



## Portable UV-C Sanitizer

Documentation and Test Results

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## Vray Device/Application Instructions

1. Charge the unit (takes 2-3 hours to fully recharge).
2. Lightly press the power button for 2 seconds to turn the unit on (Safe Mode is the default).
3. Please refer to the chart below for time assessments for each strain.
4. Set the timer for 5, 10, or 15 minutes. Default time is 5 minutes.
5. Place Vray over the area you wish to sanitize (it will beep every 10 seconds during use).
6. After using, lightly press the power button for approximately 2 seconds to turn off.

**This unit has a Safe Mode – when tilted, the UV-C light will automatically turn off.**

### To Override Safe Mode:

- 1) Lightly press the power button for 2 seconds to turn on.
- 2) Lightly press the safety button for 2 seconds to deactivate the safe mode. The light on the button turns off.
- 3) Place Vray over the area you wish to sanitize (it will beep every 10 seconds during use).
- 4) Use the override for sanitizing bulky items – desks, chairs, rugs, etc.
- 5) When you are done, lightly press the safety button to activate the safe mode or push the power button more than 2 seconds to turn off.

### Test Result Assessments between Strain Samples and HygenX™ Vray

See % reduction of the strain based on time and distance from the sample indicated on column headings.

Strains	5 Seconds at 5cm (~2")	5 Seconds at 20cm (~8")	10 Seconds at 20cm (~8")	30 Seconds at 20cm (~8")	2 Minutes at 5cm (~2")	5 Minutes at 20cm (~8")
COVID-19	99.99%	98.531%	99.853%	99.99%	Killed in 5-30 seconds. See columns at left.	
Escherichia Coli (E-Coli)	99.9%		99.9%			
Pseudomonas Aeruginosa	99.9%		99.9%			
Staphylococcus Aureus	99.9%		99.9%			
Klebsiella Pneumoniae	99.9%		99.9%			
MRSA	99.9%		99.9%			
Salmonella Typhimurium	99.9%		99.9%			
Bacillus Subtillis	99.9%		99.9%			
Vibrio Parahaemolyticus	99.9%		99.9%			
Human Coronavirus	*Human Coronavirus are larger cells and require more time to destroy. See columns at right.				99.997%	99.997%
Influenza A Virus (H3N2)					99.999%	99.999%
Human Rhino Virus					99.9999%	99.9964% @ 6"



# HygenX Vray UVC Sanitizer Efficacy Test Against COVID-19 Coronavirus

By Korea Zoonosis Research Institute Chonbuk National University



Korea Zoonosis Research Institute  
Chonbuk National University

04/21/2021



## ■ Research objectives

Research on the control effect of COVID-19 by the Vray UVC lamp device

## ■ Purpose of the Test

- Multiple studies conducted have proven the efficacy of virus extinction by light energy of various wavelengths.
- This study is conducted to verify the use of Hygenx Vray UVC lamp device in destroying Covid-19 Coronavirus.

## ■ Research Contents and Methods

### 1. Virus acquisition

- SARS-CoV-2 (NCCP 43326) was distributed by the National Culture Collection for Pathogens (NCCP) of the Korea Disease Control and Prevention Agency (KDCA)

### 2. Cell Culture (BL2 Facility)

(The day before infection)

- Vero E6 cells were seeded on 96 well cell culture plate at the concentration of  $2 \times 10^4$ /well in the BL2 facility
- For cell culture, DMEM media containing 2% Fetal Bovine Serum were used
- They were incubated in the CO<sub>2</sub> incubator under conditions of 37°C and 5% CO<sub>2</sub>

### 3. UVC lamp irradiation (BL3 facility)

(The day of infection)

4. Prepared cells, and Vray with the UVC lamp requested to PRIMETECH Co., Ltd./Hamilton-Buhl were brought into the BL3
5. 100μl of virus + 0.9ml of culture medium (DMEM containing 2% Fetal Bovine Serum) was mixed into a cell culture dish in the biological safety cabinet (BSC)
6. Irradiation was conducted at different distances and times, as shown in Table 1
7. 100μl of the reaction solution was conducted six times serial dilution into the 96 well cell culture plate which Vero E6 cells were incubated
8. Positive control group was not irradiated the UVC lamp
9. Culture and cytopathic effect (CPE) were observed for two to five days under conditions of 37°C and 5% CO<sub>2</sub> in the CO<sub>2</sub> incubator

