

UV Station

Efficacy and Safety Testing

Evaluating the effectiveness of using UV Station as means to combat viruses, bacteria and other microorganisms responsible for the transmission of disease

Prepared by:

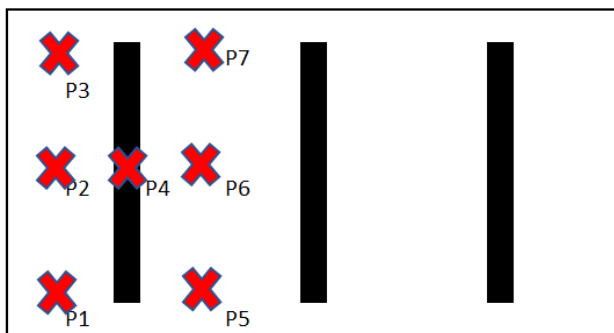
Nonstop Products

May 17th, 2021

UV Station Efficacy

The following data is consolidated from various tests conducted on UV Station by third party test laboratories. Efficacy data is commonly expressed by log reduction / inactivation of specific pathogens, similar to those shared on the following pages. Less commonly available is intensity and coverage data shown in figure 1 and 2 below. Pathogen inactivation efficacy testing or “kill rate” testing is typically done in a petri dish, which is located in the mid point of a light box where maximum light energy is delivered. This data while helpful does not address whether similar and sufficient irradiation / efficacy is present in other areas of the light box. UV Station was designed with these limitations in mind, so energy levels throughout the entire light box (measured in mJ/cm²) exceed that required to inactivate 99.999% of common pathogens (5 log reduction).

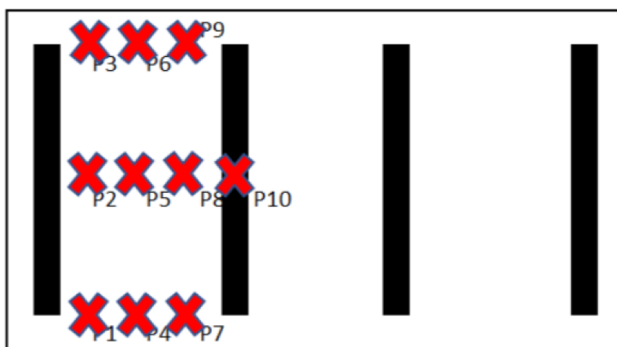
Figure 1



UV-C radiation dose measurements by radiometer (@ 20mm below top lamps)

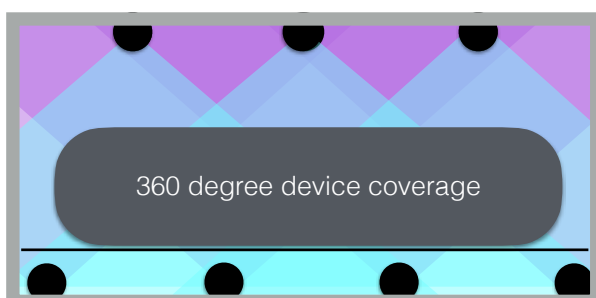
Measurement location	(mJ/cm ²) @5mins
P1	47.29
P2	82.41
P3	26.66
P4	194.76
P5	63.88
P6	62.87
P7	54.76

Figure 2



UV-C radiation dose measurements by Radiometer (touched to quartz plate)

Measurement location	(mJ/cm ²) @5mins
P1	158.62
P2	155.86
P3	124.31
P4	63.00
P5	78.84
P6	56.61
P7	95.07
P8	105.18
P9	70.97
P10	1406.56



7 UV-C Lamps with 254nm wavelength peak emission

Reflective walls

Quartz Plate

UV Station Bacteria Test Data

Summary

A Study has been conducted on the test product UV Station in order to determine its disinfection effectiveness against bacterial strain, reference to operation procedures of UV Station as recommended by the manufacturer.

On the basis of the obtained results, in compliance with the assay validity criteria, the test product UV Station performed disinfection activity with a reduction of the bacterial viability greater than 99.999% reduction compared to negative control after applied contact time of 5 minutes.

In order to determine its disinfection effectiveness against the bacterial strain, according to applicant' requirements, the study was performed at the Test Facility CMA Industrial Development Foundation Limited.

