

R2111FSVES001

Antiviral activity of Vestatis HS 360 COATING – 6% NPS FAST - 3 YEARS AGED surface against human coronavirus SARS-CoV2 for a contact time of 24 hours according to ISO 21702 (2019) standard

CLIENT

VESTATIS GmbH
Monsieur Giorgio CERANA
Gruener Deich 1-3
20097 HAMBURG
GERMANY

TEST LABORATORY

SAS VirHealth
Centre d’Innovation
Bâtiment Domilyon
321 avenue Jean Jaurès
69007 Lyon
France

TECHNICAL CONTRIBUTION

Léa Szpiro, technical manager
Loranne Durimel, laboratory technician

Quality validation

Name : Dr Vincent MOULES, CEO

Date : Lyon, 12/11/2021

Signature :



VirHealth SAS
Centre d’Innovation,
Bât Domilyon, 321 av. Jean Jaurès
69007 Lyon France
Siret 81204535900013

Report includes 12 pages



SUMMARY

I.	CONCLUSION	3
II.	CONTRACTUAL DOCUMENTS.....	4
III.	TEST CONDITIONS AND SAMPLES DATA.....	4
III.1	SAMPLES IDENTIFICATION	4
III.2	EXPERIMENTAL CONDITIONS.....	5
IV.	RESULTS	6
	ANTIVIRAL ACTIVITY OF THE VESTATIS HS 360 COATING – 6% NPS FAST - 3 YEARS AGED SURFACE AGAINST HUMAN CORONAVIRUS SARS-COV2 FOR A CONTACT TIME OF 24 HOURS	6
a.	<i>Cell susceptibility</i>	6
b.	<i>Cytotoxicity</i>	6
c.	<i>Inactivation of antiviral activity.....</i>	7
d.	<i>Test</i>	8
V.	ANNEXES	9
V.1	MATERIALS AND REAGENTS	9
V.2	RAW DATA: HUMAN CORONAVIRUS SARS-COV2	10

I. CONCLUSION

Antiviral activities of the Vestatis HS 360 COATING – 6% NPS FAST - 3 YEARS AGED surface and non-active surface have been tested under conditions defined by the ISO 21702 (2019) protocol for a contact time of 24 hours against Human coronavirus SARS-CoV2.

The Glass plate surface is the control for this test.

- Human coronavirus SARS-CoV2, 24 hours

Under experimental conditions (25°C, 24 hours, 90% RH), the Vestatis HS 360 COATING – 6% NPS FAST - 3 YEARS AGED surface shows an antiviral activity per cm² associated with a logarithmic reduction of 1.8log₁₀ (98.42%) 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 - 3 YEARS AGED	24 hours	R= 1.8	98.42

II. CONTRACTUAL DOCUMENTS

The present service is defined by the following contractual documents:

. Quotation	DEV0644
--------------------	---------

III. TEST CONDITIONS AND SAMPLES DATA

III.1 Samples identification

Surface	Active surface : Vestatis HS 360 COATING – 6% NPS FAST - 3 YEARS AGED	Reference surface : Glass plate
Appearance	Slight yellow	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: 10/2021

III.2 Experimental conditions

Experimental Conditions	
Date	- 29/10/2020
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	24 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 - 3 YEARS AGED surface against Human coronavirus SARS-CoV2 for a contact time of 24 hours

a. Cell susceptibility

Surface	log ₁₀ TCID ₅₀ /mL
SCDLP medium	7.0
Vestatis HS 360 COATING – 6% NPS FAST - 3 YEARS AGED	6.9
Glass plate	7.0
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 - 3 YEARS AGED 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	5.4
S_t = Vestatis HS 360 COATING – 6% NPS FAST - 3 YEARS AGED	5.4
S_u = Glass plate (reference)	5.4
$S_n - S_u \leq 0.5$ <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 - 3 YEARS AGED surface and reference surfaces against Human coronavirus SARS-CoV2 under test conditions (25°C, 24 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 _{124h} (log ₁₀ TCID ₅₀ /cm ²)
Glass plate	1.5	L1	5.2	4.6
		L2	5.4	4.3
		L3	5.2	4.3
		<i>Average</i>	5.3	4.4

