

# LifeStraw

## Evidence Dossier

For:  
**LifeStraw Go**  
**LifeStraw Play**  
**LifeStraw Universal**  
**LifeStraw Steel**

## CONTAMINANT REMOVAL BY PRODUCT

		Water filters (membrane pore size: 0.2 microns)			Water purifiers (membrane pore size: 0.02 microns)		
		LifeStraw	LifeStraw Go, Play, Universal, Steel	LifeStraw Flex	LifeStraw Mission	LifeStraw Family	LifeStraw Community
BACTERIA (Removes 99.999999%)	Brucella melitensis	✓	✓	✓	✓	✓	✓
	Campylobacter jejuni	✓	✓	✓	✓	✓	✓
	pasteurella tularensis	✓	✓	✓	✓	✓	✓
	Pseudomonas aeruginosa	✓	✓	✓	✓	✓	✓
	Shigella	✓	✓	✓	✓	✓	✓
	Staphylococcus Aureus	✓	✓	✓	✓	✓	✓
	Vibrio Cholera	✓	✓	✓	✓	✓	✓
	Vibrio parahaemolyticus	✓	✓	✓	✓	✓	✓
	Yersinia enterocolitica	✓	✓	✓	✓	✓	✓
	Yersinia pestis	✓	✓	✓	✓	✓	✓
	Enteropathogenic E.coli	✓	✓	✓	✓	✓	✓
	Haemophilus influenzae	✓	✓	✓	✓	✓	✓
	Klebsiella pneumoniae	✓	✓	✓	✓	✓	✓
	Legionella pneumophia	✓	✓	✓	✓	✓	✓
	Mycobacterium Tuberculosis	✓	✓	✓	✓	✓	✓
	Mycoplasma pneumoniae	✓	✓	✓	✓	✓	✓
	Pseudomonas pseudomallei	✓	✓	✓	✓	✓	✓
	Salmonella hirschfeldii	✓	✓	✓	✓	✓	✓
	Salmonella typhimurium	✓	✓	✓	✓	✓	✓
	Salmonella typhosa	✓	✓	✓	✓	✓	✓
Shigella dysenteriae	✓	✓	✓	✓	✓	✓	
Streptococcus pneumoniae	✓	✓	✓	✓	✓	✓	
Streptococcus pyogenes	✓	✓	✓	✓	✓	✓	
Leptospirosis				✓	✓	✓	
PARASITES (Removes 99.999%)	Ascario lumbricoides	✓	✓	✓	✓	✓	✓
	Cryptosporidium	✓	✓	✓	✓	✓	✓
	Entamoeba	✓	✓	✓	✓	✓	✓
	Giardia Lamblia	✓	✓	✓	✓	✓	✓
	naegleria gruberi	✓	✓	✓	✓	✓	✓
	schistosoma mansoni	✓	✓	✓	✓	✓	✓
	taenis saginata	✓	✓	✓	✓	✓	✓
VIRUS (Removes 99.999%)	Adenoviridae virus				✓	✓	✓
	Astrovirus				✓	✓	✓
	Calicivirus virus				✓	✓	✓
	Enterovirus				✓	✓	✓
	Hepatitis A virus				✓	✓	✓
	Hepatovirus				✓	✓	✓
	Influenza				✓	✓	✓
	Norovirus				✓	✓	✓
	Parainfluenza				✓	✓	✓
	Paramyxovirus				✓	✓	✓
	Parvovirus B19				✓	✓	✓
	Rhinovirus				✓	✓	✓
Rotavirus				✓	✓	✓	
Togavirus				✓	✓	✓	
CHEMICALS	Chlorine		✓	✓			
	Organic chemical matter		✓	✓			
	Pesticides and herbicides		✓	✓			
	Lead			✓			
	Heavy metals			✓			

This list is intended as complementary information. All LifeStraw products are tested under standard laboratory conditions using ISO / IEC 17025 accredited methods. For specific laboratory results, please refer to the Certificate of Analysis document, provided at [www.lifestraw.com](http://www.lifestraw.com)

LifeStraw

Internal Lab Reports

## Performance on Longevity, Microbial Removal and Chlorine Removal of LifeStraw® Go 2 stage

Study Number: LSP.17.2004.2.2

Issued by: Nguyen Quang Chung	Approved by: Cao Thu Le
Date of issuance: 14/08/2017	

### Overview

Performance of LifeStraw® Go 2 stage product was tested following US EPA (1) and NSF P231 (2) protocols for microbiological water purifiers, and NSF42 for chlorine removal efficacy.

