Analysis Report

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925805.2

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Item: Test of bactericidal efficiency during surface treatment with 'Lite Bulb Moments Smartcare Germicidal UVC lightning 20W'

Sampling: The assignor

Period: Samples received: 20 May 2020
Test performed: 30 June – 6 July 2020

Storage: The test material will be destroyed after 3 months, unless otherwise agreed in writing.

Remark: The account of the method(s) used only concerns the analysed sample(s).

Terms: This test was conducted in accordance with international requirements (ISO/IEC 17025:2017) and in accordance with the General Terms and Conditions of Danish Technological Institute. The test results solely apply to the tested item(s) or to the sub-sample(s) selected for analysis. This analysis report may be quoted in extract only if Danish Technological Institute has granted its written consent.

Date/place: 07 July 2020
Danish Technological Institute, Aarhus
Laboratory for Chemistry and Microbiology

Digitally signed by: Ebbe Norskov Bak
Date: 2020.07.07 10:02:21 +02'00'

Signature: Ebbe Norskov Bak
Specialist

Introduction

The bactericidal efficacy of exposure of a surface with the UVC-lamp was tested. The UVC-lamp was switched on in the test room for 30 min., with a distance from the lamp to the surface contaminated with the test organism of 1 meter.

Test procedure

The test surfaces were prepared according DS/EN 13697:2015+A1:2019 by preparing a suspension of the test organism in a solution with an interfering substance to simulate a lightly contaminated surface. The test suspension was inoculated onto stainless steel surfaces and dried at 37°C until visibly dry.

The inoculated surfaces were exposed to the UVC radiation at room temperature. The effect on the test organism was evaluated as the number of colony forming units (cfu) on the test samples following the UVC exposure relative to control samples prepared in the same way but not being exposed to the UVC radiation. The number of cfu was quantified according to DS/EN 17272:2020 by transferring the plates to a neutralizing agent and plating and incubation of dilution series and filtrates of the recovery solution.

Enterococcus hirae was chosen as the test organism as *E. hirae* is a gram-positive bacteria, which usually are more resistant towards UV-C exposure than gram-negative bacteria.

Product under test

The product was provided by the assignor.

Product name**:**	Lite Bulb Moments Smartcare Germicidal UVC lightning 20W
UV-C light:	UV-C wavelength: 253.7 nm (Ozone free)
Power:	20W±10%

Experimental conditions

Test organisms:	*Enterococcus hirae* ATCC 10541
Contact time:	30 min. ± 10 sec.
Distance from UV-lamp to test organism:	1 meter ± 10 cm.
Test temperature:	Room temperature (20-25°C)
Incubation:	(37 ± 1) °C for 48 hours
Interfering substances:	0.3 g/L bovine albumin (simulated clean conditions)
Solution for washing the discs:	Saline-peptone solution (SPO)
Test surface:	Stainless steel surface (2 cm diameter) Grade 2 B 1.4301 (EN 10088-1) EN 10 088-2. The test surfaces had been cleaned and sterilized.
Number of replicates for the test:	3

Results

	Contact time: 30 min Distance: 1 meter	
Testorganisme	**Reduction**	**Log reduction**
E. hirae	99.1%±0.3%	2.03±0.11

Table 1 . Reduction of Enterococcus hirae following exposure to the UVC-lamp under test

Conclusion:

Treatment of the surface contaminated with *Enterococcus hirae* for 30 min. using the UVC-lamp with a distance of 1 meter between the lamp and the surface, caused a 99% reduction in the concentration of viable bacteria evaluated as the cfu-concentration.

See enclosures 1-2 for detailed results.

Reference methods

DS/EN 13697:2015+A1:2019, modified version.
Chemical disinfectants and antiseptics – Quantitative non-porous surface test for the evaluation and bactericidal and/or fungicidal activity of chemical disinfectants used in food, industrial, domestic and institutional areas – Test method and requirements without mechanical action (phase 2, step 2).

DS/EN 17272:2020, modified version
Chemical disinfectants and antiseptics – Methods of airborne room disinfection by automated process – Determination of bactericidal, mycobactericidal, sporicidal, fungicidal, yeasticidal, viricidal and phogocidal activities.

