

**TEST REPORT**

**LAB NO.:** 2301786/ 1 - 2

**DATE:** 11/09/2023

**NAME OF CUSTOMER** : JSW PAINTS PRIVATE LIMITED  
**ADDRESS** : Vasind, Shahapur,  
Thane - 421604  
**REFERENCE** : Your letter Ref. JSWP/ BTS/06/2023 -24 dated August 04, 2023  
Kind Attention: Anirudh Neswankar  
**DATE OF RECEIPT** : 08/08/2023  
**DATE OF INITIATION** : 08/08/2023  
**DATE OF COMPLETION** : 11/09/2023  
**SAMPLE DESCRIPTION** : Sample labeled as -

Sr. No.	Descriptions
1.	Halo Majestic Interiors Matt
2.	Asian Paints Royale Luxury Emulsion Matt





## BIOTECH TESTING SERVICES

### Test Method:

ASTM D 5590: 2017

Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated four-week Agar Plate Assay

### Experimental conditions:

Test fungus	: Mixed spore suspension (density adjusted to $0.8-1.2 \times 10^6$ spores/ ml) of <i>Aspergillus niger</i> ATCC 9642, <i>Penicillium funiculosum</i> ATCC 11797 <i>Aurobasidium pullulans</i> ATCC 15233 individually
Size of sample	: 28 x 28 mm square pieces
Media used	: Potato Dextrose agar
Incubation	: 28°C/ $\geq$ 85% humidity for 4 weeks

### Test Procedure:

1. Spores of *A. niger* & *P. funiculosum* was mixed together and *A. pullulans* was used separately.
2. Sample was placed in the centre of the plate and a thin coating of fungal suspension was applied by spraying onto the surface of the sample and the agar plate.
3. Plates were incubated at 28°C under  $\geq$  85% RH for 4 weeks.
4. Plates were examined weekly for fungal growth.
5. Fungal growth on sample was rated based on following evaluation criteria.

### Observed growth on Specimen:

Growth on specimen	Rating
None	0
Trace of Growth (<10 %)	1
Light Growth (10 to 30 %)	2
Medium Growth (>30 to 60 %)	3
Heavy Growth (>60% to complete coverage)	4

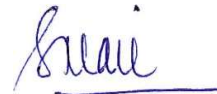
**Results:**

Sample Description	Test Fungus	Observations							
		1 week		2 weeks		3 weeks		4 weeks	
		Zone of Inhibition	Rating	Zone of Inhibition	Rating	Zone of Inhibition	Rating	Zone of Inhibition	Rating
Halo Majestic Interiors Matt	Mixed Spores	5 mm	0	3.2 mm	0	2.8 mm	0	2.6 mm	0
	Spores of A. pullulans	3.0 mm	0	2.5 mm	0	2.2 mm	0	1.8 mm	0
Asian Paints Royale Luxury Emulsion Matt	Mixed Spores	No zone	0	No zone	0	No zone	0	No zone	0
	Spores of A. pullulans	No zone	0	No zone	0	No zone	0	No zone	0
Whatman Filter paper - Viability control	Mixed Spores	No zone	4	No zone	4	No zone	4	No zone	4
	Spores of A. pullulans	No zone	3	No zone	4	No zone	4	No zone	4

**INTERPRETATION:**

Sample labeled as **Halo Majestic Interiors Matt** and **Asian Paints Royale Luxury Emulsion Matt** is Resistant to Fungus Attack when tested as per ASTM: 5590: 2017 test methods.

