



Non-Electric Storage Purity Not Guaranteed in All Brands

A water purifier is meant to remove the most common impurities found in drinking water including bacteria, chlorine, heavy metals (such as mercury, copper, and lead), pesticides and herbicides. There is no overstating the importance of choosing a suitable water purifier and the various safety issues that accompany it. Lower initial costs, reasonably good performance and overall convenience have ensured that the non-electric storage-type, chemical-based water purifiers remain a popular choice, despite factors such as varying degrees of efficiency in terms of output water, cost of refill/cartridge and annual maintenance support. It was time for *Consumer Voice* to assess the cost–utility–effectiveness parameters of these vital fixtures in today's homes.

A Consumer Voice Report

Based on the regular selling brands across the country, we conducted comparative testing (CT) of 10 popular brands of non-electric storage water purifiers. We developed the test programme including some key tests as per the guidelines based on relevant Bureau of Indian Standards. The testing was conducted as per standard test methods and also as per the

claims of the brands and other related requirements applicable to the product for testing. Apart from the essential general efficiency and chemical tests, the purifiers underwent two critical tests for turbidity and E. coli to judge them on physical and microbial safety. All types of water purifiers are expected to effectively remove the physical and microbial impurities/contaminations from the input challenge water so

that users are assured of safe and potable drinking water during the rated life/effectiveness period. The designated test laboratory conducted the various tests on masked and coded samples.

Bureau of Indian Standards has laid down specifications for ceramic water filter candles for drinking water vide IS: 7402 – 1986 (amended from time to time). These filters remove suspended matters and bacteria but are not expected to filter dissolved solids or chemicals. Note that interpretation of results is based on IS: 10500 specification for drinking water.

These days there are various other categories of water filters/purifiers that incorporate latest technologies of UV (ultra violet) and R/O (reverse osmoses), whereby a large number of impurities and undesirable minerals, solids and other permanent impurities can be removed, particularly by R/O system. Bureau of Indian Standards had some years back introduced the Indian standard for water purifiers incorporating UV technique in IS: 14724: 1999.

CV Recommendation | Top Performer

Pure It

Value for Money

Aqua Sure



BRANDS TESTED

Rank	Total Score out of 100 (Rounded off)	Brand	Model	Manufactured/Marketed by	MRP/Retail Price (Rs)
1	94	Pure It	Pure It Advance	Hindustan Unilever Limited	2,800/2,489
2	90	Aqua Sure	Extra Tuff	Eureka Forbes Ltd	1,899/1,688
3	89	Kent	Kent Gold	Kent R.O. Systems Ltd	2,795/2,484
4	86	Tata Swach	Silver Nano Technology	Tata Chemicals Ltd	1,499/1,332
5	85	Zero B	Suraksha Plus	ION Exchange (India) Ltd	2,090/1,858
6	83	Bajaj	XTP 21	Bajaj Electricals Ltd	1,999/1,777
7	82	Usha Brita	Shriram Brita SF 620	Usha Shriram Brita Pvt. Ltd	2,499/2,221
8	81	Aqua Fresh	Water Pot	Ishmeet Traders	N.P./1,600
9	77	Crystal	Everpure	Ishmeet Traders	2,795/1,778
10	76	Unitex	Water pot	Ishmeet Traders	N.P./1,778

Rating: *****very good (>90), ****good (71–90), ***average (51–70), **poor (31–50), *very poor (up to 30)

N.P. – not provided

KEY FINDINGS

- Pure It emerges as top performer, followed by Aqua Sure and Kent Gold.
- Aqua Sure is the value-for-money brand.
- Only Pure It, Aqua Sure and Unitex were able to reduce E. coli up to 100 per cent when tested at different intervals.
- Only Pure It was able to reduce MS2 virus up to 100 per cent. Rest all reduced it between 90 per cent and 99.99 per cent.
- None of the brands completely removed heavy metals such as arsenic. The reduction was found between 9.4 per cent and 93.05 per cent. In any case, only a few brands claim to do so.
- Pesticide was reduced by 28 per cent in Aqua Fresh, by 8 per cent Bajaj, and by 70 per cent Tata Swach. All other brands removed pesticide (such as lindane) up to 100 per cent from input water.
- All the brands were able to reduce the turbidity up to an acceptable level (desirable to be below 1 NTU as against 25 NTU in input water).
- Filtration rate was found highest in Unitex and Kent Gold.
- Refill cartridges are easily available at retail shops.

TEST RESULTS

FOR KEY TEST PARAMETERS

MS2 virus test | Microbiological test (TPC) |
Pesticide (lindane) | Heavy metal (arsenic) |
Residual chlorine

◆ MS2 virus test

A virus is a small infectious agent that replicates only inside the living cells of other organisms. Viruses can infect all types of life forms, from animals and plants to bacteria. Based on the recent requirement of drinking water specification (IS 10500), MS2 virus was considered for testing and spiked in input water. The output sample was then tested to check the virus removal efficiency of the purifiers.

