9.0 CERTIFICATION MARKING:

9.1 The purifier may also be marked with the Standard Mark

The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made there under. The details of conditions, under which the license for the use of Standard Mark may be granted to manufactures or producers, may be obtained from the Bureau of Indian Standards.

10.0 PACKING:

10.1 The packing of purifiers shall be as agreed to between the purchaser and the manufacturer.

ANNEX A

SAMPLING PLAN FOR POU R.O WATER PURIFIER

Samples of Product water shall be collected after emptying the storage tank. Allow at least 1 lit of Product water to flow and collect sample.

Challenge. While collecting challenge test water care must be taken that the sampling point is just before the entry into the Product..

Before initiating any tests when the RO membrane is new, follow manufacturer's instruction for Flushing. Use Challenge water for this purpose.

Conduct TDS reduction tests, Microbiological tests, Pesticide reduction tests and all other Chemical tests to be done on 4 different membranes independently. Make sure metallic solutions do not precipitate while preparing Challenge water. Testing Laboratories shall standardize the sequence of addition of these metals into Challenge water to avoid precipitation

TDS reduction, Daily production rate, recovery rating and efficiency rating

Two systems shall be conditioned in accordance with the manufacturer's instruction using test waters specified in the above table. The system shall be tested using the appropriate influent challenge water at the minmum and maximum input water pressure priscribed by the manufacture . Pre and post membrane filter shall not be removed prior to testing.

SAMPLING FREQUENCY

System / Components Operating and Sampling Plan

Systems	**No of Units / pressure**	**Sampling**
System with storage tank and automatic shut – off	2 units One at Minimum pressure One at Maximum pressure prescribed by Manufacturer	Day 1 (4 hr and 12hr) Day 2 to 4 5% of the first days production rate every 6 hr Day 5 and 6 rest under pressure Day 7 /144hr and 4 hr
Counter top systems with storage tanks or reservoir	2 units One at Minimum pressure One at	Day 1 (4 hr and 12hr) Day 2 to 4 5% of the first days production rate every 6 hr Day 5 and 6 rest under pressure Day 7 /144hr and 4 hr

	Maximum pressure prescribed by Manufacturer	
Systems without storage Tank	2 units One at Minimum pressure One at Maximum pressure prescribed by Manufacturer	Day 1 (4 hr and 12hr) Day 2 to 4 5% of the first days production rate every 6 hr Day 5 and 6 rest under pressure Day 7 /144hr and 4 hr
System with no shut off provisions	2 units One at Minimum pressure One at Maximum pressure prescribed by Manufacturer	Day 1 (4, 8, 12 and 16 hr) Day 2 to 4 5% of the first days production rate every 6 hr Day 5 and 6 rest under pressure Day 7 /144hr and 4 hr

Sampling is done after running for 15 min.

TEST -1
TDS REDUCTION TESTS FOR POU R.O WATER PURIFIER

Application:

This method is applicable for the TDS reduction. R.O drinking water treatment system shall reduce the influent challenge level 1500 ± 100 mg/l TDS (or the manufacturer's maximum TDS claim) by at least 75 % or the output TDS shall be less than or equal to 500 mg/l as per the maximum desirable TDS concentration specified in IS: 10500.

Analyses:
All analyses shall be conducted in accordance methods referenced in IS: 3025 (Part 16).

TDS REDUCTION TEST WATER
Chlorine free deionized water shall be used with the following specific characteristic maintains throughout the test reduction claims.

Turbidity	≤ 1NTU
pH	7.5 ± 0.5
Temperature	27± 2°C
Conductivity	1 microsiemen

Sodium chloride shall be added to the test water to achieve a challenge concentration of 1500 ± 100 mg/L TDS.

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TDS reduction, Daily production rate, recovery rating and efficiency rating

Two systems shall be conditioned in accordance with the manufacturer's instruction using test waters specified in the above table. The system shall be tested using the appropriate influent challenge water at the minimum and maximum input water pressure prescribed by the manufacture. Pre and post membrane filter shall not be removed prior to testing.

TEST -2

INORGANIC REDUCTION TEST FOR POU R.O WATER PURIFIER

Application

This method applicable for inorganic chemical reduction which can be used for the specific contaminants such as arsenic, cadmium chromium, copper, mercury, lead and selenium.

Analyte:

All analysis shall be conducted in accordance with the IS Standards mentioned in Table-1

Inorganic Chemical Reduction Test Water Chlorine free deionized water shall be used with the following specific characteristic maintains throughout the test reduction claims.

Turbidity	≤ 1NTU
pH	7.5 ± 0.5
Temperature	27± 2°C
Conductivity	1 microsiemen

Sodium chloride shall be added to the test water to achieve a challenge concentration of 1500 ± 100 mg/L TDS.

