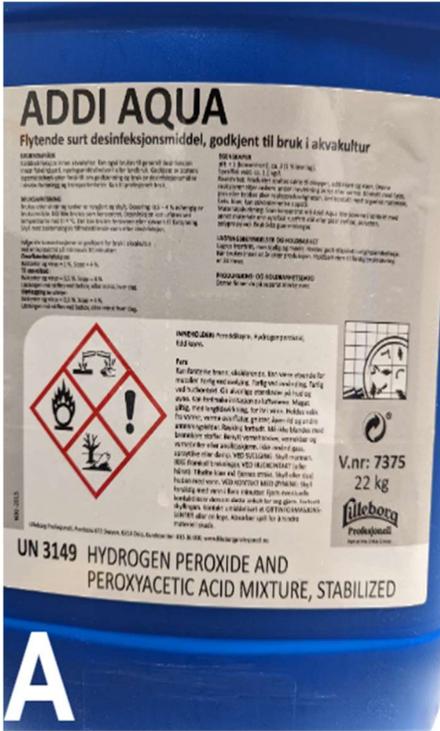
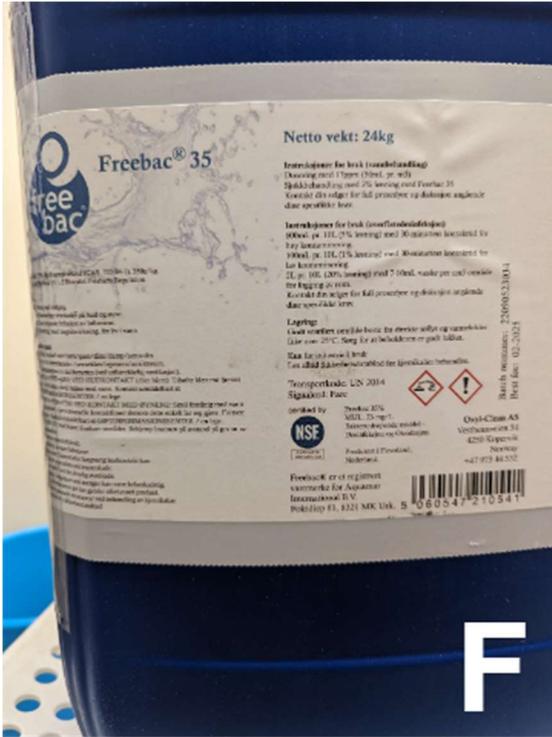


Appendix

Appendix 1. Disinfectants. (A: Addi Aqua, B: Aqua Des, C: Perfectoxid, D: Virkon Aquatic, E: Virocid, F: Free Bac @35, G : LifeClean)