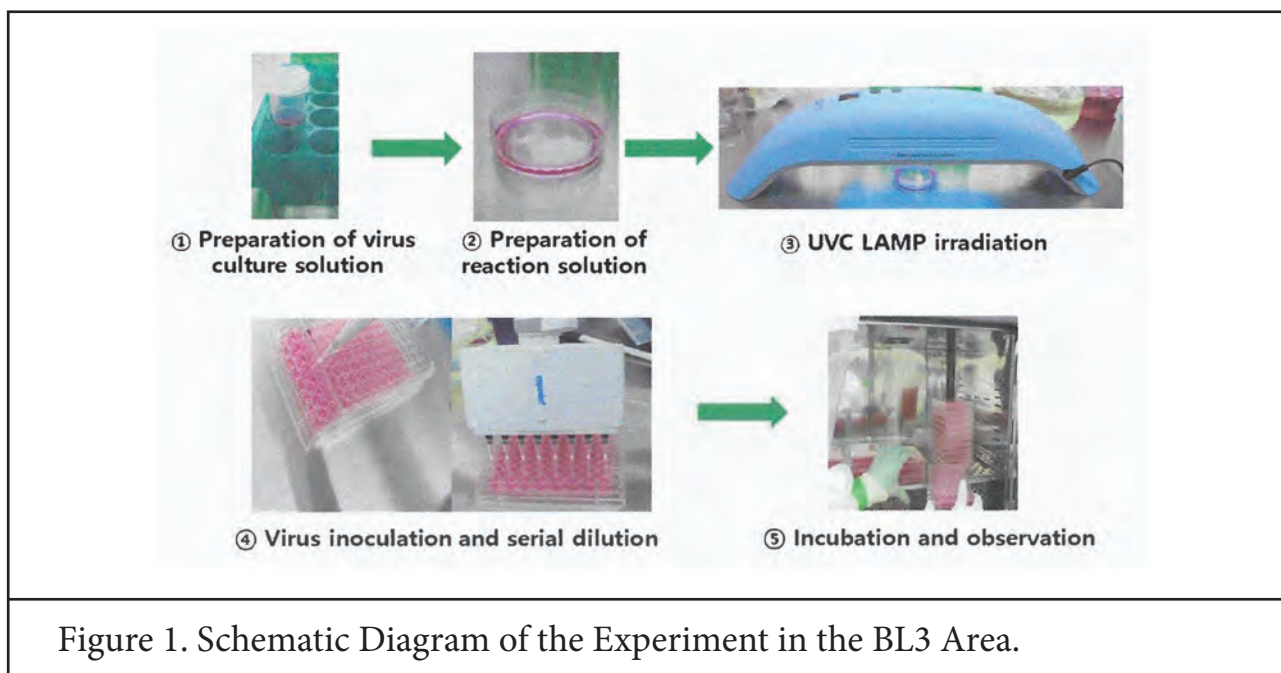


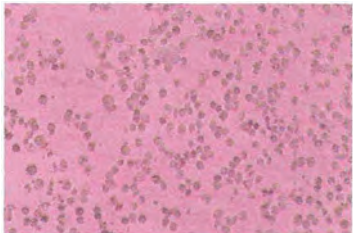
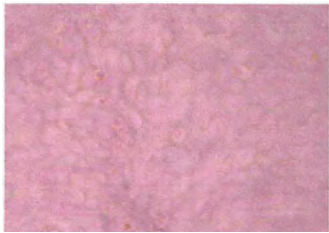
Table 1. UVC larnp irradiation conditions

Irradiation Distance	Vray / 5cm (1.97") distance	Vray held by VClaw / 20cm (7.87") distance
Irradiation Time	5 seconds	5 seconds
	10 seconds	10 seconds
	30 seconds	30 seconds

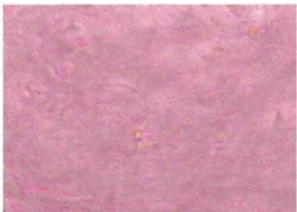
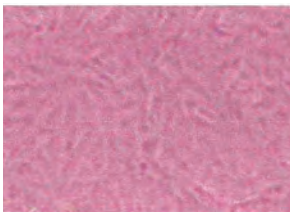

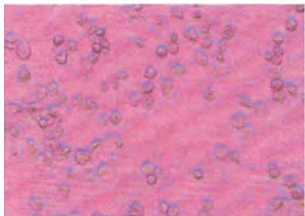
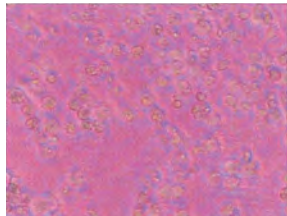



## Research Results

Virus Initial Concentration Irradiation Distance	3.16x10 <sup>7</sup> TCID <sub>50</sub> /ml			
	Vray / 5cm (1.97") distance		Vray held by VClaw / 20cm (7.87") distance	
Irradiation Time		over 99.99% inactivated	5 seconds	over 98.531% inactivated
	10 seconds	over 99.99% inactivated	10 seconds	over 99.853% inactivated
	30 seconds	over 99.99% inactivated	30 seconds	over 99.99% inactivated

SARS-CoV-2 (NCCP 43326) 3.16x10 <sup>7</sup> TCID <sub>50</sub> /ml	Positive Control	Negative Control
		

## Photo results of virus-infected cell

Distance \ Time	5 seconds	10 seconds	30 seconds
5cm (1.97") (Vray)	 over 99.99% inactivated	 over 99.99% inactivated	 over 99.99% inactivated
20cm (7.87") (Vray held by V-Claw)	 over 99.531% inactivated	 over 99.853% inactivated	 over 99.99% inactivated



## Korea Research Institute of Chemical Technology, Center for Convergent Research of Emerging Virus Infection

### Summary of Findings

## HygenX™ Vray

According to the Korea Research Institute of Chemical Technology, Center for Convergent Research of Emerging Virus Infection, which conducted independent testing of the HygenX™ Vray on the human coronavirus strain, the Vray eliminated 99.997% of the coronavirus when used as follows:

- Hold Vray up to 10cm (approx. 4") from the object being sanitized for 1-2 minutes
- Hold Vray up to 20cm (approx. 8") from the object being sanitized for a minimum of 5 minutes

For specific test result details, see charts below:

Human Coronavirus (hCoV) Strain								
UV Lamp	Virus	Time (minutes)	Virus Titer (log CCID50/well)			Virus Reduction (log)		
			5cm	10cm	20cm (mW/cm <sup>2</sup> )	5cm 0.996~1.22	10cm 0.575~0.595	20cm 0.185~0.190
Vray	hCoV	0	4.49	4.49	4.49	<0.00	<0.00	<0.00
Vray	hCoV	1	<0.00	<0.00	nt	>4.49	>4.49	nt
Vray	hCoV	2	<0.00	<0.00	nt	>4.49	>4.49	nt
Vray	hCoV	5	<0.00	<0.00	0.23	>4.49	>4.49	4.26
Vray	hCoV	10	nt	nt	<0.00	nt	nt	>4.49
Vray	hCoV	15	nt	nt	<0.00	nt	nt	>4.49

Human Coronavirus (hCoV) Strain								
UV Lamp	Virus	Contact Time (minutes)	Virus Titer (log CCID50/well)			Virus Reduction (%)		
			5cm	10cm	20cm (mW/cm <sup>2</sup> )	5cm 0.996~1.22	10cm 0.575~0.595	20cm 0.185~0.190
Vray	hCoV	0	30,888	30,888	30,888	0%	0%	0%
Vray	hCoV	1	<1.0	<1.0	nt	>99.997%	>99.997%	nt
Vray	hCoV	2	<1.0	<1.0	nt	>99.997%	>99.997%	nt
Vray	hCoV	5	<1.0	<1.0	2	>99.997%	>99.997%	99.994%
Vray	hCoV	10	nt	nt	<1.0	nt	nt	>99.997%
Vray	hCoV	15	nt	nt	<1.0	nt	nt	>99.997%

nt = not tested



TEST FOR CO.