TEST REPORT

Report No : AZ0040637(9)

Date: 14 Sep 2020

Application No : LZ021829(0)

Test Result :

Test organism	(A) Viable bacterial count without exposure	(B) Viable bacterial count after 5 minutes of exposure	Bactericidal effectiveness (%)
<i>Candida albicans</i> ATCC 10231	8.3 x10 ⁵ CFU	<1.0 x10 ⁰ CFU	>99.999%
<i>Escherichia coli</i> ATCC 8739	7.9 x10 ⁵ CFU	<1.0 x10 ⁰ CFU	>99.999%
<i>Salmonella typhimurium</i> ATCC 14028	6.9 x10 ⁵ CFU	<1.0 x10 ⁰ CFU	>99.999%
<i>Staphylococcus aureus</i> ATCC 6538	9.1 x10 ⁵ CFU	<1.0 x10 ⁰ CFU	>99.999%

- Note : 1. % denotes percentage
2. CFU denotes colony forming unit
3. NA denotes not applicable
4. Bactericidal effectiveness = [(A)-(B)]/(A) x 100

UV Station Virus Test Data

Summary

A Study has been conducted on the test product UV Station in order to determine its disinfection effectiveness against virus strain, reference to operation procedures of UV Station as recommended by the manufacturer.

On the basis of the obtained results, in compliance with the assay validity criteria, the test product UV Station performed disinfection activity with a reduction of the viral viability greater than 99.99% reduction compared to negative control after applied contact time 5 minutes.

In order to determine its disinfection effectiveness against viral strain, according to applicant' requirements, the study was performed at Gmicro Testing's Guangdong Detection Center of Microbiology. 4 log reduction was the maximum limit for this study.

GUANGDONG DETECTION CENTER OF MICROBIOLOGY

ANALYSIS AND TEST RESULT

Report №.: 2020SP10598R02E

1. Action time: 5min							
2. Test results:							
Test Virus	Host cell	Group	Logarithm of infectivity titre of virus (lgTCID ₅₀ /mL)		Average infectivity titre of virus (TCID ₅₀ /mL)	Average inactivation log value	Inactivation ratio (%)
			Results	Average value			
Influenza A virus H1N1	MDCK cells	Control group 1	5.33	5.22	1.7×10 ⁵	>4.72	>99.99
		Control group 2	5.33				
		Control group 3	5.00				
		Test group 1	<0.50	<0.50	<3.16		
		Test group 2	<0.50				
		Test group 3	<0.50				

Cell control: Normal growth.

Reference evaluation:
Refer to Technical Standard for Disinfection (Ministry of Health, Edition 2002), section 2-2.1.5.5 and the test repeated 3 times, if the average inactivation log value of the sample for the tested virus is ≥ 4.00 . it can be considered that the sample is qualified for disinfection of the tested virus.

UV Station Virus Test Data (cont.)