LifeStraw® Go 2 stage product work well until more than 4000L (test ongoing till clogging): E.coli bacteria removal was higher than log 8.1, protozoan cyst removal was higher than log 5.2, and average turbidity of filtered water of LifeStraw® Go 2 stage was 0.3 NTU. The quality of the filtered water exceeded requirements of WHO (4)/ US EPA/NSF P231 on bacteria removal ( $\geq \log 6$ ), protozoan cysts removal ( $\geq \log 4$ ), and turbidity removal ( $\leq 0.5$  NTU).

LifeStraw® Go 2 stage with carbon capsule could remove chlorine well up to more than 110L as under NSF42 testing conditions. This capacity exceeded Vestergaard's requirement and claim of 100L.

### References

- 1) US EPA Guide Standard and Protocol for Testing Microbiological Water Purifiers. April 1987.
- 2) NSF Protocol P231, Microbiological Water Purifiers. February 2003.
- 3) WL.SOP.119.v1. SOP Normal Aging procedure of LifeStraw® Go 2 stage. (Water Laboratory's internal standard operating procedure).
- 4) WHO (2011). Evaluating household water treatment options: Health-based targets and microbiological performance standards, Geneva, World Health Organization.
- 5) NSF/ ANSI 42, Drinking water treatment units – Aesthetic effects, 2015.



## Testing principles

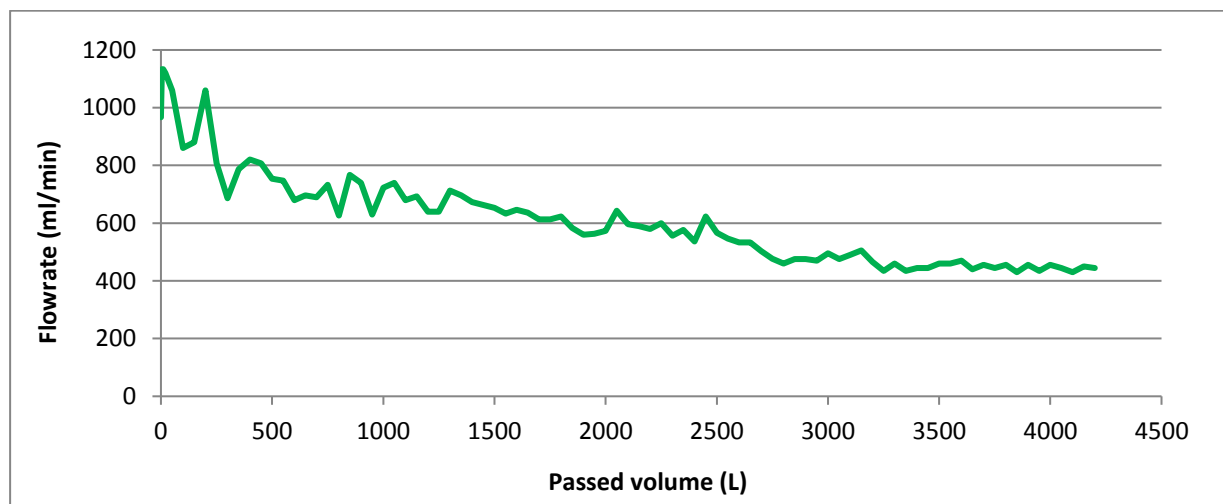
Following US EPA/ NSF P231 protocols, two replicates of LS® Go 2 stage were being aged with general test water. Every 500L along the aging process, microbial removal efficacy of the product was evaluated by being subjected to a challenging test with challenge test water.

