KASTUS®

24/7 Antimicrobial Surface Protection

Proven Performance

Independent Testing Reports

Contents

KASTUS®
24/7 Antimicrobial Surface Protection

Coronavirus Test Reports – Virology Research Services

Kastus is proven to kill >99% human coronavirus.

1a. ASTM E1053 – 1 Hour Test Report
1b. ISO21702:2019 – 2 Hours Test Report
1c. ISO21702:2019 – 24 Hours Test Report

KASTUS®
24/7 Antimicrobial Surface Protection

1a. ASTM E1053 – 1 Hour Test Report

virology research services

VRS Project #HM03

On behalf of Kastus Technologies (1st First, Block A Cookstown Court, Old Belgard Road, Tallaght, Dublin 24, D24 DTY3), Virology Research Services Limited (Company Number, 11718460) has tested the virucidal activity of Kastus Coating against human coronavirus NL63.

This work was performed in the VRS London labs in October 2020. The test was performed with a protocol adapted from the ASTM E1053 standard using dried virus.

Under the conditions tested, the Kastus Coating has a virucidal activity against human coronavirus NL63 at a contact time of 1 h. The experimental protocol and its findings are described in detail in the attached report.

At 1 h, the average recovered viral titre for the Kastus Coating was 2.84E+01 TCID50/cm^2 compared to 4.50E+02 TCID50/cm^2 for the reference control.

R (antiviral activity) = 1.20 at 1 h.

The above data indicate that the Kastus Coating inactivates > 90% of virus after 1 h of contact relative to the reference control.

Authorized VRS signatory

virology research services

Virology Research Services Ltd, Gower St., London, United Kingdom, WC1E 6BT

vrs@virologyresearchservices.com, www.virologyresearchservices.com

1b. ISO21702:2019 – 2 Hours Test Report

virology
research services

VRS Project #HM01

On behalf of Kastus Technologies (1st First, Block A Cookstown Court, Old Belgard Road, Tallaght, Dublin 24, D24 DTY3), Virology Research Services Limited (Company Number, 11718460) has tested the virucidal activity of Kastus Coating against human coronavirus NL63.

The research was conducted strictly following the protocol for ISO21702:2019. This work was performed in the VRS London labs in October 2020.

Under the conditions tested, the Kastus Coating has a virucidal activity against human coronavirus NL63 at a contact time of 2 h. The experimental protocol and its findings are described in detail in the attached report.

At 2 h, the average recovered viral titre for the Kastus Coating was 3.30E+02 TCID50/cm^2 compared to 8.30E+03 TCID50/cm^2 for the reference control.

R (antiviral activity) = 1.40 at 2 h.

The above data indicate that the Kastus Coating inactivates > 90% of virus after 2 h of contact relative to the reference control.

The Directors

Chiara Mencarelli, Ph.D.

Michela Mazzon, Ph.D.

Virology Research Services Ltd, Gower St., London, United Kingdom, WC1E 6BT

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1c. ISO21702:2019 – 24 Hours Test Report

virology
research services

VRS Project #HM01

On behalf of Kastus Technologies (1st First, Block A Cookstown Court, Old Belgard Road, Tallaght, Dublin 24, D24 DTY3), Virology Research Services Limited (Company Number, 11718460) has tested the virucidal activity of Kastus Coating against human coronavirus NL63.

The research was conducted strictly following the protocol for ISO21702:2019. This work was performed in the VRS London labs in October 2020.

Under the conditions tested, the Kastus Coating has a virucidal activity against human coronavirus NL63 at a contact time of 24 h. The experimental protocol and its findings are described in detail in the attached report.

At 24 h, the average recovered viral titre for the Kastus Coating was 2.53E+01 TCID50/cm^2 compared to 2.92E+03 TCID50/cm^2 for the reference control.

R (antiviral activity) = 2.06 at 24 h.

The above data indicate that the Kastus Coating inactivates > 99% of virus after 24 h of contact relative to the reference control.

The Directors

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Antiviral Test Report

Kastus is proven to kill >99% of Non-enveloped viruses within 10 minutes

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Antiviral Test Report

EUROLAB Laboratory Services

TEST / INSPECTION REPORT
EUROLAB LABORATORY SERVICES
TÜRCERT TEKNİK KONTROL VE BELGELENDİRME A.Ş.