Summary of Method:
To check the specific contaminants reduction claim, the system shall reduce the level of the contaminants from the influent challenge level so the arithmetic mean of all product water sample result 90% of the individual water samples is less than or equal to the maximum allowable product water concentration.

TEST -3
NITRATE / NITRITE REDUCTION FOR POU R.O WATER PURIFIER

Application:

This method applicable for nitrite and nitrate reduction claim. To qualify for the nitrate /nitrite reduction claim, the system shall reduce the level of the contaminants from the influent challenge level so that the arithmetic mean of all product water sample is less than or equal to the maximum allowable product water concentration .

Analysis Method:

Analysis shall be in accordance with the IS standards mentioned in Table -1.

Test Procedure:

Contaminant Reduction Requirements:

Contaminants	**Individual Influent 1 Sample Point limits mg/L**	**Average Influent challenge level mg/L**	**Maximum allowable product water level mg/L**	**Compounds**
Nitrate plus/ nitrite (as N)*	30.0± 20 %	30.0 ± 10 %(added as 27 mg/ L NO_3 and 3 mg/ L NO_2	10.0	$NaNO_3$/ $NaNO_2$

Test Water specification

Chlorine free deionized water shall be used with the following specific characteristic maintains throughout the test reduction claims.

Turbidity	≤ 1NTU
pH	7.5 ± 0.5
Temperature	27± 2°C
Conductivity	1 microsiemen

Sodium chloride shall be added to the test water to achieve a challenge concentration of 1500 ± 100 mg/L TDS.

For Preparing Challenge Water Add Solution as Follows

Test Parameter	**Influent Challenge Concentration**	**Material AR Grade**	**Quality / L sock Solution**	**Quantity / 100 L challenge Water**
Nitrate	30mg/ L (27 mg/L as $NaNO_3$ and 3 mg /L as NO_2	Na NO_3 &	1.37 gr /L gives 1000ppm	Add 2.7 lit /100 L of challenge water

TEST -4
TURBIDITY REDUCTION (ORGANIC AND INORGANIC SOLIDS TEST) POU R.O WATER PURIFIER

Application:
This method is applicable for mechanical filtration claims The system shall reduce the influent challenge level of 15± 2 NTU to not more than 5 NTU. This level of turbidity shall be maintained to all sampling points during rest.

Analytic method:
All analysis shall be in accordance with the applicable methods referred in IS: 3025 part 10.

Apparatus:
- Nephlometric turbidity meter

Test Procedure:
Chlorine free deionized water shall be used with the following specific characteristic maintains throughout the test reduction claims.

Turbidity	≤ 1NTU
pH	7.5 ± 0.5
Temperature	27± 2°C
Conductivity	1 microsiemen

Sodium chloride shall be added to the test water to achieve a challenge concentration of 1500 ± 100 mg/L TDS.

Influent Challenge:

The fine grade standardizes test dust that meet SAE J 726 specifications shall be used. The test dust shall have a nominal size classification of 0-5 micrometer and shall have 96% of its particle with in the 0- 5 micrometer range and 20% to 40% of its particle greater than 2.5 micrometer.

TEST-5

MICROBIOLOGICAL TEST FOR POU R.O WATER PURIFIER

A-1 The water purifier must eliminate all types of water borne disease causing microorganisms from the water. The test shall be performance-based utilizing realistic worst case challenge organism and test conditions and the effluent water quality shall be equivalent to that of a public water supply meeting the microbiological requirements and the intent of the national primary drinking water regulations.

A-2 CHALLENGE ORGANISM

Selected Standard challenge organism shall be Escherichia Coli (whichever strain is available with Premier culture collection centers in India)

A 2.1 Colony Characteristics on M Endo - Agar

Typical round, dark colonies with green metallic sheen.

A 2.2 Culture Media

Nutrient Broth	
Peptone	5.0 g
NaCI	5.0 g
Beef extract	1.5 g
Yeast extracts	1.5 g
Reagent grade Water	1000 ml
Final pH (25°C)	7.4 ± 0.2

A.2.3 Growth Medium

M Endo Agar	Grams/liter
Casein enzymatic hydrolysate :	3.7
Peptic digest	3.7
Tryptose	7.5
Yeast Extract	1.2
Lactose	9.4
Mono Potassium Phosphate	3.3
Di Potassium Phosphate	1.0
Sodium Chloride	3.7
Sodium Desoxycholate	0.1
Sodium Lauryl Sulpaht	0.05
Sodium Sulphite	1.6
Basic Fuchsin	0.8
Agar	15
pH	7.2± 0.2

A.2.3.1 Gram's Staining Reagents

Grams iodine, crystal violet solution, saffranin solution, ethyl alcohol.

