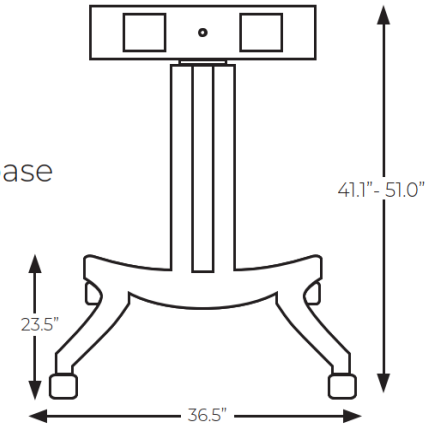
SIEMENS

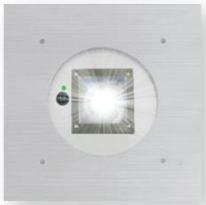
Ingenuity for life

Dimensions

Height: 41.1" – 51.0" Width: 36.5" Depth: 23.5"

Caster-wheeled base
M2-C



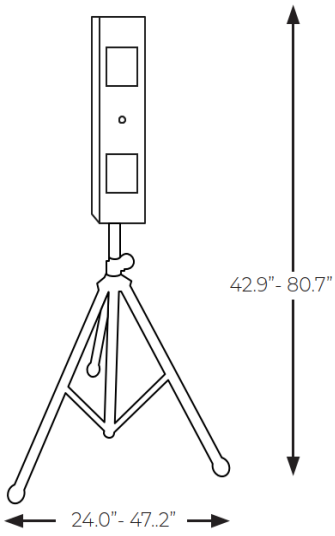


HELO
F1 / F1-12 / F1-24

Helo F1 has one UV Light Engine providing 10' x 10' coverage.

Height: 49.9" - 80.07" Width and Depth: 24.0" - 47.2"

Adjustable tripod base
M2-T



Product Specifications

Illumination

Light Source	Proprietary Pulsed Xenon Lamp
Pulse Interval	1 UV Flash every 6 seconds
Wavelengths	UV-C (200-280nm) Germicidal UV-B (280-320nm) Germicidal UV-A (320-400nm) Antibacterial
Range	12' x 12' typical
UV Bulb Rated Life	> 2 Million UV Flashes

Electrical System

Input Voltage	110V AC
Max Current	7 Amps
Total Power	60W per standard, 30 minute cycle
Power Connection	3-prong grounded plug

Physical

Weight	M2-C 53.4 lbs M2-T 14.4 lbs
Housing/Finish	Brushed Aluminum
Optics	Two patented UV Light Engines with transmissive UV lens and Xenon UV lamp
Beam Angle	170°

Environment

Ambient Operating Temperature	41°F to 104°F
Ambient Operating Humidity	<80%RH non-condensing

Certifications

Safety	TUV Certified, tested to UL 61010-1:2012
FCC	Compliant with Part 15 Class A
RoHS	Compliant
FDA	Materials are cleared for use in food and medical areas
EPA	Registered

Warranty

Warranty	1 year

Certifications

This device is tested and certified by TUV to UL specifications.

Tested to be compliant with FCC Part 15 Class A.

Internal components of this device are UL Listed, UL Recognized or CE listed.

The manufacturer is registered with the US Environmental Protection Agency (EPA). Clinical laboratory testing has been performed at independent labs.

MADE IN USA

Example Tripod with Bag:
Dimensions of bag: 50 " x 10 " x 5"
Weight with tripod stand: 15.5 lbs.

Example Micro with Case:
Dimensions: 13” x 10” x 5”
Weight of case with Micro: 6.6 lbs.

VIOLET DEFENSE TECHNOLOGY®

CLINICAL VALIDATION
(THIRD PARTY LAB TESTING)

Violet Defense Technology has been tested by independent accredited third-party testing labs. Units tested utilize pulsed Xenon technology to deploy powerful, broad spectrum UV-C, UV-B, UV-A, and violet blue light to kill germs.

BACTERIAL TESTING

	Average Percentage Reduction
	3 meters
E. *coli*	99.99%
Salmonella	99.9%
MRSA	99.9%

BACTERIAL SPORE TESTING

	Average Percentage Reduction
	1.5 meters
C. *diff*	99.9%

VIRUS TESTING

	Average Percentage Reduction
	2 meters
Norovirus	99.99%

FUNGAL TESTING

	Average Percentage Reduction
	1 meter
C. *auris*	>99.98%

For more information, contact Katy Glynn at
Katy.Glynn@Siemens.com | 224-200-9287

Results may vary and are dependent upon time and distance.

