BIOTECH TESTING SERVICES

TEST REPORT

LAB NO. : 2000575/ 1 - 2 **DATE: 19/02/2020**

NAME OF CUSTOMER : LIVINGUARD TECHNOLOGIES PVT. LTD

ADDRESS : C – 96, MIDC, TTC Indl Area, Turbhe,
Navi Mumbai-400 705

REFERENCE : Letter Ref. No.: MS2/26 dated February 15, 2020
K. Attention: Dr. Shefali Mishra

DATE OF RECEIPT : 15/02/2020

DATE OF INITIATION : 15/02/2020

DATE OF COMPLETION : 19/02/2020

SAMPLE DESCRIPTION : Fabric Sample labeled as – (Samples attached)

Sr. No.	Description	Other details
1.	100% Cellulosic Fabric	Untreated
2.	100% Cellulosic Fabric	Livinguard Treated: Code HEFM 14

Name of Test:

Evaluation of Antiviral Activity by AATCC 100 - 2012

Test Inoculum:

Virus: MS2 Bacteriophage ATCC 15597-B1

Permissive Host Cell: Escherichia coli ATCC 15597

Experimental Conditions:

Sample size	: 48 mm discs
No. of swatches used	: 1.5 gram equivalent
Method of Sterilization of sample	: Autoclaving
Viral Inoculum Volume	: 1.0 ml; 2.80 x 10^8 PFU/ ml
Host Cell Line	: Escherichia coli ATCC 15597
Dilution Medium	: Phosphate Buffered Saline (PBS)
TSA Neutralizer	: 10 ml D/E broth
Assay Medium	: 50% TSA agar
Incubation Period	: 48 hours

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Procedure for Evaluation of Antiviral activity:

MS2 Bacteriophage (MS2), ATCC 15597-B1 virus is a non-enveloped positive-stranded RNA virus of the bacteriophage family Leviviridae. Bacterial cells are the hosts for bacteriophages, and E. coli 15597 serves this purpose for MS2 bacteriophage. Its small size, icosahedral structure, and environmental resistance has made MS2 ideal for use as a surrogate virus (particularly in place of picornaviruses such as poliovirus and human norovirus) in water quality and disinfectant studies. Permissive Host Cell System for MS2: Escherichia coli, 15597.

The Antiviral activity of Fabric was determined by AATCC 100, a quantitative test method, which is similar to the ISO 18184- 2014 protocol. The non-enveloped viruses are very difficult to inactivate, as they don't have the capsid protein layer that enveloped viruses have. Enveloped viruses which have capsid proteins are very easily destroyed and inactivated by polycationic charges. It would be technically correct to infer that the tested textile would be effective against enveloped viruses such as strains of Influenza, Yellow Fever and Coronaviruses.

Stock virus was standardized to prepare a test inoculum. Fabric was cut into appropriately-sized swatches and stacked. The number of swatches per stack is that which is required to absorb the entire liquid inoculum. Fabric was inoculated with the test virus and incubated in a humid environment at room temperature for the determined contact time. An additional control is implemented to verify neutralization effectiveness of the antimicrobial agent. The viral concentration is determined at "Time Zero" to verify the target inoculum. Following neutralization, the carrier suspensions were quantified to determine the levels of infectious virus using plaque assay techniques. Assay plates were incubated for the period most suitable for the virus-host cell system for 3 days. After the incubation period, the assay is scored for log reduction as Efficacy of the test.

Contact time of 8 hours and 24 hours were selected as this textile was being tested for extended use properties. The time was essential as this will show that the treated textile does not allow for regrowth, and or cross contamination of the Virus when not in use. Storage of such a textile will be safe and without danger.

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Results:

Fabric swatches in contact with Virus: MS2 Phage for **8** and **24 hour contact** at **37^{0}C** showed the following results:-

Sample Identification	Inoculated Sample at 0 hours (B)		Inoculated Sample at 8 hours (A)		Log Reduction of Virus at 8 hours (R)	Inoculated Sample at 24 hour (A)		Log Reduction of Virus at 24 hours (R)
	pfu/sample	Log	pfu/sample	Log		pfu/sample	Log	
100% Cotton Fabric **Untreated**	1.25×10^5	5.04	2.50×10^4	4.39	**0.65**	1.00×10^4	4.00	**1.04**
100% cotton Fabric **Treated: Code HEFM 14**			<10	<1	**>4.04**	<10	<1	**>4.04**

Remarks:

PFU: Plaque Forming Unit = No. of Virus

Percentage Reduction of Virus (R) = 100 (B – A/ B)

For BIOTECH TESTING SERVICES

BIOTECH TESTING SERVICES BTS MUMBAI

Dr Shilpa U. Nair
Quality Manager
(Authorized Signatory)

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