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Assessment of antimicrobial efficiency – LifeClean Disinfectant Std and Plus	LC-TD-0052-MDD	03	1 (5)
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Rahma Wehelie Approved by (Name/Signature)	2022-03-24		
Lars Nord	2022-03-24		



LifeClean Disinfectant Std and LifeClean Disinfectant Plus:
Assessment of antimicrobial efficiency

A compilation of literature review,
tests and experiences

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1. SUMMARY

LifeClean Disinfectant – High-level Antimicrobial Disinfectant

LifeClean Disinfectant is a high-level broad-spectrum disinfectant for non-invasive medical devices, consisting of ready-to-use chlorine dioxide (ClO₂). To be used by professionals within healthcare facilities and applied with dry wipes.

LifeClean Disinfectant is a high-level disinfectant with proven efficacy as a sporicidal, bactericidal (both Gram-Negative Bacteria and Gram-Positive Bacteria), mycobactericidal, virucidal, and fungicidal. LifeClean got a short contact time of ≤2 minutes for all claimed microorganisms – except for black mold (*aspergillus brasiliensis*) and for sporicidal capacity, which we claim 5 minutes contact time for LifeClean Disinfectant Std.

Based on our fulfilled standards, we claim the specific microorganisms and its corresponding contact time for all microorganisms that are included below.

2. APPENDICES: MICROBIOLOGICAL EFFICACY SUMMARY

	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
Sporicidal	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					
			<i>Clostridium difficile</i>		>5.21 log ₁₀					
	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	✓
Mycobactericidal	EN 14348:2005 (Phase 2, Step 1)	Quantitative suspension test	<i>Mycobacterium terrae</i> ATCC 15755	4 log ₁₀	>4 log ₁₀	Dr. Brill + 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. Brill + Partner GMBH Laboratory, Germany	Clean	1 min	✓	✓
			<i>Mycobacterium avium</i> ATCC 15769						✓	✓
Virucidal	EN 14476:2019 (Phase 2, Step 1)	Quantitative suspension test	Poliovirus Type 1, LSc-2aba	4 log ₁₀	>6.33 log ₁₀	Labor-Enders Laboratory, Germany	Clean	30 sec	17.5 ppm	✓
			Adenovirus Type 5, strain Adenoid 75, ATCC VR-5		>5.33 log ₁₀				17.5 ppm	✓
			Murine Norovirus Strain S99		>5.50 log ₁₀				17.5 ppm	✓
			Polyomavirus SV40		>4.50 log ₁₀				17.5 ppm	✓
	EN 14476:2019 (Phase 2, Step 1)	Quantitative suspension test	Bovine Viral Diarrhea Virus (BVDV) strain NADL	4 log ₁₀	>5.67 log ₁₀	Labor-Enders Laboratory, Germany	Clean	1 min	20 ppm	✓
			Modified vaccinia virus Ankara (MVA)		>4.58 log ₁₀					
	EN 16777:2018	Carrier Test	Adenovirus Type 5	4 log ₁₀	>6.51 log ₁₀	Labor-Enders Laboratory, Germany	Clean	2 min	110 ppm	✓
	EN16777:2018	Carrier Test	Murine Norovirus	4 log ₁₀	>6.19 log ₁₀	Dr. Brill + Partner GMBH Laboratory, Germany	Clean	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 800-400 PPM
Virucidal	EN16777:2018	Carrier Test	Murine Parvovirus (MVM)	4 log ₁₀	>4.41 log ₁₀	Labor-Enders Laboratory, Germany	Clean	5 min		✓
	EN 16777:2018	Quantitative Carrier test	Modified vaccinia virus Ankara (MVA)	4 log ₁₀	>4.97 log ₁₀	Dr. Brill + Partner GMBH Laboratory, Germany	Clean	5 min	✓	✓
	EN 14476:2013+A2:2019	Suspension test	Feline coronavirus (FCoV)	4 log ₁₀	>4.3 log ₁₀	MSL solution, UK	Clean	1 min	✓	✓
	EN 14476:2013+A2:2019	Suspension test	Bovine coronavirus (BCoV)	4 log ₁₀	>5.5 log ₁₀	Dr. Brill + 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	✓
Fungicidal	EN 13624:2013 (Phase 2, Step 1)	Quantitative suspension test	Candida albicans ATCC 10231	4 log ₁₀	>4 log ₁₀	Dr. Brill + Partner GMBH Laboratory, Germany	Clean	1 min	✓	✓
			Aspergillus brasiliensis ATCC 16404						✓	✓
	EN 13624:2013 (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 13624:2013 (Phase 2, Step 1)	Quantitative suspension test	Candida auris DSM 21092	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	Mikrolab 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. Brill + 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. Brill + Partner GMBH Laboratory, Germany and	Clean	2 min		✓
	EN 16615:2015 (Phase 2, step 2)	4-Field test	Candida albicans ATCC 10231	4 log ₁₀	>5 log ₁₀	RISE Research Institutes of Sweden	Clean	2 min	✓	✓
Gram-Negative Bacteria	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 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 14561:2006 (Phase 2, Step 2)	Carrier test	Pseudomonas aeruginosa ATCC 15442	5 log ₁₀	>5.11 log ₁₀	Dr. Brill + 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 K12, NCTC 10538	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	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 33152	5 log ₁₀	>5.76 log ₁₀		Clean	2 min	✓	✓
				5 log ₁₀	>5 log ₁₀		Dirty	2 min	✓	✓
	EN 13727:2015 (Phase 2, Step 2)	Quantitative suspension test	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)						✓	✓
	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	✓	✓