February 11, 2020

DATE

For the official test report, contact us.





+82-42-860-7412

한국화학연구원  
Korea Research Institute of Chemical Technology

CEVI융합연구단  
Center for Convergent Research of Emerging  
Virus Infection



2쪽 중 1쪽

## 시험성적서 (Certificate of Testing)

의뢰인	담당자	김윤주	전화	010-7666-3263
	소속	(주)프라임테크	메일	kyj@vray.co.kr
	주소	서울 강남구 역삼로 221, 6F (한국여성경제인협회)		
의뢰내용	UV등의 바이러스 살균력 시험			
시료	UV등 ( 브이레이 Vray )			
시험바이러스	Human Corona virus strain	역가측정용 세포주	MRC5 세포	
시험번호	17DI113	시험기간	17.09.13 ~ 9.19 (6d)	
UV조사거리	5cm, 10cm, 20cm	조사시간	0,1,2,5,10,15 min	
역가측정	CPE/MTT	비고		
시험온도	실온(약 23℃)	시험참여자	김다혜, 이종교	

## 시험 결과

UV lamp	Virus	Time (min)	Virus titer (log CCID50/well)			Virus reduction(log)		
			5cm	10cm	20cm (mW/cm <sup>2</sup> )	5cm 0.996~1.22	10cm 0.575~0.595	20cm 0.185~0.190
Vray	hCoV	0	4.49	4.49	4.49	<0.00	<0.00	<0.00
Vray	hCoV	1	<0.00	<0.00	nt	>4.49	>4.49	nt
Vray	hCoV	2	<0.00	<0.00	nt	>4.49	>4.49	nt
Vray	hCoV	5	<0.00	<0.00	0.23	>4.49	>4.49	4.26
Vray	hCoV	10	nt	nt	<0.00	nt	nt	>4.49
Vray	hCoV	15	nt	nt	<0.00	nt	nt	>4.49

결론: UV등인 브이레이(Vray)를 5cm와 10cm 거리에서는 1 분 이내에, 20cm 거리에서는 5 분 이내에 로그값 4.0 이상의 바이러스 불활화가 관찰되었음.

\*일반값으로 계산된 바이러스 역가와 %로 표시된 바이러스 감소율은 첨부하는 표 참조  
2017 년 11 월 14 일

Korea Research Institute of Chemical Technology  
Virus Research and Testing Center

시험책임자: 이종교 (Chong-Kyo Lee) (인)





첨부: 일반값으로 계산된 바이러스 역가와  
%로 표시된 바이러스 감소율



2 쪽 중 2 쪽

표. 바이러스 역가와 감소율(%)

UV lamp	Virus	Contact time (min)	Virus titer (CCID50/well)			Virus reduction(%)		
			5cm	10cm	20cm (mW/cm <sup>2</sup> )	5cm 0.996~1.22	10cm 0.575~0.595	20cm 0.185~0.190
Vray	hCoV	0	30,888	30,888	30,888	0%	0%	0%
Vray	hCoV	1	<1.0	<1.0	nt	>99.997%	>99.997%	nt
Vray	hCoV	2	<1.0	<1.0	nt	>99.997%	>99.997%	nt
Vray	hCoV	5	<1.0	<1.0	2	>99.997%	>99.997%	99.994%
Vray	hCoV	10	nt	nt	<1.0	nt	nt	>99.997%
Vray	hCoV	15	nt	nt	<1.0	nt	nt	>99.997%



SGS Korea Co., Ltd.

## Summary of Findings

### HygenX™ Vray

According to the laboratories at SGS Korea Co., Ltd., which conducted independent testing of the HygenX™ Vray on listed strains, it found that the Vray effectively eliminated 99.999% of tested bacterium when used as follows:

#### Test Result Assessments between Strain Samples and HygenX™ Vray

Strains	5 Seconds Held at 2" (5 cm) from Sample
Escherichia Coli (E-Coli)	99.999%
Staphylococcus Aureus	99.999%
MRSA	99.999%
Klebsiella Pneumoniae	99.999%
Pseudomonas Aeruginosa	99.999%
Bacillus Subtillis	99.999%
Vibrio Parahaemolyticus	99.999%



TEST FOR CO.

July 30, 2020

DATE

For the official test report, contact us.

# Test Report

No. F690101/LF-CTSAYHA18-07118ER1

Issued Date: 2018. 07. 25

Page 1 of 9

**PRIMETECH CO., LTD.**  
6F, 221 Yeoksam-ro  
Gangnam-gu, Seoul  
Korea

The following sample(s) was/were submitted and identified by/on behalf of the client as:-

<b>SGS File No.</b>	: AYHA18-07118ER1
<b>Sample Description</b>	: UVC sterilizer (Vray, VR-03-KKY)
<b>Style no./Item no.</b>	: Vray/VR-03-KKY
<b>Order No.</b>	: -
<b>Buyer</b>	: -
<b>Manufacturer</b>	: PRIMETECH CO., LTD.
<b>Country of Origin</b>	: KOREA
<b>Country of Destination</b>	: -
<b>Received Date</b>	: 2018. 07. 05
<b>Test Period</b>	: 2018. 07. 05 to 2018. 07. 18
<b>Test Method</b>	: For further details, please refer to following page (s)
<b>Test Results</b>	: For further details, please refer to following page (s)
<b>Supersedes /Referral</b>	: This test report supersedes previous report number, "F690101/LF-CTSAYHA18-07118E" issued by SGS Korea.

SGS Korea Co., Ltd.



