Summary of evaluation

This report summarizes the results of laboratory testing of an ultraviolet (UV) disinfection device known by the tradename ‘Waterlogic Hybrid’ or ‘Waterlogic Edge Purifier’ under Round I 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 ultraviolet (UV) disinfection technologies, and investigated the ability of the device to reduce the quantity of bacteria, viruses and protozoa. Based on the evaluation results, the Waterlogic Hybrid / Waterlogic Edge Purifier meets WHO performance criteria and is classified as providing Comprehensive protection (★★).
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* (2011) and set out log₁₀ reduction targets against bacteria, viruses and protozoa (Table).

**WHO performance criteria for household water treatment technologies**

<table>
<thead>
<tr>
<th>Performance classification</th>
<th>Bacteria (log₁₀ reduction required)</th>
<th>Viruses (log₁₀ reduction required)</th>
<th>Protozoa (log₁₀ reduction required)</th>
<th>Interpretation (with correct and consistent use)</th>
</tr>
</thead>
<tbody>
<tr>
<td>★★★</td>
<td>≥ 4</td>
<td>≥ 5</td>
<td>≥ 4</td>
<td>Comprehensive protection</td>
</tr>
<tr>
<td>★★</td>
<td>≥ 2</td>
<td>≥ 3</td>
<td>≥ 2</td>
<td>Targeted protection</td>
</tr>
<tr>
<td>★</td>
<td>Meets at least 2-star (★★) criteria for two classes of pathogens</td>
<td></td>
<td></td>
<td>Little or no protection</td>
</tr>
<tr>
<td>–</td>
<td>Fails to meet criteria for 1-star (★)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Product description**

The Waterlogic Hybrid / Waterlogic Edge Purifier is an ultraviolet (UV) disinfection device, comprising an electric kettle fitted a carbon pre-filter and a UV lamp. The device has a detachable 1.5 L reservoir that holds the raw / untreated water. Water is disinfected as it passes over the UV lamp. The full product description, illustrations and use instructions can be found at: www.waterlogic.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 1.0 (WHO, 2015); and the technology test plan for UV Batch Systems V 1.0. Testing was conducted at a WHO-designated laboratory, NSF International, in the United States of America.

**Test organisms:** Evaluation of the Waterlogic Edge / Waterlogic Hybrid Purifier investigated its performance in reducing the quantity of bacteria, viruses and protozoa. The test organisms were, respectively, *Escherichia coli* (*E. coli*); the coliphages MS2 and phiX174; and *Cryptosporidium parvum* (*C. parvum*) oocysts.

**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 UV Batch Systems V 1.0 for details on the physicochemical characteristics of the test waters.

**Test set-up:** Three production units were used in the test, with daily test volumes of 40 L. The 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 six days (in GTW on Days 1 to 3 and in CTW on Days 4 to 6), resulting in a total of 18 sample points for each organism (i.e. 3 days × 2 test waters × 3 test units).
Results

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

Performance across test units

The Waterlogic Edge / Waterlogic Hybrid Purifier achieved mean log\(_{10}\) reductions of 8.0 for E. coli, 5.7 for MS2, 6.1 for phiX174 and 4.0 for C. parvum oocysts.

Performance across the three units tested was generally consistent for all organisms tested in both test waters. Reduction of viruses and protozoa was slightly lower in CTW than in GTW, and the targets for MS2 and C. parvum were not met in CTW.

Interpretation and application of results

Performance is classified in three ascending tiers: ★ (one-star), ★★ (two-star) and ★★★ (three-star), as shown in the table. 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). A maximum deviation of 0.2 log\(_{10}\) is acceptable for 25% of sample points at the two-star performance tier and of 0.4 log\(_{10}\) at the three-star performance tier\(^2\). This means that

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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 shown in Table XXX. Due to the complexity of using viable organisms, there may be variations in these pretreatment concentrations above what is sufficient. Although these variations may lead to demonstrated reductions that far exceed the performance targets, the emphasis is on whether the performance target has been met and not the extent by which it 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.
for classification as a two-star product, up to three of the 12 sample points can achieve a reduction of \(1.8 \log_{10}\) for bacteria or protozoan cysts (instead of \(2 \log_{10}\)) or \(2.8 \log_{10}\) for viruses (instead of \(3 \log_{10}\)). 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 Waterlogic Edge / Waterlogic Hybrid Purifier met the three-star performance target for bacteria, but did not meet the three-star targets for viruses and protozoa. As such, the product is classified as providing **Comprehensive protection (★ ★)**.

**Considerations for product selection**

<table>
<thead>
<tr>
<th>Microbial conditions</th>
<th>Effective against bacteria, viruses and protozoa; can be used under all microbial water quality conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physicochemical water characteristics</td>
<td>Can be used in both turbid and non-turbid water</td>
</tr>
<tr>
<td>Product information and labelling</td>
<td>Check that the device is appropriately labelled and has clear instructions for use</td>
</tr>
</tbody>
</table>

**References**


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