- Most of the tested brands reduced the percentage of MS2 virus by more than 99 per cent. Brand Pure It removed it completely. Unitex reduced it by only 90 per cent, which is not desirable in output drinking water of a purifier.

◆ Microbiological test (TPC)

The presence of bacteria and pathogenic (disease-causing) organisms is a concern when considering the safety of drinking water. Total plate count (non-pathogenic) was checked to judge the efficiency of the purifiers in the output water. The main test to judge the microbiological efficacy was conducted in the endurance test at defined/regular intervals.

- Except for Pure It and Usha Brita, none of the brands completely removed the microbes from input water. However, the level of TPC was in the range of 4–18, which is not high and is non-pathogenic.

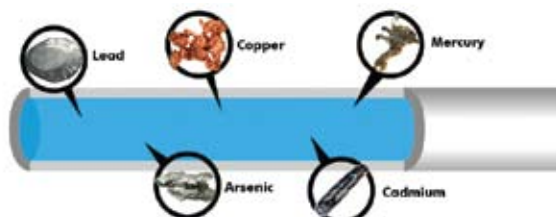
Brand	Total Plate Count (TPC)	
	Input Water	Output Water
Pure It	160	Nil
Usha Brita	160	Nil
Unitex	160	4
Zero B	160	5
Kent Gold	160	8
Bajaj	160	9
Aqua Fresh	160	10
Aqua Sure	160	14
Crystal	160	16
Tata Swach	160	18

◆ Pesticide (lindane)

This test was conducted keeping in view the pesticides coming into various potable water sources, viz. groundwater, rainwater, streams, etc. We had noted that some brands claimed to be effective in removing pesticides. The pesticide lindane was added

in input water in 0.5 ppm concentration. Output water was tested for the residues of added pesticide.

- Most of the brands removed the pesticide.
- Bajaj purifier could remove by 8 per cent only.



◆ Heavy metal (arsenic)

As per the national standard, toxic substances like mercury, cadmium, arsenic, cyanide, lead, chromium and nickel should not be present in drinking water. Some of the brands tested also claimed removal of heavy metals. To examine efficiency in removing heavy metals, we used arsenic as input and tested the brands for its presence in the output water.

- None of the brands of water purifier was able to completely remove the heavy metal used for the test – that is, arsenic.

◆ Residual chlorine

The presence of chlorine residue in drinking water indicates that a sufficient amount of chlorine was added initially to the water to inactivate the bacteria and some viruses that cause diarrhoea, as well as to ensure that the water was protected from recontamination. The residues of chlorine must be

absent in the output water of water purifiers. Chlorine of 2 ppm concentration was added in input water and output sample was collected from the purifier.

- Chlorine was not detected in any of the brands.

Chlorine is actually added in drinking water in order to disinfect it and prevent the transmission of waterborne diseases, but it can also be easily perceived in the taste and smell of the water and its own disinfection by-products are a matter of concern.



CHEMICAL, VIRUS AND MICROBIOLOGICAL TEST SCORES

	Weigh- htage	Pure It	Zero B	Aqua Sure	Kent Gold	Crystal	Usha Brita	Aqua fresh	Bajaj	Tata Swach	Unitex
Chemical tests	32	30.98	30.53	29.39	29.01	28.88	26.82	25.27	24.31	24.31	23.1
Residual chlorine	2	2	2	2	2	2	2	2	2	2	2
Heavy metal (arsenic)	6	4.98	5.51	5.16	5.53	4.10	5.17	2.28	1.77	2.36	4.86
Pesticide (lindane)	6	6.0	6.0	6.0	6.0	6.0	6.0	3.84	3.24	5.1	6.0
MS2 virus test	12	12	11.4	11.28	10.08	11.98	7.65	11.90	11.98	10.2	4.8
Microbiological test (TPC)	6	6	5.62	4.95	5.4	4.8	6	5.25	5.32	4.65	5.7

Comparative Test

FOR ENDURANCE

E. coli | Turbidity



◆ E. coli

Microbiological contamination of water has long been a concern of the public. Many infectious microorganisms found in the environment – including shigella, escherichia coli, salmonella, s. aureus, yeast and mould – can cause symptoms such as nausea, vomiting, diarrhoea and stomach cramps. While



conducting this test, E. coli was spiked in the input challenge water at regular intervals of 300, 600, 900 and 1,200 litres of various concentrations. Spiking level was kept higher to check efficacy of the product in worst/adverse conditions. The output water was tested to check the efficacy of the filter.