Following NSF42 protocol, three replications of LifeStraw® Go 2 stage were tested. Chlorine concentration of influent water was controlled at  $2\pm 0.2$ mg/L. Chlorine concentration of effluent water was checked frequently to evaluate chlorine removal efficacy.

Test waters were prepared and controlled following US EPA (1), NSF P231 (2) and NSF42 (5). Operating the product during testing was done following WL.SOP.119.v1.

## Results and discussions

### 1. Longevity performance



**Figure 1.** Average flow-rate of LS Go 2 stage up to more than 4000L (test ongoing)

LifeStraw® Go 2 stage product worked well until more than 4000L (test ongoing). At 4000L point, average filtration rate was around 450ml/min - means that it is easy to get a cup of high quality filtrated water through LifeStraw® Go 2 stage in about a haft of minute. The average turbidity of filtrated water up to 4000L point was ca. 0.3 NTU and thus meets requirement of NSF International Standard/American National Standard.

### 2. Microbial removal efficacy

LifeStraw® Go 2 stage uses hollow fiber microfiltration technology which can remove microorganisms bigger than its pore size of  $0.2\mu\text{m}$ , thus, it can remove *E.coli* bacteria (ca.  $0.5\times 2\mu\text{m}$ ) and protozoa cysts (minimum  $3\mu\text{m}$ ). Although the removal of protozoan cysts was only tested at random testing points, removal of *E.coli* (the smaller tested organisms) guaranteed removal of protozoan cysts.

Results showed that LifeStraw® Go 2 stage product exceeded requirements of US EPA, NSF P231 and WHO for microbiological water purifiers on removal of bacteria and protozoa cysts up to 4000L (test ongoing).

**Table 1. Bacteria removal efficacy**

Replicates	<i>E.coli</i> removal (log <sub>10</sub> reduction) (*)							
	10L	500L	1000L	1500L	2000L	2500L	3000L	4000L
1	>8.5	>8.7	>8.8	>8.5	>8.1	>8.7	>8.7	>8.8
2	>8.5	>8.7	>8.8	>8.5	>8.7	>8.7	>8.7	>8.8

(\*) *E.coli* in water was analyzed following SMEWW-9222G (Standard Methods for Examination of Water and Wastewater)