UNITED ACCREDITATION FOUNDATION UAF

5190243IB02
2020200803

Report No:	2020200803-R1
Applicant:	**KASTUS TECHNOLOGIES** Kastus, Block A, Cookstown Court, Tallagh, Dublin Z4 IRELAND
Contact Person:	James KENNEDY
Contact Telephone:	+353 01 5241680
Contact e-mail:	James.kennedy@kastus.com
Sample Accepted on:	05.08.2020
Report Date:	21.08.2020
Total number of pages:	6 (Pg)

Sample ID: **KASTUS GLASS**

	TEST	METHOD	Specimen	RESULT
*	**Surface Time Kill Test for Viruses**	**ASTM E 1053**	**KASTUS GLASS**	**PASS**

Seal

Customer Representative
Hasan KUTLU

Laboratory Manager
Hava SARIAYDIN

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Antiviral Test Report

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TÜRCERT TEKNİK KONTROL VE BELGELENDİRME A.Ş.

UNITED ACCREDITATION FOUNDATION UAF

EUROLAB ® (TÜRCERT TEKNİK KONTROL VE BELGELENDİRME A.Ş.)

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Environment

The requirements and standards apply to equipment intended for use in

X	Residential (domestic) environment
X	Commercial and light-industrial environment
X	Industrial environment
X	Medical environment

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Antiviral Test Report

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Astm E 1053 - Surface Time Kill Test For Viruses

Scope:

The ASTM E1053 test method is used to determine the virucidal effectiveness of liquid disinfectant products designed for use on hard, nonporous environmental surfaces. In an ASTM E1053 test, a viral inoculum is dried onto carriers, followed by exposure to a test formulation via spray device or pipette (modified use-dilution) for the specified contact time(s). Control carriers are concurrently processed using an equivalent volume of cell culture medium or other suitable buffer. Following neutralization, the carriers are enumerated using standard cell culture (e.g. TCID50) or plaque assay techniques. Log10 and percent reduction values are calculated to determine the effectiveness of the test product relative to the control carriers.

Procedure:

- Sterile glass Petri dish carriers (100 x 15 mm) were inoculated with a volume of virus suspension. A sufficient number of test and control carriers were prepared.
- Inoculated carriers were dried at room temperature under laminar flow conditions.
- The control carrier was held covered for the contact time then harvested in the same manner as the test.
- The viral suspensions were quantified to determine the levels of infectious virus using standard cell culture or plaque assay techniques.
- Assay trays/plates were incubated for the period most suitable for the virus-host cell system
- After the incubation period, the assay was scored for the presence/absence of test virus. The appropriate calculations were performed to determine viral titers.
- • Log10 and percent reductions are computed for viral films exposed to the test product relative to the titer obtained for the study control carrier(s), and reported to the EUROLAB Laboratory.
- The control carrier is harvested using an equivalent volume cell culture medium or other suitable buffer.

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Antiviral Test Report

The following measures are met to ensure the acceptability of virucidal efficacy data:

- A minimum of 4.80 log10 infective units/control carrier is recovered from each plate recovery control film(s).
- The virus titer control demonstrate obvious and or typical cytopathic effects on the monolayers unless a detection method other than cytopathic effect is used.
- Quantification of the test and control parameters are conducted at a minimum of four determinations per dilution.

Test Microorganism Information

MS2 Bacteriophage (MS2), ATCC 15597-B1

This 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, icosohedral 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

Feline calicivirus (FCV), ATCC VR-782

This virus is a non-enveloped, positive-stranded RNA member of the genus Vesivirus, and a common cause of respiratory infections in cats. Symptoms of infection in felines include nasal discharge and mouth ulcers. As a member of the Caliciviridae viral family, FCV is closely related to human noroviruses, which cause acute gastroenteritis marked by nausea, vomiting, and diarrhea. Unlike human norovirus, however, a simple cell culture assay system is available for FCV. Therefore, feline calicivirus is the US EPA-approved surrogate microorganism for human norovirus label claims. Both FCV and human norovirus are able to remain viable on environmental surfaces for extended periods of time and are resistant to a number of disinfectant actives.

Permissive Host Cell Line Selected for FCV: CRFK (Crandell-Rees Feline Kidney Cells), ATCC CCL-94

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Antiviral Test Report

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UAF United Accreditation Foundation

Procedure Continued...

