



BIOLOGICAL CONSULTING SERVICES
OF NORTH FLORIDA, INC.

October 25, 2017

Mike Radloff
Kohler Co. Global Faucets
444 Highland Dr
Kohler WI 53044
920-457-4441
Mike.Radloff@Kohler.com
Client ID: Clarity Filter (A), Clarity Filter (C), Clarity Filter (E)

BCS ID: 1710206, 1710208, 1710210

Project Name: Purifier Unit Efficacy Testing

Dear Mike Radloff,

We have completed the filtration efficacy study on the submitted units as outlined below. The contaminant species, study conditions, and water parameters utilized were based on client's request and adaptation of the guidance documents and protocols listed below:

Validation of Water Purifier Efficacy: Screening of initial purifier performance as per client requested protocol;
BCS SOP-F1 (ISO17025 accredited)

Report Conclusion: Acceptable performance for the tested species at the indicated test points.

Following, you will find our report on the results of the study conducted on the referenced samples. Should you have any questions, please do not hesitate to contact me.

Sincerely,

George Lukasik, Ph.D.
Laboratory Director

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Final Report BCS ID 1710206, 1710208, 1710210 Revision: 0; 10/23/2017

Client: Kohler Co. Global Faucets

Project: Purifier Unit Efficacy Testing

BCS LABORATORIES, INC. — GAINESVILLE
4609 NW 6TH STREET, STE. A, GAINESVILLE, FLORIDA 32609
TEL. (352) 377-9272, FAX. (352) 377-5630

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FL DOH #E82924, ISO/IEC 17025:2005 L2422 (L-A-B), PA DEP# 68-03950, EPA# FL01147
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Analysis: 3.0um Microspheres Filtration Efficacy (parasite)

Test Water: General Test Water I

Test Point: Purifier Initial Efficacy

Temp: 24.1 C

pH: 7.61

NTU: 0.27 NTU

TOC: 0.415 ppm

Influent Conc: 1.70E+04 microspheres/mL

TDS: 212 ppm

Hardness: 133 ppm

Test Notes: Microspheres were not detected in units' effluent (Qualifier: U). System's performance meets and/or exceeds the NSF53 7.3.2 water purifier standard for Cysts Removal; >3Log10 or >99.95% at a single test point event.

BCS Sample ID 1: 1710206	Client ID 1: Clarity Filter (A)			
Eff Conc 1: <1.00E+00 microspheres/mL	% Reduct 1: >99.994	Log10 Reduct 1:	>4.2	
BCS Sample ID 2: 1710208	Client ID 2: Clarity Filter (C)			
Eff Conc 2: <1.00E+00 microspheres/mL	% Reduct 2: >99.994	Log10 Reduct 2:	>4.2	
BCS Sample ID 3: 1710210	Client ID 3: Clarity Filter (E)			
Eff Conc 3: <1.00E+00 microspheres/mL	% Reduct 3: >99.994	Log10 Reduct 3:	>4.2	

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Analysis: *E. coli* Filtration Efficacy

Test Water: General Test Water I

Test Point: Purifier Initial Efficacy

Temp: 24.1 C

pH: 7.61 NTU: 0.27 NTU TOC: 0.415 ppm

Influent Conc: 5.10E+05 cfu/mL

TDS: 212 ppm Hardness: 133 ppm

Test Notes: Escherichia coli ATCC 11229 was utilized in the study.

BCS Sample ID 1: 1710206	Client ID 1: Clarity Filter (A)				
Eff Conc 1: 2.69E+01 cfu/mL	% Reduct 1: 99.994	Log10 Reduct 1: 4.3			
BCS Sample ID 2: 1710208	Client ID 2: Clarity Filter (C)				
Eff Conc 2: 3.14E+01 cfu/mL	% Reduct 2: 99.993	Log10 Reduct 2: 4.2			
BCS Sample ID 3: 1710210	Client ID 3: Clarity Filter (E)				
Eff Conc 3: 2.88E+01 cfu/mL	% Reduct 3: 99.994	Log10 Reduct 3: 4.2			