Conrad Lee / Technical Manager

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- Antimicrobial Activity of Photo: *Escherichia coli* -

- after 5 sec. at a distance of 5 cm -



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- Antimicrobial Activity of Photo: *Staphylococcus aureus* -

- after 5 sec. at a distance of 5 cm -



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- Antimicrobial Activity of Photo: **MRSA** -

- after 5 sec. at a distance of 5 cm -



BACTERIUM: MRSA ATCC 33591

SGS FILE NO. : Control

DATE: 2018-07-16

REF.: -



BACTERIUM: MRSA ATCC 33591

SGS FILE NO. : AYHA18-07118

DATE: 2018-07-16

REF.: -



BACTERIUM: MRSA ATCC 33591

SGS FILE NO. : AYHA18-07118

DATE: 2018-07-16

REF.: -



BACTERIUM: MRSA ATCC 33591

SGS FILE NO. : AYHA18-07118

DATE: 2018-07-16

REF.: -

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- Antimicrobial Activity of Photo: *Klebsiella pneumoniae* -

- after 5 sec. at a distance of 5 cm -



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## Test Report

No. F690101/LF-CTSAYHA18-07118ER1

Issued Date: 2018. 07. 25

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- Antimicrobial Activity of Photo: *Pseudomonas aeruginosa* -

- after 5 sec. at a distance of 5 cm -



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- Antimicrobial Activity of Photo: *Bacillus subtilis* -

- after 5 sec. at a distance of 5 cm -



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## Test Report

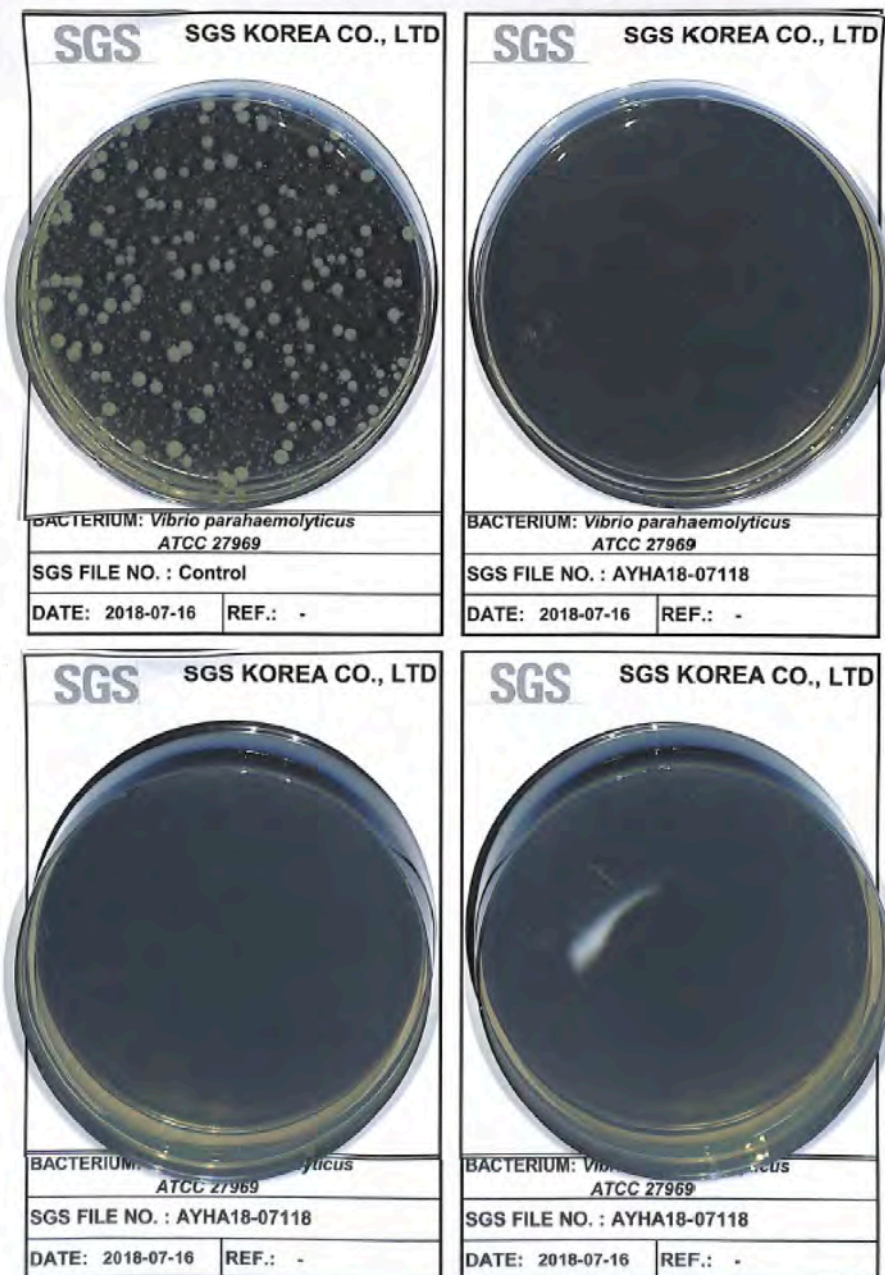
No. F690101/LF-CTSAYHA18-07118ER1

Issued Date: 2018. 07. 25

Page 9 of 9

- Antimicrobial Activity of Photo: *Vibrio parahaemolyticus* -

- after 5 sec. at a distance of 5 cm -



\*\*\* End of Report \*\*\*

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## Test Report

No. F690101/LF-CTSAYHA18-07118ER1

Issued Date: 2018. 07. 25

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### Results (#) :

Test microorganisms	Bacteria number after 24 hr at 36 °C	
	Control (CFU/plate)	Sample (CFU/plate)
<i>Escherichia coli</i> (ATCC 8739)	1.1 X 10 <sup>5</sup>	< 10
<i>Staphylococcus aureus</i> (ATCC 6538)	2.0 X 10 <sup>5</sup>	< 10
MRSA (ATCC 33591)	2.8 X 10 <sup>5</sup>	< 10
<i>Klebsiella pneumoniae</i> (ATCC 4352)	1.3 X 10 <sup>5</sup>	< 10
<i>Pseudomonas aeruginosa</i> (ATCC 9047)	3.0 X 10 <sup>5</sup>	< 10
<i>Bacillus subtilis</i> (ATCC 6633)	1.7 X 10 <sup>5</sup>	< 10
<i>Vibrio parahaemolyticus</i> (ATCC 27969)	3.8 X 10 <sup>5</sup>	< 10