Test Substance Diluent : Sterile R/O Water
Carriers Per Test : 1
Spray Distance : 6-8 inches
Use-dilution Volume : Not Applicable
Viral Inoculum Volume : 0.200 ml
Carrier Dry Time : 39 minutes
Contact Time(s) : 10 minutes
Host Cell Line : E. coli ATCC 15597
Assay Medium : Tryptic Soy Agar
Carrier Type : Petri Dishes

TEST RESULTS

ORGANISM	LABORATORY	DILUTION	METHOD	CONTACT	RESULTS	Percent Reduction Relative to Controls
Adenovirus	Eurolab	60 sc	ASTM E 1053	10 min	**LOG_{10} 2.46**	**≥ %99**
Canine parvovirus	Eurolab	60 sc	ASTM E 1053	10 min	**LOG_{10} 2.46**	**≥ %99**
Cytomegalovirus	Eurolab	60 sc	ASTM E 1053	10 min	**LOG_{10} 2.46**	**≥ %99**
Feline calicivirus	Eurolab	60 sc	ASTM E 1053	10 min	**LOG_{10} 2.46**	**≥ %99**
Hepatitis A Virus	Eurolab	60 sc	ASTM E 1053	10 min	**LOG_{10} 2.61**	**≥ %99**
Herpes Simplex Virus	Eurolab	60 sc	ASTM E 1053	10 min	**LOG_{10} 2.55**	**≥ %99**
Influenza A	Eurolab	60 sc	ASTM E 1053	10 min	**LOG_{10} 2.59**	**≥ %99**
Murine Norovirus	Eurolab	60 sc	ASTM E 1053	10 min	**LOG_{10} 2.46**	**≥ %99**
Rhinovirus	Eurolab	60 sc	ASTM E 1053	10 min	**LOG_{10} 2.46**	**≥ %99**
Rotavirus	Eurolab	60 sc	ASTM E 1053	10 min	**LOG_{10} 2.46**	**≥ %99**
Vaccinia Virus	Eurolab	60 sc	ASTM E 1053	10 min	**LOG_{10} 2.46**	**≥ %99**

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IMAGE

*****END OF REPORT*****

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Antibacterial Test Reports

Proven to Kill >99% of Surface Bacteria

Independent ISO 27447 : 2009 Lab Reports

3a. SA - Airmid Laboratories Report
3b. E. coli - Guangdong Centre for Microbiology Report
3c. SA - Guangdong Centre for Microbiology Report

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3a. ISO 27447:2009 Results Explanation Airmid – S.A.

Section 4.2 of the test report shows test result as an Antibacterial activity R value.

Antibacterial activity R_L is calculated using the Log value of colony counts from Table 4.1 of the testing report.

Kastus coated colony count after 24h contact time = 1

Uncoated colony count after 24h contact time = 1.16E+04

R_L: Log(1.16E+04/1)=4.06

The kill rate in % is calculated by equation: $(1 - 10^{-R_L}) * 100$

Kill rate = 99.99%

4.2. Photocatalytic antibacterial activity results – R_L and ΔR

The log values from the Table 4.1 were used to calculate R_L and ΔR

Photocatalytic antibacterial activity R_L = 4.06

Photocatalytic antibacterial activity including any effect in the dark ΔR = 0.94

Table 4.1: Summary of Results for *Staphylococcus aureus*

Sample	Sample Exposure	Contact Time	
		0 Hrs	24 Hrs
Kastus Coated	UV 0.25mW/cm^2	1.22 x 10^5	1.00
Kastus Coated	Dark	1.22 x 10^5	5.07 x 10^1
Uncoated Control	UV 0.25mW/cm^2	1.22 x 10^5	1.16 x 10^4
Uncoated Control	Dark	1.22 x 10^5	6.73 x 10^4

3a. ISO 27447:2009 Test Report

airmid healthgroup

Customer Name	Kastus Technologies
Customer Address	GW112 Greenway Hub DIT Grangegorman Dublin 7
Contact	James Kennedy
Test Requested	**Determination of antibacterial activity of photocatalytic materials according to ISO 27447:2009**

Sample Description

Glass Name	Glass Details	No. Received
Kastus	Coated	6
Control	Uncoated	19

Date of Receipt	25 February 2019
ASC Code	ASC003719
ASC Report Number	ASCR092330
ASC Report Date	28 February 2019

3b. ISO 27447:2009 Results Explanation – E. coli

Page 3 of the test report shows test result as an **Antibacterial activity R value**.