PATHOGENS TESTED

The CDC actively maintains a list of drug-resistant pathogens that pose a threat to the United States. The loss of effective antibiotics makes it even more critical to have alternate solutions to prevent the spread of bacteria, virus, and fungi. Violet Defense tested its technology against key pathogens of greatest concern.

E. *coli*
- This bacteria has multiple strains that is most commonly known for food poisoning.
- Over 260,000 infections occur each year from Shiga toxin-producing E. coli (STEC)

Salmonella
- Leading cause of hospitalizations due to foodborne disease costs an estimated $2.2 billion[2] in healthcare costs

MRSA
- MRSA is a type of staph bacteria resistant to many antibiotics
- Over 80,000 cases of MRSA each year and 11,000 associated deaths each year in the U.S.

C. *diff*
- Clostridioides difficile (C. *diff*) is a bacterium that causes diarrhea and colitis (an inflammation of the colon)
- Approximately 29,000 people diagnosed with C. *diff* in a year died within one month of diagnosis.

Norovirus
- Highly contagious virus, norovirus causes inflammation of stomach and intestines, resulting in vomiting and diarrhea
- Estimated to cause 19-21 million illnesses each year in the U.S.

C. *auris*
- This highly lethal, antifungal resistant fungus is an emerging, yet serious global health threat.

VIOLET DEFENSE TECHNOLOGY

Study Report

Antibacterial & Antiviral Effectiveness of Violet Defense Devices

In July and August of 2017, Violet Defense engaged a third-party, clinical testing lab to validate the efficacy of its S.A.G.E. products. The following represents the results of that testing.

About Microchem Laboratory

Microchem Laboratory is an EPA and FDA GLP-Compliant, ISO 17025 Accredited Testing Laboratory (Laboratory Accreditation Bureau Certificate Number L2450). Tests were conducted at the Microchem Laboratory, 1304 W. Industrial Blvd, Round Rock, TX 78681. For more information, visit www.microchemlab.com.

Products Tested

S.A.G.E. UV Whole Room Unit

The S.A.G.E. UV Whole Room Unit uses pulsed Xenon technology to deploy broad spectrum of UV-C, UV-B, UV-A and violet blue light to kill bacteria and viruses. Each unit includes intelligent control that can be programmed to run autonomously for a pre-defined period.

S.A.G.E. UV Bathroom Fan

The S.A.G.E. UV Bathroom Fan uses pulsed Xenon technology to deploy broad spectrum of UV-C, UV-B, UV-A and violet blue light to kill bacteria and viruses. Each unit includes intelligent control that can be programmed to run autonomously for a pre-defined period.

Test Methods

ASTM International, formerly the American Society for Testing and Materials (ASTM), is an internationally recognized organization that develops and publishes product and testing standards.

Antibacterial Tests (Studies NG9044-A1, NG9045-A1, NG9204-A1, NG9205-A1) were conducted utilizing ASTM International Standard Test Method E1153 Modified for Devices Test Method for Efficacy of Sanitizers Recommended for Inanimate Non-Food Contact Surfaces. ASTM E1153 is a quantitative test method designed to evaluate the antimicrobial efficacy of sanitizers on pre-cleaned, inanimate, nonporous environmental surfaces.

Antiviral Tests (Studies NG9046 & NG9047-A3) were conducted utilizing ASTM International Standard Test Method E1053 Modified for Device Assessment of the Virucidal Activity of Chemicals Intended for Disinfection of Inanimate, Nonporous Environmental Surfaces. An ASTM E1053 test is used to determine the virucidal effectiveness of disinfectant products designed for use on hard, nonporous environmental surfaces.

Pathogens Tested

Focus Antibacterial Pathogens:

Escherichia coli

This bacteria is a Gram-negative, rod-shaped, facultative anaerobe commonly found in the gastrointestinal tract of mammals. Certain pathogenic groups of *E. coli* such as enterohemorrhagic (EHEC), verocytotoxin producing (VTEC) and Shiga-like toxin producing (STEC) can cause a multitude of illnesses. E. coli is relatively susceptible to disinfection when dried on a surface, yet it can be a challenging microorganism to mitigate in solution.

