

Wideners Various Provided Filtration Units' Microbial filtration Efficacy Testing. Microbial species selected based on EPA purifier test protocol and WHO/NSF purifier test standards. Units received from Amazon.com supplier and tested shortly following receipt. Units were conditioned and challenged and tested as per intended use using municipal water with added microbial species at test conditions that resemble what would be encountered during light normal use. Bacteria: *Raoultella terrigena* (RT), Virus: MS2 Coliphage (Virus), Cyst Surrogate: 3.0 Micron Latex Sphere. Study Date: 04.03.19

Package label ID	BCS ID	Filter Description	Flowrate (mL/min)	Test Procedure	Vacuum Hg; If applicable) (In	RT Influent concentration in cfu/mL*	RT Effluent concentration in cfu/mL*	Average Percent Removal	MS2 Influent concentration in pfu/mL*	MS2 Effluent concentration in pfu/mL*	Average Percent Removal	Microsphere Influent concentration in Microsphere/mL*	Microsphere Effluent concentration/mL	Average Percent Removal
OKO Original Level 2 Filter	1904067	Bottle	333.3	Squeeze Test	N/A	3.41 x 10 ⁵	< 0.45	> 99.9999%	1.62E+05	149	99.91%	2.1 x 10 ⁴	< 1	> 99.996%
Filter One Personal Water Bottle w/ Built In Compass	1904034	Bottle	250	Vacuum**	3.2		< 0.45	> 99.9999%		>100,000	< 50% (negligible)		< 1	> 99.996%
Grayl Ultralight	1904036	Bottle	1000	Press Down Test	N/A		< 0.45	> 99.9999%		4.1	99.997%		< 1	> 99.996%
Berkey Sport	1904064	Bottle	250	Squeeze Test	N/A		2.3	99.9993%		>100,000	< 38.3%		< 1	> 99.996%
Berkey Black	1904033	Filter and Housing	222.2	Gravity Filtration	N/A		< 0.45	> 99.9999%		146.4	99.91%		< 1	> 99.996%
Life Straw Mission	1904038	Purifier	800	Gravity Filtration	N/A	3.50E+05	< 0.45	> 99.9999%	2.26E+05	5.0	99.9999%	1.90E+04	< 1	> 99.996%
Life Straw Personal	1904037	Purifier	500	Vacuum**	3.2		< 0.45	> 99.9999%		>100,000	< 50% (negligible)		< 1	> 99.996%
Miniwell L630	1904032	Purifier	700	Gravity Filtration	N/A		< 0.45	> 99.9999%		>100,000	< 50% (negligible)		< 1	> 99.996%
MSR AutoFlow	1904061	Purifier	800	Gravity Filtration	N/A		< 0.45	> 99.9999%		>100,000	< 50% (negligible)		< 1	> 99.996%
Sawyer Products MINI	1904029	Purifier	250	Vacuum**	3.2		< 0.45	> 99.9999%		>100,000	< 50% (negligible)		< 1	> 99.996%
Nature's Hangout: Personal Water Filter Straw	1904030	Purifier	250	Vacuum**	3.2		< 0.45	> 99.9999%		>100,000	< 50% (negligible)		< 1	> 99.996%
H2O Survival Water Filter Travel Straw	1904066	Purifier	250	Vacuum**	3.2		< 0.45	> 99.9999%		< 0.45	>99.9996%		< 1	> 99.996%
MUV: Survivalist Water Filter	1904035	Purifier	250	Vacuum**	3.2		< 0.45	> 99.9999%		4.5	99.998%		< 1	> 99.996%
Aquaway Connectable: Versatile Personal Water Filter	1904093	Purifier	250	Vacuum**	3.2		< 0.45	> 99.9999%		>100,000	< 50% (negligible)		< 1	> 99.996%
EtekCity 1500L Personal Water Filter	1904065	Purifier	250	Vacuum**	3.2		< 0.45	> 99.9999%		>100,000	< 50% (negligible)		< 1	> 99.996%
Renogy Portable Outdoor Water Filter	1904063	Purifier	600	Hand Pump	N/A	3.45E+05	< 0.45	> 99.9999%	1.42E+05	>100,000	< 50% (negligible)	2.10E+04	< 1	> 99.996%
Katadyn Hiker Filter	1904031	Purifier	600	Hand Pump	N/A		< 0.45	> 99.9999%		>100,000	< 50% (negligible)		< 1	> 99.996%

The conducted test study was requested and commissioned by client. It was performed to evaluate the provided purifier units' filtration efficacy as per the client requested and laboratory implemented protocol. Initially, each filter was conditioned as per manufacturer's instruction. If no instruction was given, 1 liter of carbon block dechlorinated municipal water was passed through each of the filters in the provided housing. General Test Water Type 1 (GTW, Dechlorinated Municipal water) water was seeded with the indicated contaminants. The solution was thoroughly homogenized and 1 liter was passed through each filter. A sample from the filtrate was removed and was assayed for the respective species. A sample of the influent challenge water was removed prior to the beginning of the study. All analysis was conducted in duplicate at minimum. The number of microorganisms was determined in each sample. The respective percent reductions were determined based on the concentration obtained in the filter influent and analyzed effluent sample. Each filter's Influent and effluent samples were analyzed as per laboratory accredited methodology. RT was analyzed as per SM 9215C (APHA 2012) and MS-2 as per EPA 1602 (Lab SOP V-10), and fluorescent microspheres as per EPA 1623.1.

* values represents calculated average of at least duplicate analysis performed at two dilutions on duplicate collected samples

** Vacuum: test was performed by placing challenge solution in unit's reservoir or sterile vessel and aspirating the solution through the unit's mouth piece at a controlled vacuum

The results pertain only to the sample(s) analyzed associated identifier #(s). Unit descriptions and names were obtained from the submitted documents. The analysis was authorized and commissioned by the client or client's representative. The resulting data are representative of the analysis conducted on the collected samples and it's/their condition at the time of analysis. The data provided is strictly representative of the study conducted under laboratory conditions using the material/samples/articles provided by the client (or client's representative) and it's (their) condition at the time of test. The data obtained may not be representative or indicative of a real-life process and/or application. The sample(s) were analyzed in accordance with the appropriate method, however due to the inherent limitations of methods, microorganisms may avoid detection. BCS Laboratories offers no express or implied warranties concerning the quality, safety, and/or purity of any sample, batch, source, or the process they are derived from. Quality assurance controls were performed as outlined in the method and as per Good Laboratory Practices. Analyses were performed in accordance with laboratory practices and procedures set-forth by ISO 17025-2005 and NELAP/TNI accreditation standards unless otherwise noted. BCS makes no express or implied warranty regarding the ownership, merchantability, safety or fitness for a particular purpose of any such property or product.