Brand	Score out of 20
Pure It	20
Aqua Sure	20
Unitex	20
Crystal	19.61
Bajaj	19.51
Kent Gold	19.49
Aqua Fresh	19.31
Usha Brita	19.24
Tata Swach	19.21
Zero B	18.34

◆ Turbidity

This refers to the amount of dissolved solid particles that are suspected to be in water and that cause light rays shining through the water to scatter. Thus, turbidity makes the water cloudy or even opaque in extreme cases. The turbidity of drinking water should not be more than 3 NTU and ideally be below 1 NTU. This is a key quality indicator for a water filter/purifier and the test was conducted as per the requirements of IS: 7402.

- All the brands of water purifiers were able to remove turbidity to a level that makes it safe and suitable for drinking.

ENDURANCE SCORES

	Weightage	Unitex	Pure It	Tata Swach	Aqua Fresh	Aqua Sure	Crystal	Kent Gold	Bajaj	Usha Brita	Zero B
Endurance tests	32	30.77	30.38	29.95	29.93	29.51	28.67	28.52	28.24	28	27.88
E. coli	20	20	20	19.21	19.31	20	19.61	19.49	19.51	19.24	18.34
Turbidity	12	10.77	10.38	10.74	10.62	9.51	9.06	9.03	8.73	8.76	9.54

FOR PHYSICAL PARAMETERS

Capacity | Rate of filtration | Suspended particles
| Sensory test

◆ Capacity

Storage-type water purifier has generally two storage containers: one is the upper level through which water stored to be purified and collected in the bottom container.

- Capacity of upper and lower containers of water purifiers was close to their claimed values.



◆ Rate of filtration

It is the quantity of purified water released from the purifier in a particular time period. The more the filtration rate, the higher the output of water from the purifier.

- Highest filtration rate was found in Unitex, followed by Kent and Usha Brita; it was lowest in Crystal.

Brand	Result (litre/hour)
Unitex	8.30
Kent Gold	4.82
Usha Brita	4.41
Aqua Fresh	3.9
Tata Swach	3.8
Pure It	3.24
Aqua Sure	2.4
Bajaj	1.25
Zero B	0.825
Crystal	0.730

◆ Sensory panel test

It was conducted to judge the sensory attributes of output water for all the brands.

- Except Zero B, all the other brands were quite acceptable.



PHYSICAL TEST SCORES

	Weightage	Usha Brita	Aqua Fresh	Pure It	Tata Swach	Aqua Sure	Bajaj	Unitex	Kent Gold	Crystal	Zero B
Physical tests	18	15.66	15.59	15.23	15.18	15.04	14.67	14	15.75	11.78	11.85
Capacity	4	3.58	3.72	3.65	3.56	3.82	3.94	1.1	3.69	1.27	3.5
Rate of filtration	5	3.88	3.67	3.38	3.62	3.02	2.53	5.0	4.06	2.31	2.35
Suspended particles	3	3	3	3	3	3	3	3	3	3	3
Sensory test	6	5.2	5.2	5.2	5.0	5.2	5.2	4.9	5.0	5.2	3.0

FOR GENERAL PARAMETERS

Packaging | Marking | User manual | Workmanship and finish | Convenience

◆ Packaging

As per the national standard, packing of purifier shall be robust to ensure adequate protection from transportation damage.

- All the brands were found to be suitably packed.

◆ Marking

The water purifier shall be marked with details like brand name, production serial number, name and address of the manufacturer, manufacturing date and MRP.

- Crystal and Unitex were found deficient in providing most of the information. Manufactured/Marketed by information was not mentioned.



◆ User manual

The user manual was checked for installation, maintenance and cleaning instruction, operation instruction, warranty, technical specifications and dual language.

- Pure It, Aqua Sure, Bajaj and Tata Swach have given all the required information.
- Crystal, Usha and Unitex have not given the required information.

◆ Workmanship and finish

A five-member panel gave ratings on this aspect.

- All the tested brands have good to excellent workmanship and finish.

◆ Convenience

Panel members looked for how convenient the product was in terms of installation, cleaning of filter cartridge and their replacement.

The convenience factor varies from convenient to very convenient.



After-Sales Service

The *Consumer Voice* team checked out the after-sales service of most of the brands being tested – namely Crystal, Unitex, Usha Brita, Kent Gold, Aqua Fresh, Aqua Sure and Pure It. A formal complaint was lodged with the respective manufacturers. Kent, Usha, Aqua Sure and Pure It resolved the issues within two days of lodging complaint. Since Crystal, Aqua Fresh and Unitex had not mentioned any manufacturer/marketer detail, the complaint was lodged with their distributor/dealer and it took more than a week to resolve the problem, and that too after many follow-ups.

While buying water purifiers, consumers are advised to look for manufacture or marketer contact details for after-sales service.