Salmonella enterica

This bacteria is Gram-negative, rod-shaped, facultative anaerobe. Like the closely related *Escherichia* genus, *Salmonella* are common to all parts of the world and share habitats in the digestive systems of cold and warm-blooded animals. *S. enterica* is one of the most common bacteria associated with zoonotic and foodbourne illness. Because of its regular occurrence and pathogenicity, *S. enterica* is a common bacteria for measuring disinfectant efficacy.

Staphylococcus aureus (MRSA)

This bacteria is a Gram-positive, cocci shaped, aerobe which is resistant to the penicillin-derivative antibiotic methicillin. MRSA can cause troublesome infections, and their rapid reproduction and resistance to antibiotics make them more difficult to treat. MRSA bacteria are resistant to drying and can therefore survive on surfaces and fabrics for an extended period of time and therefore makes this bacteria an excellent representative for antimicrobial efficacy testing on surfaces.

Focus Viral Pathogens

Feline calicivirus (FCV), ATCC VR-782, surrogate for human norovirus

This virus is a non-enveloped, positive-stranded RNA member of the genus. 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.

Study Results

Antibacterial Activity and Sanitizing Efficacy of Violet Defense's Device (Study ID Number: NG9045-A1)

Product Tested: S.A.G.E. UV Whole Room Unit
Operational Mode Tested: Extended Life Mode (Over a 4-hour period, unit runs alternating 1-hour cycles of 2-minutes of cleaning, 8-minute breaks followed by 30-minute break. **Cumulative cleaning time is 36 minutes**)
Distances Tested: 2 meters (6.6 feet) & 3 meters (9.8 feet)
Study Timeline: 6/28/17-7/6/17

Test Microorganism	Test Substance/ Test Conditions	Contact Time	Units Per Carrier	Average Percent Reduction Infectious Units Per Carrier
E. Coli ATCC 8739	Plate Recovery Control	Initial	1.47E+07	N/A
		Final	6.20E+05	
		Average	7.66E+06	
	Violet Defense Whole Room Unit (2 meters)	4 Hour Cycle (36 min. run time)	9.00E+01	99.999%
	Violet Defense Whole Room Unit (3 meters)	4 Hour Cycle (36 min. run time)	1.05E+03	99.99%

Test Microorganism	Test Substance/ Test Conditions	Contact Time	Units Per Carrier	Average Percent Reduction Infectious Units Per Carrier
S. enterica ATCC 10708	Plate Recovery Control	Initial	1.71E+06	N/A
		Final	2.90E+04	
		Average	8.70E+05	
	Violet Defense Whole Room Unit (2 meters)	4 Hour Cycle (36 min. run time)	6.08E+02	99.93%
	Violet Defense Whole Room Unit (3 meters)	4 Hour Cycle (36 min. run time)	1.10E+03	99.87%

Test Microorganism	Test Substance/ Test Conditions	Contact Time	Units Per Carrier	Average Percent Reduction Infectious Units Per Carrier
S. aureus ATCC 33592	Plate Recovery Control	Initial	2.20E+06	N/A
		Final	1.83E+06	
		Average	2.02E+06	
	Violet Defense Whole Room Unit (2 meters)	4 Hour Cycle (36 min. run time)	9.00E+02	99.96%
	Violet Defense Whole Room Unit (3 meters)	4 Hour Cycle (36 min. run time)	3.40E+03	99.83%

Antibacterial Activity and Sanitizing Efficacy of Violet Defense's Device (Study ID Number: NG9204-A1)

Product Tested: S.A.G.E. UV Whole Room Unit
Operational Modes Tested: Quick Clean Mode (15-minutes), Standard Mode (30-minutes), and Ultra Mode (45-minutes)
Distances Tested: 3 meters (9.8 feet) & 4 meters (13.1 feet)
Study Timeline: 8/2/2017-8/14/2017