**For BIOTECH TESTING SERVICES**

Dr Shilpa U. Nair  
Quality Manager  
(Authorized Signatory)

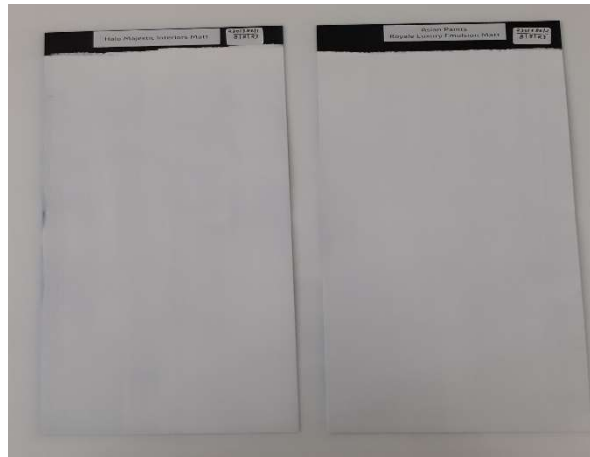
**TEST REPORT**

LAB NO.: 2301786/ 1 - 2

DATE: 14/08/2023

**NAME OF CUSTOMER** : JSW PAINTS PRIVATE LIMITED  
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**DATE OF COMPLETION** : 14/08/2023  
**SAMPLE DESCRIPTION** : Paint coated panel sample labeled as-

Sr. No.	Descriptions
1.	Halo Majestic Interiors Matt
2.	Asian Paints Royale Luxury Emulsion Matt
Untreated - Lab Control	

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**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.

**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 : Test Sample (50 mm x 50 mm); Pre-sterilized by ETO gas  
 Control Carrier : Sample 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 and 24 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	40	42	44

**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

\*Modified method with use of MS2 virus

**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				
<b>Untreated:</b> Average no. of Plaques recovered at 0 hours ( $U_0$ ): $9.60 \times 10^4$ PFU/sq. cm.				Log = 4.98
<b>Untreated:</b> Average no. of Plaques recovered at 2 hours ( $U_t$ ): $1.00 \times 10^5$ PFU/sq. cm.				Log = 5.00
Sample Identification	Average No. of Plaques recovered from Treated ( $A_t$ )	Log of Plaques recovered from Treated ( $A_t$ )	Antiviral Activity(R) (Log $U_t$ - $A_t$ )	Virus Reduction Percentage
Halo Majestic Interiors Matt	610	2.78	<b>2.22</b>	<b>99.39</b>
Asian Paints Royale Luxury Emulsion Matt	920	2.96	<b>2.04</b>	<b>99.08</b>

**B. Contact duration of 24 hours**

Quantitative Assessment of Antiviral Activity –ISO 21702: 2019				
<b>Untreated:</b> Average no. of Plaques recovered at 0 hours ( $U_0$ ): $9.60 \times 10^4$ PFU/sq. cm.				Log = 4.98
<b>Untreated:</b> Average no. of Plaques recovered at 24 hours ( $U_t$ ): $1.40 \times 10^5$ PFU/sq. cm.				Log = 5.14
Sample Identification	Average No. of Plaques recovered from Treated ( $A_t$ )	Log of Plaques recovered from Treated ( $A_t$ )	Antiviral Activity(R) (Log $U_t$ - $A_t$ )	Virus Reduction Percentage
Halo Majestic Interiors Matt	<10	<1	<b>&gt;4.14</b>	<b>&gt;99.99</b>
Asian Paints Royale Luxury Emulsion Matt	40	1.60	<b>3.54</b>	<b>99.97</b>

Where:

R = Antiviral activity

$U_0$  = Log of PFU recovered from Untreated specimen immediately after inoculation, in PFU/ cm<sup>2</sup>

$U_t$  = Log of PFU recovered from Untreated specimen after 2/24 hrs. after inoculation, in PFU/ cm<sup>2</sup>

$A_t$  = Log of PFU recovered from Treated specimen after 2/24 hrs. after inoculation, in PFU/ cm<sup>2</sup>

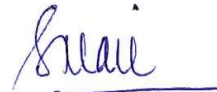
**COMMENT:**

When tested as specified, Sample labeled as **Halo Majestic Interiors Matt** has shown **99.39%** and **>99.99%** reduction of MS2 Bacteriophage; **Asian Paints Royale Luxury Emulsion Matt** has shown **99.08%** and **99.97%** reduction of MS2 Bacteriophage as surrogate virus in 2 hours and 24 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**



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Quality Manager  
(Authorized Signatory)

