

International Scheme to Evaluate Household Water Treatment Technologies

Katadyn Rapidyn Water Filter Kit

Product evaluation report

WHO performance classification	Targeted protection (bacteria and protozoa only) One-star (★)
Manufacturer	Katadyn Products Inc Pfäffikerstrasse 37 8310 Kemptthal Switzerland www.katadyngroup.com
Evaluation procedure	Abbreviated laboratory testing
WHO report issue date	Round III, 2020
WHO reference	28/8/2019-R3-3

Summary of evaluation

This report summarizes the evaluation results of a ceramic filtration device known by the tradename 'Katadyn Rapidyn Water Filter Kit', under Round III of the World Health Organization (WHO) International Scheme to Evaluate Household Water Treatment Technologies (the Scheme). The WHO evaluation criteria for household water treatment (HWT) technologies recommend evaluation against three classes of pathogens: bacteria, viruses and protozoa. Hence, while the manufacturer Katadyn Products Inc does not claim any reduction against viruses, a viral reduction challenge was included in the test. Evaluation of the Katadyn Rapidyn Water Filter Kit followed the requirements of the WHO protocol for filtration technologies, and investigated the ability of the device to reduce bacteria and viruses. Reduction of protozoa was assigned based on the mean bacterial reduction achieved. Based on the evaluation results, the Katadyn Rapidyn Water Filter Kit meets WHO performance criteria and is classified as providing *Targeted protection* against bacteria and protozoa only (★).

1. 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.

Table 1. 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 Katadyn Rapidyn Water Filter Kit is a gravity-fed ceramic filtration device. The assembled filter set comprises two 10-L buckets stacked on top of each other. These buckets serve as receptacles for raw and filtered water. The filter cartridge is screwed to the bottom of the raw water bucket. Water is filtered through the cartridge under gravity into the clean water bucket. The estimated flow rate when the filter is new is 3 L/hour, with non-turbid water. The full product description, illustrations and use instructions can be found at: www.katadyngroup.com.

2. Evaluation approach

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 (WHO, 2019); and the test plan for Filtration Technologies V 3.2 (WHO, 2020). Testing was conducted at a WHO-designated laboratory, KWR Watercycle Research Institute.

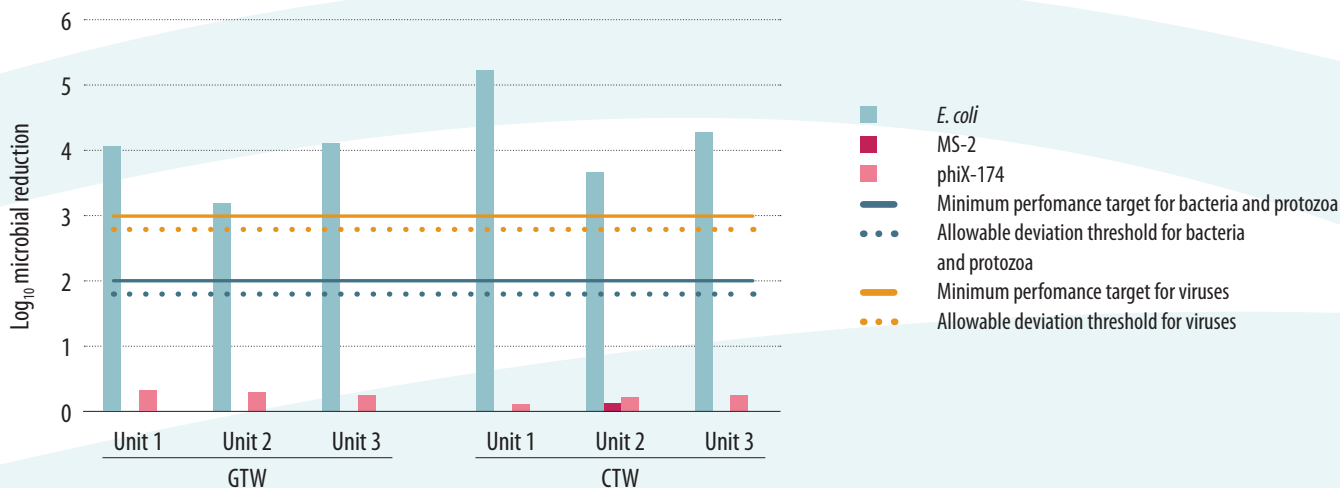
Test organisms: Evaluation of the Katadyn Rapidyn Water Filter Kit investigated its performance in removing bacteria and viruses. The test organisms were *Escherichia coli* (*E. coli*) and bacteriophages MS-2 and phiX-174. Based on the available evidence on filtration media on the removal of protozoan cysts, testing against this microbial group was not conducted (WHO, 2019). The protozoan reduction is assigned based on the mean bacterial reduction observed.