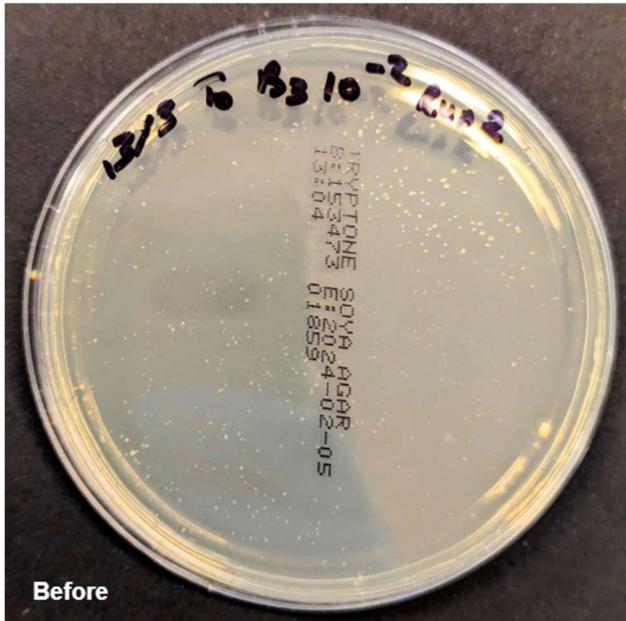
F



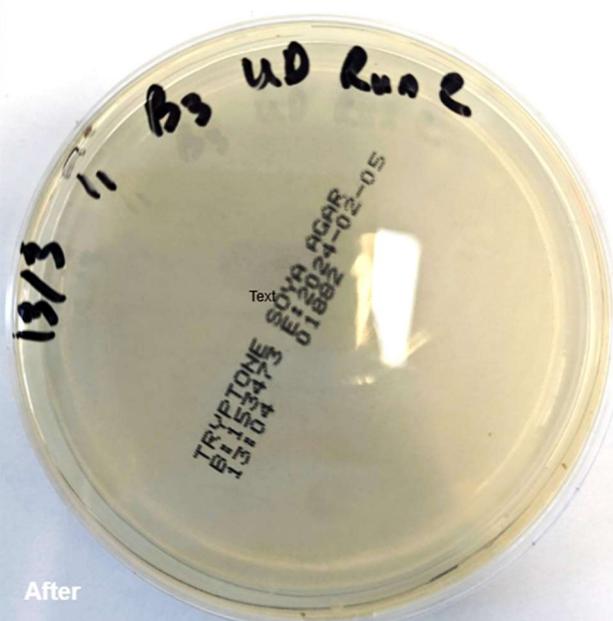
G

Appendix 2. TSA Plates Before and After Disinfection

A. Aqua Des

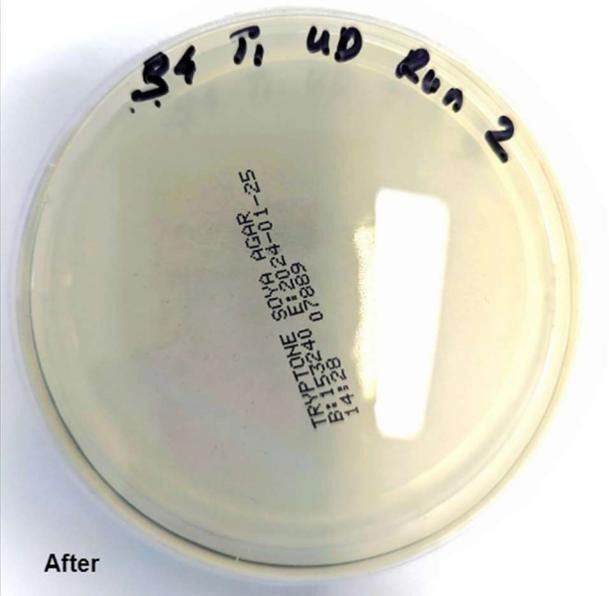


Before

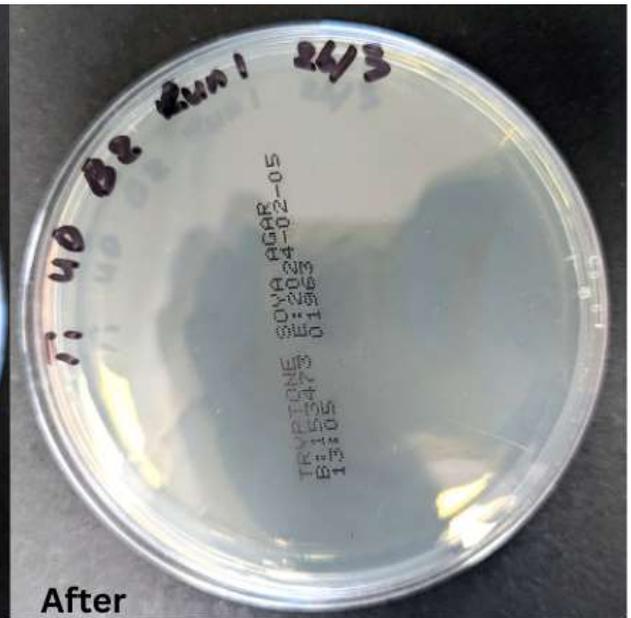


After

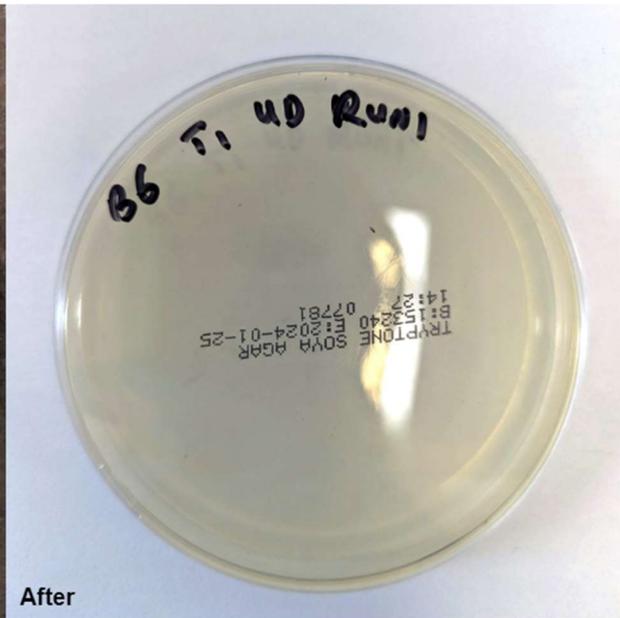
B. Addi Aqua