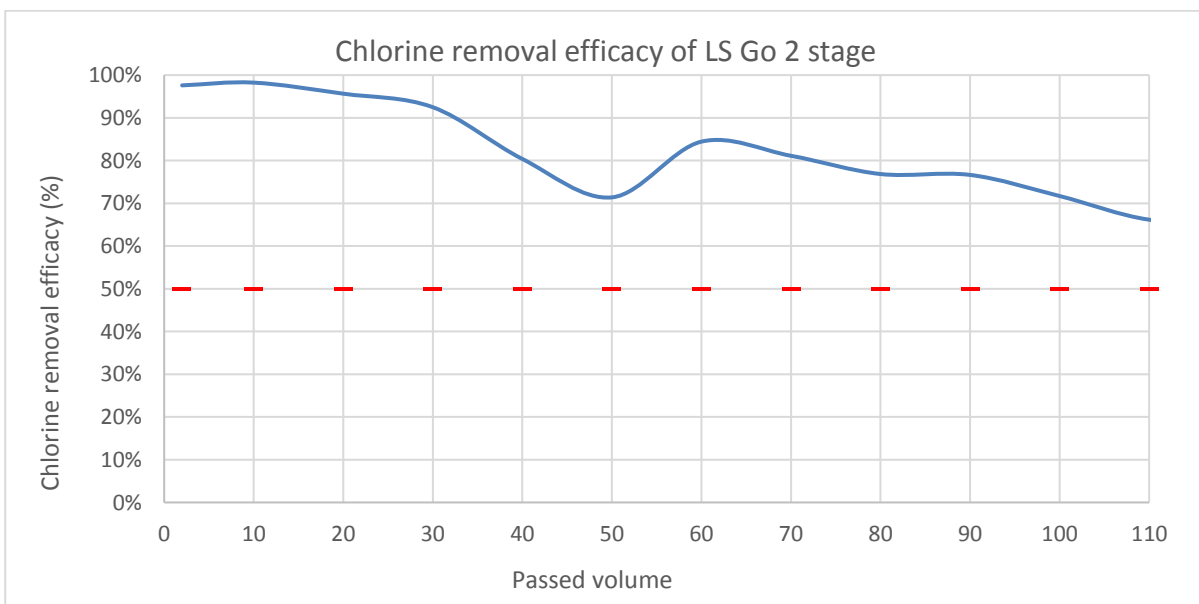
**Table 2. Protozoan removal efficacy**

Replicates	Protozoa removal (log <sub>10</sub> reduction) (**)	
	2500L	4000L
1	>5.2	-
2	>5.2	>5.2

(\*\*) Protozoa cysts were tested with 3µm spheres surrogate as alternative. Sphere concentration in water was analyzed following US EPA 05/9205/EPADWCTR

### 3. Chlorine removal efficacy

LifeStraw® Go 2 stage with its carbon capsule could remove chlorine very well (higher 60%) up to more than 110L when tested with chlorine water following the NSF42 protocol (NSF42 required chlorine removal efficacy must be higher than 50%). This chlorine removal capacity was higher than Vestergaard’s requirement and claim of 100L.



**Figure 2:** Chlorine removal efficacy of LifeStraw® Go 2 stage following the NSF42 protocol

## Conclusions

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LifeStraw® Go 2 stage product was working well until more than 4000L (test is ongoing) when tested following USEPA (1) and NSF P231 (2): *E.coli* bacteria removal was higher than log 8.1, protozoan cyst removal was higher than log 5.2, and average turbidity of filtered water of LifeStraw® Go 2 stage was 0.3NTU.

The quality of the filtered water exceeded requirements of WHO/ US EPA/NSF P231 on bacteria removal ( $\geq \log 6$ ) and protozoan cysts removal ( $\geq \log 4$ ), and turbidity removal ( $\leq 0.5$  NTU).

Regarding to chlorine removal efficacy, LifeStraw® Go 2 stage with its carbon capsule could remove chlorine well (higher than 60%) up to more than 110L – exceeded requirement of NSF42 of minimum 50% removal. It also exceeded the Vestergaard's requirement and claim of 100L.

## Sample Information

<b>Test</b>	: LifeStraw® Go 2 Stage	<b>Requested by</b>	: PARA Membranes Ltd.
<b>Quantity</b>	: 10 pcs	<b>Description</b>	: QC Cartridge
<b>Date of receipt of test sample (dd/mm/yyyy)</b>			: 23/02/2018

## Analysis Results

Parameter	Microbiological log <sub>10</sub> reduction		Physico-chemical characteristics			Conclusion	
	Bacteria (E.coli)	Protozoa (3µm spheres surrogate)	Turbidity of effluent water (NTU)	Flow rate (ml/min)	Chlorine removal (%)		
Reference method	SMEWW 9222G	US EPA 05/9205/EPADWC (Modified) (*)	SMEWW 2130B (*)	WL.SOP.117	Hach 8167 - DPD method (*)		
Specification	Min 8	Min 5	Max 0.5	Min 700	Min 81	PASSED	
1	LSGOCWPR8A112	>8.6	>5.2	0.1	1420	-	PASSED
2	LSGOCWPR8A112	>8.6	>5.2	0.2	1220	-	PASSED
3	LSGOCWPR8A112	>8.6	>5.2	0.1	1160	-	PASSED
4	LSGOCWPR8A112	-	-	-	-	85%	PASSED
5	LSGOCWPR8A112	-	-	-	-	90%	PASSED
6	LSGOCWPR8A113	>8.6	>5.2	0.1	1220	-	PASSED
7	LSGOCWPR8A113	>8.6	>5.2	0.2	1340	-	PASSED
8	LSGOCWPR8A113	>8.6	>5.2	0.1	1360	-	PASSED
9	LSGOCWPR8A113	-	-	-	-	86%	PASSED
10	LSGOCWPR8A113	-	-	-	-	84%	PASSED

Note: (\*) ISO/IEC 17025 accredited methods



I, the undersigned, hereby declare that the findings provide a true and accurate record of the results obtained on samples as received.