Antibacterial activity R_L is calculated using the Log value of colony counts from the table on page 3 of the testing report.

Kastus coated colony count after 24h contact time = <10

Uncoated colony count after 24h contact time = 6.5E+06

R_L: Log(6.5E+06/10)=5.81

The kill rate in % is calculated by equation: $(1 - 10^{-R_L}) * 100$

Kill rate = 99.999%

测试微生物 The tested organism	空白对照片接种后"0"时活菌数 Average number of viable bacterial of non-treated specimens, just after inoculation (cfu/片)	空白对照片在强度 L 的紫外光照射 24h 后得到的活菌数 Average number of viable bacterial of non-treated specimens, after UV irradiation of intensity L for 24h (cfu/片)	光触媒试验片在强度 L 中的紫外光照射 24h 后得到的活菌数 Average number of viable bacterial of photocatalytic treated specimens, after UV irradiation of intensity L for 24h (cfu/片)	空白对照片在暗条件下保存 24h 后的活菌数 Average number of viable bacterial of non-treated specimens, after being kept in a dark place for 24h (cfu/片)	光触媒试验片在暗条件下保存 24h 后的活菌数 Average number of viable bacterial of photocatalytic treated specimens, after being kept in a dark place for 24h (cfu/片)	R_L 总抗菌活性值 Photocatalyst antibacterial activity value, after irradiation at a constant intensity(L) on a photocatalytic material	△R 光催化抗菌活性值 Photocatalyst antibacterial activity value with UV irradiation
大肠杆菌（*Escherichia coli*）ATCC 8739	3.8×10^5	6.5×10^6	<10	8.9×10^6	110	>5.81	0.90

3b. ISO 27447:2009 Test Report

广微测
Gimicro Testing

中国认可 国际互认 检测 TESTING CNAS L1747

推荐实验室

广东省微生物分析检测中心
GUANGDONG DETECTION CENTER OF MICROBIOLOGY

分 析 检 测 报 告
REPORT FOR ANALYSIS

报告编号 Report №.	2020FM15560R01Da
样品名称 Name of Sample	Kastus 抗菌玻璃 Kastus coated glass
委托单位 Applicant	Kastus Technologies
检测类型 Test Type	委托检测 Entrustment Test

单位地址： 广州市先烈中路 100 号大院 66 号楼
Address: Building 66, No.100 Central Xian Lie Road, Guangzhou, China
邮政编码： 510070
Postcode:
电话号码： (020)87137666
Tel:
传真号码： (020)87137668
Fax:
网 址： www.gddcm.com
Website:

3b. ISO 27447:2009 Test Report

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Gmicro Testing

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推荐实验室

广东省微生物分析检测中心

GUANGDONG DETECTION CENTER OF MICROBIOLOGY

分 析 检 测 报 告

REPORT FOR ANALYSIS

报告编号（Report №.）2020FM15560R01Da 校验码（Verification Code）：37158092

样品名称 Name of Sample	Kastus 抗菌玻璃 Kastus coated glass	检测类型 Test Type	委托检测 Entrustment Test
委托单位 Applicant	Kastus Technologies Kastus Technologies	地 址 Address	Cookstown Court, Old Belgard Rd., Tallaght, Dublin 24, Ireland
样品来源 Sample Source	委托方送检 Submitted for Testing by the Applicant	样品数量 Sample Quantity	15 pcs
样品规格和批号 Spec and Lot № of Sample	50mm×50mm、20200510	样品状态和特性 State and Characteristic	透明,玻璃 Transparent，Glass
接样日期 Sample Received Date	2020-05-27	检测完成日期 Completion Date	2020-06-16
检测依据和方法 Test Standard and Method	ISO 27447:2009		
检测项目 Item Tested	抗（抑）菌试验 Antibacterial efficacy		
检测结论 Test Conclusion	该样品所检项目的实测数据见本检测报告续页。 The test data of the sample(s) is attached to the page(s) of this report. 签发日期：2020-07-03 Issue Date （机构盖章 Official Seal）		
备注 Remarks			

制 表：Editor　　审 核：Verifier　　批 准：Approver

第 2 页 共 4 页

3c. ISO 27447:2009 Results Explanation – S.A.