Remark: CFU = Colony forming unit

Picture of Sample as Received :



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KTR Korea Testing and Research Institute

## Summary of Findings

### HygenX™ Vray

According to KTR Korea Testing and Research Institute, which conducted independent testing of the HygenX™ Vray on listed strains, it found that the Vray effectively eliminated 99.999% of tested bacterium when used as follows:

#### Test Result Assessments between Strain Samples and HygenX™ Vray

Strains	5 Seconds Held 8" (20 cm) from Sample	10 Seconds Held 2" (5 cm) from Sample
Escherichia Coli (E-Coli)	99.999%	99.999%
S. Typhimurium	99.999%	99.999%
Staphylococcus Aureus	99.999%	99.999%
Bacillus Subtilis	99.999%	99.999%
Vibrio Parahaemolyticus	99.999%	99.999%



TEST FOR CO.

January 3, 2018

DATE

For the official test report, contact us.



# TEST REPORT

98, Gyoyukwon-ro, Gwacheon-si, Gyeonggi-do, 13810, Rep. of KOREA

TEL 82-2-2164-0011 FAX 82-2-2634-1008

Report No : TBK-002453

Receipt Date : 2017.11.03.

Representative : Yunju Kim

Test Completion Date : 2018.01.03.

Company name: PRIMETECH Co., Ltd.

Address : 6F, 221, Yeoksam-ro, Gangnam-gu, Seoul, KOREA (06224)

Sample name : UV sterilizer (Vray)

## Test Results

TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
Bactericidal test(E. coli)	CFU/PL ATE	Control group(Initial)	$4.5 \times 10^4$	Client Provided Test Method
Bactericidal test(E. coli)	CFU/PL ATE	Test group (5 seconds later)	$<10 (>99.9 \%)$	Client Provided Test Method
Bactericidal test(S. typhimurium)	CFU/PL ATE	Control group(Initial)	$6.0 \times 10^4$	Client Provided Test Method
Bactericidal test(S. typhimurium)	CFU/PL ATE	Test group (5 seconds later)	$<10 (>99.9 \%)$	Client Provided Test Method
Bactericidal test(B. subtilis)	CFU/PL ATE	Control group(Initial)	$8.0 \times 10^4$	Client Provided Test Method
Bactericidal test(B. subtilis)	CFU/PL ATE	Test group (5 seconds later)	20 (99.9 %)	Client Provided Test Method
Bactericidal test(V. paraheamolyticus)	CFU/PL ATE	Control group(Initial)	$1.4 \times 10^4$	Client Provided Test Method
Bactericidal test(V. paraheamolyticus)	CFU/PL ATE	Test group (5 seconds later)	$<10 (>99.9 \%)$	Client Provided Test Method

- Next Page -

*Yoon Se-mi*

Tested by Yoon Se-mi  
E-mail: ysm@ktr.or.kr

*Jin-Sik Cho*

Technical Manager: Jin-Sik Cho  
Tel: 1577-0091(ARS ①→④)

2018.01.03.

**Korea Testing & Research Institute**

President

*Byun, Jong-Rip*



QR Code for forgery





# TEST REPORT

98, Gyoyukwon-ro, Gwacheon-si, Gyeonggi-do, 13810, Rep. of KOREA

TEL 82-2-2164-0011 FAX 82-2-2634-1008

Report No : TBK-002453

Receipt Date : 2017.11.03.

Representative : Yunju Kim

Test Completion Date : 2018.01.03.

Company name: PRIMETECH Co., Ltd.

Address : 6F, 221, Yeoksam-ro, Gangnam-gu, Seoul, KOREA (06224)

Sample name : UV sterilizer (Vray)

## Test Results

TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
-----------	------	--------	--------	-------------

\* Test condition

- Distance between sample and inoculum: 5 cm
- Preheating time: 10 seconds

\*\* Test strain

- Escherichia coli ATCC 25922
- Salmonella typhimurium ATCC 13311
- Bacillus subtilis ATCC 6633
- Vibrio parahaemolyticus ATCC 33844

\*\*\* Decrease rate (%) =  $\{(A-B)/A\} \times 100$

- A : Plate count of control group at initial time (Average)
- B : Plate count of test group after designated time (Average)

Attachment: Test report

- Usage of Report: QUALITY CONTROL

NOTE : 1. The test results of this test report are only limited in to the samples and sample names provided by the client and do not guarantee the quality of all products of the client. You can check website ([www.ktr.or.kr](http://www.ktr.or.kr)) or QR code to verify the authenticity of the certificate.  
2. This test report shall be used only within the purpose of its defined usage and shall not be used for public relation, advertisement and lawsuit.  
3. This test report is only valid when printed on KTR original report paper with hologram and when re-issued by KTR. The copy and the electronic file of the test report are only for reference.

*Yoon Se-mi*

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*Jin-Sik Cho*

Technical Manager: Jin-Sik Cho  
Tel: 1577-0091(ARS ①→④)

2018.01.03.

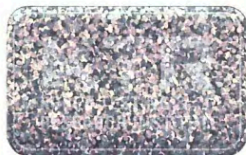
**Korea Testing & Research Institute**

President

*Byun, Jong-Rip*



QR Code for forgery



# TEST REPORT

98, Gyoyukwon-ro, Gwacheon-si, Gyeonggi-do, 13810, Rep. of KOREA

TEL 82-2-2164-0011 FAX 82-2-2634-1008

Report No : TBK-002455

Receipt Date : 2017.11.03.

Representative : Yunju Kim

Test Completion Date : 2018.01.03.

Company name: PRIMETECH Co., Ltd.