Date and signature

05/03/2018



Cao Thu Le  
Water Laboratory Manager

LifeStraw

External Lab Reports



# TEST REPORT

Report No: AWRTCL/13983A, 13984B & 13985A/17-18


Date: 18.04.2018

Customer details	Sample details
<b>Name &amp; Address :</b> Le Thu Cao Laboratory manager Life Straw Vietnam	Sample received: 29.03.2018
	Sample code no:- AWRTCL/13983A,13984B & 13985A/17-18
	Sample Description : Life Straw Go - 2stage filtration, Life Straw Play, Life Straw Universal
	No of Samples for Testing: 1 No. each
	Submitted By : Life Straw, Vietnam
	Date of Analysis Started : 04.04.2018
	Date of Analysis Completed : 10.04.2018
	Subcontract : Not Applicable
Condition of Sample when received: Intact.	

## TEST DATA: Table 1 - Microbial reduction @ 800 ml/min Flow Rate

S.No	Sample Number	Volume of Filtration Liters	Microorganisms	Input water	Treated water	% Reduction & Log reduction
				Microbial counts	Microbial counts	
1	AWRTCL/13983A/17-18 Life Straw Go 2 stage	12Lit	E.Coli MTCC-68	5.50x10 <sup>7</sup> cfu/ml ( 7.74 log)	NVC/ml	>99.99999% 7.74 log
		12Lit	3 micron Microspheres	1.73 x 10 <sup>7</sup> /Liter (7.23 log)	< 160 /Liter	> 99.999% 5.03 log
2	AWRTCL/13984B/17-18 Life Straw Play	12Lit	E.Coli MTCC-68	6.0x10 <sup>7</sup> cfu/ml ( 7.77 log)	NVC/ml	>99.99999% 7.77 log
		12 Lit	3 micron Microspheres	1.69 x 10 <sup>7</sup> /Liter (7.22 log)	<160/Liter	>99.999% 5.02 log
3	AWRTCL/13985A/17-18 Life Straw Universal	12Lit	E.Coli MTCC-68	7.0x10 <sup>7</sup> cfu/ml ( 7.84 log)	NVC/ml	>99.99999% 7.84 log
		12 Lit	3 micron Microspheres	1.62 x 10 <sup>7</sup> /Liter (7.20 log)	320/Liter	99.998% 4.70 log

NVC: No viable colonies & <160/Liter: below detection limit



Dr S.MURALIDHARA RAO  
Head - Laboratory

WE UNDER TAKE ANALYTICAL JOBS FOR WATER, FOOD, BIOCIDAL RESINS, DETERGENTS & SANITIZERS AND SOIL. WE CARRY OUT PERFORMANCE EVALUATION OF DRINKING WATER TREATMENT UNITS AS PER NSF/ANSI SPECIFICATIONS. BASED ON PERFORMANCE WE CAN ARRANGE FOR GOLD SEAL CERTIFICATION FROM WQA - USA

- Note:**
- The Results pertain only to the tested samples and applicable parameters.
  - Samples will be disposed after 15 days from the issue of test certificate unless otherwise specified, Incase of bacteriological tests, the samples will be disposed after 7 days itself from the date of issuing the certificate.
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  - In case, any reconfirmation of contents of this certificate is required please contact our office.