Page 3 of the test report shows test result as an **Antibacterial activity R value**.

Antibacterial activity R_L is calculated using the Log value of colony counts from the table on page 3 of the testing report.

Kastus coated colony count after 24h contact time = <10

Uncoated colony count after 24h contact time = 1.2E+05

R_L: Log(1.2E+05/10)=4.08

The kill rate in % is calculated by equation: $(1 - 10^{-R_L}) * 100$

Kill rate = 99.99%

测试微生物 The tested organism	空白对照片接种后"0"时活菌数 Average number of viable bacterial of non-treated specimens, just after inoculation (cfu/片)	空白对照片在强度 L 的紫外光照射 24h 后得到的活菌数 Average number of viable bacterial of non-treated specimens, after UV irradiation of intensity L for 24h (cfu/片)	光触媒试验片在强度 L 中的紫外光照射 24h 后得到的活菌数 Average number of viable bacterial of photocatalytic treated specimens, after UV irradiation of intensity L for 24h (cfu/片)	空白对照片在暗条件下保存 24h 后的活菌数 Average number of viable bacterial of non-treated specimens, after being kept in a dark place for 24h (cfu/片)	光触媒试验片在暗条件下保存 24h 后的活菌数 Average number of viable bacterial of photocatalytic treated specimens, after being kept in a dark place for 24h (cfu/片)	R_L 总抗菌活性值 Photocatalyst antibacterial activity value, after irradiation at a constant intensity(L) on a photocatalytic material	△R 光催化抗菌活性值 Photocatalyst antibacterial activity value with UV irradiation
金黄色葡萄球菌（*Staphylococcus aureus*）ATCC 6538P	3.1×10^5	1.2×10^5	<10	3.2×10^5	<10	>4.08	0

3c. ISO 27447:2009 Test Report

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TESTING
CNAS L1747

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广东省微生物分析检测中心
GUANGDONG DETECTION CENTER OF MICROBIOLOGY

分 析 检 测 报 告
REPORT FOR ANALYSIS

报 告 编 号 Report №.	2020FM15560R02D
样 品 名 称 Name of Sample	Kastus 抗菌玻璃 Kastus coated glass
委 托 单 位 Applicant	Kastus Technologies Kastus Technologies
检 测 类 型 Test Type	委托检测 Entrustment Test

单位地址： 广州市先烈中路 100 号大院 66 号楼
Address: Building 66, No.100 Central Xian Lie Road, Guangzhou, China
邮政编码： 510070
Postcode:
电话号码： (020)87137666
Tel:
传真号码： (020)87137668
Fax:
网 址： www.gddcm.com
Website:

3c. ISO 27447:2009 Test Report

广微测 Gmicro Testing

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推荐实验室

广东省微生物分析检测中心

GUANGDONG DETECTION CENTER OF MICROBIOLOGY

分析检测报告

REPORT FOR ANALYSIS

报告编号（Report №.）2020FM15560R02D 校验码（Verification Code）：96427508

样品名称 Name of Sample	Kastus 抗菌玻璃 Kastus coated glass	检测类型 Test Type	委托检测 Entrustment Test
委托单位 Applicant	Kastus Technologies Kastus Technologies	地　址 Address	Cookstown Court, Old Belgard Rd., Tallaght, Dublin 24, Ireland Cookstown Court, Old Belgard Rd., Tallaght, Dublin 24, Ireland
样品来源 Sample Source	委托方送检 Submitted for Testing by the Applicant	样品数量 Sample Quantity	15 pcs
样品规格和批号 Spec and Lot № of Sample	50mm×50mm、20200510	样品状态和特性 State and Characteristic	透明,玻璃 Transparent，Glass
接样日期 Sample Received Date	2020-05-27	检测完成日期 Completion Date	2020-06-16
检测依据和方法 Test Standard and Method	ISO 27447:2009		
检测项目 Item Tested	抗（抑）菌试验 Antibacterial efficacy		
检测结论 Test Conclusion	该样品所检项目的实测数据见本检测报告续页。 The test data of the sample(s) is attached to the page(s) of this report. 签发日期 Issue Date：2020-07-03 （机构盖章 Official Seal）		
备注 Remarks			

