

R2106FSVES001

Antiviral activity of Vestatis HS 360 COATING – 6% NPS FAST surface against human coronavirus SARS-CoV2 for a contact time of 12, 24 and 36 hours according to ISO 21702 (2019) standard

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Report includes 12 pages



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I. CONCLUSION

Antiviral activities of the Vestatis HS 360 COATING – 6% NPS FAST surface and non-active surface have been tested under conditions defined by the ISO 21702 (2019) protocol for a contact time of 12, 24 and 36 hours against Human coronavirus SARS-CoV2.

The Glass plate surface is the control for this test.

- Human coronavirus SARS-CoV2, 12 hours

Under experimental conditions (25°C, 12 hours, 90% RH), the Vestatis HS 360 COATING – 6% NPS FAST surface shows an antiviral activity per cm² associated with a logarithmic reduction of 3.1log₁₀ (99.92%) efficiency under the ISO 21702 standard protocol.

PRODUCT	Contact time	Antiviral activity R (log ₁₀ cm ²)	Antiviral activity (%)
Vestatis HS 360 COATING – 6% NPS FAST	12 hours	R= 3.1	99.92

- Human coronavirus SARS-CoV2, 24 hours

Under experimental conditions (25°C, 24 hours, 90% RH), the Vestatis HS 360 COATING – 6% NPS FAST surface shows an antiviral activity per cm² associated with a logarithmic reduction of 2.7log₁₀ (99.80%) efficiency under the ISO 21702 standard protocol.

PRODUCT	Contact time	Antiviral activity R (log ₁₀ cm ²)	Antiviral activity (%)
Vestatis HS 360 COATING – 6% NPS FAST	24 hours	R= 2.7*	99.80

*: R max due to the limit of detection

- Human coronavirus SARS-CoV2, 36 hours

Under experimental conditions (25°C, 36 hours, 90% RH), the Vestatis HS 360 COATING – 6% NPS FAST surface shows an antiviral activity per cm² associated with a logarithmic reduction of 2.2log₁₀ (99.37%) efficiency under the ISO 21702 standard protocol.

PRODUCT	Contact time	Antiviral activity R (log ₁₀ .cm ²)	Antiviral activity (%)
Vestatis HS 360 COATING – 6% NPS FAST	36 hours	R= 2.2*	99.37

*: R max due to the limit of detection

II. CONTRACTUAL DOCUMENTS

The present service is defined by the following contractual documents:

. Quotation	DEV0497
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III. TEST CONDITIONS AND SAMPLES DATA

III.1 Samples identification

Surface	Active surface : Vestatis HS 360 COATING – 6% NPS FAST	Reference surface : Glass plate
Appearance	Transparent	Transparent
Size (cm)	5 x 5	5 x 5
Thickness (mm)	4	4
Porous / non-porous	Non-porous	Non-porous

Manufacturer: VESTATIS

Supplier: VESTATIS

Storage conditions: room temperature

Evaluation period: 06/2021

III.2 Experimental conditions

Experimental Conditions	
Date	- 01/06/2020
Viral strain	Human coronavirus SARS-CoV2
Inoculum volume	400 μ L
Cover film	4cm x 4 cm = 16cm ²
Temperature	25°C \pm 1
Humidity HR (%)	90% \pm 5
Contact time	12, 24 and 36 hours
Interfering substance	n.a
Neutralisation	Submerging in 10mL of SCDLP medium
Quantification	endpoint titration on permissive cells
Number of wells per dilution	8
Incubation temperature	37 \pm 1 °C

IV. RESULTS

Antiviral activity of the Vestatis HS 360 COATING – 6% NPS FAST surface against Human coronavirus SARS-CoV2 for a contact time of 12, 24 and 36 hours

a. Cell susceptibility

Surface	log ₁₀ TCID ₅₀ /mL
SCDLP medium	7.7
Vestatis HS 360 COATING – 6% NPS FAST	7.8
Glass plate	7.7
Active Surface: Difference < 0.5 log ₁₀ <input checked="" type="checkbox"/> yes <input type="checkbox"/> no	
Inactive Surface: Difference < 0.5 log ₁₀ <input checked="" type="checkbox"/> yes <input type="checkbox"/> no	

b. Cytotoxicity

The test surface cytotoxicity is determined by reading of cytopathic effect (CPE) on VERO E6 permissive cells and quantified by TCID₅₀ technique.