**Mailing Address:**

**AQUADIAGNOSTICS WATER RESEARCH & TECHNOLOGY CENTRE LIMITED.**

No. No. 43, PMR Towers, 3rd Floor, Above State Bank of India, Beretena Agrahara, Near Hosa Road Junction, Hosur Main Road, Bangalore - 560 100.  
Tel: 080-25743042, email: aquadiagnostics@gmail.com, website: www.aquadiagnostics.com

**Registered Office :** No. 143 C-4, Bommasandra Layout Area, Hosur Road, Anekal Taluk, Bangalore - 560 099, Karnataka



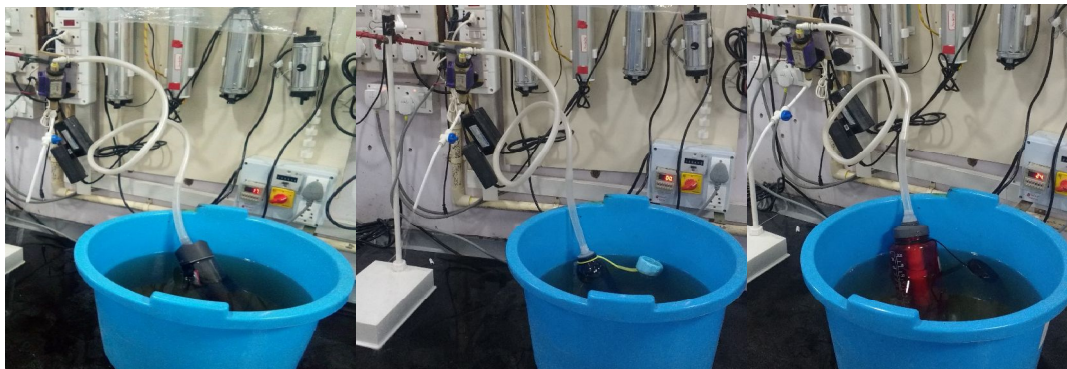
12 Lit of filtration includes 5 Liters of DM water flushing (wetting and removal of entrapped air), 5 Liters of non spiked test water for conditioning of the product and 5 Liters of spiked test water. During 2<sup>nd</sup> spiked water running sampling was done after filtering 2 Liters. Test setup was assembled in the manner as shown in the picture ( next page) . All the tubing, pump etc were first run with DM water to flush out any adhering debris, biological contaminants etc.

**INFERENCE:** Tested Lifestraw namely Lifestraw Go 2 stage, Lifestraw Play, Lifestraw Universal have demonstrated > log 7 reduction with E.coli MTCC- 68 Bacterium and > 4.7 to 5log reduction with 3 micron plastic sphere when tested at flow rate of 800ml/min and thus performs in accordance with NSF P231 for bacterial and cyst reduction.

**TEST WATER COMPOSITION: Microbial Reduction**

Test Characteristic	Recommended Concentration NSF P231 Protocol (CTW#03)	Concentration maintained by the Laboratory		
		Sample Code & Customer Code AWRTCL/13983A/ 17-18 Life Straw Go 2 stage	Sample Code & Customer Code AWRTCL/13984B/ 17-18 Life Straw Play	Sample Code & Customer Code AWRTCL/13985A/ 17-18 Life Straw Universal
pH	9.0±0.2	9.1	9.1	9.1
TDS mg/L	1500±150 mg/L	1530	1530	1530
Turbidity NTU	Not less than 30NTU	31.0	31.0	31.0
TOC mg/L	Not less than 10 mg/L	11 mg/L	11 mg/L	11 mg/L
Temperature °C	4±1 °C	5°C	5°C	5°C
Residual Chlorine mg/L	Not detectable	<0.05 mg/L	<0.05 mg/L	<0.05 mg/L

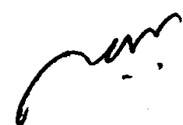
<0.05 mg/L=Not detected



LIFESTRAW GO 2 STAGE

LIFESTRAW PLAY

LIFESTRAW UNIVERSAL

  
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Head - Laboratory

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Tel: 080-25743042, email: aquadiagnostics@gmail.com, website: www.aquadiagnostics.com

**Registered Office :** No. 143 C-4, Bommasandra Layout Area, Hosur Road, Anekal Taluk, Bangalore - 560 099, Karnataka

**TEST REPORT**

Report No: AWR TCL/13983/ 17-18

Date: 17.04.2018

Customer details	Sample details
<b>Name &amp; Address :</b> Kind Attn Le Thu Cao Laboratory manager Life Straw Vietnam	Sample received: 29.03.2018
	Sample code no:- AWR TCL/13983 / 17-18
	Sample Description : Life Straw Go- 2stage
	No of Samples for Testing: 1 No.
	Submitted By : Life Straw, Vietnam
	Date of Analysis Started : 17.04.2018
	Date of Analysis Completed : 17.04.2018
	Subcontract : Not Applicable
Condition of Sample when received: Intact.	