制　表：Editor　　审　核：Verifier　　批　准：Approver

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Eurofins Independent Test

Kastus is confirmed as Non-Leaching

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Eurofins – Non-Leaching Test Report

eurofins | BioPharma Product Testing

DAkkS Deutsche Akkreditierungsstelle D-PL-13377-01-00

In vitro Cytotoxicity Assay:
Cell Growth Analysis via BCA-Staining
with an Extract of
Kastus Log4+™ coated glass

Report

Version: Final

Study Completion Date: 18 FEB 2016

Eurofins Munich Study No.: 156793

Sponsor:
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Germany

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GLP/GMP FDA approved

Eurofins – Non-Leaching Test Report

1. Copy of the GLP Certificate

Bayerisches Landesamt für
Gesundheit und Lebensmittelsicherheit

GLP-Bescheinigung/Statement of GLP Compliance
(gemäß/according to § 19b Abs. 1 Chemikaliengesetz)

Eine GLP-Inspektion zur Überwachung der Einhaltung der GLP-Grundsätze gemäß Chemikaliengesetz bzw. Richtlinie 2004/9/EG wurde durchgeführt in:

Assessment of conformity with GLP according to Chemikaliengesetz and Directive 2004/9/EC at:

☒ Prüfeinrichtung/Test facility ☐ Prüfstandort/Test site

EUROFINS BIOPHARMA PRODUCT TESTING MUNICH GMBH
BEHRINGSTRAßE 6-8
82152 PLANEGG

(Unverwechselbare Bezeichnung und Adresse/Unequivocal name and address)

Prüfungen nach Kategorien/Areas of Expertise
(gemäß/according ChemVwV-GLP Nr. 5.3/OECD guidance)

Kategorie 2/ Category 2
Kategorie 3/ Category 3
Kategorie 8/ Category 8
Kategorie 9*/ Category 9*

Sonstige Prüfungen:
biologische und mikrobiologische Sicherheitsprüfungen an Medizinprodukten und Arzneimitteln; Auftragsarchivierung

**other tests:*
biological an microbiological safety evaluation on medical devices and pharmaceuticals; contract archiving

Datum der Inspektion/Date of Inspection
(Tag.Monat.Jahr/day.month.year)

18. bis 19.03.2015

Die/Der genannte Prüfeinrichtung/Prüfstandort befindet sich im nationalen GLP-Überwachungsverfahren und wird regelmäßig auf Einhaltung der GLP-Grundsätze überwacht.

The above mentioned test facility/test site is included in the national GLP Compliance Programme and is inspected on a regular basis.

Auf der Grundlage des Inspektionsberichtes wird hiermit bestätigt, dass in dieser Prüfeinrichtung/diesem Prüfstandort die oben genannten Prüfungen unter Einhaltung der GLP-Grundsätze durchgeführt werden können.

Based on the inspection report it can be confirmed, that this test facility/test site is able to conduct the aforementioned studies in compliance with the Principles of GLP.

Schwabach, 05.06.2015

Dr. Peter Franke
Leiter der GLP-Landesleitstelle Bayern

GLP- Landesleitstelle Bayern
Bayerisches Landesamt für Gesundheit
und Lebensmittelsicherheit
Rathausgasse 4
91126 Schwabach

Eurofins – Non-Leaching Test Report

5. Quality Assurance

5.1. GLP Compliance

This study was conducted to comply with:

Chemikaliengesetz ("Chemicals Act") of the Federal Republic of Germany, Appendix 1 to § 19a as amended and promulgated on August 28, 2013 (BGBl. I S. 3498) [1].

Konsens-Dokument der Bund-Länder-Arbeitsgruppe Gute Laborpraxis ("Consensus Document of the National and Länder Working Party on Good Laboratory Practice") on the archiving and storage of records and materials, 5 May 1998 [2].

OECD Principles of Good Laboratory Practice (as revised in 1997); OECD Environmental Health and Safety Publications; Series on Principles of Good Laboratory Practice and Compliance Monitoring - Number 1. Environment Directorate, Organisation for Economic Co-operation and Development, Paris 1998 [3].

The OECD principles of Good Laboratory Practice are accepted by Regulatory Authorities throughout the European Community, USA and Japan.

This study was assessed for compliance with the study plan and the Standard Operating Procedures of Eurofins Munich. The study and/or the test facility are inspected periodically by the Quality Assurance Unit according to the corresponding SOPs. These inspections and audits are carried out by the Quality Assurance Unit, personnel independent of staff involved in the study. A signed quality assurance statement, listing all performed audits, is included in the report.