Address : 6F, 221, Yeoksam-ro, Gangnam-gu, Seoul, KOREA (06224)

Sample name : UV sterilizer (Vray)

## Test Results

TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
Bactericidal test(E. coli)	CFU/PL ATE	Control group(Initial)	$4.5 \times 10^4$	Client Provided Test Method
Bactericidal test(E. coli)	CFU/PL ATE	Test group (10 seconds later)	$<10$ (>99.9 %)	Client Provided Test Method
Bactericidal test(S. typhimurium)	CFU/PL ATE	Control group(Initial)	$6.0 \times 10^4$	Client Provided Test Method
Bactericidal test(S. typhimurium)	CFU/PL ATE	Test group (10 seconds later)	TNTC	Client Provided Test Method
Bactericidal test(B. subtilis)	CFU/PL ATE	Control group(Initial)	$8.0 \times 10^4$	Client Provided Test Method
Bactericidal test(B. subtilis)	CFU/PL ATE	Test group (10 seconds later)	TNTC	Client Provided Test Method
Bactericidal test(V. paraheamolyticus)	CFU/PL ATE	Control group(Initial)	$1.4 \times 10^4$	Client Provided Test Method
Bactericidal test(V. paraheamolyticus)	CFU/PL ATE	Test group (10 seconds later)	$<10$ (>99.9 %)	Client Provided Test Method

- Next Page -

*Yoon Se-mi*

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Technical Manager: Jin-Sik Cho  
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2018.01.03.

**Korea Testing & Research Institute**

President

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# TEST REPORT

98, Gyoyukwon-ro, Gwacheon-si, Gyeonggi-do, 13810, Rep. of KOREA

TEL 82-2-2164-0011 FAX 82-2-2634-1008

Report No : TBK-002455

Receipt Date : 2017.11.03.

Representative : Yunju Kim

Test Completion Date : 2018.01.03.

Company name: PRIMETECH Co., Ltd.

Address : 6F, 221, Yeoksam-ro, Gangnam-gu, Seoul, KOREA (06224)

Sample name : UV sterilizer (Vray)

## Test Results

TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
-----------	------	--------	--------	-------------

Test condition

- Distance between sample and inoculum: 20 cm
- Preheating time: 10 seconds

\*\* Test strain

- Escherichia coli ATCC 25922
- Salmonella typhimurium ATCC 13311
- Bacillus subtilis ATCC 6633
- Vibrio parahaemolyticus ATCC 33844

\*\*\* Decrease rate (%) =  $\{(A-B)/A\} \times 100$ 

- A : Plate count of control group at initial time (Average)
- B : Plate count of test group after designated time (Average)

Attachment: Test report

- Usage of Report: QUALITY CONTROL

NOTE : 1. The test results of this test report are only limited in to the samples and sample names provided by the client and do not guarantee the quality of all products of the client. You can check website ([www.ktr.or.kr](http://www.ktr.or.kr)) or QR code to verify the authenticity of the certificate.

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*Yoon Se-mi*

Tested by Yoon Se-mi  
E-mail: ysm@ktr.or.kr

*Jin-Sik Cho*

Technical Manager: Jin-Sik Cho  
Tel: 1577-0091(ARS ①→④)

2018.01.03.

## Korea Testing & Research Institute

President

*Byun, Jong-Rip*



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KCL Korea Conformity Laboratories

## Summary of Findings

### HygenX™ Vray

According to KCL Korea Conformity Laboratories, which conducted independent testing of the HygenX™ Vray on listed strains, it found that the Vray effectively eliminated 99.999% of tested bacterium when used as follows:

#### Test Result Assessments between Strain Samples and HygenX™ Vray

Strains	5 Seconds Held 2.75" (7 cm) from Sample	10 Seconds Held 2" (5 cm) from Sample
Escherichia Coli (E-Coli)	99.999%	nt
Klebsiella Pneumoniae	99.999%	99.999%
Pseudomonas Aeruginosa	99.999%	99.999%
Staphylococcus Aureus	99.999%	99.999%
MRSA	nt	99.999%
S. Typhimurium	99.999%	99.999%
Staphylococcus Aureus	99.999%	99.999%
Bacillus Subtillis	99.999%	99.999%
Vibrio Parahaemolyticus	99.999%	99.999%

nt=not tested



TEST FOR CO.

Oct. 31, 2017

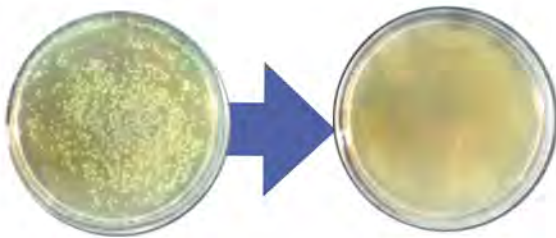
DATE

For the official test report, contact us.

# vray

Before

After



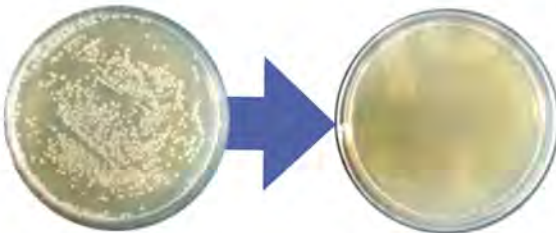
## **Pseudomonas Aeruginosa**

*Pseudomonas aeruginosa* is a common bacterium that is associated with numerous serious illnesses, including chronic infections in cystic fibrosis patients.



## **Staphylococcus Aureus**

The bacterium *Staphylococcus aureus* is a common cause of skin infections, respiratory infections and food poisoning.



## **Klebsiella Pneumoniae**

Found to be a major cause of pneumonia in the late 19th Century, *Streptococcus pneumonia* can cause other infections, including bronchitis and meningitis.



## **MRSA**

Commonly occurring in hospital settings, MRSA is a strain of staph. MRSA is spread by contact, whether with people or objects contaminated with the bacteria. Extremely contagious, MRSA evolves to become resistant to antibiotics.

TESTING PROVIDED BY **KCL**





## TEST REPORT

1. NO : CT17-119309

2. Client

○ Name : HamiltonBunl/Primetecn

○ Address : 80 Little Falls Road, Fairfield NJ 07004

3. Date of Test : 2017.11.02 ~ 2017.11.22

4. Use of Report : Quality Control

5. Test Sample : Vray

6. Test Method

(1) Client's requirement method

Reissuance(R1)

Date : 2017.11.22

Affirmation	Tested By	JKS	Technical Manager	Sangbok
	Name : Kye Seung Chang		Name : Sang Bok Bae	
Our report apply only to the standards or procedures identified and to the sample(s) tested unless otherwise specified. The test results are not indicative of representative of the qualities of the qualities of the lot from which the sample was taken or of apparently identical or similar products.				