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Analysis: *R. terrigena* Filtration Efficacy

Test Water: General Test Water I

Test Point: Purifier Initial Efficacy

Temp: 24.1 C

pH: 7.61 NTU: 0.27 NTU TOC: 0.415 ppm

Influent Conc: 3.80 E+05 cfu/mL

TDS: 212 ppm Hardness: 133 ppm

Test Notes: Raoultella terrigena ATCC 33257 (previously known as Klebsiella terrigena) was utilized in the study. System performance meets NSFP231 for bacteriological filtration efficacy in GTW1 at a single test point event.

BCS Sample ID 1: 1710206	Client ID 1: Clarity Filter (A)			
Eff Conc 1: <4.50E-01 cfu/mL	% Reduct 1: >99.9999	Log10 Reduct 1:	>5.9	
BCS Sample ID 2: 1710208	Client ID 2: Clarity Filter (C)			
Eff Conc 2: <4.50E-01 cfu/mL	% Reduct 2: >99.9999	Log10 Reduct 2:	>5.9	
BCS Sample ID 3: 1710210	Client ID 3: Clarity Filter (E)			
Eff Conc 3: <4.50E-01 cfu/mL	% Reduct 3: >99.9999	Log10 Reduct 3:	>5.9	

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Analysis: *S. enterica* Serovar Typhimurium Filtration Efficacy

Test Water: General Test Water I

Test Point: Purifier Initial Efficacy

Temp: 24.1 C

pH: 7.61

NTU: 0.27 NTU

TOC: 0.415 ppm

Influent Conc: 3.90E+05 cfu/mL

TDS: 212 ppm

Hardness: 133 ppm

Test Notes: Salmonella typhimurium ATCC 14028 was utilized in the study

BCS Sample ID 1: 1710206	Client ID 1: Clarity Filter (A)			
Eff Conc 1: <4.50E-01 cfu/mL	% Reduct 1: >99.9999	Log10 Reduct 1:	>5.9	
BCS Sample ID 2: 1710208	Client ID 2: Clarity Filter (C)			
Eff Conc 2: 8.70E+00 cfu/mL	% Reduct 2: 99.998	Log10 Reduct 2:	4.7	
BCS Sample ID 3: 1710210	Client ID 3: Clarity Filter (E)			
Eff Conc 3: 4.50E-01 cfu/mL	% Reduct 3: 99.9999	Log10 Reduct 3:	5.9	

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Analysis: *Shigella Flexneri* Filtration Efficacy

Test Water: General Test Water I

Test Point: Purifier Initial Efficacy

Temp: 24.1 C

pH: 7.61 NTU: 0.27 NTU TOC: 0.415 ppm

Influent Conc: 2.50E+05 cfu/mL

TDS: 212 ppm Hardness: 133 ppm

Test Notes: *Shigella flexneri* ATCC 12022 was utilized in the study.

BCS Sample ID 1: 1710206	Client ID 1: Clarity Filter (A)		
Eff Conc 1: <4.50E-01 cfu/mL	% Reduct 1: >99.9998	Log10 Reduct 1:	>6
BCS Sample ID 2: 1710208	Client ID 2: Clarity Filter (C)		
Eff Conc 2: <4.50E-01 cfu/mL	% Reduct 2: >99.9998	Log10 Reduct 2:	>6
BCS Sample ID 3: 1710210	Client ID 3: Clarity Filter (E)		
Eff Conc 3: <4.50E-01 cfu/mL	% Reduct 3: >99.9998	Log10 Reduct 3:	>6

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Analysis: *Leptospira interrogans* Filtration Efficacy

Test Water: General Test Water I

Test Point: Purifier Initial Efficacy

Temp: 24.1 C

pH: 7.61 NTU: 0.27 NTU TOC: 0.415 ppm

Influent Conc: 3.90E+05 cfu/mL

TDS: 212 ppm Hardness: 133 ppm

Test Notes: *Leptospira interrogans* ATCC 23581 was utilized in the study.