For viral recuperation on surface, the surfaces are submerging in 10mL of SCDLP medium (recuperation buffer). The recuperation buffer cytotoxicity is determined by reading of cytopathic effect (CPE).

Under test conditions, the recuperations buffers from Vestatis HS 360 COATING – 6% NPS FAST surface and reference surfaces show cytopathic effects on VERO E6 cells for a contact time of 12, 24 and 36 hours.

The test results are dependent on and take into account the cytotoxicity results.

c. Inactivation of antiviral activity

Product	\log_{10} TCID ₅₀ /mL
S_n = SCDLP medium	6.0
S_t = Vestatis HS 360 COATING – 6% NPS FAST	6.0
S_u = Glass plate (reference)	5.9
$S_n - S_u \leq 0.5$ <input checked="" type="checkbox"/> yes <input type="checkbox"/> no $S_n - S_t \leq 0.5$ <input checked="" type="checkbox"/> yes <input type="checkbox"/> no	

Explanations:

S_n : the average of the common logarithm of the infectivity titer of virus from three specimens of the SCDLP broth for negative control.

S_u : the average of the common logarithm of the infectivity titer of virus recovered from three untreated test specimens;

S_t : the average of the common logarithm of the infectivity titer of virus recovered from three test specimens.

d. Test

Raw data for antiviral activity of Vestatis HS 360 COATING – 6% NPS FAST surface and reference surfaces against Human coronavirus SARS-CoV2 under test conditions (25°C, 12, 24 and 36 hours, 90% RH) are presented in appendices.

Results have been determined by visual reading of cytopathic effects (CPE) and quantified by TCID₅₀ technique on VERO E6 cells.

Surface	Cytotoxicity (log ₁₀ TCID ₅₀)	Specimen	U ₀ (log ₁₀ TCID ₅₀ /cm ²)	U _{12h} (log ₁₀ TCID ₅₀ /cm ²)	U _{24h} (log ₁₀ TCID ₅₀ /cm ²)	U _{36h} (log ₁₀ TCID ₅₀ /cm ²)
Glass plate	1.5	L1	5.4	4.7	4.2	3.7
		L2	5.4	4.6	4.4	3.5
		L3	5.6	4.5	3.9	4.0
		<i>Average</i>	5.5	4.6	4.2	3.7

Surface	Cytotoxicity (log ₁₀ TCID ₅₀)	Specimen	A ₀ (log ₁₀ TCID ₅₀ /cm ²)	A ₁₂ (log ₁₀ TCID ₅₀ /cm ²)	A ₂₄ (log ₁₀ TCID ₅₀ /cm ²)	A _{24h} (log ₁₀ TCID ₅₀ /cm ²)
Vestatis HS 360 COATING – 6% NPS FAST	1.5	L1	5.1	1.5	1.5	1.5
		L2	5.2	1.5	1.5	1.5
		L3	5.0	1.5	1.5	1.5
		<i>Average</i>	5.1	1.5	1.5	1.5
		R (log ₁₀ TCID ₅₀ /cm ²)	/	3.1	2.7	2.2

R is the antiviral activity

U₀ is the average of the common logarithm of the number of TCID₅₀ recovered from three untreated test specimens immediately after inoculation

U_t is the average of the common logarithm of the number of TCID₅₀ recovered from three untreated test specimens

A₀ is the average of the common logarithm of the number of TCID₅₀ recovered from three treated test specimens immediately after inoculation

A_t is the average of the common logarithm of the number of TCID₅₀ recovered from three treated test specimens.

The logarithmic value of the number of TCID₅₀ recovered immediately after inoculation from untreated test specimen (U₀) satisfies the requirement below: $(L_{max} - L_{min}) / (L_{mean}) \leq 0.2$.

The number of virus recovered from each untreated test specimen after contacting for 24 h shall not be less than 6.2×10^2 TCID₅₀/cm².