2017.11.22

Korea Conformity Laboratories

President Kyung Sik Kim

Address : #805, 1<sup>st</sup> VALLEY Gunpo, 149, Gongdan-ro, Gunpo-si, Gyeonggi-do, 15845, Korea 82-31-389-9100

Result Inquiry : The Center of Green Complex Technologies 82-31-389-9184

# TEST REPORT

No : CT17-119309

## 7. Test Results

Test Items		Test method	Test Results			Testing Environment
			Early Conc. (CFU/mL)	After 5 sec Conc. (CFU/mL)	Reduction rate of bacteria(%)	
Antibacterial test for <i>Klebsiella pneumoniae</i>	BLANK	Client's requirement method	$1.3 \times 10^4$	$1.3 \times 10^4$	—	(37.0 ± 0.2) °C
	Vray		$1.3 \times 10^4$	< 10	99.9	
Antibacterial test for MRSA	BLANK		$1.1 \times 10^4$	$1.1 \times 10^4$	—	
	Vray		$1.1 \times 10^4$	< 10	99.9	

※ CFU : Colony Forming Unit

※ Test strain : *Klebsiella pneumoniae* ATCC 4352MRSA(*Staphylococcus aureus subsp. aureus* ATCC 33591)

※ Sample : Vray

※ Client's requirement method

— Test time : 5 seconds

— Distance between of the medium inoculated with the strain and lamp into the sample : 5 cm

※ Inoculum preparation, Inoculation method, Assessment of Results : KCL-FIR-1002:2011 Mod.

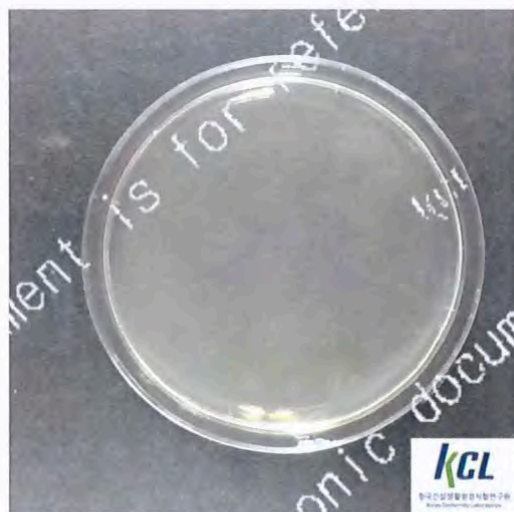


# TEST REPORT

No : CT17-119309



<Picture 1. *Klebsiella pneumoniae* - BLANK (0 h)>



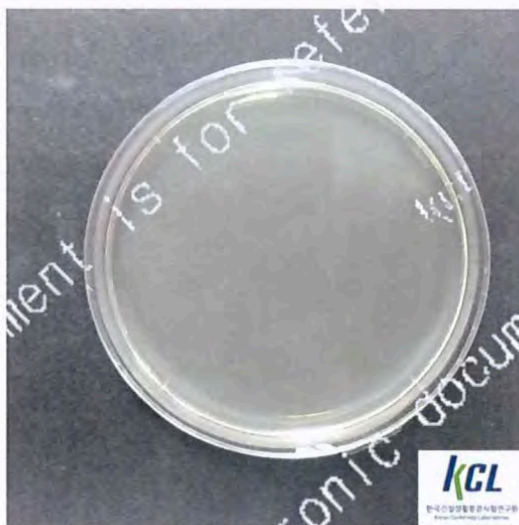
<Picture 2. *Klebsiella pneumoniae* - Vray (5 sec)>

# TEST REPORT

No : CT17-119309



<Picture 3. MRSA - BLANK (0 h)>



<Picture 4. MRSA - Vray (5 sec)>

# TEST REPORT

No : CT17-119309



<Picture 5. Sample[ray]>

----- End of Report -----



## TEST REPORT

1. NO : CT17-119308

2. Client

○ Name : HamiltonBuhl/Primetech

○ Address : 80 Little Falls Road, Fairfield NJ 07004

3. Date of Test : 2017.11.02 ~ 2017.11.22

4. Use of Report : Quality Control


5. Test Sample : Vray

6. Test Method

(1) Client's requirement method

Reissuance(R1)

Date : 2017.11.22

Affirmation	Tested By	JKS	Technical Manager	
	Name : Kye Seung Chang		Name : Sang Bok Bae	
Our report apply only to the standards or procedures identified and to the sample(s) tested unless otherwise specified. The test results are not indicative of representative of the qualities of the qualities of the lot from which the sample was taken or of apparently identical or similar products.				

2017.11.22

Korea Conformity Laboratories

President Kyung Sik Kim

Address : #805, 1<sup>st</sup> VALLEY Gunpo, 149, Gongdan-ro, Gunpo-si, Gyeonggi-do, 15845, Korea 82-31-389-9100

Result Inquiry : The Center of Green Complex Technologies 82-31-389-9184



# TEST REPORT

No : CT17-119308

## 7. Test Results

Test Items		Test method	Test Results			Testing Environment
			Early Conc. (CFU/mL)	After 5 sec Conc. (CFU/mL)	Reduction rate of bacteria(%)	
Antibacterial test for <i>Escherichia coli</i>	BLANK	Client's requirement method	$1.0 \times 10^4$	$1.0 \times 10^4$	—	(37.0 ± 0.2) °C
	Vray		$1.0 \times 10^4$	< 10	99.9	
Antibacterial test for <i>Pseudomonas aeruginosa</i>	BLANK		$1.3 \times 10^4$	$1.3 \times 10^4$	—	
	Vray		$1.3 \times 10^4$	< 10	99.9	
Antibacterial test for <i>Staphylococcus aureus</i>	BLANK		$1.0 \times 10^4$	$1.0 \times 10^4$	—	
	Vray		$1.0 \times 10^4$	< 10	99.9	

