

WHO International Scheme to Evaluate Household Water Treatment Technologies

Nazava Water Filter

Product evaluation report

WHO performance classification	Targeted protection (bacteria and protozoa only) One-star (★)
Manufacturer	PT Holland for Water JI Kolonel Masturi 345 Cipageran, Cimahi Utara 40511 Cimahi West Java Republic of Indonesia www.nazava.com
Evaluation procedure	Abbreviated laboratory testing
WHO report issue date	Round II, 2018
WHO reference number	20/07/2015-R2-9

Summary of evaluation

This report summarizes the results of laboratory testing of a ceramic filtration device known by the tradename 'Nazava Water Filter', under Round II of the World Health Organization (WHO) International Scheme to Evaluate Household Water Treatment Technologies (the Scheme). Testing followed the requirements of the WHO protocol for batch filtration technologies. Testing investigated the ability of the device to remove bacteria and viruses. Reduction against protozoa was assigned based on the mean bacterial reduction achieved. Based on the evaluation results, the Nazava Water Filter meets WHO performance criteria and is classified as providing one-star (★) *Targeted protection* against bacteria and protozoa only.

Background

Evaluation under the Scheme is based on performance criteria set out in *Evaluating Household Water Treatment Options: Health-based targets and microbiological performance specifications* (WHO, 2011). The criteria were determined by applying quantitative microbial risk assessment methods outlined in the WHO *Guidelines for Drinking-water Quality* (2017) and set out log₁₀ reduction targets against bacteria, viruses and protozoa, as shown in the table below.

WHO performance criteria for household water treatment technologies

Performance classification	Bacteria (log ₁₀ reduction required)	Viruses (log ₁₀ reduction required)	Protozoa (log ₁₀ reduction required)	Interpretation (with correct and consistent use)
★ ★ ★	≥ 4	≥ 5	≥ 4	Comprehensive protection
★ ★	≥ 2	≥ 3	≥ 2	
★	Meets at least 2-star (★ ★) criteria for two classes of pathogens			Targeted protection
—	Fails to meet criteria for 1-star (★)			Little or no protection

Product description

The Nazava Water Filter is a ceramic candle filter that is impregnated with silver. Microorganisms are physically removed from water as it filters through the ceramic candle under gravity. The ceramic candle also contains active carbon to remove taste and odour from water. The assembled filter set comprises two 13.5-litre buckets stacked on top of each other; these buckets serve as receptacles for raw and filtered water. The ceramic candle is screwed to the bottom of the raw water bucket. Water is filtered through the ceramic candle and into the clean water bucket. The full product description, illustrations and use instructions can be found at: www.nazava.com.

Test methods

Product-specific test plan: A product-specific test plan was developed based on the manufacturer’s instructions for use; the WHO Scheme Harmonized Testing Protocol: Technology Non-Specific V 2.0 (June 2018); and the technology test plan for Gravity-fed Batch Filtration Technologies V 2.0. Testing was conducted at a WHO designated laboratory, NSF International, in the United States.

Test organisms: Evaluation of the Nazava Water Filter investigated its performance in reducing bacteria and viruses. The test organisms were *Escherichia coli* (*E. coli*) and bacteriophages MS2 and phiX174. Based on the available evidence on filtration primarily by size exclusion and removal of protozoan cysts, testing against this microbial group was not conducted (WHO, 2018). Protozoan reduction is assigned based on the mean bacterial reduction achieved.

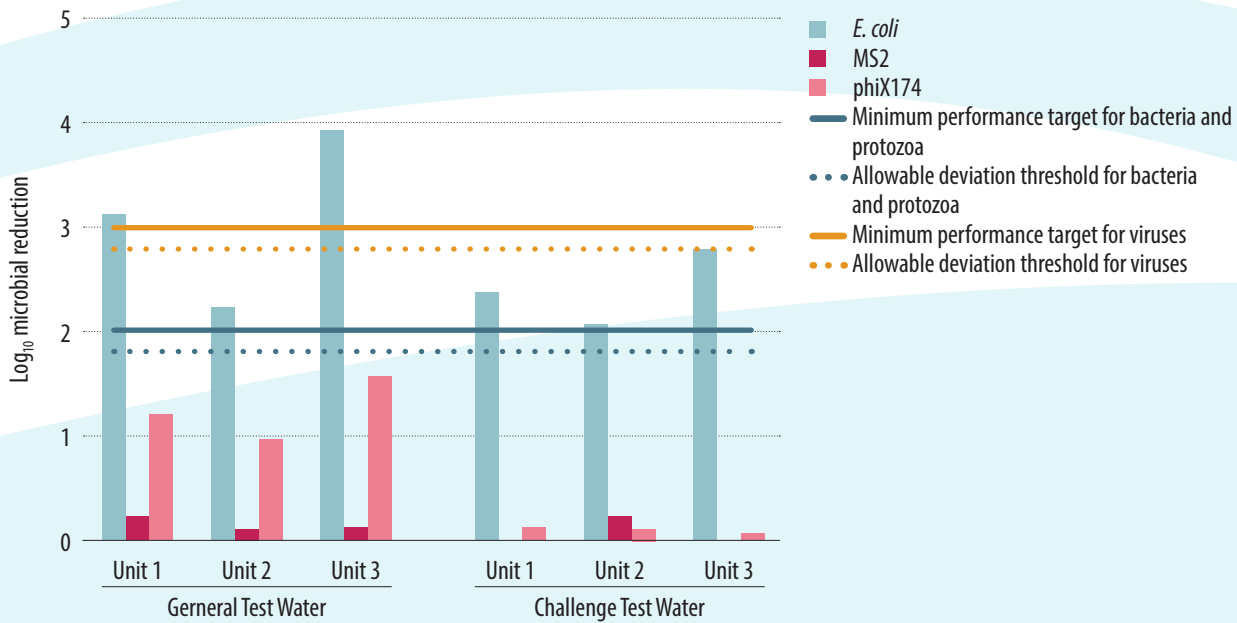
Test waters: The device was tested in two simulated natural waters: General Test Water (GTW), simulating high quality groundwater, and Challenge Test Water (CTW), simulating surface water. Refer to the technology test plan for Gravity-fed Batch Filtration Technologies V 2.0 for details on physicochemical characteristics of the test waters.