Test Microorganism	Test Substance/ Test Conditions	Contact Time	Units Per Carrier	Average Percent Reduction Infectious Units Per Carrier
E. Coli ATCC 8739	Plate Recovery Control	Initial	4.71E+06	N/A
		Final	4.05E+06	
		Average	4.38E+06	
	Violet Defense Whole Room Unit (3 meters)	15 minutes	2.38E+04	99.46%
		30 minutes	6.84E+03	99.84%
		45 minutes	1.30E+03	99.97%
	Violet Defense Whole Room Unit (4 meters)	15 minutes	1.00E+05	97.72%
		30 minutes	1.38E+04	99.69%
		45 minutes	6.70E+03	99.85%

Test Microorganism	Test Substance/ Test Conditions	Contact Time	Units Per Carrier	Average Percent Reduction Infectious Units Per Carrier
S. enterica ATCC 10708	Plate Recovery Control	Initial	2.46E+06	N/A
		Final	5.43E+05	
		Average	1.50E+06	
	Violet Defense Whole Room Unit (3 meters)	15 minutes	3.38E+04	97.75%
		30 minutes	2.68E+03	99.82%
		45 minutes	4.13E+02	99.97%
	Violet Defense Whole Room Unit (4 meters)	15 minutes	2.63E+04	98.25%
		30 minutes	9.98E+03	99.34%
		45 minutes	1.85E+03	99.88%

Test Microorganism	Test Substance/ Test Conditions	Contact Time	Units Per Carrier	Average Percent Reduction Infectious Units Per Carrier
S. aureus ATCC 33592	Plate Recovery Control	Initial	1.46E+06	N/A
		Final	1.71E+06	
		Average	1.59E+06	
	Violet Defense Whole Room Unit (3 meters)	15 minutes	3.25E+04	97.95%
		30 minutes	6.25E+03	99.61%
		45 minutes	2.25E+03	99.86%
	Violet Defense Whole Room Unit (4 meters)	15 minutes	7.75E+04	95.12%
		30 minutes	2.13E+04	98.66%
		45 minutes	5.35E+03	99.66%

Antibacterial Activity and Sanitizing Efficacy of Violet Defense's Device (Study ID Number: NG9044-A1)

Product Tested: S.A.G.E. UV Bathroom Fan
Operational Modes Tested: Extended Life Mode (Over a 4-hour period, unit runs alternating 1-hour cycles of 2-minutes of cleaning, 8-minute breaks followed by 30-minute break. **Cumulative cleaning time is 36 minutes**)
Distance Tested: 2 meters (6.6 feet)
Study Timeline: 6/29/17-7/7/17

Test Microorganism	Test Substance/ Test Conditions	Contact Time	Units Per Carrier	Average Percent Reduction Infectious Units Per Carrier
E. Coli ATCC 8739	Plate Recovery Control	Initial	5.30E+06	N/A
		Final	3.80E+05	
		Average	2.84E+06	
	Violet Defense Bath Fan (2 meters)	4 Hour Cycle (36 min. run time)	1.42E+04	99.50%

Test Microorganism	Test Substance/ Test Conditions	Contact Time	Units Per Carrier	Average Percent Reduction Infectious Units Per Carrier
S. enterica ATCC 10708	Plate Recovery Control	Initial	1.88E+06	N/A
		Final	6.40E+04	
		Average	9.72E+05	
	Violet Defense Bath Fan (2 meters)	4 Hour Cycle (36 min. run time)	3.29E+03	99.66%

Test Microorganism	Test Substance/ Test Conditions	Contact Time	Units Per Carrier	Average Percent Reduction Infectious Units Per Carrier
S. aureus ATCC 33592	Plate Recovery Control	Initial	1.33E+06	N/A
		Final	9.00E+05	
		Average	1.12E+06	
	Violet Defense Bath Fan (2 meters)	4 Hour Cycle (36 min. run time)	1.78E+04	98.40%

Antibacterial Activity and Sanitizing Efficacy of Violet Defense's Device (Study ID Number: NG9205-A1)

Product Tested: S.A.G.E. UV Bathroom Fan
Operational Modes Tested: Quick Clean Mode (15-minutes), Standard Mode (30-minutes), and Ultra Mode (45-minutes)
Distances Tested: 2 meters (6.6 feet) & 3 meters (9.8 feet)
Study Timeline: 8/2/2017-8/14/2017