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Gram-Positive Bacteria	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
	EN 13727:2014 (Phase 2, Step 1)	Suspension test	Staphylococcus aureus ATCC 6538	5 log ₁₀	>5 log ₁₀	Dr. Brill + Partner GMBH Laboratory, Germany	Clean	1 min	✓	✓
	EN 13727:2014 (Phase 2, Step 1)	Suspension test	Staphylococcus aureus ATCC 6538	5 log ₁₀	>7.36 log ₁₀	Labor-Enders Laboratory, Germany	Clean	1 min	20 ppm	✓
	EN 13727:2015 (Phase 2, Step 2)	Suspension test	Staphylococcus 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)	Carrier test	Staphylococcus aureus ATCC 6538	5 log ₁₀	>5 log ₁₀	Dr. Brill + Partner GMBH Laboratory, Germany	Clean	1 min	✓	✓
	EN 14561:2006 (Phase 2, Step 2)	Quantitative Carrier test	Enterococcus hirae ATCC 10541	5 log ₁₀	>5.11 log ₁₀	Dr. Brill + Partner GMBH Laboratory, Germany	Clean	1 min	✓	✓
	EN 13727: 2015 (Phase 2, Step 2)	Quantitative suspension test	Enterococcus hirae 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	Enterococcus hirae ATCC 10541	5 log ₁₀	>7.45 log ₁₀	Labor-Enders Laboratory, Germany	Clean	1 min	20 ppm	✓
	EN 13727:2015 (Phase 2, Step 2)	Quantitative suspension test	Listeria monocytogenes CCUG 51681	5 log ₁₀	>5 log ₁₀	Internal test at Örebro University Hospital	Clean/dirty	2 min	✓	✓
	EN 13727:2015 (Phase 2, Step 2)	Quantitative suspension test	Entrococcus faecium (VRE) CCUG 56431	5 log ₁₀	> 5.75 log ₁₀	Internal test at Örebro University Hospital	Clean/Dirty	2 min	✓	✓
	EN 16615:2015 (Phase 2, step 2)	4-Field test	Staphylococcus aureus ATCC 6538	5 log ₁₀	>6.95 log ₁₀	Hygiene Nord GmbH, Germany	Clean	1 min	✓	✓
	EN 16615:2015 (Phase 2, step 2)	4-Field test	Enterococcus hirae ATCC 10541	5 log ₁₀	>5.80 log ₁₀	Hygiene Nord GmbH, Germany	Clean	5 min	✓	✓
DNA Analysis		In Vitro	Plasmid DNA	N/A	N/A	SLU	Clean	10 / 2 min	✓	✓

¹Initial **bacterial** spores 10⁶
²Initial **bacterial** spores 10⁹
³Initial **bacterial** spores 10⁹ and different bacteria strain
⁴Initial **bacterial** spores 10⁶ and 200 PPM
⁵Bactericidal effect (Clean condition for 2 minutes and Dirty condition for 5 minutes).
⁶These bacteria: Bacillus subtilis, Bacillus cereus and Clostridium difficile were tested for 400 PPM for 2 minutes.

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Third party test institutes



Veterinærinstituttet
Norwegian Veterinary Institute

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