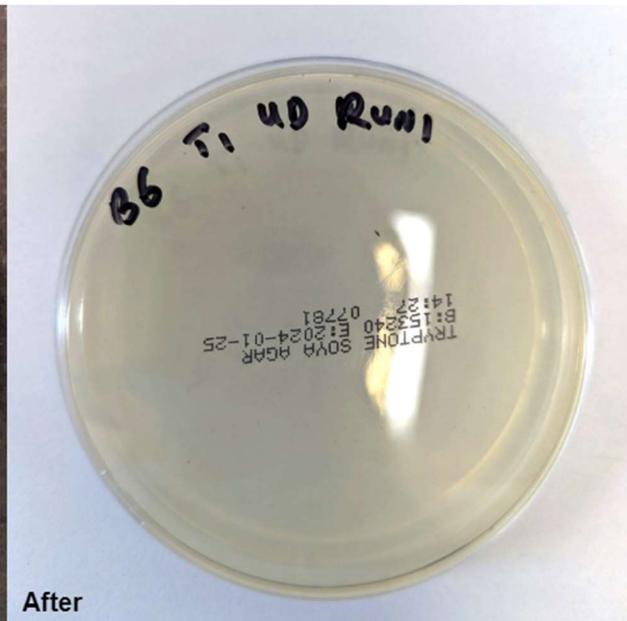
C. Perfectoxid



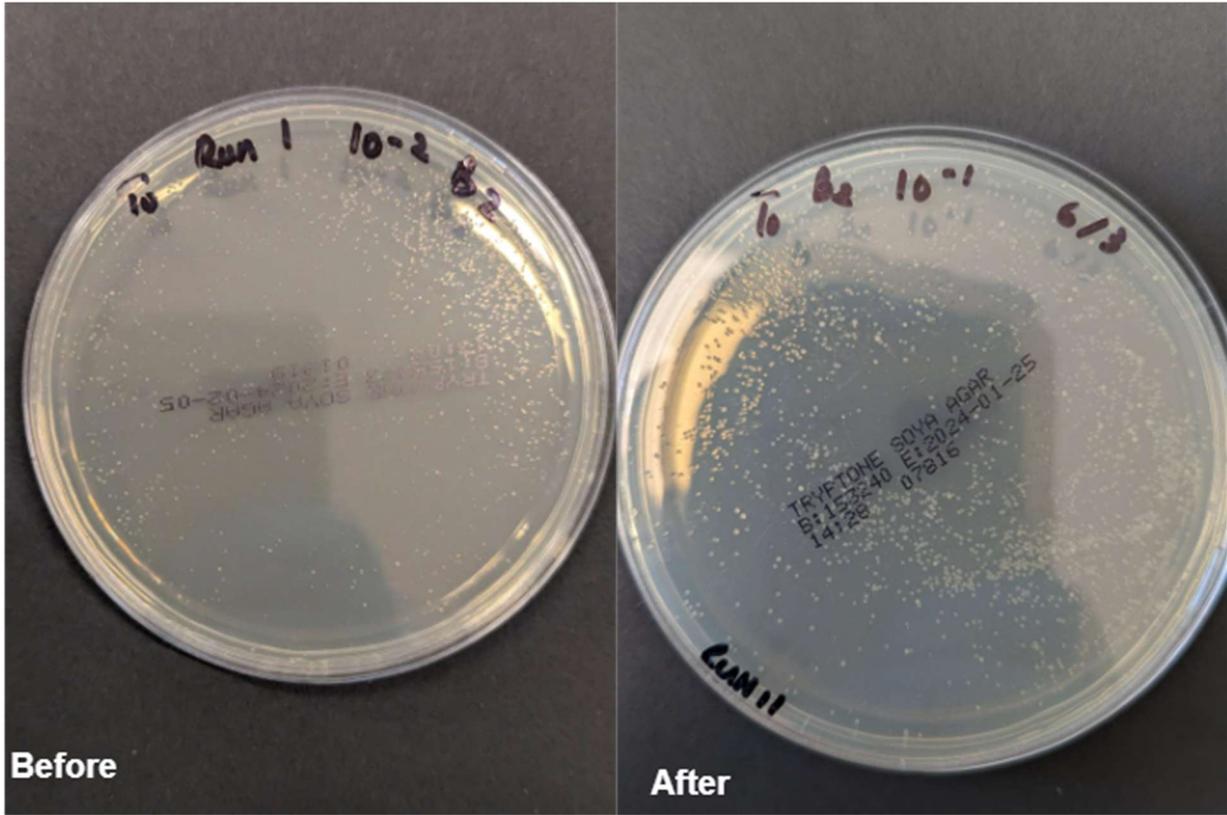
D. Virkon Aquatic



E. Virocid



F. Free Bac @35

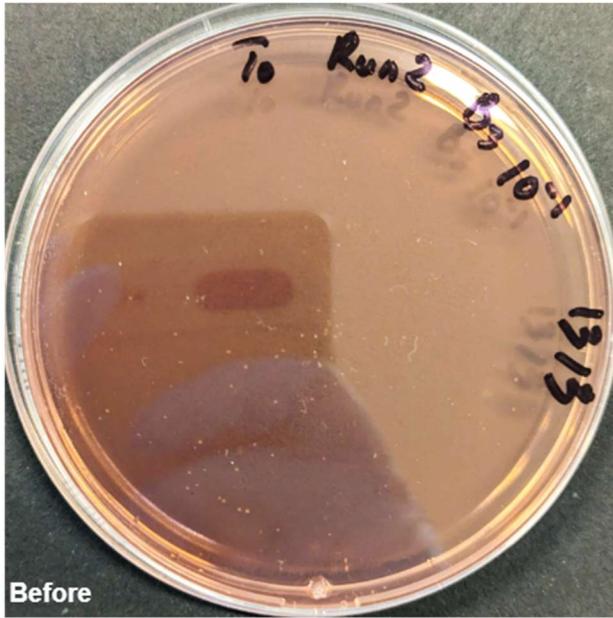


G. Comparison with TSA Control and Sample Treated With Life Clean

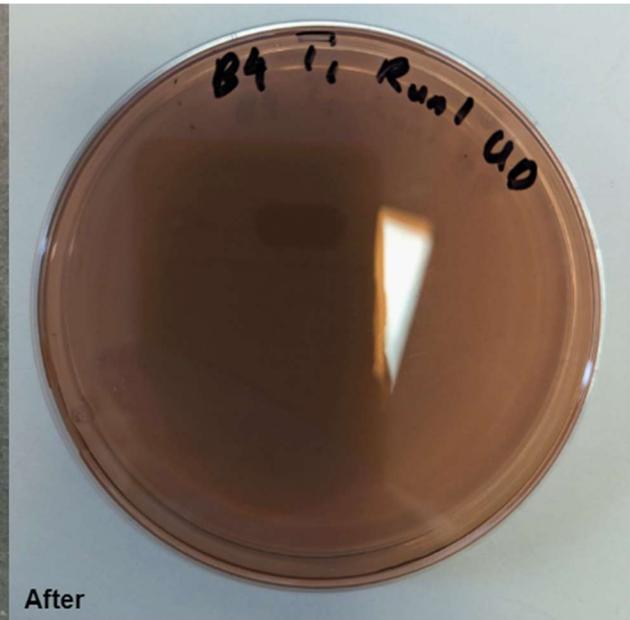
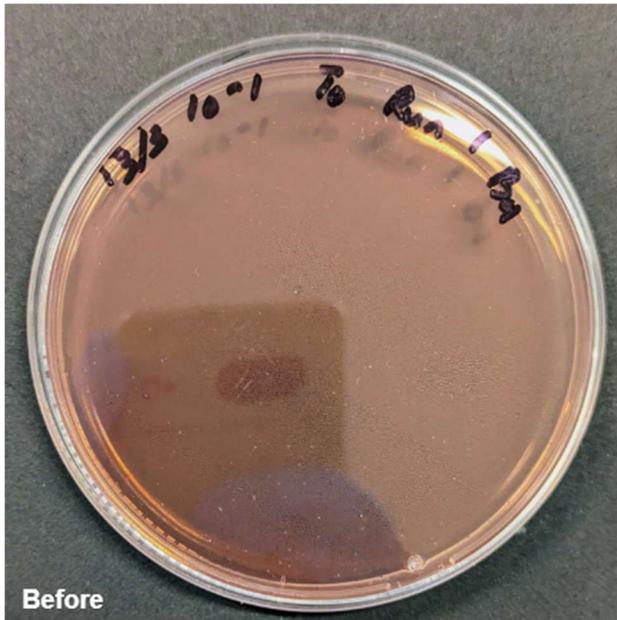