The test method is part of the Eurofins Munich accreditation scope according to guideline 90/385/EWG [4], 93/42/EWG [5] and DIN EN ISO/IEC 17025 [6] for testing of medical devices.

5.2. Guidelines

This study followed the procedures indicated by internal Eurofins Munich SOPs and the following internationally accepted guidelines and recommendations:

Biological evaluation of medical devices:

ISO 10993-1: 2009 "Evaluation and testing within a risk management process" [7]

ISO 10993-5: 2009 "Tests for *in vitro* cytotoxicity" [8]

ISO 10993-12: 2012 "Sample preparation and reference materials" [9]

Eurofins – Non-Leaching Test Report

6. Statement of Compliance

Eurofins Munich Study No.:	156793
Test Item:	Kastus Log4+™ coated glass
Title:	*In vitro* Cytotoxicity Assay: Cell Growth Analysis via BCA-Staining with an Extract of Kastus Log4+™ coated glass
Study Director:	Dipl.-Biol. Margit Oppong-Nketiah

This study performed in the test facility Eurofins Munich was conducted in compliance with Good Laboratory Practice Regulations:

Chemikaliengesetz ("Chemicals Act") of the Federal Republic of Germany, Appendix 1 to § 19a as amended and promulgated on August 28, 2013 (BGBl. I S. 3498) [1].

Konsens-Dokument der Bund-Länder-Arbeitsgruppe Gute Laborpraxis ("Consensus Document of the National and Länder Working Party on Good Laboratory Practice") on the archiving and storage of records and materials, 5 May 1998 [2].

"OECD Principles of Good Laboratory Practice (as revised in 1997)", Paris 1998 [3].

There were no circumstances that may have affected the quality or integrity of the study.

Study Director: Dipl.-Biol. Margit Oppong-Nketiah

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Date: 18 Feb 2016

Eurofins – Non-Leaching Test Report

7. Statement of the Quality Assurance Unit

Eurofins Munich Study No.:	156793
Test Item:	Kastus Log4+™ coated glass
Title:	*In vitro* Cytotoxicity Assay: Cell Growth Analysis via BCA-Staining with an Extract of Kastus Log4+™ coated glass
Study Director:	Dipl.-Biol. Margit Oppong-Nketiah

This report and the conduct of this study were inspected by the Quality Assurance Unit on the following dates:

Phase of QAU Inspection	Date of QAU Inspection	Date of Reporting to the Study Director and Management
Audit Final Study Plan:	28 January 2015	28 January 2015
Audit Experimental Phase (process-based):	21 October 2015	21 October 2015
Audit Final Report:	18 FEB 2016	18 FEB 2016

This report reflects the raw data.

Member of the
Quality Assurance Unit:

Print Name: Gwendolyn Beckmann, M.Sc.

Date: 18 Feb 2016

Eurofins – Non-Leaching Test Report

8. Summary

In the present study the cytotoxic effects of Kastus Log4+™ coated glass were analysed. Hereby, the test item was extracted under agitation for 24 ± 2 h with cell culture medium and the extract was incubated with L929 cells for 68 - 72 h. The protein content of the individual cultures was then analysed as a measure for cytotoxicity and compared to those of the controls.

In this study under the given conditions no leachable substances were released in cytotoxic concentrations from the test item.

Kastus Abrasion Test Report

KASTUS®
24/7 Antimicrobial Surface Protection

Abrasion Testing Overview

The abrasion tests were carried out using an Abrasion Tester Model: ZJ-339. A microfibre cloth was used as the abrasion medium. All testing was carrying out with a load of 1000 grams applied to the testing head (see the left image below). No surfactant was used to lubricate the surface during testing.

Once the abrasion has been completed and the sample testing area cleaned, an ink test is used to determine photocatalytic activity under UV exposure. The ink test is carried out following the guides on the next slide.

Figure: Kastus Abrasion Tester Model: ZJ-339.