Test set up: Three production units were used in the test, with daily test volumes of 13 L. All units were operated according to the manufacturer’s use instructions. Pretreatment and posttreatment water grab samples were analysed using methods identified in the product-specific test plan. Testing was conducted over four days (GTW on Days 1 and 2; CTW on Days 3 and 4), resulting in a total of 12 sample points for each organism (i.e. 2 days x 2 test waters x 3 test units). Posttreatment silver residual samples were collected and analysed.

Results

The figure below presents the results of the bacterial and viral testing for the three units in GTW and CTW. All test water characteristics were within specifications.

Performance across test units¹



The Nazava Water Filter achieved mean log₁₀ reductions of 2.7 for *E. coli*; 0.1 for MS2; and 0.7 for phiX174. Performance across the three test units was generally consistent for all organisms tested and in both test waters.

Posttreatment residual silver concentrations ranged from 0.015 to 0.035 mg/L, below the tolerable limit of 0.1 mg/L (WHO, 2017).

Interpretation and application of results

Performance is classified in three ascending tiers of performance: ★ (one-star); ★★ (two-star); and ★★★ (three-star), as shown in Table 1. Both three- and two-star products are classified as providing *Comprehensive protection* against all three microbial groups. One-star products are those that meet performance targets for only two of the three microbial groups, and are classified as providing *Targeted protection*.

Each production unit should consistently meet or exceed the performance target for each microbial group, and in both test waters (GTW and CTW). However, a maximum deviation of 0.2 log₁₀ is acceptable for 25% of sample points at the two-star performance tier, and 0.4 log₁₀ at the three-star performance tier². This means that for classification as a two-star product, up to three of the twelve sample points can achieve a reduction

¹ The maximum microbial reduction that can be demonstrated is limited by the pretreatment challenge concentration delivered. For each organism tested, the pretreatment concentration must be sufficient to allow for the demonstration of the performance targets in the table showing the performance criteria. Due to the complexity of using viable organisms, there may be variation in these pretreatment concentrations above what is sufficient, which may lead to demonstrated reductions reported that far exceed the performance targets. However, the emphasis is on whether the performance target has been met and not the extent by which the target was exceeded.

² These cut-off values were determined using QMRA modelling and selecting ranges that still resulted in appreciable health gains within a specific performance tier.

of 1.8 log₁₀ for bacteria or protozoan cysts (instead of 2 log₁₀), or 2.8 log₁₀ for viruses (instead of 3 log₁₀). Each phage is treated separately for evaluating acceptable allowance, and the overall claim for viruses is based on the lower performing phage.

Performance classification

The Nazava Water Filter met the minimum performance target of 2 log₁₀ for bacteria. For the protozoan reduction, a value of 2.7 log₁₀ was assigned based on the mean bacterial reduction achieved. The minimum performance target of 3 log₁₀ for viruses was not met.

As such, the Nazava Water Filter is classified as providing *Targeted protection* (★) against bacteria and protozoa only.

Considerations for product selection



Microbial conditions

Use where contaminant of concern is known to be bacterial / protozoan microbes



Physico-chemical water characteristics

Suitable for all water quality conditions, and includes a fabric prefilter to be used when treating turbid water



Product information and labelling

Check that the device is appropriately labelled and has clear instructions for use

References

Evaluating household water treatment options: health-based targets and microbiological performance specifications. Geneva: World Health Organization; 2011 (http://www.who.int/water_sanitation_health/publications/household_water/en/).

Guidelines for drinking-water quality, fourth edition. Incorporating the first addendum. Geneva: World Health Organization; 2017 (http://www.who.int/water_sanitation_health/publications/drinking-water-quality-guidelines-4-including-1st-addendum/en/).

Harmonized Testing Protocol: Technology non-specific version 2.0. Geneva: World Health Organization; 2018 (http://www.who.int/water_sanitation_health/water-quality/household/household-water-treatment-scheme-resources/en/).

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