Enclosure 1

Product concentration / Exposure time	UVC-light / 30 min.

Test suspension N	**Dilutions**	**Microbial count of plates**		**N [cells/mL] Log(N)**	**$5 \cdot 10^7 \leq N \leq 2 \cdot 10^9$ $7.7 \leq \log(N) \leq 9.3$**	**N [cells/metal disc] Log(N)**
	10^{-6}	305	31	$3.08 \cdot 10^8$	$7.7 \leq$ **8.49** ≤ 9.3 Accepted	$7.69 \cdot 10^6$
	10^{-7}	>330	31	8.49		6.89

Control plates	**Dilutions**	**Microbial count of plates T1**		**T1: [cells/metal disc]** $\geq 1 \cdot 10^6$ CFU/disc **Log(T1)**	**Microbial count of plates T2**		**T2: [cells/metal disc]** $\geq 1 \cdot 10^6$ CFU/disc **Log(T2)**
	10^{-1}	>330	>330	$5.40 \cdot 10^6$ Accepted	>330	>330	$3.95 \cdot 10^6$ Accepted
	10^{-2}	>330	>330		>330	>330	
	10^{-3}	56	52	6.73	42	37	6.60
	10^{-4}	10	4		3	5	

Test	**Dilutions / filtration volume**	**Microbial count of plates, Test 1**		**Microbial count of plates, Test 2**		**Microbial count of plates, Test 3**		**Result**	**n'1+n'2**	**Log(n'1 +n'2)**	**Log reduction T = 6.66**	**Reduction T = $4.68 \cdot 10^4$**
	10^0	>330	>330	>330	>330	>330	>330	Test 1	$4.05 \cdot 10^4$	4.61	2.06	99.1%
	10^{-1}	42	39	56	59	33	36	Test 2	$5.75 \cdot 10^4$	4.76	1.90	98.8%
	10^{-2}	7	2	6	7	4	3	Test 3	$3.45 \cdot 10^4$	4.54	2.13	99.3%
	10^{-3}	0	0	0	0	0	0					
	10 ml	>165		>165		>165		**Average ±std.dev.**	$4.42 \cdot 10^4$	4.64	**2.03 ±0.11**	**99.1% ±0.3%**
	87 ml	>165		>165		>165						
n'2: CFU/metal disc		2		27		1						

Table 2: n'1: CFU/membrane filter. n'2: CFU/disc. The lower limit is 14 CFU/ml. Results <14 CFU are included in the final calculation as<14.

Enclosure 2

Method validation Product concentration	UVC-light / 30 min.

Test suspension N	**Dilutions**	**Microbial count of plates**		**N [cells/mL] Log(N)**
	10^{-6}	305	31	$3.08 \cdot 10^{8}$
	10^{-7}	>330	31	8.49

Method validation Neutralization-Dilution method	**Dilutions**	**Microbial count of plates VC**		**VC_1: cells/mL/Log(VC_1)**
	10^{-7}	34	37	$3.55 \cdot 10^{8}$
				8.55

Method validation Membrane filtration	**Dilutions**	**Microbial count of plates VC**	**VC_1: cells/mL/Log(VC_1)**
	10^{-7}	54	$5.40 \cdot 10^{8}$
			8.73

Method validation Inhibitory effect of metal disc cast in agarose gel	**Dilution of test organism added to metal disc**	**Microbial count of plate**	**Metal disc cells/mL/Log_{10}**
	10^{-7}	38	$3.80 \cdot 10^{8}$
			8.58

1mL test suspension was used for the validation of the inhibitory effect of the metal disc cast in agarose gel.

Results

Log_{10} for test suspension	**Log_{10} for VC for neutralization-dilution method**	**Log_{10} for VC for membrane filtration method**	**Log_{10} for test organism added to metal disc**
8.49	8.55	8.73	8.58

Table 3: Resumé of the method validation for test with E. hirae.

Conclusion on the validation

The solution for washing the metal discs did not have any toxic effect against the test organism. The membrane filtration and disc cast in the agarose gel did not have any inhibitory toxic effect against the test organism.