

## TEST REPORT

LAB NO. : 2101711/ 1 - 2

DATE: 01/06/2021

**NAME OF CUSTOMER** : M/S. STYLAM INDUSTRIES LIMITED.

**ADDRESS** : SCO 14, Sector 7C, Madhya Marg, Chandigarh, India

**REFERENCE** : Your Letter Ref: MKT-06/21.05.2021 dated May 21 2021  
Kind Attention: Mr. Sachin Bhatla

**DATE OF RECEIPT** : 24/05/2021

**DATE OF INITIATION** : 25/05/2021

**DATE OF COMPLETION** : 31/05/2021

**SAMPLE DESCRIPTION** : Laminate specimen labeled as -

Sr. No.	Sample Code	Sample code
1.	Stylam Antiviral Laminate sample	GGL20
2.	Stylam Antiviral Laminate sample	GGPT
Untreated lab control		

**Name of Test:**

Measurement of Antiviral activity on plastics and other non-porous surfaces and coating materials

**Name of Test Protocol:**

ISO 21702: 2019\*

**Scope of Method:**

This test specifies method for measuring antiviral activity on plastic and other non-porous surface of antiviral-treated products against specified virus. Due to individual sensitivities, the results of one test virus might not be applicable for other viruses.

\*Modified method with use of MS2 virus



## BIOTECH TESTING SERVICES

### Test Microorganism Information:

MS2 Bacteriophage (MS2) is an RNA virus of the family Leviviridae. Escherichia coli 15597 are the hosts for bacteriophages. Due to its environmental resistance, MS2 bacteriophages are used as a surrogate virus (particularly in place of Picornaviruses such as Poliovirus and human Norovirus) in water quality and Antimicrobial studies.

Virus: MS2 Bacteriophage

Permissive Host Cell: Escherichia coli ATCC 15597

### Experimental Details:

Test Carrier	: Laminate applied on Lenata Paper (50 mm x 50 mm); Pre-sterilized by UV light
Control Carrier	: LDPE Film non coated and sterilized by autoclaving (50 mm x 50 mm)
LDPE cover	: LDPE film pre sterilized 40 mm x 40 mm
Virus	: MS2 Bacteriophage; Inoculum volume 0.4 ml
Permissive Host Cell	: Escherichia coli ATCC 15597
Contact Period	: 2 hours
Neutralizer	: DE broth
Medium	: Trypticase soya agar
Incubation for survivors	: 37°C for 3 days

### Validation and Records:

#### Neutralizer Validation and Records:

Validation Test			
Test Organism	Exptl. Condition Control (A) (PFU/ ml)	Neutralizer Toxicity Control (B) (PFU/ ml)	Dilution-neutralization Control (C) (PFU/ ml)
MS2 Bacteriophage	42	44	48

#### Where –

A=No. of PFU/ml of Test organism in Experimental condition validation

B=No. of PFU/ml of Test organism in Neutralizer Toxicity validation



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### Test Procedure:

Pre-sterilized samples were loaded with diluted viral suspension to  $10^6$  PFU/ ml. Virus suspension 0.4 ml was added to 50 mm x 50 mm of Test substrate. It was covered with 40 mm x 40 mm LDPE film. Following exposure time, Virus was eluted and neutralized by serial tenfold dilution and assayed to determined surviving Viruses in comparison with Control without test product in sq. cms. Virus assay was quantitative as Plaque forming unit (PFU) visible as area of Clearance.

### Results:

#### A. Contact duration of 2 hours

Quantitative Assessment of Antiviral Activity – ISO 21702: 2019				
Untreated: Average no. of Plaques recovered at 0 hours ( $U_0$ ): $8.60 \times 10^4$ PFU/sq cm.			Log = 4.93	
Untreated: Average no. of Plaques recovered at 2 hours ( $U_t$ ): $9.80 \times 10^4$ PFU/sq cm.			Log = 4.99	
Sample Identification	Average No. of Plaques recovered from Treated ( $A_t$ )	Log of Plaques recovered from Treated ( $A_t$ )	Antiviral Activity (R) ( $\text{Log } U_t - A_t$ )	Virus Reduction Percentage
Stylam Antiviral Laminate sample GGL20	490	2.69	2.30	99.50
Stylam Antiviral Laminate sample GGPT	640	2.80	2.19	99.34

Where:

R = Antiviral activity

$U_0$  = Log of PFU recovered from Untreated specimen immediately after inoculation, in PFU/  $\text{cm}^2$

$U_t$  = Log of PFU recovered from Untreated specimen after 2 hrs. after inoculation, in PFU/  $\text{cm}^2$

$A_t$  = Log of PFU recovered from Treated specimen after 2 hrs. after inoculation, in PFU/  $\text{cm}^2$

### COMMENT:

When tested as specified, Laminate sample labeled as **Stylam Antiviral Laminate sample - GGL20** has shown **99.50%** reduction; **Stylam Antiviral Laminate sample - GGPT** has shown **99.34%** reduction of MS2 Bacteriophage as surrogate virus in 2 hours when tested by ISO 21702: 2019 standard.