Appendix 3. CIN Plates Before and After Disinfection

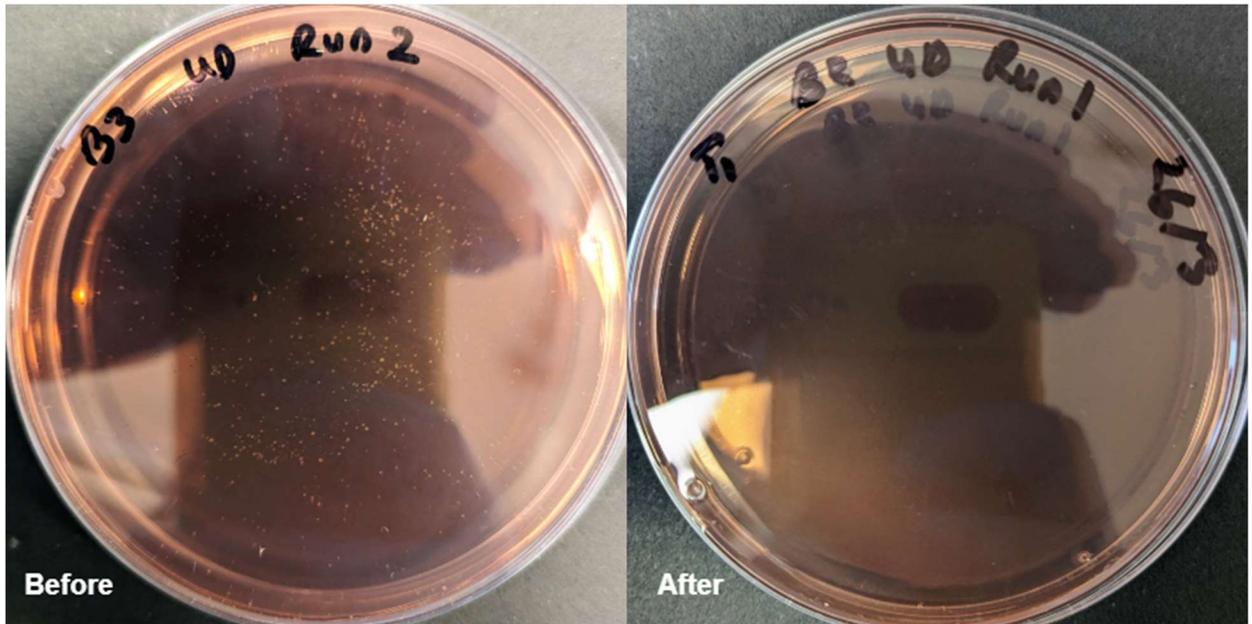
A. Aqua Des



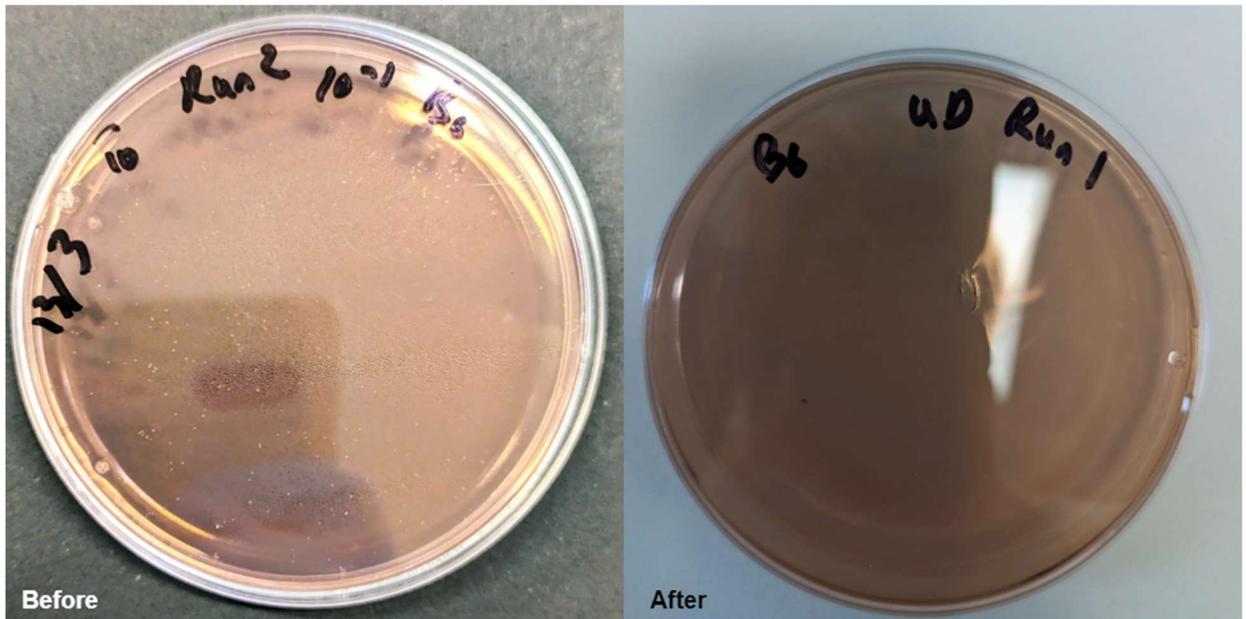
B. Addi Aqua



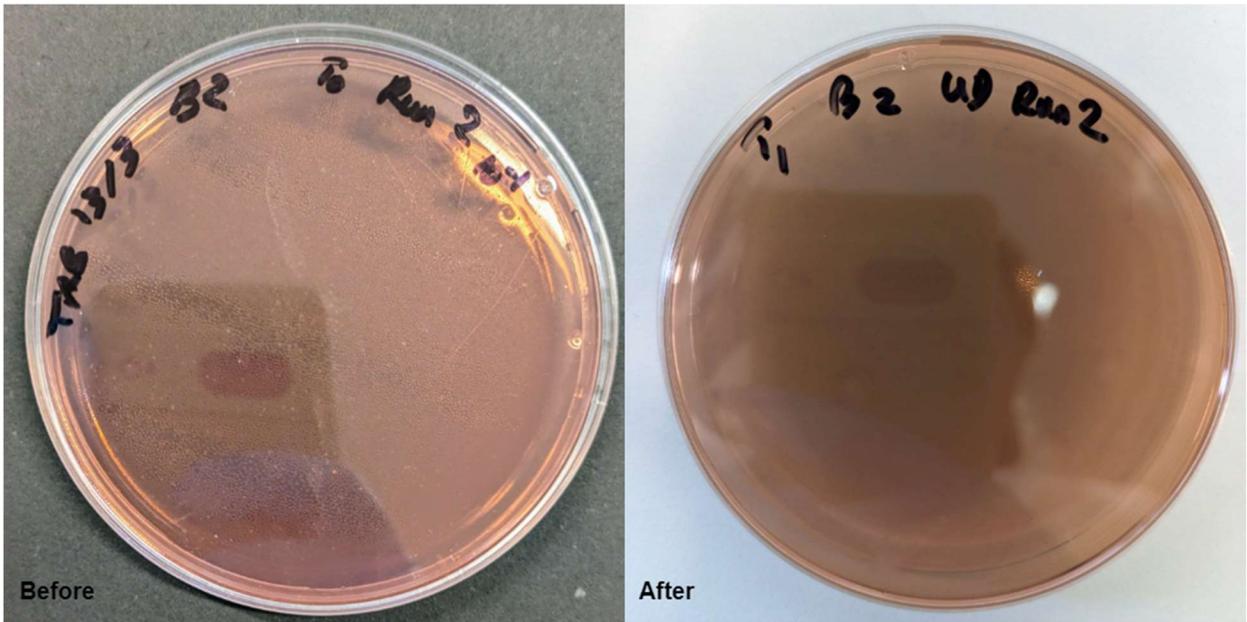
C. Perfectoxid



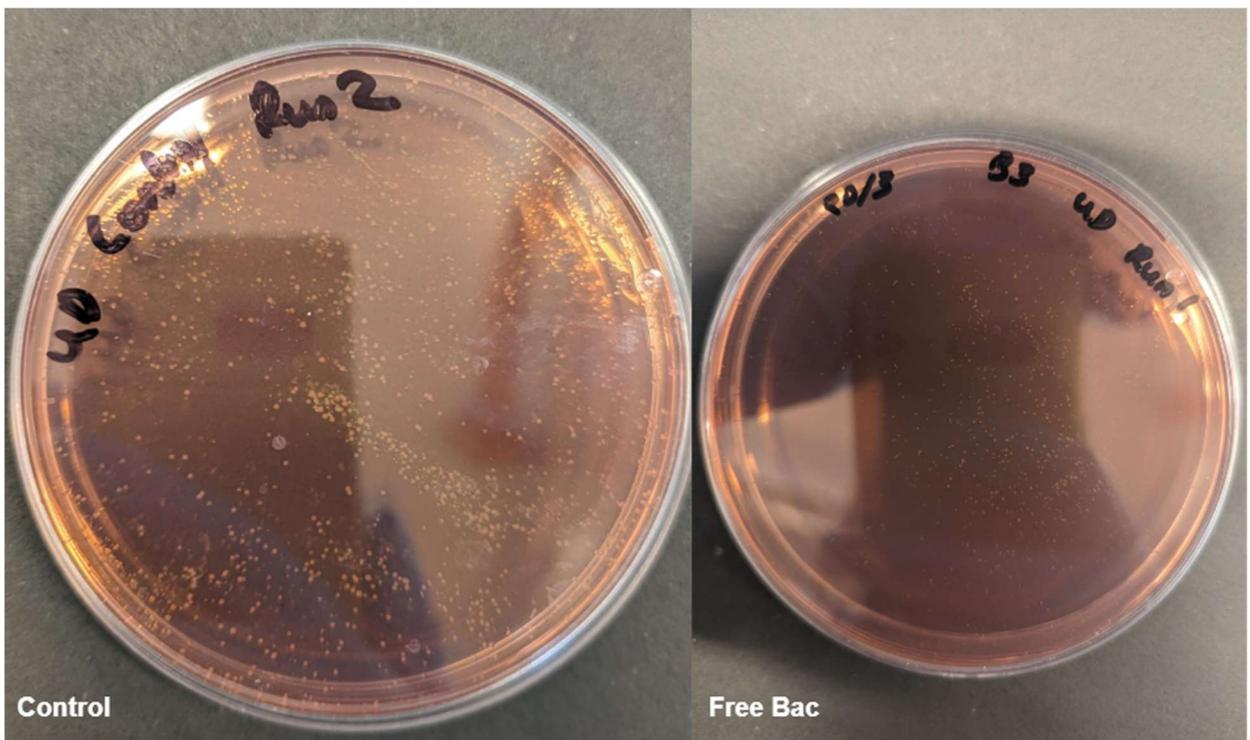
D. Virkon Aquatic



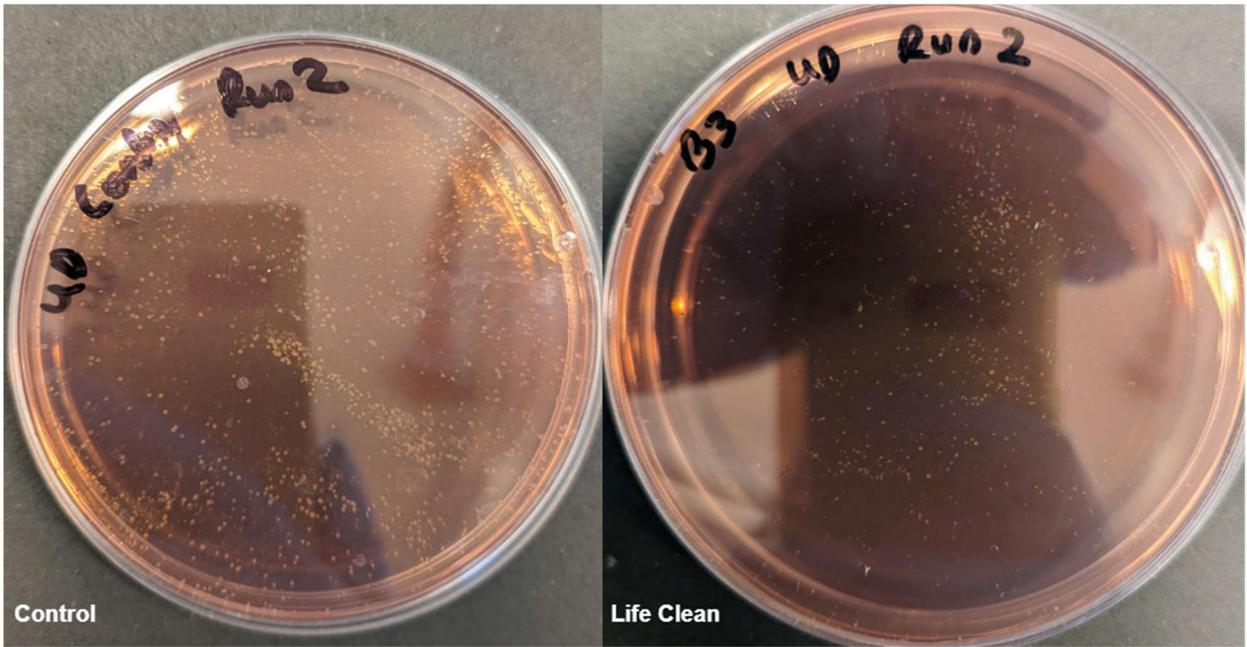
E. Virocid



F. Comparison with Control CIN plate and Samples Treated with Free Bac @35



G. Comparison with Control CIN plate and Samples Treated with Life Clean



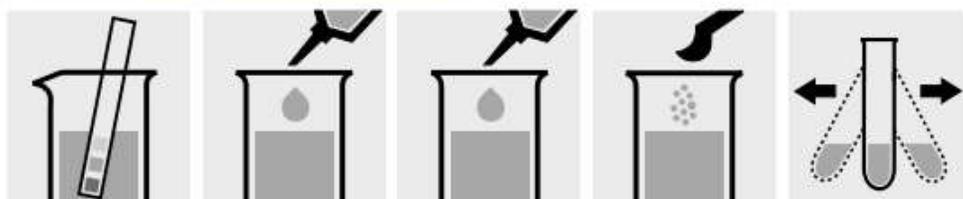
Appendix 4: Analytical procedure for ammonium (NH₄-N) test using Spectroquant Prove 100

Ammonium

114752
 Test

Measuring range:	0.05 – 3.00 mg/l NH ₄ -N	0.06 – 3.86 mg/l NH ₄	10-mm cell
	0.03 – 1.50 mg/l NH ₄ -N	0.04 – 1.93 mg/l NH ₄	20-mm cell