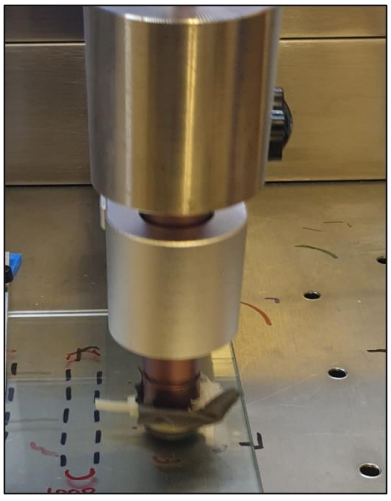


Figure: Microfiber cloths Abrasion Tester Model: ZJ-339.

Photocatalytic Ink Testing

Photocatalytic ink pen testing is a method to check that the coating has been applied correctly. It is developed by 3rd party Ink Intelligent.

The ink is formulated specifically to take advantage of the photocatalytic process. Normally, a dye on the surface of a photocatalyst would be oxidised like any other organic material. However, other more easily oxidised ingredients within the ink allow the dye to be chemically reduced instead. The results are that instead of being destroyed, the dye within the ink is transformed and simply changes colour. The ink changes from clear to brown/grey.

The requirements for the UV light needed to carry out the ink pen testing are included in Ink Test QC DOC V20.1. This pen utilises similar technology as the ISO 21066:2018 standard used to determine photocatalytic activity.

The ink testing isn't a direct measure of the antimicrobial properties of our coating. It can be used to examine if our coating has been applied correctly and is photocatalytic.

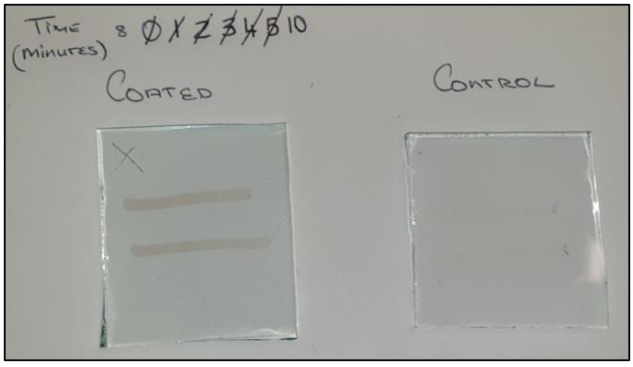


Figure 2: Kastus Coated sample (left) and a non-coated control (right), after ink application and 0 minutes exposure time.

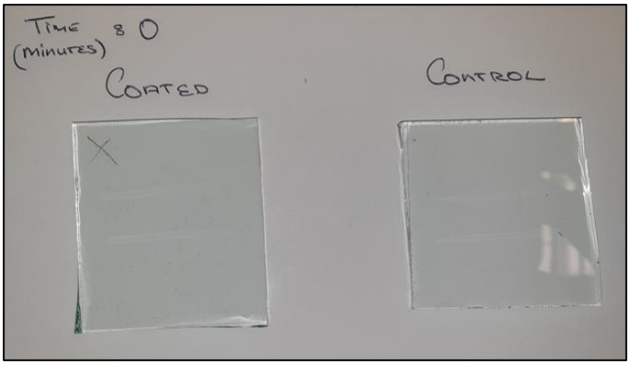
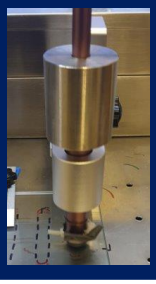


Figure 3: Kastus Coated sample (left) and a non-coated control (right), after ink application and 10 minutes exposure time.

Cloth Abrasion Test Report

Cloth Abrasion Testing Results

1. After all different abrasion cycle tests, the ink changes from transparent to brown within 10 minutes.
   → The coating is still present and photoactive.
(2) Coating is still present under the microscope after 15,000 cycles.

Abrasion	# Cycles	Photocatalytic Ink Test	Judge
Dust-free microfiber cloth 	1,000	No reduction in photocatalytic activity	PASS
	5,000	No reduction in photocatalytic activity	PASS
	10,000	No reduction in photocatalytic activity	PASS
	15,000	No reduction in photocatalytic activity	PASS

(1) The test was stopped after 15,000 cycles with dust-free cloth.
(2) The photocatalytic ink has changed from transparent to brown, and it is expected to have antimicrobial functionality after abrasion.

- Frequency: 60 cycles/min
- Loading: 1000g
- Test length: 50cm
- Test carried out on AG Glass

KASTUS®

24/7 Antimicrobial Surface Protection

For more information or to answer any questions you may have please contact our team on info@kastus.com

Discover more at www.Kastus.com