**TEST DATA: 1 micron plastic microsphere reduction at 800 ml/min Flow rate**

Volume of Filtration Liters	Sample Code & Customer Code AWR TCL/13983/17-18 Life Straw Go 2 stage		
	Input Water Microsphere count	Output Water Microsphere count	% Reduction
12 Liters	2.5 x 10 <sup>8</sup> spheres / Liter	<160/Liter	>99.9999 (>6.19 Log)

&lt;160 : Below Detection Limit

**INFERENCE:**

**Tested LS Go – 2 stage product reduces 1 micron polystyrene black dyed microspheres to > 99.9999% reduction (>6.19 log)**

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**Picture of the sample and test setup****TEST WATER CHARACTERISTICS: CTW#03**

Test parameter	Recommended by NSF P231 protocol	Concentration maintained by the Laboratory
pH	9.0±0.2	9.1
TDS mg/L	1500 ±150	1520
TOC mg/L	Not less than 10 mg/L	11 mg/L
Turbidity NTU	Not less than 30 NTU	32.0 NTU
Temperature °C	4±1 °C	4 °C

**Note :** 12 Lit of filtration includes 5 Liters of DM water flushing (wetting and removal of entrapped air), 5 Liters of non spiked test water for conditioning of the product and 5 Liters of spiked test water. During 2<sup>nd</sup> spiked water running sampling was done after filtering 2 Liters. Test setup was assembled in the manner as shown in the picture. All the tubing, pump etc were first run with DM water to flush out any adhering debris, biological contaminants etc.

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Head - Laboratory

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**TEST REPORT**


Report No: AWRCL/ PRTR/ 11191-11191A/16-17

Date: 03.12.2016

CUSTOMER DETAILS	SAMPLE DETAILS	TEST DETAILS
<b>Kind Attn:</b>  <b>Cao Thu Le, Msc.,</b> <b>Laboratory Manager - Water</b> <b>Borne Disease Control</b> <b>Vestergaard SA.</b>	<b>Sample received:</b>	<b>Protocol : NSF</b> <b>P248 Emergency</b> <b>Military</b> <b>Operations</b> <b>Microbiological</b> <b>Water Purifiers</b> <b>Dec 2008. &amp;</b> <b>NSF/ANSI 42</b> <b>Drinking Water</b> <b>Treatment units –</b> <b>Aesthetic effects.</b>
	<b>Sample code no:- AWRCL/11191-11191A/16-17</b>	
	<b>Sample Description: Lifestraw Go 2 stage filtration</b>	
	<b>Sample Quantity for Testing: 2 Nos.</b>	
	<b>Submitted by : Vestergaard SA.</b>	
	<b>Date of Analysis Started : 08.11.2016</b>	
	<b>Date of Analysis Completed: 10.11.2016</b>	
	<b>Subcontract : Not Applicable</b>	
<b>Sample condition when received : Intact. No cracks and breakages were found on the bottle as well as on cartridge.</b>		

**TEST SAMPLE AND SETUP**

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 Head - Laboratory

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 email: smr@aquadiagnostics.com, aquadiagnostics@gmail.com, website: www.aquadiagnostics.com

**Registered Office :** No. 143 C-4, Bommasandra Layout Area, Hosur Road, Anekal Taluk, Bangalore - 560 099, Karnataka

**1. TEST REQUIREMENTS:**

- 1.1. Test sample: Life straw Go : Chlorine reduction as per NSF/ANSI 42
- 1.2. E.Coli & 3 micron microsphere reduction. Protocol : NSF P248 Emergency Military Operations Microbiological Water
- 1.3. Test Flow rate: As achieved under vacuumization

**2. METHODOLOGY OF TESTING :****2.1. Water filtration :**

Test set up, as shown in the picture, was made ready. Initially DM water was filled in the Bottle and flushed. Then the bottle was again filled with unspiked Test water and conditioned. Later spiked water was filled and filtered twice and required quantity of samples were collected for analysis.