	0.010 – 0.500 mg/l NH ₄ -N	0.013 – 0.644 mg/l NH ₄	50-mm cell
	0.05 – 3.00 mg/l NH ₃ -N	0.06 – 3.65 mg/l NH ₃	10-mm cell
	0.03 – 1.50 mg/l NH ₃ -N	0.04 – 1.82 mg/l NH ₃	20-mm cell
	0.010 – 0.500 mg/l NH ₃ -N	0.016 – 0.608 mg/l NH ₃	50-mm cell

Expression of results also possible in mmol/l.



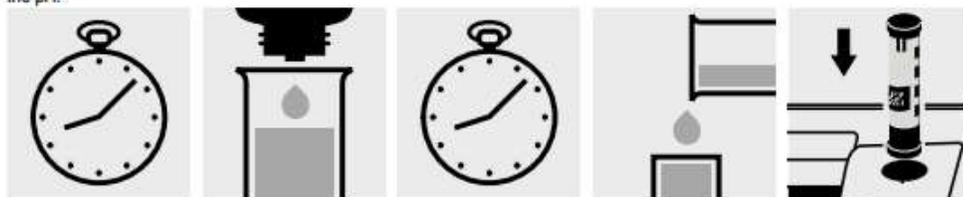
Check the pH of the sample, specified range: pH 4 – 13.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

Pipette 5.0 ml of the sample into a test tube.

Add 0.60 ml of NH₄-1 with pipette and mix.

Add 1 level blue microspoon of NH₄-2.

Shake vigorously to dissolve the solid substance.



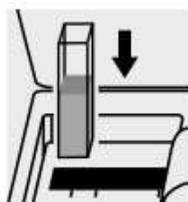
Reaction time:
5 minutes

Add 4 drops of NH₄-3 and mix.

Reaction time:
5 minutes

Transfer the solution into a corresponding cell.

Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

Very high ammonium concentrations in the sample produce turquoise-colored solutions (measurement solution should be yellow-green to green) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

To measure in the 50-mm cell, the sample volume and the volume of the reagents have to be doubled for each. Alternatively, the semi-microcell, Cat.No. 173502, can be used.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 50, Cat.No. 114695, or the Standard solutions for photometric applications, CRM, Cat.Nos. 125022, 125023, 125024, and 132227.

Ready-to-use ammonium standard solution Certipur®, Cat.No. 119812, concentration 1000 mg/l NH₄⁺, can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 50) is highly recommended.

Appendix 5. Microbiological Efficacy Summary of Life Clean



Microbiological Efficacy Summary

Document	Doc. id.	Version	Page
Assessment of antimicrobial efficiency – LifeClean Disinfectant Std and Plus	LC-TD-0052-Public	01	1 (4)
Issued by (Name/Signature)	Rahma Wehelie		Date
Approved by (Name/Signature)	Rahma Wehelie		Date
Lars Nord	Lars Nord		Date
			2022-03-29
			2022-03-29

	Test norm	Test type	Organism	Log reduction required	Log reduction achieved	Laboratory	Clean or dirty	Contact time	LC Std 400-200 PPM	LC Plus 800-400 PPM
Sporecidal	EN 13697:2001 (Phase 2, Step 2)	Quantitative Carrier test	<i>Bacillus subtilis</i> ATCC 6633	4 log ₁₀	>4 log ₁₀	Dr. BnE + Partner GMBH Laboratory, Germany	Clean	2 min		✓
	EN 13697:2001 (Phase 2, Step 2)	Quantitative Carrier test	<i>Clostridium difficile</i> UK 027	3 log ₁₀	>3 log ₁₀		Clean	2 min		✓1
	EN 13704:2002 (Phase 2, Step 1)	Quantitative suspension test	<i>Clostridium difficile</i> UK 027	3 log ₁₀	>3 log ₁₀		Clean	1.5 min	✓	✓
			<i>Clostridium difficile</i> UK 027		>3.3 log ₁₀		Clean/Dirty	5 min	✓1, 3	✓
			<i>Clostridium difficile</i> UK 023		>6.1-7.5 log ₁₀	Clean	5-10 min	✓2	✓	
	EN 17126:2018 (Phase 2, Step 1)	Quantitative suspension test	<i>Bacillus subtilis</i>	4 log ₁₀	>5.02 log ₁₀	MSL Solution, UK	Clean	2.5 min	✓6	✓
			<i>Bacillus cereus</i>		>5.21 log ₁₀		Dirty	2 min	✓6	✓
			<i>Clostridium difficile</i>		>5.21 log ₁₀			2 min	✓6	✓
	EN 17126:2018 (Phase 2, Step 1)	Quantitative suspension test	<i>Bacillus subtilis</i>	4 log ₁₀	>4.08 log ₁₀	MSL Solution, UK	Dirty	2 min	✓6	✓
			<i>Bacillus cereus</i>		>5.36 log ₁₀			2 min	✓6	✓
<i>Clostridium difficile</i>			>5.43 log ₁₀		2 min			✓6	✓	
EN 13727:2012+A2:2015 (Phase 2, Step 2)	Quantitative suspension test	<i>Clostridium perfringens</i>	5 log ₁₀	5.08 log ₁₀	Hygiene Nord GmbH, Germany	Clean	2 min		✓	
Mycobactericidal	EN 14348:2005 (Phase 2, Step 1)	Quantitative suspension test	<i>Mycobacterium terrae</i> ATCC 15755	4 log ₁₀	>4 log ₁₀	Dr. BnE + Partner GMBH Laboratory, Germany	Clean	1 min	✓	✓
			<i>Mycobacterium avium</i> ATCC 15769						✓	✓
	EN 14563:2009 (Phase 2, Step 2)	Quantitative Carrier test	<i>Mycobacterium terrae</i> ATCC 15755	4 log ₁₀	>4 log ₁₀	Dr. BnE + Partner GMBH Laboratory, Germany	Clean	1 min	✓	✓
			<i>Mycobacterium avium</i> ATCC 15769						✓	✓
Virucidal	EN 14476:2019 (Phase 2, Step 1)	Quantitative suspension test	<i>Poliiovirus</i> Type 1, LSC-2/ba	4 log ₁₀	>6.33 log ₁₀	Labor-Enders Laboratory, Germany	Clean	30 sec	17.5 ppm	✓
			<i>Adenovirus</i> Type 5, strain Adencid 75, ATCC VR-5		>5.33 log ₁₀				17.5 ppm	✓
			<i>Murine Norovirus</i> Strain 599		>5.50 log ₁₀				17.5 ppm	✓
			<i>Poliovirus</i> S140		>4.50 log ₁₀				17.5 ppm	✓
	EN 14476:2019 (Phase 2, Step 1)	Quantitative suspension test	<i>Bovine Viral Diarrhea Virus (BVD)</i> strain NADL	4 log ₁₀	>5.67 log ₁₀	Labor-Enders Laboratory, Germany	Clean	1 min	20 ppm	✓
			<i>Modified vaccinia virus Ankara (MVA)</i>		>4.58 log ₁₀					✓
	EN 16777:2018	Quantitative Carrier test	<i>Adenovirus</i> Type 5	4 log ₁₀	>6.51 log ₁₀	Labor-Enders Laboratory, Germany	Clean	2 min	110 ppm	✓
	EN16777:2018	Quantitative Carrier test	<i>Murine Norovirus</i>	4 log ₁₀	>6.19 log ₁₀	Dr. BnE + Partner GMBH Laboratory, Germany	Clean	2 min	✓	✓
EN16777:2018	Quantitative Carrier test	<i>Modified vaccinia virus Ankara (MVA)</i>	4 log ₁₀	>4.97 log ₁₀	Dr. BnE + Partner GMBH Laboratory, Germany	Clean	5 min	✓	✓	