Test Microorganism	Test Substance/ Test Conditions	Contact Time	Units Per Carrier	Average Percent Reduction Infectious Units Per Carrier
E. Coli ATCC 8739	Plate Recovery Control	Initial	5.39E+06	N/A
		Final	1.68E+06	
		Average	3.53E+06	
	Violet Defense Bath Fan (2 meters)	15 minutes	9.88E+04	97.20%
		30 minutes	5.00E+04	98.58%
		45 minutes	6.86E+03	99.81%
	Violet Defense Bath Fan (3 meters)	15 minutes	7.75E+05	78.05%
		30 minutes	2.05E+05	94.19%
		45 minutes	1.50E+04	99.58%

Test Microorganism	Test Substance/ Test Conditions	Contact Time	Units Per Carrier	Average Percent Reduction Infectious Units Per Carrier
S. enterica ATCC 10708	Plate Recovery Control	Initial	4.00E+05	N/A
		Final	2.05E+05	
		Average	3.03E+05	
	Violet Defense Bath Fan (2 meters)	15 minutes	3.50E+04	88.43%
		30 minutes	5.00E+03	98.35%
		45 minutes	8.75E+03	97.11%
	Violet Defense Bath Fan (3 meters)	15 minutes	4.25E+04	85.95%
		30 minutes	6.25E+03	97.93%
		45 minutes	6.25E+03	97.93%

Test Microorganism	Test Substance/ Test Conditions	Contact Time	Units Per Carrier	Average Percent Reduction Infectious Units Per Carrier
S. aureus ATCC 33592	Plate Recovery Control	Initial	1.69E+06	N/A
		Final	1.50E+06	
		Average	1.59E+06	
	Violet Defense Bath Fan (2 meters)	15 minutes	2.45E+05	84.63%
		30 minutes	3.00E+04	98.12%
		45 minutes	9.85E+03	99.38%
	Violet Defense Bath Fan (3 meters)	15 minutes	3.58E+05	77.57%
		30 minutes	1.01E+05	93.65%
		45 minutes	3.63E+04	97.73%

Determination of the Antiviral Effectiveness of Test Device Against Feline Calicivirus (Study ID Number: NG9046-A1)

Product Tested: S.A.G.E. UV Bathroom Fan
Operational Mode Tested: Extended Life Mode (Over a 4-hour period, unit runs alternating 1-hour cycles of 2-minutes of cleaning, 8-minute breaks followed by 30-minute break. **Cumulative cleaning time is 36 minutes**)
Distance Tested: 2 meters (6.6 feet)
Study Timeline: 6/30/17-7/6/17

Test Microorganism	Test Substance/ Test Conditions	Contact Time	Units Per Carrier	Average Percent Reduction Infectious Units Per Carrier
Feline Calicivirus (EPA-approved human norovirus surrogate), ATCC VR-782	Plate Recovery Control	Initial	7.08E+05	N/A
		Final	1.26E+04	
		Average	3.60E+05	
	Violet Defense Bath Fan (2 meters)	4 Hour Cycle (36 min. run time)	2.24E+02	99.77%

Determination of the Antiviral Effectiveness of Test Device Against Feline Calicivirus (Study ID Number: NG9047-A3)

Product Tested: S.A.G.E. UV Whole Room Unit
Operational Mode Tested: Extended Life Mode (Over a 4-hour period, unit runs alternating 1-hour cycles of 2-minutes of cleaning, 8-minute breaks followed by 30-minute break. **Cumulative cleaning time is 36 minutes**)
Distances Tested: 2 meters (6.6 feet) & 3 meters (9.8 feet)
Study Timeline: 6/29/17-7/6/17

Test Microorganism	Test Substance/ Test Conditions	Contact Time	Units Per Carrier	Average Percent Reduction Infectious Units Per Carrier
Feline Calicivirus (EPA-approved human norovirus surrogate), ATCC VR-782	Plate Recovery Control	Initial	7.08E+06	N/A
		Final	1.26E+05	
		Average	3.60E+06	
	Violet Defense Whole Room Unit (2 meters)	4 Hour Cycle (36 min. run time)	7.08E+01	99.993%
	Violet Defense Whole Room Unit (3 meters)	4 Hour Cycle (36 min. run time)	2.24E+02	99.98%

VIOLET DEFENSE TECHNOLOGY

Study Report
UV Comparison Trial

In July 2018, Sodexo, in connection with ResInnova Laboratories, conducted a UV comparison trial to evaluate and compare the antimicrobial efficacies of several disinfection machines. Violet Defense agreed to provide units to be a part of this independent, side-by-side comparison.