GUANGDONG DETECTION CENTER OF MICROBIOLOGY

ANALYSIS AND TEST RESULT

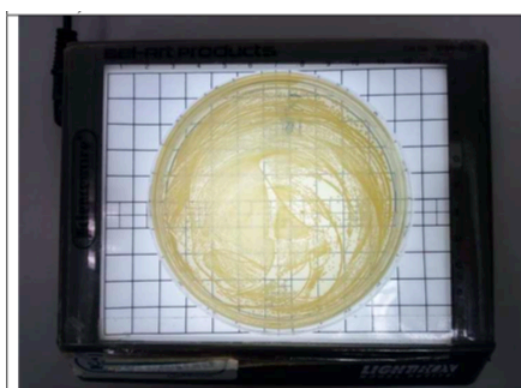
Report No.: 2020SP10598R01E

1. Action position: Position directly below the UV lamp

2. Action time: 5min

3. Test results:

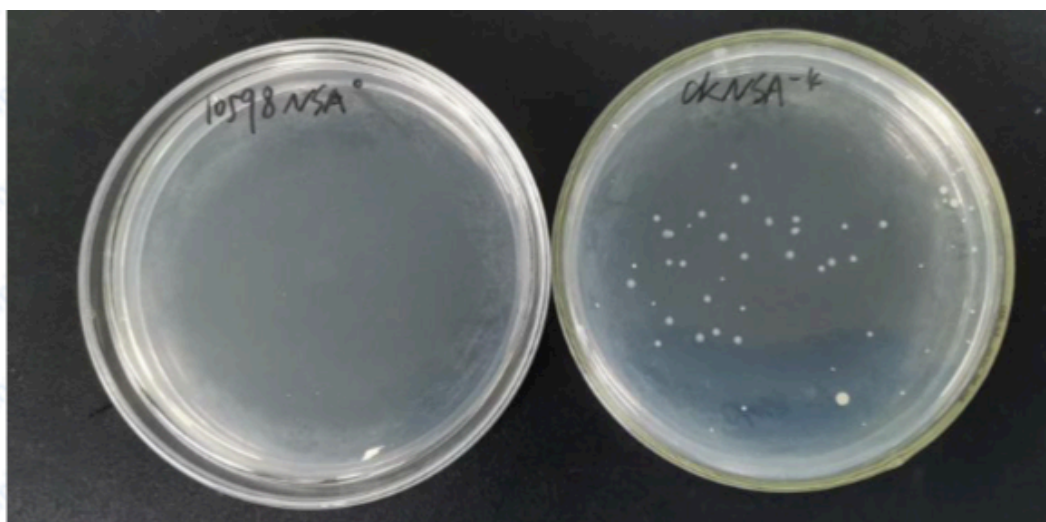
Test organisms	Test group	Average cfu of testing groups (cfu/piece)	Average cfu of positive controls (cfu/piece)	Sterilization logarithm (KL)	Sterilization rate (%)
<i>Methicillin-resistant Staphylococcus aureus</i> ATCC 43300	1	<5	2.2×10^6	>5.64	>99.99
	2	<5	2.4×10^6	>5.68	>99.99
	3	<5	2.1×10^6	>5.62	>99.99
	Average			>5.65	>99.99



Control sample of *Staphylococcus aureus* (ATCC 6538)



Treated sample of *Staphylococcus aureus* (ATCC 6538)



Treated sample of MRSA

Control sample of MRSA

Why UV

You do your best to stay clean and healthy. You probably wash your hands more frequently than ever. But what about the items you handle most frequently? Your mobile phone, other wearable tech, the TV remote control... they are notoriously dirty and not easy to clean with liquids. Keeping these items clean helps reduce transmission of germs. UV Station is one of the easiest and efficacious methods to clean and disinfect these devices.

How it Works

Thanks to its germicidal properties UV-C light technology has been used for years to sterilize objects across many industries. Now you can harness the power of the sun to kill bacteria and viruses that may be hiding on your devices. UV Station has 7 strategically placed UV-C lamps within its light box in order to provide 360 degree coverage.

What it Cleans / Proper Use

UV-Station was designed to clean the most common things we touch. While phones and remotes are high on that list, other items that fit into the UV Station light box can also be cleaned (e.g. watches, fitness bands, earbuds, eye wear, etc.). Note that the germicidal UV-C light is only effective on the external surfaces it reaches. For example if you place your passport inside, then both covers will be cleaned, but the inside pages will not. Therefore proper use means ensuring that devices placed inside do not overlap, or fold over on themselves. Also be sure devices are not touching the side walls of the light box. Proper use also means observing safety warnings.

Safety / Certification

UV-C light exposure can be harmful to humans and animals. Prolonged exposure to the light radiation can cause damaging effects to the skin and eyes. UV Station was designed to contain the UV-C radiation safely within its light box. It has a safety mechanism that will only allow the clean cycle to begin or continue if the lid is fully closed. Keep the lid closed until the clean cycle is complete. Opening the lid mid-cycle should automatically shut off the lights. If the lights remain on after opening the lid, do not look at the light, and unplug the device. Non-medical use UV-C lamps are regulated by the EPA as pesticides. Manufactures using UV-C lamps must register with the EPA. Nonstop UV Station EPA Registration number is 99701-CHN-1; and is clearly marked on every box.

UV Station™

Jetway Black NSUV-BK

EPA ESTABLISHMENT # 99701-CHN-1

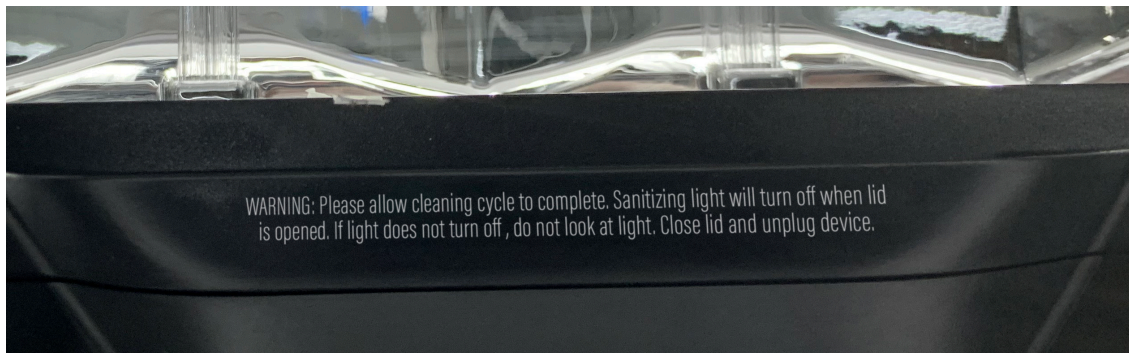


Chemical-Free

One of the many benefits of UV-C technology is that it is incredibly effective at inactivating germs, while being chemical free. That means the UV Station can provide years of cleaning power without contributing any negative impacts to our environment.