A-3 PREPARATION

A- 3.1 Inoculums Preparation

Using an inoculating needle transfer the pure culture into a sterile and cooled nutrient broth culture tube (10 ml) and incubate at 37 ± 0.5°C for 24 h.

A- 3.2 Dilution Water

Dechlorinated sterile tap water shall be used for preparation of dilution water.

A- 3.3 Test Water

Spike 5 l of dilution water with 1 ml of E.Coli cell suspension (broth culture). This test water should produce a count of at least 2.0 x 10 5 CFU/ml otherwise count can easily be standardized by few preliminary tests. The test water shall be used as influent water and shall have following characteristics.

a) Turbidity ≤ 1 NTU,
b) PH value 6.5 to 8.5,
c) Temperature 27 ± 2° C

A-4 TEST PROCEDURE FOR SAMPLING

Pass the test water through the RO system (while it is 'ON')

A. 5 MEMBRANE FILTRATION, PLATING AND INCUBATION

A-5.1 Output / Effluent sample

Using MF technique filter 100 ml of each sample through 0.45 µ membrane filter. Keep membrane on to an M Endo agar plate and incubate at 37 ±0.5°C for 24 h.

A-5.2 Input / influent sample

Subject 1 ml input sample to serial dilution (10-4, 10-5). Using pour plating technique take 1 ml of each dilution and plate it on to M Endo agar medium. Input sample shall also be analyzed in duplicate. Incubate the plates at 37 ±0.5°C for 24 h

A-7 VERIFICATION AND COLONY COUNT

Observe the plates after the incubation period. E.Coli colonies on M Endo agar will be with definite round & dark colonies with Green Metallic sheen Count the colonies in influent and effluent sample plates using a colony counter. Pickup typical colonies make a suspension and carryout Gram staining and observe under the microscope test protocol. Gram negative short rods measuring about 0.5 µ m in diameter occurring singly conforms to E.Coli

A-8 RESULTS AND COMPUTATION

A- 8.1 Disinfection efficiency shall be calculated using the following formulae:

$$\text{Percent disinfection} = \frac{\text{Input CFU/100 ml} - \text{Output CFU / 100ml}}{\text{Input CFU / 100ml}} \times 100$$

A- 8.2 The device shall pass the following disinfection level:

Organism	Influent challenge	Effluent % Reduction	Minimum log reduction
E.Coli	10 7 / 100 ml	99.9999	6 / 100 ml

TEST-6.
CYST REDUCTION TEST FOR POU R.O WATER PURIFIER

Application:
This method applicable for cyst reduction claim. The system shall reduce the number of 3 – 4 micrometer particle form an influent challenge level of at least 50,000 (5×10^4). Particle per millimeter by at least 99.95%.

Analytic Method:
Standard particle counting technique from particle counter manufacturers shall be used for cyst reduction test. Post membrane shall be removed prior to testing.

Apparatus:
- Standard particle counter or Haemocytometer

Test water:

Use deionized water with 2 < microsiemen /cm conductivity shall be used.

Influent Challenge

Fine dust or latex beads shall be used to influent challenge water to achieve at least 50,000($5x\ 10^4$) particle per millimeter of 3 – 4 µm diameter**.**

TEST- 6

MATERIAL EXTRACTION FOR POU R.O WATER PURIFIER

Application

To evaluate the concentration of the extractable contaminants from the material in contact with drinking water

Apparatus:

- GC – MS
- Ion selective Electrode
- ICP or AAS – GF

Test Procedure: as per IS 9845:1998

Exposure of System or Components

- The system can be installed flushed and conditioned as per the instruction.
- If incase the instructions are not available system can be operated by closing the out let until the storage tank is full.
- Incase on components it can be flushed with one unit volume using the exposure water at an initial inlet static pressure of 340 Kpa (50 psig or 3.40 kg/cm^2).
- Sufficient components or systems shall be exposed to provide the required volume for analysis.

Test water Specification (Exposure Water):

- TDS : 50 ±5 mg/l
- pH : 6.75± 0.25
- Temperature : 27 ± 2 °C

Exposure Procedure:

- As per the manufacturers instruction flush and condition system or components (inlet pressure as per manufacturer specification)
- Fill with exposure water and maintain for 24 hrs at 27 ± 2°C and 2Lof sample can be collected for analysis.
- According to the manufacturer instruction the system or component can be flushed refilled and maintained for another 24hrs at 27 ± 2 °C & 2L sample can be collected again for analysis
- The above said process can be repeated to give a total of three 24 h exposure and 2L sample.
- Combine all the 3 samples and analyze all the contaminants for exposure water & extractant water as per IS standards

Passing Criteria of the Product: Membrane Preservatives

- After the system installation and flushing process, we must carry out the membrane preservative test, where the membrane preservative shall not be present in the product water at a level of toxicological significance.