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 Filtration Batch Technologies V 3.2 for details on physicochemical characteristics of the test waters. Test set-up: Three new production units were selected for the test. 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, in GTW on Days 1 and 2 and in CTW on Days 3 and 4, resulting in a total of 12 sample points for each organism (i.e. 2 days × 2 test waters × 3 test units). Posttreatment arsenic and silver residual samples were collected and analysed.

3. 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 Katadyn Rapidyn Water Filter Kit achieved a mean log₁₀ reduction of 4.1 for *E. coli*; 0.0 for MS-2; and 0.2 for phiX-174.

Posttreatment residual silver concentrations ranged from 0.021 to 0.054 mg/L, below the 0.1 mg/L health advisory value in the *Guidelines for Drinking-water Quality* (2017). Arsenic concentrations in all samples were less than 0.01 mg/L, below the limit of detection.

4. Interpretation and application of results

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

Each production unit should consistently meet or exceed the performance target for each microbial group 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 12 sample points can achieve a minimum reduction of 1.8 log₁₀ for bacteria or protozoan cysts (instead of 2 log₁₀) or 2.8 log₁₀ for viruses (instead of 3 log₁₀). Each phase is treated separately for evaluating acceptable allowance, and the overall claim for viruses is based on the lower performing phase.

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

Performance classification

The Katadyn Rapidyn Water Filter Kit fully met the performance target for bacteria. For the protozoan reduction, a value of 4.1 log₁₀ is assigned, based on the mean bacterial reduction. The minimum performance target for viruses was not met. As such, the Katadyn Rapidyn Water Filter Kit 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



Product information and labelling

Check that the product 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 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; 2019 (http://www.who.int/water_sanitation_health/water-quality/household/household-water-treatment-scheme-resources/en/).

Filtration Technology Testing Protocol: version 3.2. Geneva: World Health Organization; 2020 (http://www.who.int/water_sanitation_health/water-quality/household/household-water-treatment-scheme-resources/en/).

Disclaimer

Reference to any company or product in this report, particularly those listed in any of the figures and tables, does not constitute an endorsement, certification or warranty of fitness by WHO of such company or product for any purpose, and does not imply any preference over companies or products of a similar nature that are not mentioned.

WHO does not warrant that any products included in the figures and tables are of acceptable quality; have obtained regulatory approval in any country; or that their use is otherwise in accordance with the national laws and regulations of any country, including but not limited to patent laws. Evaluation under the Scheme is intended to guide UN Member States and procuring UN agencies in the selection of household water treatment (HWT) technologies. Inclusion of any products in this report, particularly in any of the figures and tables listed in the report does not furthermore imply any approval by WHO of these products (which is the sole prerogative of national authorities).

The results in this report reflect the performance level that the product was found to meet at the time of testing. WHO cannot represent that the products reported herein will continue to meet the stated performance levels. Furthermore, the results contained in this report may not be used by manufacturers, suppliers or any other parties for commercial or promotional purposes.



For more information, contact:

World Health Organization
Water, Sanitation, Hygiene and Health Unit
Department of Environment, Climate Change and Health
20, Avenue Appia
1211 Geneva 27, Switzerland
Email: hhwater@who.int
http://www.who.int/water_sanitation_health/water-quality/household/scheme-household-water-treatment/en/

ISBN 978-92-4-000774-1 (electronic version)

ISBN 978-92-4-000775-8 (print version)

© World Health Organization 2020.

Some rights reserved.

This work is available under the CC BY-NC-SA 3.0 IGO licence.