**TEST REPORT**

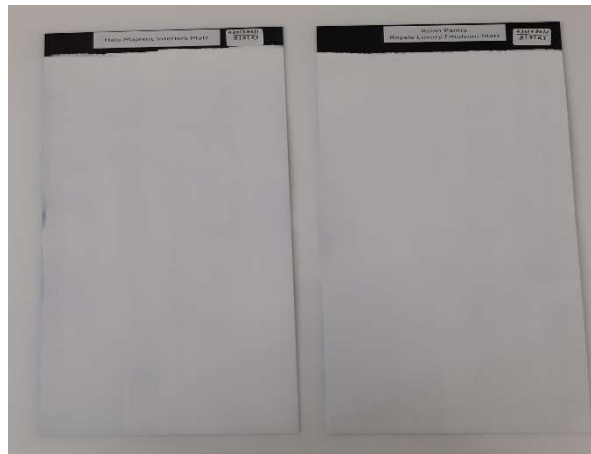
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ULR NO. TC84842310000911F

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Untreated - Lab Control	



**Test Method:**

JIS Z 2801: 2010; Amendment 1: 2012

Antibacterial products - Test for antibacterial activity and efficacy

**Test Organisms:**

1. Staphylococcus aureus ATCC 6538
2. Escherichia coli ATCC 8739

**Experimental Conditions:**

Sample type & Size	: 5cm x 5cm
Lab Control	: LDPE Film
Cover Film	: LDPE Film
Pre-treatment of sample	: ETO Sterilisation
Inoculum Carrier	: 1/20 Nutrient Broth with Tween 80
Volume of Inoculum	: 0.1 ml
Contact Time	: 24 hours at 37 <sup>0</sup> C
Media and Reagent	: Soyabean-casein digest agar
Incubation Temperature	: 37 <sup>0</sup> C for 24 hours
Neutraliser used	: SCDLP Broth

**Results:**

**ANTIBACTERIAL ACTIVITY**

1. Test Bacteria: Staphylococcus aureus ATCC 6538

Quantitative Assessment of Activity - JIS Z 2801: 2010; Amendment 1: 2012				
Untreated lab control: Conc. of Inoculum on untreated sample at 0 hours ( $U_0$ ): $1.38 \times 10^5$				Log = 5.13
Untreated lab control: Conc. of Inoculum on untreated sample after 24 hours ( $U_t$ ): $1.26 \times 10^6$				Log = 6.10
Sample Identification	No. Bacteria on treated sample ( $A_t$ )	Log of Bacteria on treated sample	Antimicrobial Activity (R)(Log $U_t$ - $A_t$ )	Microbial Kill (% Reduction)
Halo Majestic Interiors Matt	<10	<1	>5.10	>99.99
Asian Paints Royale Luxury Emulsion Matt	<10	<1	>5.10	>99.99

2. Test Bacteria: Escherichia coli ATCC 8739

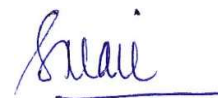
Quantitative Assessment of Activity - JIS Z 2801: 2010; Amendment 1: 2012				
Untreated lab control: Conc. of Inoculum on untreated sample at 0 hours ( $U_0$ ): $1.88 \times 10^5$				Log = 5.27
Untreated lab control: Conc. of Inoculum on untreated sample after 24 hours ( $U_t$ ): $3.30 \times 10^6$				Log = 6.51
Sample Identification	No. Bacteria on treated sample ( $A_t$ )	Log of Bacteria on treated sample	Antimicrobial Activity (R)(Log $U_t$ - $A_t$ )	Microbial Kill (% Reduction)
Halo Majestic Interiors Matt	100	2.00	4.51	99.99
Asian Paints Royale Luxury Emulsion Matt	790	2.89	3.62	99.97

The Standard Bacterial Effectiveness  $R \geq 2$  log reduction

**COMMENT:**

When tested as specified, Sample labeled **Halo Majestic Interiors Matt** and **Asian Paints Royale Luxury Emulsion Matt**; **PASS** the Quantitative Assessment of Activity for Staphylococcus aureus and Escherichia coli by **JIS Z 2801: 2010; Amendment 1: 2012 Test Method**.

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