Surface	Cytotoxicity (log ₁₀ TCID ₅₀)	Specimen	A ₀ (log ₁₀ TCID ₅₀ /cm ²)	A ₂₄ (log ₁₀ TCID ₅₀ /cm ²)
Vestatis HS 360 COATING – 6% NPS FAST - 3 YEARS AGED	1.5	L1	5.4	2.6
		L2	5.2	2.6
		L3	5.1	2.6
		<i>Average</i>	5.2	2.6
		R (log ₁₀ TCID ₅₀ /cm ²)	/	1.8

R is the antiviral activity

*U*₀ 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

*A*₀ 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: $(L_{\max} - L_{\min}) / (L_{\text{mean}}) \leq 0.2$.

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)	8	ATCC CCL-81-3	n.a.
Viral strain	Coronavirus SARS-COV-2 BetaCoV/France/IDF0571/2020 (Accession ID = EPI_ISL_411218)	n.a.	052021SARS2-1	1.10 ⁷ TCID ₅₀ /mL

- Reagents

	Name	Batch number	Expiration Date	Preparation
Medium	DMEM	0000939603	14/10/2022	n.a.
Antibiotics	Penicillin and streptomycin	2240841	30/07/2022	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	24	44444444	0	0	0	0	0	0	0		
Vestatis HS 360 COATING – 6% NPS FAST - 3 YEARS AGED	24	44444444	0	0	0	0	0	0	0		
Cell susceptibility											
SCDLP	/	44444444	44444444	44444444	44444444	44444444	44444444	10012010	0	0	
Glass plate	/	44444444	44444444	44444444	44444444	44444444	44444444	22032000	0	0	
Vestatis HS 360 COATING – 6% NPS FAST - 3 YEARS AGED	/	44444444	44444444	44444444	44444444	44444444	44444444	00120020	0	0	
A0/U0											
Glass plate	/	44444444	44444444	44444444	44444444	44444444	24012000	12000200	0	0	
	0	44444444	44444444	44444444	44444444	44444444	20320202	12010001	0	0	
	0	44444444	44444444	44444444	44444444	44444444	11002101	00110000	0	0	
Vestatis HS 360 COATING – 6% NPS FAST - 3 YEARS AGED	0	44444444	44444444	44444444	44444444	44444444	01412000	0232020	0	0	
	0	44444444	44444444	44444444	44444444	44444444	22003202	00110000	0	0	
	0	44444444	44444444	44444444	44444444	44444444	30020022	01200000	0	0	
Suppression of product's activity											
SCDLP	/	44444444	44444444	44444444	44444444	44444444	44444444	44444444	01000000	0	0
	/	44444444	44444444	44444444	44444444	44444444	44444444	44444444	0	0	0
	/	44444444	44444444	44444444	44444444	44444444	44444444	44444444	0	0	0
Glass plate	/	44444444	44444444	44444444	44444444	44444444	44444444	44444444	02000003	0	0
	/	44444444	44444444	44444444	44444444	44444444	44444444	44444444	00200000	0	0
	/	44444444	44444444	44444444	44444444	44444444	44444444	44444444	0	0	0
Vestatis HS 360 COATING – 6% NPS FAST - 3 YEARS AGED	/	44444444	44444444	44444444	44444444	44444444	44444444	44444444	0	0	0
	/	44444444	44444444	44444444	44444444	44444444	44444444	44444444	0	0	0
	/	44444444	44444444	44444444	44444444	44444444	44444444	44444444	02001000	0	0
TEST											
Glass plate	24	44444444	44444444	44444444	44444444	44444444	01400000	0	0	0	
	24	44444444	44444444	44444444	44444444	44444444	0	0	0	0	
	24	44444444	44444444	44444444	44444444	44444444	0	0	0	0	
Vestatis HS 360 COATING – 6% NPS FAST - 3 YEARS AGED	24	44444444	44444444	01200000	0	0	0	0	0	0	
	24	44444444	44444444	00200010	0	0	0	0	0	0	
	24	44444444	44444444	00110000	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