Guest Safety & Terms of Use

With consumer UV Sanitizers safety language is contained within the user guide / installation manual is sufficient. UV Station is designed to be used by hotel guests that do not have access to this information. Therefore the product itself has been designed to communicate the safety language to the guest in the following ways:

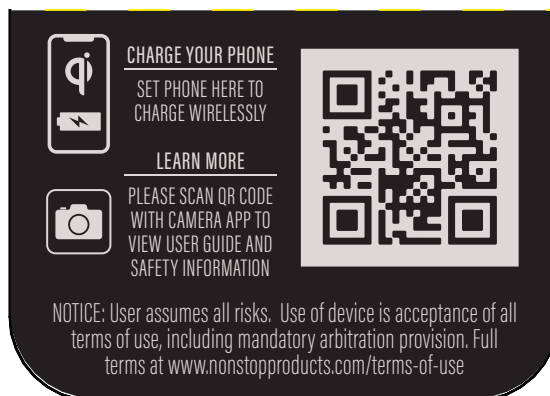


This language, affixed to product directly at the point where the UV-C compartment lid is opened / closed informs the user what to do in the unlikely event of a malfunction of such that the safety switch that shuts off the UV-C lamps when the lid is opened does not function properly.



Language on the front of product informs users of additional safety information that is available for review online; together with a QR code for quick access to the web page that hosts the information. You can view this page by visiting : [Nonstop Terms of Use](#)

Just below the advertisement of the additional safety information is language about the terms of use and the website URL is provided (same one that the QR links to).



Staff Safety & OSHA

From an OSHA perspective the two potential hazardous substances would be mercury and non-ionizing radiation (from potential exposure to the ultra violet light). With respect to mercury exposure, which should only occur if a bulb breaks, attached is an OSHA fact sheet regarding cleaning up mercury and taking other safety precautions. With respect to exposure to ultra violet light, the OSHA non-ionizing radiation exposure guidance exposure limitation is Power density of 10 mW./cm² (milliwatt per square centimeter) over six minutes.

UV Station readings within the compartment average .52 mW/cm². Therefore even under a condition where a person had their hand in the box for the full 5 minute clean cycle (which is not possible under normal operation because the light shuts off when the lid is opened) this would still fall under OSHA's exposure guidance threshold.

Other than cleaning up mercury, which the hotel should probably have specially trained employees perform, hotel staff should not have any significant exposure to either mercury or ultra violet light under normal circumstances.



Avoiding Mercury Exposure from Fluorescent Bulbs

Metallic mercury poses health risks from inhalation and skin exposure. Tubular or compact fluorescent bulbs contain small amounts of the metal mercury sealed inside. If fluorescent bulbs are broken, small amounts of mercury will be released into the environment. Proper cleanup will reduce workers' exposure to the low levels of mercury anticipated when a fluorescent bulb is accidentally broken.

How Workers Can Be Exposed

- Breathing mercury vapor in the air.
- Skin contact with mercury.

Health Effects and Symptoms

- Signs of mercury poisoning include tremors; mood, memory or coordination changes; and skin irritation or allergy.
- Exposure to mercury can harm unborn children.

Preventing Accidental Breakage

- Handle bulbs carefully and store away from workers.
- Package bulbs in a sturdy container to prevent breakage.
- Label containers of fluorescent bulbs.

Safe Cleanup of Broken Fluorescent Bulbs

- Notify workers and tell them to stay away from the area.
- Open any windows and doors to air out the room.
- **Do not** use a broom or vacuum cleaner unless the vacuum cleaner is specifically designed to collect mercury.
- Wear appropriate disposable chemical-resistant gloves.
- Use a commercial mercury spill kit if available, or scoop up pieces of glass and powder with stiff paper or cardboard to avoid contact with the broken glass.
- Use sticky tape to pick up any remaining pieces of glass.
- Wipe down hard floors with a damp paper towel.
- Place all pieces of glass and cleanup materials in a sealable plastic bag or a glass jar with a lid.
- Wash your hands thoroughly after cleanup.

Disposing of Fluorescent Bulbs

- Follow EPA and state government regulations for disposal of fluorescent bulbs and mercury-contaminated waste.

For more information:



U.S. Department of Labor

www.osha.gov (800) 321-OSHA (6742)