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	Test norm	Test type	Organism	Log reduction required	Log reduction achieved	Laboratory	Clean or dirty	Contact time	LC Std 400-200 PPM	LC Plus 800-400 PPM
Virustaki	EN1677:2018	Quantitative Carrier test	Murine Parvovirus (MVM)	4 log ₁₀	>4.41 log ₁₀	Labor-Enders Laboratory, Germany	Clean	5 min		✓
	EN 14675:2015 (Phase 2, Step 1)	Quantitative suspension test	IPNV Virus Salmonid fish viral infection	4 log ₁₀	>4 log ₁₀	Norwegian Veterinary Institute, Norway	Clean	5 min	✓	✓
				4 log ₁₀	>4 log ₁₀		Dirty	5 min	✓	✓
	EN 14349:2007 (Phase 2, Step 1)	Quantitative Carrier test	Avian influenza virus, (H10N7)	4 log ₁₀	>4.2 log ₁₀	SVA	Clean	1 min		✓
	EN 14349:2007 (Phase 2, Step 2)	Quantitative Carrier test	PPV, strain 89/2/76	4 log ₁₀	>5.3 log ₁₀	SVA	Clean	5 min	✓	✓
	EN 14476:2013+A2:2019	Suspension test	Feline coronavirus (FCoV)	4 log ₁₀	>4.3 log ₁₀	M&L solution, UK	Clean	1 min	✓	✓
	EN 14476:2013+A2:2019	Suspension test	Bovine coronavirus (BCoV)	4 log ₁₀	>5.5 log ₁₀	Dr. Boll + Partner GMBH Laboratory, Germany	Clean	30 sec	50 ppm	✓
	EN 14476:2013+A2:2019	Suspension test	SARS-CoV-2-Covid-19	4 log ₁₀	>5.6 log ₁₀	SVA	Clean	30 sec	50 ppm	✓
AOAC 961.02	Quantitative Carrier test	Adenovirus Type 5, strain Adenoid 75, ATCC VR-5	5 log ₁₀	6.1 log ₁₀	MicroChem Laboratory, Texas, USA	Clean	5 min	✓	✓	
Fungistaki	EN 13626:2013 (Phase 2, Step 1)	Quantitative suspension test	Candida albicans ATCC 10231	4 log ₁₀	>4 log ₁₀	Dr. Boll + Partner GMBH Laboratory, Germany	Clean	1 min	✓	✓
			Aspergillus brasiliensis ATCC 16404						✓	✓
	EN 13634:2013 (Phase 2, Step 1)	Quantitative suspension test	Candida albicans ATCC 10231	4 log ₁₀	>6.36 log ₁₀	Labor-Enders Laboratory, Germany	Clean	1 min	20 ppm	✓
	EN 13634:2013 (Phase 2, Step 1)	Quantitative suspension test	Candida auris DSM 21062	4 log ₁₀	>4 log ₁₀	Microbial Analytics Sweden	Clean	2 min	✓	✓
	EN 14562:2006 (Phase 2, Step 2)	Quantitative Carrier test	Aspergillus brasiliensis (niger) / black mold ATCC 16404	4 log ₁₀	>4 log ₁₀	Mindlab Stockholm AB	Clean/Dirty	3/5 min	✓	✓
	EN 14562:2006 (Phase 2, Step 2)	Quantitative Carrier test	Candida albicans ATCC 10231	4 log ₁₀	>4 log ₁₀	Dr. Boll + Partner GMBH Laboratory, Germany	Clean	1 min	✓	✓
	EN 14562:2006 (Phase 2, Step 2)	Quantitative Carrier test	Aspergillus brasiliensis (niger) / black mold ATCC 16404	4 log ₁₀	>4 log ₁₀	Dr. Boll + Partner GMBH Laboratory, Germany and	Clean	2 min		✓
				4 log ₁₀	>4 log ₁₀		Dirty	2 min	✓	
	AOAC 961.02	Germinical Spray	Trichophyton mentagrophytes	0/0	0/0	Medical Technology, Mahidol University, Thailand	Dirty	2 min	✓	✓
	EN 16615:2015 (Phase 2, step 2)	4-Field test	Candida albicans ATCC 10231	4 log ₁₀	>5 log ₁₀	RISE Research Institute of Sweden	Clean	2 min	✓	✓
EN 16615:2015 (Phase 2, step 2)	4-Field test	Candida albicans ATCC 10231	4 log ₁₀	>5.63 log ₁₀	Hygiene Nord GmbH, Germany	Clean	1 min	✓	✓	
EN 17387:2020	Quantitative Carrier test	Candida albicans ATCC 10231	4 log ₁₀	>5.47 log ₁₀	Labor-Enders Laboratory, Germany	Clean	5 min	✓	✓	
Gram-Negative Bacteria	EN 13727:2014 (Phase 2, Step 1)	Quantitative suspension test	Pseudomonas aeruginosa ATCC 15442	5 log ₁₀	>7.58 log ₁₀	Labor-Enders Laboratory, Germany	Clean	1 min	20 ppm	✓
	EN 14561:2004 (Phase 2, Step 2)	Quantitative Carrier test	Pseudomonas aeruginosa ATCC 15442	5 log ₁₀	>5.11 log ₁₀	Dr. Boll + Partner GMBH Laboratory, Germany	Clean	1 min	✓	✓
	EN 13727:2015 (Phase 2, Step 2)	Quantitative suspension test	Pseudomonas aeruginosa ATCC 15442	5 log ₁₀	>5 log ₁₀	Food Safety Laboratory, Chung-Ang University, Seoul, South Korea	Dirty	2 min	✓	✓
	EN 13727:2015 (Phase 2, Step 2)	Quantitative suspension test*	Escherichia coli ATCC 25922	5 log ₁₀	>5 log ₁₀	Internal test at Örebro University Hospital, Sweden	Clean	2 min	✓	✓
	EN 13727:2015 (Phase 2, Step 2)	Quantitative suspension test	Escherichia coli K12, NCTC 10638	5 log ₁₀	>7.5 log ₁₀	Labor-Enders Laboratory, Germany	Clean	1 min	20 ppm	✓
	EN 13727:2015 (Phase 2, Step 2)	Quantitative suspension test	Campylobacter jejuni ATCC 33560	5 log ₁₀	>5 log ₁₀	Internal test at Örebro University Hospital, Sweden	Clean/Dirty	2 min	✓	✓
	EN 13727:2015 (Phase 2, Step 2)	Quantitative suspension test	Proteus mirabilis ATCC 14153	5 log ₁₀	>7.5 log ₁₀	Labor-Enders Laboratory, Germany Labor-Enders Laboratory, Germany	Clean	1 min	20 ppm	✓
	EN 13727:2015 (Phase 2, Step 2)	Quantitative suspension test	Salmonella typhimurium ATCC 14028	5 log ₁₀	>5.76 log ₁₀	Internal test at Örebro University Hospital, Sweden	Clean	2 min	✓	✓
5 log ₁₀				>5.76 log ₁₀	Dirty		2 min	✓	✓	
Legionella pneumophila ATCC 30152			5 log ₁₀	>5.76 log ₁₀	Clean	2 min	✓	✓		
			5 log ₁₀	>5 log ₁₀	Dirty	2 min	✓	✓		