### Disclaimer:

Bacteriophages are viruses of Bacteria. They are suitable only as a Preliminary screen in the development of germicidal product. Due to variation in virus antigen, for specific virucidal claims, test should be conducted specifically with that virus

For BIOTECH TESTING SERVICES



  
Dr Shilpa U. Nair  
Quality Manager  
(Authorized Signatory)

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## BIOTECH TESTING SERVICES

### TEST REPORT

LAB NO. : 2101711/ 1 - 2

DATE: 17/06/2021

**NAME OF CUSTOMER** : M/S. STYLAM INDUSTRIES LIMITED.  
**ADDRESS** : SCO 14, Sector 7C, Madhya Marg, Chandigarh, India  
**REFERENCE** : Your Letter Ref: MKT-06/21.05.2021 dated May 21 2021  
Kind Attention: Mr. Sachin Bhatla  
**DATE OF RECEIPT** : 24/05/2021  
**DATE OF INITIATION** : 25/05/2021  
**DATE OF COMPLETION** : 17/06/2021  
**SAMPLE DESCRIPTION** : Laminate specimen labeled as -

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**Name of Test Protocol:**

ISO 21702: 2019

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This test specifies method for measuring antiviral activity on plastic and other non-porous surface of antiviral-treated products against specified virus. Due to individual sensitivities, the results of one test virus might not be applicable for other viruses.





## BIOTECH TESTING SERVICES

### Virus strains and host cells:

Test Virus: Influenza A virus (H3N2): A/Hong Kong/8/68: ATCC VR-1679

Host Cell: MDCK cell ATCC CCL-34

Infectivity titre test: TCID50 method

### Test Conditions:

Infectivity titre test: TCID50 method

### Experimental Conditions:

Test Sample	: Laminate surface (50 mm x 50 mm); Pre-sterilized by ETO
Control Carrier	: LDPE film (50 mm x 50 mm); Pre-sterilized by ETO
Test procedure	: Triplicates
Virus inoculum volume	: 0.4 ml
Viral titre	: $1.60 \times 10^6$ PFU/ cm <sup>2</sup>
Contact Period	: 2 hours
Neutralizer	: SCDLP broth, validated
Incubation for survivors	: 37° C CO <sub>2</sub> incubator/ 7 days

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**Results:**
**Test Virus:** Influenza A Virus (H3N2): A/Hong Kong/8/68: ATCC VR-1679

**Test Sample:** Stylam Antiviral Laminate sample - GGL20

Virus	Contact Duration	Group	Logarithm of Infectivity titre of virus (lgTCID <sub>50</sub> / cm <sup>2</sup> )	Average titre Infectivity of virus (lgTCID <sub>50</sub> / cm <sup>2</sup> )
Influenza virus suspension: ( 1.50 × 10 <sup>8</sup> PFU/ ml)	0 hours	Control (U <sub>0</sub> )	6.40	6.17
			6.20	
			5.90	
	2 hours	Control (U <sub>t</sub> )	6.32	6.09
			6.10	
			5.85	
	2 hours	Stylam Antiviral Laminate sample - GGL20 (A <sub>t</sub> )	2.90	2.73
			2.70	
			2.60	
Antiviral activity R= U <sub>t</sub> - A <sub>t</sub> (2 hours contact)			-	3.36 (99.95%)

**Test Virus:** Influenza A Virus (H3N2): A/Hong Kong/8/68: ATCC VR-1679

**Test Sample:** Stylam Antiviral Laminate sample - GGPT

Virus	Contact Duration	Group	Logarithm of Infectivity titre of virus (lgTCID <sub>50</sub> / cm <sup>2</sup> )	Average titre Infectivity of virus (lgTCID <sub>50</sub> / cm <sup>2</sup> )
Influenza virus suspension: ( 1.50 × 10 <sup>8</sup> PFU/ ml)	0 hours	Control (U <sub>0</sub> )	6.40	6.17
			6.20	
			5.90	
	2 hours	Control (U <sub>t</sub> )	6.32	6.09
			6.10	
			5.85	
	2 hours	Stylam Antiviral Laminate sample - GGPT (A <sub>t</sub> )	3.00	2.97
			3.10	
			2.80	
Antiviral activity R= U <sub>t</sub> - A <sub>t</sub> (2 hours contact)			-	3.12 (99.92%)

**Where**

R is the Antiviral activity

U<sub>0</sub> is the average of common logarithm from three control/ untreated specimen immediately after inoculation

U<sub>t</sub> is the average of common logarithm from three control/ untreated specimen after 2 hours

A<sub>t</sub> is the average of common logarithm from three Treated specimen after 2 hours

**COMMENT:**

When tested as specified, Sample labeled as **Stylam Antiviral Laminate sample - GGL20** has shown **99.95%** Reduction; **Stylam Antiviral Laminate sample - GGPT** has shown **99.92%** Reduction of Influenza A Virus (H3N2) in 2 hours contact when tested by ISO 21702: 2019 standard

**For BIOTECH TESTING SERVICES**



  
Dr Shilpa U. Nair  
Quality Manager  
(Authorized Signatory)

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