BCS Sample ID 1: 1710206	Client ID 1: Clarity Filter (A)			
Eff Conc 1: <4.50E-01 cfu/mL	% Reduct 1: >99.9999	Log10 Reduct 1:	>5.9	
BCS Sample ID 2: 1710208	Client ID 2: Clarity Filter (C)			
Eff Conc 2: <4.50E-01 cfu/mL	% Reduct 2: >99.9999	Log10 Reduct 2:	>5.9	
BCS Sample ID 3: 1710210	Client ID 3: Clarity Filter (E)			
Eff Conc 3: <4.50E-01 cfu/mL	% Reduct 3: >99.9999	Log10 Reduct 3:	>5.9	

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Project: Purifier Unit Efficacy Testing
Date Received: October 12, 2017 15:25 Analyst: David Sekora, M.S.
Test Start Date: October 16, 2017 Test End Date: October 25, 2017 Qualifier: U

Report Notes:

The referenced water filtration units were received from Kohler Co. Global Faucets. Each unit as assigned the referenced BCS identifier number; 1710206, 1710208, and 1710210. The provided filter units were fitted into the Clarity units. The units were conditioned as per study sponsors instructions; each filter was conditioned by adding 5 liters of Laboratory reagent water the upper reservoir and allowing the water to filter through by gravity for one hour. After conditioning, an aliquot of the challenge species was added to General Test Water, the water was homogenized, and a sample was removed. The sample was diluted 1/1,000 in phosphate buffered water and analyzed to determine initial influent concentration. Five liters of the challenge water was transferred into the upper reservoir of each filtration unit. The challenge water was allowed to filter by gravity. Following two hours, the amount filtered was measured and duplicate 100mL samples of each units' effluent were collected. Influent samples were collected again from the upper reservoir of each filter and diluted 1/1,000 in phosphate buffered water prior to analysis. Reported Influent concentration represents the final concentration values. The collected samples were analyzed in duplicates for the microbiocidal species as per laboratory standard accredited ISO17025:2005 methodology; bacteria was analyzed as per SM 9215 (APHA 2012), 3.0um microspheres were enumerated as per EPA 1623.1, turbidity as per SM2130B, pH as per SM4500HB, TOC (if needed) as per SM5310C, Alkalinity as per SM2320B, TDS as per SM2540, chlorine as per SM4500-Cl G, and hardness as per SM2340C. All analysis was conducted using calibrated and/or validated Instruments to traceable standards (NIST). All method QC was within method acceptance limit. No general environmental conditions are specified in the standard or have been identified that could affect the test results or measurements. End of Report Notes.

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*I certify that I have examined I am familiar with the information submitted herein. The results pertain only to the sample(s) analyzed associated identifier #(s). Based on my inquiry of the individuals responsible for the analysis, I believe the data to be true, accurate, and complete. 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.

Signature of Laboratory Director/Authorized Rep.  Date: October 25, 2017

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DATA QUALIFIER CODES	
SYMBOL	MEANING
D	Measurement was made in the field.
I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
J1	The sample matrix interfered with the ability to make any accurate determination.
J2	No Quality Control criteria exist for the component.
^	analysis conducted outside the Laboratory's scope of accreditation
L	Off scale high. Actual value is known to be greater than value given.
O	Sampled, but analysis not performed.
Q	Sample held beyond the accepted holding time.
U	Indicates that the compound was analyzed for but not detected. The reported value is the method detection limit.
V	Analyte was detected in both sample and associated method blank. Data may not be accurate.
Y	The laboratory analysis was from an improperly preserved sample. The data may not be accurate.
Z	Too many colonies present (TNTC); the numeric value given represents the upper end of the value that can be determined based on the volume.
?	Data are rejected and should not be used. QC data did not meet acceptance criteria.
**	Analysis of analyte submitted to an accredited sub-contract laboratory.
!	Data deviate from historically established concentration range.
#	BCS Lab specific qualifier. See laboratory analysis notes.

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