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Test norm	Test type	Organism	Log reduction required	Log reduction achieved	Laboratory	Clean or dirty	Contact time	LC Std 400-200 PPM	LC Plus 300-400 PPM	
Gram-Negative Bacteria	EN 14349:2012 (Phase 2, Step 2)	Aeromonas salmonicida ATCC 14174	5 log ₁₀	>5.65 log ₁₀	Internal test at Örebro University Hospital, Sweden	Clean	2 min	✓	✓	
				>5.65 log ₁₀		Dirty	2 min	✓	✓	
		Yersinia ruckeri ATCC 29473		>5 log ₁₀		Clean	2 min	✓	✓	
				>5 log ₁₀		Dirty	2 min	✓	✓	
	EN 13727:2015 (Phase 2, Step 2)	Klebsiella pneumoniae (ESBL) CCUG 54718	5 log ₁₀	> 5.76 log ₁₀	Internal test at Örebro University Hospital	Clean/Dirty	2 min	✓	✓	
						Acinetobacter baumannii (Clinical strain)	✓	✓		
	AOAC W61.00	Germeicidal Spray	Salmonella choleraesuis ATCC 10708	0/60	0/60	Medical Technology, Mahachulalongkornrajavidyalaya University, Thailand	Clean	30 sec		✓
			Pseudomonas aeruginosa ATCC 15442				Dirty	2 min		✓
	AOAC W61.00	Quantitative Carrier test	Salmonella enterica ATCC 10708	5 log ₁₀	>4.2 log ₁₀	MicroChem Laboratory, Texas, USA	Clean	5 min	✓	✓
			Pseudomonas aeruginosa ATCC 15442		>4.7 log ₁₀					
	EN 16615:2015 (Phase 2, step 2)	4-Field test	Pseudomonas aeruginosa ATCC 15442	5 log ₁₀	>6.83 log ₁₀	Hygiene Nord GmbH, Germany	Clean	1 min	✓	✓
	EN 17387:2000 (Phase 2, step 2)	Quantitative Carrier test	Pseudomonas aeruginosa ATCC 15442	5 log ₁₀	>6.41 log ₁₀	Labo-Enders Laboratory, Germany	Clean	5 min	✓	✓
Gram-Positive Bacteria	EN 13727:2014 (Phase 2, Step 1)	S. aureus ATCC 6538	5 log ₁₀	>5 log ₁₀	Dr. Bill + Partner GMBH Laboratory, Germany	Clean	1 min	✓	✓	
	EN 13727:2014 (Phase 2, Step 1)	S. aureus ATCC 6538	5 log ₁₀	>7.36 log ₁₀	Labo-Enders Laboratory, Germany	Clean	1 min	20 ppm	✓	
	EN 13727:2015 (Phase 2, Step 2)	S. aureus ATCC 6538	5 log ₁₀	>5 log ₁₀	Food Safety Laboratory, Chung-Ang University, Seoul, South Korea	Dirty	2 min	✓	✓	
	EN 14561:2006 (Phase 2, Step 2)	S. aureus ATCC 6538	5 log ₁₀	>5 log ₁₀	Dr. Bill + Partner GMBH Laboratory, Germany	Clean	1 min	✓	✓	
	AOAC W61.00	Germeicidal Spray	S. aureus ATCC 6538	0/60	0/60	Medical Technology, Mahachulalongkornrajavidyalaya University, Thailand	Clean	30 sec		✓
							Dirty	2 min		✓
	AOAC Use Dilution	Quantitative Carrier test	S. aureus ATCC 6538	5 log ₁₀	>6.71 log ₁₀	MicroChem Laboratory, Texas, USA	Clean	5 min	✓	✓
	EN 14349:2012 (Phase 2, Step 2)	Quantitative Carrier test	S. aureus ATCC 6538	5 log ₁₀	>5.02 log ₁₀	SVA, Sweden	Dirty	5 min		✓
	EN 14349:2012 (Phase 2, Step 2)	Quantitative Carrier test	E. coli ATCC 10541	5 log ₁₀	>5.11 log ₁₀	SVA	Dirty	5 min		✓
	EN 14561:2006 (Phase 2, Step 2)	Quantitative Carrier test	E. coli ATCC 10541	5 log ₁₀	>5.11 log ₁₀	Dr. Bill + Partner GMBH Laboratory, Germany	Clean	1 min	✓	✓
	EN 13727:2015 (Phase 2, Step 2)	Quantitative suspension test	E. coli ATCC 10541	5 log ₁₀	>5 log ₁₀	Food Safety Laboratory, Chung-Ang University, Seoul, South Korea	Dirty	2 min	✓	✓
	EN 13727:2015 (Phase 2, Step 2)	Quantitative suspension test	E. coli ATCC 10541	5 log ₁₀	>7.45 log ₁₀	Labo-Enders Laboratory, Germany	Clean	1 min	20 ppm	
	EN 13727:2015 (Phase 2, Step 2)	Quantitative suspension test	L. monocytogenes CCUG 51681	5 log ₁₀	>5 log ₁₀	Internal test at Örebro University Hospital	Clean/dirty	2 min	✓	✓
			S. equi CCUG 37782	5 log ₁₀	>5 log ₁₀		Clean	2 min	✓	✓
		Quantitative suspension test	S. equi CCUG 37782	5 log ₁₀	>5 log ₁₀	Dirty	2 min	✓	✓	
EN 14349:2012 (Phase 2, Step 2)	Quantitative suspension test	C. piscicola ATCC 3586	4 log ₁₀	>5 log ₁₀	Internal test at Örebro University Hospital	Clean	2 min	✓	✓	
			4 log ₁₀	>5 log ₁₀		Dirty	2 min	✓	✓	
EN 16615:2015 (Phase 2, step 2)	4-Field test	S. aureus ATCC 6538	5 log ₁₀	>5 log ₁₀	RISE Research Institutes of Sweden	Clean	2 min	✓	✓	
EN 13727:2015 (Phase 2, Step 2)	Quantitative suspension test	E. coli faecium (NR) CCUG 56431								> 5.75 log ₁₀
EN 16615:2015 (Phase 2, step 2)	4-Field test	S. aureus ATCC 6538	5 log ₁₀	>6.95 log ₁₀	Hygiene Nord GmbH, Germany	Clean	1 min	✓	✓	

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Gram-Positive Bacteria	EN 16615:2015 (Phase 2, step 2)	4-Field test	Enterococcus hirae ATCC 10541	5 logs	>7.02 logs	Hygiene Nord GmbH, Germany	Clean	5 min	✓	✓
	EN 17389:2000 (Phase 2, step 2)	Quantitative Carrier test	Enterococcus hirae ATCC 10541 Staphylococcus aureus ATCC 4538	5 logs	7.30 6.95	Labor-Enders Laboratory, Germany	Clean	5 min 5 min	✓	✓
Parasites	N/A	In vitro sporulation method for Coccidia	Coccidia spp		N/A	VidLab, Sweden	Dirty	N/A		✓
	Salmon lice	In vitro	Lepesophtheirus salmonis	N/A	N/A	ILAB, Norway	N/A	1 min	100 ppm	✓
	N/A	In Vitro	Gyrodactylus salaris	N/A	N/A	Norwegian Veterinary Institute, Norway	N/A	10 sec / 1 min	200 / 100 ppm	✓
	DNA Analysis	In Vitro	Plasmid DNA	N/A	N/A	SLU	Clean	10 / 2 min		✓

¹Initial bacterial spores 10⁶

²Initial bacterial spores 10⁶

³Initial bacterial spores 10⁶ and different bacteria strain

⁴Initial bacterial spores 10⁶ and 200 PPM

⁵Bactericidal effect (Clean condition for 2 minutes and Dirty condition for 5 minutes).

*These bacteria: Bacillus subtilis, Bacillus cereus and Clostridium difficile were tested for 400 PPM for 2 minutes for clean/dirty condition..

Third party test institutes



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