V. ANNEXES

V.1 Materials and reagents

- Cell line and viral strain

	Name	Number of passages	Batch number	Quantification
Cell line	VERO E6 (ATCC CCL-81)	12	ATCC CCL-81-2	n.a.
Viral strain	Coronavirus SARS-COV-2 BetaCoV/France/IDF0571/2020 (Accession ID = EPI_ISL_411218)	n.a.	052021SARS2-1	$5.62 \cdot 10^6$ TCID ₅₀ /mL

- Reagents

	Name	Batch number	Expiration Date	Preparation
Medium	DMEM	0000939603	14/10/2022	n.a.
Antibiotics	Penicillin and streptomycin	2240838	30/07/2021	1%
L-Glutamine	L-GLU	2248755	03/2022	1%
SVF	SVF	S73136	04/09/2024	5 % (culture) 2% (infection)

V.2 Raw data: human coronavirus SARS-CoV2

Product	Contact time (h)	Dilutions (-log)								
		P	1	2	3	4	5	6	7	
Cytotoxicity										
Glass plate	12	44444444	0	0	0	0	0	0	0	
Vestatis HS 360 COATING – 6% NPS FAST	12	44444444	0	0	0	0	0	0	0	
Glass plate	24	44444444	0	0	0	0	0	0	0	
Vestatis HS 360 COATING – 6% NPS FAST	24	44444444	0	0	0	0	0	0	0	
Glass plate	36	44444444	0	0	0	0	0	0	0	
Vestatis HS 360 COATING – 6% NPS FAST	36	44444444	0	0	0	0	0	0	0	
Cell susceptibility										
SCDLP	/	44444444	44444444	44444444	44444444	44444444	44444444	20324444	0	0
Glass plate	/	44444444	44444444	44444444	44444444	44444444	44444444	11111112	0	0
Vestatis HS 360 COATING – 6% NPS FAST	/	44444444	44444444	44444444	44444444	44444444	44444444	23241210	0	0
A0/U0										
Glass plate	/	44444444	44444444	44444444	44444444	44444444	11111110	0	0	0
	0	44444444	44444444	44444444	44444444	44444444	01203333	0	0	0
	0	44444444	44444444	44444444	44444444	44444444	22221111	0	0	0
Vestatis HS 360 COATING – 6% NPS FAST	0	44444444	44444444	44444444	44444444	44444444	10011002	0	0	0
	0	44444444	44444444	44444444	44444444	44444444	02302220	0	0	0
	0	44444444	44444444	44444444	44444444	44444444	00110100	0	0	0
Suppression of product's activity										
SCDLP	/	44444444	44444444	44444444	44444444	44444444	44444444	10230200	0	0
	/	44444444	44444444	44444444	44444444	44444444	44444444	14020000	0	0
	/	44444444	44444444	44444444	44444444	44444444	44444444	02030001	0	0
Glass plate	/	44444444	44444444	44444444	44444444	44444444	44444444	00010100	0	0
	/	44444444	44444444	44444444	44444444	44444444	44444444	203000010	0	0
	/	44444444	44444444	44444444	44444444	44444444	44444444	10000000	0	0
Vestatis HS 360 COATING – 6% NPS FAST	/	44444444	44444444	44444444	44444444	44444444	44444444	01020300	0	0
	/	44444444	44444444	44444444	44444444	44444444	44444444	02203300	0	0
	/	44444444	44444444	44444444	44444444	44444444	44444444	10000001	0	0
TEST										
Glass plate	12	44444444	44444444	44444444	11111111	00100000	0	0	0	
	12	44444444	44444444	44444444	02021111	00000110	0	0	0	
	12	44444444	44444444	44444444	11202220	00000001	0	0	0	
Vestatis HS 360 COATING – 6% NPS FAST	12	44444444	0	0	0	0	0	0	0	
	12	44444444	0	0	0	0	0	0	0	
	12	44444444	0	0	0	0	0	0	0	

Glass plate	24	44444444	44444444	44444444	01022001	01000000	0	0	0
	24	44444444	44444444	44444444	22023410	0	0	0	0
	24	44444444	44444444	44444444	10110000	0	0	0	0
Vestatis HS 360 COATING – 6% NPS FAST	24	44444444	0	0	0	0	0	0	0
	24	44444444	0	0	0	0	0	0	0
	24	44444444	0	0	0	0	0	0	0
Glass plate	36	44444444	44444444	11110101	00100101	0	0	0	0
	36	44444444	44444444	00110110	011100000	0	0	0	0
	36	44444444	44444444	11111101	10101010	0	0	0	0
Vestatis HS 360 COATING – 6% NPS FAST	36	44444444	0	0	0	0	0	0	0
	36	44444444	0	0	0	0	0	0	0
	36	44444444	0	0	0	0	0	0	0

Explanations:

- 1-4: degrees of CPE in 8 cell culture unit (microtiter plate)
- 0: no virus present
- n.a: not applicable
- n.d: not done