**2.2. Enumeration: In duplicate samples.**

Spiking of E.Coli and 3 micron microspheres were done together.

**2.3 Analysis of Chlorine . This was done on a separate unit.****3. ANALYSIS:**

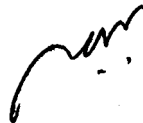
3.1. E.Coli was enumerated with Membrane filtration technique on M Endo agar. Incubation was carried out for 24 hrs at 37 °C. Microspheres were counted on Heamocytometer coupled with Light Microscope.

**4. TEST DATA**

TEST ORGANISM	INPUT WATER COUNTS	OUTPUT WATER COUNTS	% REDUCTION
E.Coli MTCC 68	6.5 x 10 <sup>5</sup> / ml	No viable counts / 100 ml	>99.9999% ( >7 log)
3 Micron Microspheres Polystyrene black dyed beads	2.80 x 10 <sup>7</sup> / Liter	<160 / Liter	>99.999% ( > 4.8 log)

Flow rate of the filtration: 600 ml/min

**5.0 INFERENCE:** Tested unit of Lifestraw Go unit performs in accordance with NSF P 248 for Bacterial and Cyst reduction.



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**Note:**

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2. Samples will be disposed after 15 days from the issue of test certificate unless otherwise specified, In case of bacteriological tests, the samples will be disposed after 7 days itself from the date of issuing the certificate.
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**RECOGNISED BY WATER QUALITY ASSOCIATION - USA, NABL ACCREDITED LABORATORY****6.0 TEST WATER COMPOSITION FOR MICROBIAL REDUCTION TESTS.**

CHARACTERISTICS	RECOMMENDED CONCENTRATION	MAINTAINED CONCENTRATION BY LAB
Chlorine mg/L	<0.1	<0.05
pH	9.0±0.2	9.0
TOC mg/L	10 – 15 mg/L	10
TDS mg/L	1500 ± 300	1542
Temperature °C	4.0 ± 1 °C	5
Turbidity NTU	30 – 50	33.02
Alkalinity as CaCO <sub>3</sub> mg/L	100±20 mg	114.0

Adjusting test water characteristics : DM water was used by adding MgSO<sub>4</sub>,CaCl<sub>2</sub>,Na<sub>2</sub>HCO<sub>3</sub> and NaCl salts. TOC was generated by Sodium salt of Humic Acid. Turbidity was generated by A2 dust.

**7. TEST DATA OF CHLORINE REDUCTION**

TEST PARAMETER	INPUT WATER CHLORINE CONCENTRATION mg/L	OUTPUT WATER CHLORINE CONCENTRATION mg/L	% REDUCTION
Chlorine as Cl <sub>2</sub> mg/L	2.0 mg/L	<0.05 mg/L	> 97.5%

Flow Rate : 615 ml /min.

INFERENCE: Tested Lifestraw GO unit conforms to Chlorine reduction% from an input concentration of 2 mg/L ± 10% to ≥ 50% as per NSF/ANSI 42 Specification.

**8.0 TEST WATER COMPOSITION FOR CHLORINE REDUCTION TESTS.**

CHARACTERISTICS	RECOMMENDED CONCENTRATION	MAINTAINED CONCENTRATION BY LAB
Chlorine mg/L	2.0 ±0.2	2.0
pH	7.5 ±0.5	7.32
TOC mg/L	≥ 1 mg/L	1.0
TDS mg/L	200-500 mg/L	478
Temperature °C	20 ± 3 °C	22
Turbidity NTU	<1 NTU	<1.0

Adjusting test water characteristics : DM water was used by adding MgSO<sub>4</sub>,CaCl<sub>2</sub>,Na<sub>2</sub>HCO<sub>3</sub> and NaCl salts. TOC was generated by Sodium salt of Humic Acid. Turbidity was generated by A2 dust.

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