※ CFU : Colony Forming Unit

※ Test strain : *Escherichia coli* ATCC 25922*Pseudomonas aeruginosa* ATCC 15442*Staphylococcus aureus* ATCC 6538

※ Sample : Vray

※ Client's requirement method

— Test time : 5 seconds

— Distance between of the medium inoculated with the strain and lamp into the sample : 5 cm

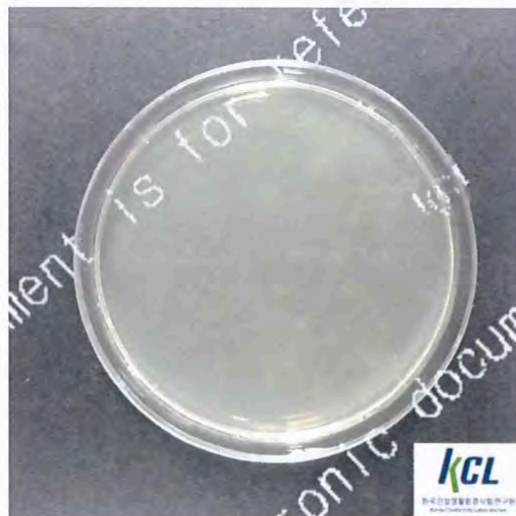
※ Inoculum preparation, Inoculation method, Assessment of Results : KCL-FIR-1002:2011 Mod.

# TEST REPORT

No : CT17-119308



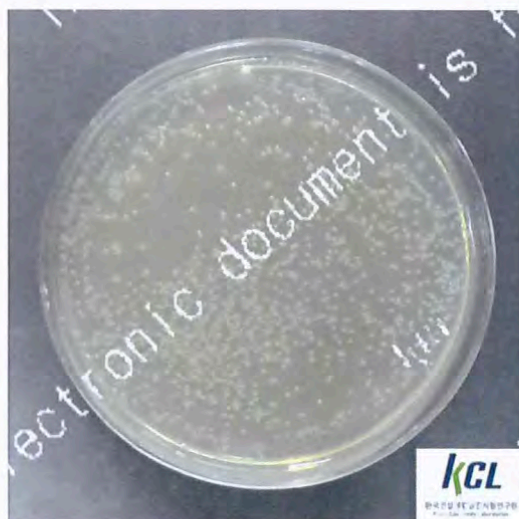
<Picture 1. *Escherichia coli* - BLANK (0 h)>



<Picture 2. *Escherichia coli* - Vray (5 sec)>

# TEST REPORT

No : CT17-119308



<Picture 3. *Pseudomonas aeruginosa* - ELANK (0 h)>

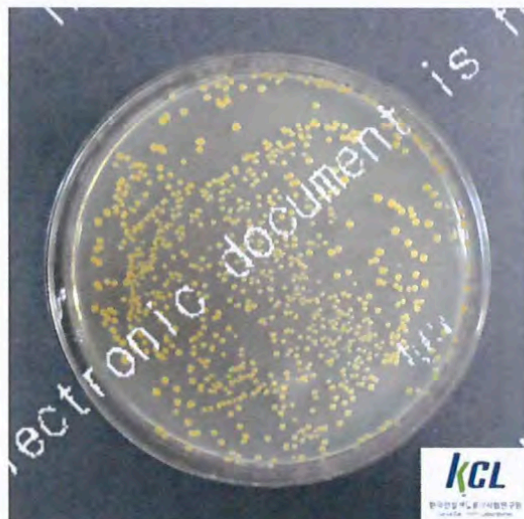


<Picture 4. *Pseudomonas aeruginosa* - Vray (5 sec)>

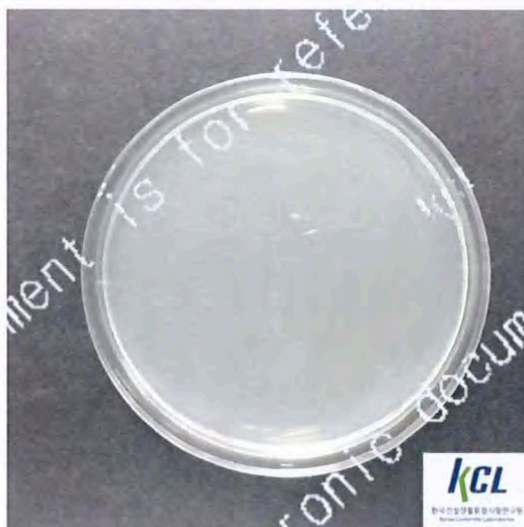


# TEST REPORT

No : CT17-119308



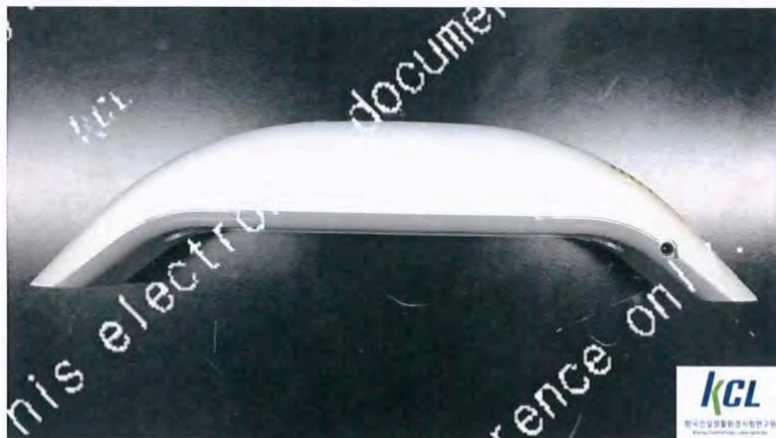
<Picture 5. *Staphylococcus aureus* - BLANK (0 h)>



<Picture 6. *Staphylococcus aureus* - Vray (5 sec)>

# TEST REPORT

No : CT17-119308



<Picture 7. Sample[ray]>

----- End of Report -----