Based on the overall test results, it is concluded that chemical-based water purifiers gives us clear and almost safe drinking water where the quality of tap/ground water is not dependable. This type of purifiers does not claim removal of heavy metals and pesticides; however, when tested, the heavy metal reduction was found to be around 9.4 per cent to 93 per cent and pesticides reduction was between 30 per cent and 100 per cent. The removal of bacteria (such as *E. Coli*) was between 99 per cent and 100 per cent, and virus reduction was between 90 per cent and 100 per cent.

These purifiers may be recommended for rural and town areas where electricity and affordability is

a major concern. The cost of product ranges from Rs 1,300 to Rs 2,500 and the low operating cost makes a huge difference in comparison to other purifiers (R/O and UV systems). The R/O system is recommended where total dissolved solid (TDS) is higher and the UV system where TDS is on the lower side.

Non-electric storage water purifiers require regular maintenance and cleaning of filters, and change of cartridge within 15 days/30 days; so care is required for these to work efficiently (must read user manual). Lastly, only go for those purifiers that mention their 'manufactured/marketed by' details on the packaging so that you can get service on your doorstep and on time.



Comparative Test



WATER PURIFIERS:

Brand → Claims/Features ↓	Pure It	Aqua Sure	Tata Swach	Kent Gold	
Purification capacity (litres)/cartridge	1,500	1,500	3,000	4,000	
Cleaning of filter	When to clean is not explained/ only procedure is provided	Sediment filter, particulate filter and carbon filter in 15 days	Top mesh once a week Bottom mesh in one month	Sediment and carbon filter in 30 days	
Replacement of filter	Red indication shows change of germ-kill kit	Replace cartridge after 1,500 litres	3,000 litres or 6 months	Sediment filter 3 months Carbon filter 6 months UF membrane 12 months	
Removal of cysts and bacteria	1 crore virus in 1 litre of water	Bacteria and viruses	100 crore bacteria and 1 crore virus	Yes, cyst removal 99.99%	
Heavy metals and pesticides	Removes harmful pesticides	No	No	No	
Additional features/claims	Advanced auto shut-off system, after the life end of cartridge	Toughened body, double storage capacity	Auto shut-off mechanism that shuts off water flow when purifying power is over	Tank made of unbreakable food-grade material. No chemicals used (chlorine, bromine, etc.)	



CLAIMS/FEATURES

	Bajaj	Aqua Fresh	Usha Brita	Zero B	Crystal
	1,500	4,200	1,500	3,000	N.P.
	N.P.	Sediment and carbon filter in 15 days, UF membrane backwashed in 15 days	Not given	Once in a week	N.P.
	Red band visual indicator (shows life end of cartridge)	Sediment filter 3 months Carbon filter 6 months UF membrane 12 months	6 months	3,000 litres/6 months	N.P.
	Bacteria removal 3 log Virus removal 3 log Cyst removal 3 log	Yes	Yes	Yes	Removes bacteria
	No	No	No	No	Removes heavy metals
	Cartridge replacement with lock system	No boiling and electricity. Germ-free		No electricity	Blends 19 natural raw materials

Comparative Test

Responses of Manufacturers

As a matter of policy, before publication the test results of the brands tested are shared with their respective manufacturers/marketers, inviting their views/comments. We reproduce here the reactions:

Brand	Manufacturer's/marketer' comment	VOICE Society's Reply
Kent Gold	i) E. coli percentage reduction tested after spiking to 27×10^8 (2700×10^6) Cfu/ml. As per IS 10500:2012, spiking level should be up to 10×10^6 . This is a very high level of spiking and will reduce percentage reduction ii) Query on capacity of purifier	i) There was no specific standard and spiking level for E. coli testing was based on claims made by some prominent manufacturers. Spiking level was kept on higher side to check efficacy of the product in worst/adverse conditions ii) Verified and replied
Aqua Sure	i) Total plate count (TPC) is 14, which is not a concern, but we suggest you consider removing it from the list to avoid confusion ii) The taste rating is less and so is the turbidity reduction. Request you to test again	i) Test was conducted keeping in view users' concern. However, the results obtained are not high. We will take care while reporting ii) The score assigned was based on panel members' observation. Test was already conducted at four intervals
Bajaj	i) Queries on rate of filtration, standard followed, etc. ii) We are not claiming removal of pesticides and heavy metals	i) Verified and responded ii) Some brands claimed to do so and hence we checked if others could also reduce these
Pure It	Observed significant differences with respect to the flow rate in the results from our lab tests	Flow rate was measured in lab at an initial stage, with same method for all the brands tested
Crystal, Aqua Fresh, Unitex	Is there any scope to further improve the quality of the product?	After-sales service is important to users to build confidence in product