About ResInnova Laboratories

ResInnova Laboratories is an International Antimicrobial Council (IAC) certified laboratory and implements testing standards established by AATCC, ASTM, ISO and JIS. Tests were conducted at the ResInnova Laboratory, 8807 Colesville Rd, Silver Spring, Maryland. For more information, visit www.resinnovalabs.com.

Test Protocol

Each product in the comparison trial was tested against bacterial spores in different test locations in a laboratory-controlled mock hospital room and bathroom. The testing protocol for Violet Defense utilized 4 whole room units in a layout designed to replicate a fully installed deployment.

Pathogens Tested

Clostridioides difficile (C. diff)

This bacteria is a gram-positive, rod shaped, endospore generating obligate anaerobe. *Clostridium* species are part of the normal human gut flora that produce spores which are highly resistant to chemical and environmental conditions. *C. difficile* is commonly associated with hospital acquired infections and is known to cause antibiotic assisted colitis.

Study Results

UV Comparison Trial

Tested Device: Violet Defense UV Disinfection Device
Operational Mode Tested: Four 30-minute cycles to replicate automatic mode over a 24-hour period
Distances Tested: ~1.5 meters

Test Microorganism	Location	Average Percent Reduction
C. *difficile*	Bedrail (right)	99.9707%
	Bedrail (left)	99.9560%
	Under Bed	99.9937%
	Call Button	99.9681%
	Guest Chair Armrest	99.9954%
	Floor (near)	99.9918%
	Table (top)	99.9881%
	Table (bottom)	99.9842%
	Floor (far)	99.9525%
	Toilet Seat	99.9928%
	Sink Handle	99.9285%
	Grab Bar	99.9661%
	AVERAGE	**99.9740%**

VIOLET DEFENSE TECHNOLOGY

Study Report

Antimicrobial Effectiveness of Violet Defense Devices

In June 2019, Violet Defense engaged a third-party, clinical testing lab to validate the efficacy of its products against C. *auris*. The following represents the results of that testing.

About Microchem Laboratory

Microchem Laboratory is an EPA and FDA GLP-Compliant, ISO 17025 Accredited Testing Laboratory (Laboratory Accreditation Bureau Certificate Number L2450). Tests were conducted at the Microchem Laboratory, 1304 W. Industrial Blvd, Round Rock, TX 78681. For more information, visit www.microchemlab.com.

Test Methods

ASTM International, formerly the American Society for Testing and Materials (ASTM), is an internationally recognized organization that develops and publishes product and testing standards.

This study (NG13050) was conducted utilizing ASTM International Standard Test Method E1153 Modified for Devices Test Method for Efficacy of Sanitizers Recommended for Inanimate Non-Food Contact Surfaces. ASTM E1153 is a quantitative test method designed to evaluate the antimicrobial efficacy of sanitizers on pre-cleaned, inanimate, nonporous environmental surfaces.

Pathogens Tested

Candida auris AR Bank #0381

This fungus grows as a yeast and is ascomycetous. C. *auris* is an emerging pathogen and the epidemiology for transmission is still under investigation. Infections have most often occurred in hospitalized patients and healthcare facilities. This yeast has developed resistance to commonly used antifungal drugs and specialized laboratory methods are needed to identify C. *auris* infections. Because of this, C. *auris* infections are increasingly difficult to identify and treat.

Study Results

Antibacterial Activity and Sanitizing Efficacy of Violet Defense's Device (Study ID Number: NG13050)

Tested Device: Violet Defense UV Disinfection Device
Operational Mode Tested: Single Cycle Mode with run times of 1 hour, 2 hours, and 3 hours
Distances Tested: 1 meter (3.3 feet) & 2 meters (6.6 feet)
Study Timeline: 6/3/19-6/19/19

Test Microorganism	Distance	Contact Time	Average Percent Reduction
C. *auris* CDC AR Bank #0381	1 meter	1 hour	99.96%
		2 hours	99.97%
		3 hours	>99.98%
	2 meters	1 hour	96.66%
		2 hours	99.79%
		3 hours	99.82%